
G

Gastrointestinal Tract and Abdomen

ESOPHAGUS

- G-1** Retention of Barium in the Hypopharynx (Esp. Cricopharyngeal Achalasia) (Roentgen Counterpart of Dysphagia)
- G-2** Esophageal Motility Disorder (Aperistalsis, Tertiary Contractions, Spasm, and other Forms)
- G-3** Achalasia (Cardiospasm) of the Esophagus
- G-4** Air in the Esophagus
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- G-15** Transverse Mucosal Folds in the Esophagus
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MESENTERY AND PERITONEUM

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ABDOMINAL AIR, GAS, OR ABSCESS

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ABDOMEN, MISCELLANEOUS

- G-253** Abdominal Wall Mass (Esp. on US, CT, or MRI)
- G-254** Cystic Abdominal Mass in a Fetus or Newborn (US)
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- G-256** Lower Abdominal Mass in a Neonate or Child
 - G-257** Abdominal Lymphadenopathy (US, CT, MRI)
 - G-258** Fat Density in the Abdomen (CT, MRI)
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 - G-261** Complications of AIDS in the Gastrointestinal Tract and Abdomen

Gamut G-1

RETENTION OF BARIUM IN THE HYPOPHARYNX (ESP. CRICOPHARYNGEAL ACHALASIA) (ROENTGEN COUNTERPART OF DYSPHAGIA)

COMMON

1. Connective tissue disease (collagen vascular disease)_g (esp. scleroderma; dermatomyositis)
2. Cricopharyngeal achalasia (minor to severe muscular incoordination)
3. Esophageal obstruction (eg, achalasia; carcinoma)
4. Muscular disorder_g (eg, myasthenia gravis; myotonic dystrophy; steroid or thyrotoxic myopathy; oculopharyngeal myopathy)
5. Neurologic disorder_g (eg, stroke; bulbar or pseudobulbar palsy; bulbar poliomyelitis; high unilateral cervical vagotomy; multiple sclerosis; parkinsonism; amyotrophic lateral sclerosis; syringomyelia; Riley-Day S. (familial dysautonomia); peripheral or central cranial nerve palsy; diphtheria; tetanus)
6. Postradiation therapy for pharyngeal or neck malignancy
7. Zenker's diverticulum

UNCOMMON

1. Abscess; cellulitis (esp. pharyngeal; peritonsillar)
2. Esophageal web (eg, congenital; Plummer-Vinson S.)
3. Foreign body
4. Hematoma of neck
5. Lymphadenopathy, cervical
6. [Pseudodeflect from total laryngectomy]
7. Stricture (eg, lye)
8. Thyroid neoplasm

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

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Gamut G-2

ESOPHAGEAL MOTILITY DISORDER (APERISTALSIS, TERTIARY CONTRACTIONS, SPASM, AND OTHER FORMS)

COMMON

- +*1. Achalasia (cardiospasm) (See G-3)
 2. Chhalasia (infantile gastroesophageal regurgitation)
 3. Cricopharyngeal achalasia
 - +4. Diffuse esophageal spasm, idiopathic
- +*5. Esophagitis (eg, reflux or peptic; radiation; caustic; monilial; herpes; viral)
- +6. Neurologic disorder_g (eg, stroke; peripheral or central cranial nerve palsy; pseudobulbar palsy; bulbar poliomyelitis; syringomyelia; high unilateral cervical vagotomy; multiple sclerosis; parkinsonism; amyotrophic lateral sclerosis; cerebral disease; Riley-Day S. {familial dysautonomia})
- +7. Obstructive lesion, extrinsic or intrinsic (eg, Schatzki ring; stricture; esophageal neoplasm; foreign body; web; mediastinal tumor, cyst, or lymphadenopathy; mediastinitis)
- +*8. Postsurgical repair of esophageal atresia, tracheoesophageal fistula, or hiatal hernia
- +9. Presbyesophagus
- *10. Scleroderma
11. Zenker's diverticulum

UNCOMMON

1. Alcoholic neuropathy
- *2. Amyloidosis

(continued)

3. Behçet S.
- *4. Chagas' disease
5. Congenital syndromes (eg, Ehlers-Danlos S.; cutis laxa; G syndrome)
- *6. Connective tissue disease (collagen vascular disease)_g, other (eg, dermatomyositis; polymyositis; mixed connective tissue disease {MCTD}); lupus erythematosus; rheumatoid arthritis)
- *7. Crohn's disease
- +8. Diabetic neuropathy
- *9. Drug reaction (atropine; curare; Pro-Banthine)
- +10. Hypertensive lower esophageal sphincter
11. Iatrogenic (eg, postvagotomy S.; sclerotherapy for varices)
12. Intramural diverticulosis of esophagus
- +13. Muscular disorder_g (esp. myasthenia gravis; oculopharyngeal myopathy; muscular or myotonic dystrophy; steroid or thyrotoxic myopathy)
- +14. Neoplasm, infiltrative (eg, diffuse esophageal carcinoma; leukemia)
- +15. Nutcracker esophagus
16. Paraneoplastic S.
17. Thyroid disease (myxedema; thyrotoxicosis)
18. Tylosis (keratosis palmaris et plantaris familiaris)

* Esophagus may be aperistaltic.

+ Tertiary contractions often present.

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Gamut G-3

ACHALASIA (CARDIOSPASM) OF THE ESOPHAGUS

COMMON

1. [Carcinoma, esophageal or gastric]
2. Idiopathic
3. [Stricture from esophagitis]

UNCOMMON

1. Amyloidosis
2. Cerebrovascular accident (stroke)
3. Chagas' disease
4. Chronic idiopathic intestinal pseudo-obstruction
5. Connective tissue disease (collagen disease)_g (esp. scleroderma)
6. Diabetic neuropathy
7. Drug reaction (esp. atropine; Pro-Banthine)
8. Hypertensive lower esophageal sphincter
9. Iatrogenic (eg, vagotomy)
10. Nerve destruction (myenteric plexus, sympathetic, or vagus), esp. by neoplasm

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

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Gamut G-4**AIR IN THE ESOPHAGUS****COMMON**

1. Achalasia (See G-3)
2. Infant respiratory distress syndrome (hyaline membrane disease)
3. Normal
4. Respirator therapy; intubation
5. Scleroderma

UNCOMMON

1. Caustic esophagitis
2. Chagas' disease
3. Diverticulum, esophageal
4. Gastroesophageal regurgitation, infantile or adult
5. Hypertensive lower esophageal sphincter
6. Obstruction of esophagus (eg, neoplasm of esophagus; mediastinal tumor, cyst, or lymphadenopathy; mediastinitis)
7. Postoperative (eg, esophageal or pulmonary surgery)

References

1. Meredith HC, Anderson RJ, Vujic I: Another look at the segmental air esophagram. *AJR* 1960;136:23–26
2. Ott DJ: Motility disorders of the esophagus. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 316–328

Gamut G-5**EXTRINSIC IMPRESSION ON THE CERVICAL ESOPHAGUS****COMMON**

1. Cricopharyngeal muscle
2. [Esophageal web]
3. Lymph node enlargement
4. Osteophyte of cervical spine
5. Pharyngeal venous plexus (postcricoid impression)
6. Soft tissue abscess or hematoma (esp. retro-laryngeal)
7. Thyroid mass (eg, goiter; adenoma; carcinoma; thyroiditis)

UNCOMMON

1. Aneurysm or buckling of carotid or innominate artery
2. Cervical spine lesion, other (eg, osteomyelitis; neoplasm; anteriorly herniated disk)
3. Ectopic gastric mucosa
4. Parathyroid tumor (eg, adenoma; carcinoma)
5. [Gastrointestinal stromal tumor_g (esp. leiomyoma) or lipoma of esophagus]
6. Tracheal or laryngeal neoplasm

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Gelfand DW: *Gastrointestinal Radiology*. New York: Churchill Livingstone, 1984
2. Eisenberg RL: *Clinical Imaging: An Atlas of Differential Diagnosis*. (ed 3) Philadelphia: Lippincott-Raven, 1997, pp 284–285

Gamut G-6

EXTRINSIC IMPRESSION ON THE THORACIC ESOPHAGUS

COMMON

1. Cardiac enlargement (esp. left atrium)
2. Duplication cyst (bronchogenic or enteric)
3. Hiatal hernia (esp. paraesophageal)
4. Mediastinal lymphadenopathy (eg, metastasis; lymphoma; tuberculosis; histoplasmosis; sarcoidosis)
5. Mediastinal mass (eg, tumor; cyst; mediastinitis)
6. Normal structure (left main stem bronchus; aortic knob; confluence of left pulmonary veins)
7. Pericardial lesion (eg, effusion; cyst; tumor) (See E-43)
8. Pleuropulmonary fibrosis at lung apex, esp. tuberculosis (pseudoinpression)
9. Pulmonary mass (esp. carcinoma of lung)
10. Vascular impression, abnormal (eg, aortic aneurysm or tortuosity; coarctation of aorta; right, cervical, or double aortic arch; truncus arteriosus; aberrant right or left subclavian artery; pulmonary sling) (See G-7)

UNCOMMON

1. Neurinoma of vagus or phrenic nerve
2. Spinal abnormality (eg, kyphosis; scoliosis; osteophyte; DISH; neoplasm; osteomyelitis)
3. Tracheal neoplasm (See B-111, F-81-1)

References

1. Gelfand DW: *Gastrointestinal Radiology*. New York: Churchill Livingstone, 1984, p 190
2. Eisenberg RL: *Clinical Imaging: An Atlas of Differential Diagnosis*. (ed 3) Philadelphia: Lippincott-Raven, 1996, pp 286–291

Gamut G-7

EXTRINSIC VASCULAR IMPRESSION ON THE ESOPHAGUS (See E-18)

COMMON

1. Aberrant right or left subclavian artery
2. Aortic abnormality, acquired (eg, aneurysm; tortuosity)
3. Aortic knob
4. Coarctation of aorta
5. Right aortic arch (esp. posterior or type II aortic arch)

UNCOMMON

1. Anomalous innominate artery
2. Aortic diverticulum
3. APVC, total (below diaphragm)
4. Arteriovenous malformation
5. Azygos or hemiazygos vein dilatation
6. Cervical aortic arch
7. Corrected transposition (medially placed pulmonary artery)
8. Double aortic arch
9. Enlarged “bronchial” artery (incl. truncus arteriosus; absent main pulmonary artery)
10. Pulmonary artery “sling” (anomalous origin of left pulmonary artery)
11. Pulmonary vein confluence draining into back of left atrium
12. Sequestration of lung (anomalous artery from aorta)

References

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Gamut G-8

TRACHEOESOPHAGEAL OR ESOPHAGOBRONCHIAL FISTULA

COMMON

1. Carcinoma of esophagus, lung or trachea
2. Congenital, with or without esophageal atresia

UNCOMMON

1. Abscess, pulmonary or mediastinal
2. Actinomycosis
3. Behçet S.
4. Caustic esophagitis (esp. lye)
5. Crohn's disease
6. Diverticulum of esophagus, perforated
7. Esophageal lung (sequestration)
8. Granulomatous lymphadenitis (esp. histoplasmosis; tuberculosis; syphilis)
9. Infected pulmonary or mediastinal cyst or sequestration of lung
10. Lymphoma_g
11. Radiation therapy
12. Rupture of esophagus, "spontaneous" or traumatic (eg, foreign body; missile), or iatrogenic (surgery; instrumentation)

References

1. Cameron DC: Non-malignant oesophago-bronchial fistulae in the adult: Case reports and review of the literature. *Australas Radiol* 1983; 27:143–153
2. DeBacker AI, De Schepper AM, Vaneerdeweg W: Esophagobronchial fistula following redo Nissen fundoplication. *Abdom Imaging* 2000;25:116–118
3. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 131–139
4. Ramakantan R, Shah P: Tuberculous fistulas of the pharynx and esophagus. *Gastrointest Radiol* 1990;15:145–152
5. Spalding AR, Burney DP, Richie RE: Acquired benign bronchoesophageal fistulas in the adult. *Ann Thorac Surg* 1979; 28:378–383

Gamut G-9

DOUBLE-BARREL ESOPHAGUS*

COMMON

1. Dissecting intramural hematoma or hemorrhage
 - a. Severe vomiting (eg, Boerhaave S. with esophageal perforation, or Mallory-Weiss S. with esophageal tear)
 - b. Trauma
 - c. Instrumentation (eg, nasogastric intubation; endoscopy)
 - d. Ingestion of sharp foreign body
 - e. Spontaneous (eg, bleeding diathesis)

UNCOMMON

1. Esophageal duplication
2. Crohn's disease
3. Intraluminal diverticulum
4. Intramural abscess (eg, postendoscopy or foreign body perforation)
5. Intramural pseudodiverticulosis

* Barium opacification of an intramural dissecting channel separated from the normal esophageal lumen by an intervening radiolucent mucosal stripe.

References

1. Canon CL, Levine MS, Cherukuri R, et al: Intramural tracking: a feature of esophageal intramural pseudodiverticulosis. *AJR* 2000;175:371–374
2. Eisenberg RL: *Gastrointestinal Radiology. A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 140–145
3. Ghahremani GG: Esophageal trauma. *Semin Roentgenol* 1994;24:387–400
4. Levine MS: Other esophagitis. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 364–386

Gamut G-10-1

**DIVERTICULUM OF THE ESOPHAGUS—
UPPER THIRD**

COMMON

1. Zenker's diverticulum (pulsion type, posterior wall)

UNCOMMON

1. Killian-Jamieson diverticulum
2. Lateral pharyngeal pouch (pharyngocele), congenital or acquired (eg, glass blower; trumpet player)
3. Traction diverticulum (esp. after upper lobectomy, laryngectomy, or neck infection)

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 119–124
2. Rubesin SE: Structural abnormalities of the pharynx. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 227–255

Gamut G-10-2

**DIVERTICULUM OF THE ESOPHAGUS—
MIDDLE THIRD**

COMMON

1. Acquired pulsion diverticulum due to esophageal dysmotility
2. Traction diverticulum (esp. from adherent granulomatous lymph node)

UNCOMMON

1. Congenital pulsion diverticulum (interaortico-bronchial)
2. [Neurenteric or duplication cyst, communicating]

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 119–124
2. Levine MS: Miscellaneous abnormalities of the esophagus. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 465–483

Gamut-10-3

**DIVERTICULUM OF THE ESOPHAGUS—
LOWER THIRD**

1. Epiphrenic (“lower Zenker’s”)
2. [Mucosal tear, spontaneous (Mallory-Weiss S.) or postinstrumentation]
3. [Penetrating peptic ulcer]
4. Postoperative (eg, for achalasia)

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Bruggeman LL, Seaman WB: Epiphrenic diverticula: An analysis of 80 cases. AJR 1973; 119:266–276
2. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 2) Philadelphia: Lippincott, 1996, pp 119–124
3. Kreel L: Outline of Radiology. New York: Appleton-Century-Crofts, 1971, pp 110–112
4. Reeders JW, Joosten FB, Rosenbusch G: Radiology of the esophagus. Radiologe 2000;40:479–493

Gamut G-10-4

**DIVERTICULA OF THE ESOPHAGUS—
DIFFUSE**

1. Intramural diverticulosis
2. [Pseudodiverticulosis, esp. with *Candida* or herpes esophagitis]

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 2) Philadelphia: Lippincott, 1996, pp 119–124
2. Graham DY, Goyal RK, Sparkman J, et al: Diffuse intramural esophageal diverticulosis. *Gastroenterology* 1975; 68:781–785.
3. Levine MS, Moolten DN, Herlinger H, Laufer I: Esophageal intramural pseudodiverticulosis: a reevaluation. *AJR* 1986;147:1165–1170
4. Levine MS: Other esophagitides. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 364–386

Gamut G-11

SOLITARY INTRAMURAL OR INTRALUMINAL FILLING DEFECT OF THE ESOPHAGUS

COMMON

1. Air bubble; meat impaction; coin; other foreign body
2. Carcinoma of esophagus or stomach
3. Extrinsic lesion invading the esophageal wall (eg, carcinoma of lung; granulomatous lymph node)
4. Gastrointestinal stromal tumor_g (esp. leiomyoma)
5. Papilloma, squamous
6. Plaque-like lesion (eg, candidiasis—usually multiple) (See G-17)
7. Polyp_g (eg, adenomatous; fibrovascular; inflammatory esophagogastric)
8. Varix

UNCOMMON

1. Abscess
2. Angioma
3. Duplication cyst (bronchogenic or enteric)
4. Hematoma, intramural
5. Lipoma
6. Lymphoma_g; leukemia
7. Melanoma
8. Metastasis

9. Prolapsed gastric fold
10. Sarcoma (eg, leiomyosarcoma; Kaposi sarcoma)
11. Ulcer with edema (See G-14)
12. Villous adenoma

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 98–118
2. Gelfand DW: Gastrointestinal Radiology. New York: Churchill Livingstone, 1984, p 182
3. Levine MS: Esophagus: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 509–511
4. Styles RA, Gibb SP, Tarshis A, et al: Esophagogastric polyps: Radiographic and endoscopic findings. *Radiology* 1985;154:307–311

Gamut G-12

LOCALIZED CONSTRICTION OR NARROWING OF THE ESOPHAGUS

COMMON

1. Achalasia (cardiospasm)
2. Congenital atresia or stenosis, with or without T-E fistula
3. Duplication cyst (eg, bronchogenic cyst; gastroenteric cyst; neurenteric cyst)
4. Extrinsic pressure (eg, aortic knob; left main stem bronchus; aortic aneurysm or tortuosity, right aortic arch) (See G-5 to G-7)
5. Lower esophageal ring (Schatzki ring)
6. Neoplasm, benign (esp. gastrointestinal stromal tumor_g—leiomyoma; lipoma)
7. Neoplasm, malignant (esp. carcinoma or leiomyosarcoma of esophagus or gastric cardia)
8. Physiologic (muscular ring; inferior esophageal sphincter; normal sling fibers of diaphragm)
9. Postoperative (fundoplication; repair of hiatal hernia or esophageal atresia); postgastrectomy alkaline reflux esophagitis
10. Spasm, localized (eg, lower esophageal spasm)

(continued)

11. Stricture (eg, peptic or reflux esophagitis; corrosive esophagitis—lye; oral medication; postradiation; nasogastric intubation; Barrett esophagus; congenital)
12. Web or diaphragm of esophagus

UNCOMMON

1. Benign mucous membrane pemphigoid
2. Cartilaginous ring (tracheobronchial rest)
3. Chronic granulomatous disease of childhood
4. Crohn’s disease
5. Epidermolysis bullosa
6. Graft-versus-host disease
7. Hemorrhage in distal esophagus with adherent thrombus (eg, Mallory-Weiss S.; varices)
8. Hiatal hernia (esp. with short esophagus)
9. Infectious or inflammatory esophagitis (eg, candidiasis; herpes simplex; tuberculosis; histoplasmosis; actinomycosis; syphilis; eosinophilic esophagitis; Behçet S.)
10. Intramural esophageal pseudodiverticulosis
11. Lymphoma_g
12. Metastasis or direct spread from adjacent malignancy
13. Peptic esophageal ulcer
14. Postinstrumentation stricture (eg, nasogastric intubation; endoscopic perforation)
15. Sclerotherapy of esophageal varices
16. Tylosis (keratosis palmaris et plantaris familiaris)
17. Zollinger-Ellison S.

References

1. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 70–97
2. Gelfand DW: *Gastrointestinal Radiology*. New York: Churchill Livingstone, 1984, p 188
3. Levine MS: Esophagus: Differential diagnosis. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 509–511
4. Picus D, Frank PH: Eosinophilic esophagitis. *AJR* 1981; 136:1001–1003
5. Rohl L, Aksglaede K, Fundi-Jensen P, et al: Esophageal rings and strictures. *Acta Radiol* 2000;41:275–279

Gamut G-13

THICKENING OF THE ESOPHAGEAL WALL (CT, US, MRI)

COMMON

1. Carcinoma (squamous cell carcinoma in proximal 4/5; adenocarcinoma in distal fifth)
2. Corrosive esophagitis (eg, lye; oral medication)
3. Duplication cyst (eg, bronchogenic cyst; gastroenteric cyst; neurenteric cyst)
4. Infectious or inflammatory esophagitis (eg, candidiasis; herpes simplex; tuberculosis; histoplasmosis; actinomycosis; syphilis; eosinophilic esophagitis; Behçet S.)
5. Metastasis or direct spread from adjacent malignancy
6. Neoplasm, other (esp. gastrointestinal stromal tumor_g—leiomyoma; leiomyosarcoma); lipoma
7. Postoperative (fundoplication; repair of hiatal hernia or esophageal atresia)
8. Reflux esophagitis (incl. Zollinger-Ellison S.; post-gastrectomy alkaline reflux esophagitis)
9. Varices

UNCOMMON

1. Barrett esophagus
2. Benign mucous membrane pemphigoid
3. Chronic granulomatous disease of childhood
4. Crohn’s disease
5. Epidermolysis bullosa
6. Hemorrhage or hematoma involving esophagus
7. [Hiatal hernia (esp. with short esophagus)]
8. Intramural esophageal pseudodiverticulosis
9. Lymphoma_g
10. Papillomatosis of esophagus
11. Peptic esophageal ulcer with edema
12. Tylosis (keratosis palmaris et plantaris familiaris)

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Halpert RD, Feczko PJ: *Gastrointestinal Radiology: The Requisites*. (ed 2) St. Louis: Mosby-Year Book, 1999

- Levine MS: Esophagus: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 509–513

Gamut G-14

ESOPHAGEAL ULCERATION(S)

COMMON

- Barrett esophagus
- Carcinoma of esophagus
- Corrosive esophagitis
- Drug-induced esophagitis (eg, potassium chloride; tetracycline; quinidine; ascorbic acid; ferrous sulfate; bromide)
- Intubation esophagitis
- Opportunistic esophagitis (esp. *Candida*; herpes; cytomegalovirus)
- Reflux or peptic esophagitis (eg, hiatal hernia; vomiting; achalasia; scleroderma; pregnancy; surgery)

UNCOMMON

- Alcoholic esophagitis, acute
- Behçet syndrome
- Benign mucous pemphigoid
- Eosinophilic esophagitis
- Epidermolysis bullosa
- Granulomatous esophagitis (eg, tuberculosis; histoplasmosis; syphilis; Crohn's disease)
- Human immunodeficiency virus (HIV) infection
- [Intramural esophageal pseudodiverticulosis]
- Lymphoma_g
- Metastasis
- Radiation esophagitis
- Sclerotherapy of esophageal varices

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

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- Collazzo LA, Levine MS, Rubesin SE, et al: Acute radiation esophagitis: radiographic findings. *AJR* 1997;169:1067–1070

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- Frager D, Kotler DP, Baer J: Idiopathic esophageal ulceration in the acquired immunodeficiency syndrome. *Abdom Imaging* 1994;19:2
- Levine MS, Caroline D, Thompson JJ, et al: Adenocarcinoma of the esophagus: Relationship to Barrett mucosa. *Radiology* 1984;150:305–309
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- Sam JW, Levine MS, Rubesin SE, et al: The “foamy” esophagus: a radiographic sign of *Candida* esophagitis. *AJR* 2000;174:999–1002

Gamut G-15

TRANSVERSE MUCOSAL FOLDS IN THE ESOPHAGUS

COMMON

- Esophagitis (eg, reflux; candidiasis)
- Normal (feline esophagus)
- Scleroderma
- [Tertiary contractions]

UNCOMMON

- Achalasia
- Corrosive esophagitis
- [Linear transverse ulcerations]

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

- Levine MS, Goldstein HM: Fixed transverse folds in the esophagus: a sign of reflux esophagitis. *AJR* 1984;143:275–278
- Levine MS: Infectious esophagitis. *Semin Roentgenol* 1994;24:341–350
- Reeder JD, Kramer SS, Dudgeon DL: Transverse esophageal folds: Association with corrosive injury. *Radiology* 1985;159:303–304
- Reeders JW, Joosten FB, Rosenbusch G: Radiology of the esophagus. *Radiologie* 2000;40:479–493

Gamut G-16

WIDESPREAD IRREGULAR OR NODULAR ESOPHAGEAL MUCOSA

COMMON

1. [Artifacts (esp. air bubbles)]
2. Corrosive esophagitis
3. Glycogenic acanthosis
4. Intubation esophagitis
5. Opportunistic esophagitis (eg, *Candida*; herpes; cytomegalovirus)
6. Peptic esophagitis (incl. Barrett type)
7. Reflux esophagitis (eg, hiatal hernia; achalasia; scleroderma)
8. Varices

UNCOMMON

1. Acanthosis nigricans
2. Behçet S.
3. Carcinoma, superficial spreading type
4. Cowden S. (multiple hamartoma S.)
5. Crohn's disease
6. Diverticulosis, intramural; pseudodiverticulosis
7. Ectopic sebaceous glands
8. Eosinophilic esophagitis
9. Epidermolysis bullosa
10. Esophagitis cystica
11. [Feline esophagus]
12. Granulomatous esophagitis (eg, tuberculosis; histoplasmosis; syphilis)
13. Hirsute esophagus ("skin tube" esophagus created during reconstructive surgery of pharynx and esophagus)
14. Leukoplakia
15. Lymph follicles
16. Lymphoma
17. Papillomatosis of esophagus
18. Pemphigus; bullous pemphigoid
19. Radiation esophagitis
20. Scleroderma

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Gelfand DW: Gastrointestinal Radiology. New York: Churchill Livingstone, 1984, p 173
2. Itai Y, Kogure T, Okuyama Y: Radiological manifestations of oesophageal involvement in acanthosis nigricans. *Br J Radiol* 1976;49:592–593
3. Itai Y, Kogure T, Okuyama Y, et al: Diffuse finely nodular lesions of the esophagus. *AJR* 1977;128:563–566
4. Levine MS: Esophagus: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 509–511
5. Meyers C, Durkin MG, Love L: Radiographic findings in herpetic esophagitis. *Radiology* 1976;119:21–22

Gamut G-17

ESOPHAGEAL PLAQUES

COMMON

1. Candidiasis (moniliasis)

UNCOMMON

1. Acanthosis nigricans
2. Barrett esophagus
3. Carcinoma, early or superficial spreading
4. Corrosive esophagitis
5. Crohn's disease
6. Leukoplakia
7. Reflux esophagitis
8. Tuberculosis
9. Viral esophagitis (herpes; cytomegalovirus)

References

1. Graziani L, Bearzi I, Romagnoli A, et al: Significance of diffuse granularity and nodularity of the esophageal mucosa at double-contrast radiography. *Gastrointest Radiol* 1985;10:1–8
2. Reeders JW, Joosten FB, Rosenbusch G: Radiology of the esophagus. *Radiologe* 2000;40:479–493

Gamut G-18

ESOPHAGEAL VARICES

COMMON

1. Portal hypertension (esp. cirrhosis; portal vein thrombosis; schistosomiasis) (See G-191)
- *2. Superior vena cava obstruction (downhill varices) (esp. bronchogenic carcinoma, mediastinal tumor or fibrosis; retrosternal goiter) (See E-70)

UNCOMMON

1. Arteriovenous malformation
2. Idiopathic
3. Noncirrhotic liver disease (eg, primary or metastatic carcinoma of liver; heart failure)
- *4. Postsurgical (resection of retrosternal tumor)
5. [Varicoid lesions of esophagus (esp. varicoid carcinoma; lymphoma; esophagitis)] (See G-16)

* Varices may be confined to upper esophagus.

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Baron RL, Gore RM: Diffuse liver disease. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1590–1638
2. Felson B, Lessure AP: “Downhill” varices of the esophagus. *Dis Chest* 1964;46:740
3. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach (ed 3). Philadelphia: Lippincott, 1996, pp 125–130
4. Reeders JW, Joosten FB, Rosenbusch G: Radiology of the esophagus. *Radiologie* 2000;40:479–493

Gamut G-19

ESOPHAGEAL LESION IN A CHILD

COMMON

1. Atresia
2. Chalasias (infantile gastroesophageal regurgitation)
3. Duplication cyst (enteric; neurenteric; bronchogenic)

4. Esophagitis (corrosive; reflux; peptic; radiation; infectious; intubation; instrumentation)
5. Extrinsic compression (See G-5-7)
6. Foreign body (esp. coin)
7. Hiatal hernia (esp. with short esophagus)
8. Opportunistic esophagitis (eg, *Candida*; herpes; cytomegalovirus)
9. Postsurgical repair of esophageal atresia, tracheo-esophageal fistula, or hiatal hernia
10. Stricture (eg, congenital or secondary to esophagitis)
11. Vascular impression (eg, right aortic arch; double aortic arch; cervical aortic arch; aberrant right or left subclavian artery; pulmonary sling) (See G-7)

UNCOMMON

1. Achalasia
2. Congenital syndromes (eg, Riley-Day S. {familial dysautonomia}; Ehlers-Danlos S.)
3. Diverticulum (See G-10)
4. Epidermolysis bullosa
5. Metastasis
6. Neoplasm, benign or malignant (incl. lymphoma_g)
7. Pemphigus
8. Peptic ulcer; Barrett esophagus
9. Trauma
10. Varices
11. Web; diaphragm; Schatzki ring

References

1. Fernbach SK, Zawin JK: Diseases of the pediatric esophagus. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 2074–2089
2. Silverman FN, (ed.) Caffey’s Pediatric X-ray Diagnosis: An Integrated Imaging Approach. (ed 8) Chicago: Year Book Medical Publ, 1985
3. Swischuk LE, John SD: Differential Diagnosis in Pediatric Radiology. (ed 2) Baltimore: Williams & Wilkins, 1995, pp 175–176

Gamut G-20

ABNORMAL POSITION OF THE STOMACH (ROTATION OR DISPLACEMENT)

COMMON

1. Cascade stomach
2. Displacement by enlarged adjacent organ (eg, liver; spleen; left kidney; pancreas; aorta) or by adjacent mass, or lesser sac abscess or hernia
3. Eventration or paralysis of left hemidiaphragm
4. Hernia (eg, hiatal; paraesophageal; Morgagni; Bochdalek; traumatic; intrapericardial)
5. Inversion of left hemidiaphragm (pleural effusion; thoracic mass)
6. Obesity; emphysema (anterior displacement)

UNCOMMON

1. Absent hemidiaphragm
2. "Upside-down" stomach
3. Volvulus (organoaxial or mesenteroaxial)

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1. Burgener FA, Kormano M: Differential Diagnosis in Conventional Radiology. (ed 2) New York: Thieme Medical Publ, 1991, pp 568–571
2. Kreef L: Outline of Radiology. New York: Appleton-Century-Crofts, 1971, pp 133–134

Gamut G-21

FILLING DEFECT(S) IN THE STOMACH (INTRALUMINAL, MUCOSAL, OR INTRAMURAL)

COMMON

- *1. Adenomatous polyp (eg, in chronic atrophic gastritis; familial polyposis of colon; Cronkhite-Canada S.)
- *2. [Areae gastricae]

3. Bezoar
- *4. Blood clot; intramural hematoma
5. Carcinoma
6. Ectopic pancreas
7. [Extrinsic mass (eg, from spleen, liver, pancreas, kidney, colon)]
- *8. Foreign body (eg, coin)
9. Giant rugal fold; hypertrophied prepyloric antral fold
- *10. Hyperplastic polyp
- *11. Leiomyoma, other gastrointestinal stromal tumor_g
- *12. Lymphoma_g
- *13. Metastasis (esp. melanoma; Kaposi sarcoma; carcinoma of lung or breast)
- *14. Neoplasm, other (eg, carcinoid; tubular adenoma; angioma; lipoma; villous adenoma; plasmacytoma)
- *15. Peptic ulcer
16. Postoperative defect (eg, suture granuloma; fundoplication)
17. Sarcoma (esp. leiomyosarcoma)
- *18. Varix

UNCOMMON

- *1. Amyloidosis
- *2. Candidiasis
3. [Double pylorus]
4. Duplication cyst
- *5. Fundic gland polyposis
6. Gallstone
7. Granuloma with eosinophils (inflammatory fibroid polyp)
- *8. Hamartoma (eg, Peutz-Jeghers S. (alimentary tract polyposis); Cowden S. (multiple hamartoma S.); Ruvalcaba-Myhre-Smith S.)
9. Jejuno gastric intussusception
- *10. Lymphoid hyperplasia; pseudolymphoma
- *11. Parasites (esp. *Ascaris*; *Anisakis*)
12. Prolapse of esophageal mucosa
- *13. Thickened folds simulating nodules or filling defects (eg, Ménétrier's disease; Crohn's disease;

tuberculosis; sarcoidosis; eosinophilic gastritis)
(See G-26)

14. Tumefactive extramedullary hematopoiesis

* May be multiple.

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Cherukuri R, Levine MS, Furth EE, et al: Giant hyperplastic polyps in the stomach: radiographic findings in seven patients. *AJR* 2000;175:1445–1448
2. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 243–278
3. Gelfand DW: *Gastrointestinal Radiology*. New York: Churchill Livingstone, 1984, pp 221, 229
4. Lau CF, Hui PK, Mak KL, et al: Gastric polypoid lesions. *Am J Gastroenterol* 1998;93:2559–2564
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6. Park SH, Han JK, Kim TK, et al: Unusual gastric tumors: radiologic-pathologic correlation. *RadioGraphics* 1999;19:1435–1436

Gamut G-22

FILLING DEFECT IN A GASTRIC REMNANT

COMMON

1. Bezoar
2. Postoperative deformity or defect (eg, suture granuloma; scar; prolapse; mural inversion)
3. Ulcer (esp. marginal ulcer)

UNCOMMON

1. Carcinoma (recurrent; gastric stump)
2. Gastritis, postoperative (incl. bile reflux gastritis)
3. Gastrojejunal mucosal prolapse (antegrade prolapse into efferent or afferent loop)
4. Jejunogastric intussusception (usually efferent loop in Billroth II anastomosis)

5. Lymphoma (gastric stump)
6. Polyp_g (esp. hyperplastic)

References

1. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 279–288
2. Smith CH, Gore RM: Postoperative stomach and duodenum. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 682–697

Gamut G-23

LESION INVOLVING THE GASTRIC FUNDUS (INTRINSIC OR EXTRINSIC)

COMMON

1. Bezoar
2. Carcinoma of stomach (adenocarcinoma) or esophagus (squamous cell)
3. Diverticulum of fundus
4. Extragastric malignancy (eg, carcinoma of tail or body of pancreas or splenic flexure of colon; liver, kidney, or adrenal neoplasm; lymphoma_g or metastases involving adjacent nodes)
5. Extrinsic pressure from normal or enlarged structure (eg, liver; spleen; splenic flexure of colon; left kidney; heart; aortic aneurysm)
6. Giant rugal folds (incl. Ménétrier's disease)
7. Hiatal hernia with esophagogastric herniation
8. Leiomyoma; neurofibroma; other gastrointestinal stromal tumor_g; lipoma
9. Lymphoma_g
10. Peptic ulcer
11. Polyp_g (esp. hyperplastic or adenomatous)
12. Postsurgical deformity (eg, Nissen repair of hiatal hernia with fundoplication; postsplenectomy)
13. Varices (eg, cirrhosis; schistosomiasis); portal hypertensive gastropathy

(continued)

UNCOMMON

1. Hematoma, intramural or extrinsic
2. Sarcoma (esp. leiomyosarcoma)
3. Splenosis following splenectomy
4. Subphrenic abscess

References

1. Chang R, Levine MS, Ginsberg GG, et al: Portal hypertensive gastropathy: radiographic findings in eight patients. *AJR* 2000;175:1609–1612
2. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 305–316
3. Gore RM, Levine MS, Ghahremani GG, et al: Gastric cancer: radiologic diagnosis. *Radiol Clin North Am* 1997;35:311–331

Gamut G-24**GASTRIC ULCERATION****COMMON**

1. Carcinoma of stomach
- *2. Gastritis (eg, alcohol; aspirin; anti-inflammatory drugs)
3. Lymphoma_g
4. Marginal ulcer (postsubtotal gastrectomy)
5. Peptic ulcer

UNCOMMON

1. [Ectopic pancreas (duct)]
2. Carcinoid
3. Chemotherapy (hepatic arterial infusion)
4. Corrosive gastritis
- *5. Crohn's disease
6. *Cryptosporidium* antritis
7. Eosinophilic gastritis
8. Kaposi sarcoma
9. Ménétrier's disease (giant hypertrophic gastritis)
10. Metastasis (often bull's-eye lesion, esp. melanoma)
(See G-105)
11. Pseudolymphoma

12. Radiation therapy
13. Gastrointestinal stromal tumor_g, benign or malignant (esp. leiomyoma; leiomyosarcoma; neurofibroma)
14. Suture line ulceration (esp. after gastric surgery for morbid obesity)
15. Tuberculosis

* May cause aphthoid ulcerations.

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 181–203
2. Gelfand DW: *Gastrointestinal Radiology*. New York: Churchill Livingstone, 1984, p 216
3. Levine MS: Peptic ulcers. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 509–513

Gamut G-25**EROSIVE GASTRITIS*****COMMON**

1. Acute gastritis (eg, alcohol abuse)
2. Crohn's disease
3. Drugs (eg, aspirin; NSAID; steroids)
4. *Helicobacter pylori* infection
5. Idiopathic
6. [Normal areae gastricae]
7. Peptic ulcer; hyperacidity

UNCOMMON

1. Corrosive gastritis
2. *Cryptosporidium* antritis
3. [Lymphoma]
4. Opportunistic infection (eg, candidiasis; herpes simplex; cytomegalovirus)
5. Postoperative gastritis

6. Radiation therapy
7. Zollinger-Ellison S.; multiple endocrine neoplasia (MEN) S.

* Superficial erosions or aphthoid ulcerations seen especially with double contrast technique.

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 204–207
2. Levine MS: Inflammatory conditions of the stomach and duodenum. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 546–574
3. McLean AM, Paul RE Jr, Philips E: Chronic erosive gastritis—Clinical and radiologic features. *J Can Assoc Radiol* 1982;33:158–162

Gamut G-26

LARGE GASTRIC FOLDS (LOCAL OR WIDESPREAD); ALSO THICKENING OF THE STOMACH WALL ON CT, US, OR MRI

COMMON

1. Carcinoma
2. Gastritis (esp. hypertrophic; alcoholic; antral; *Helicobacter pylori*)
3. Lymphoma_g
4. Ménétrier's disease (giant hypertrophic gastritis)
5. Normal variant (hyperrugosity of fundus and greater curvature)
6. Pancreatitis, acute
7. Peptic ulcer disease; hyperacidity
8. Postoperative stomach
9. Varices (eg, cirrhosis; schistosomiasis); portal hypertensive gastropathy

UNCOMMON

1. Amyloidosis
2. Diffuse cystic gastric disease

3. Drug related gastritis (eg, aspirin; NSAID); chemotherapy toxicity
4. [Food retention]
5. Gastritis, other (eg, eosinophilic, corrosive, phlegmonous, or postradiation)
6. Granulomatous infiltration of stomach wall (eg, Crohn's disease; sarcoidosis; tuberculosis; histoplasmosis; actinomycosis; syphilis)
7. Infectious gastritis, other (eg, botulism; dysentery; diphtheria; candidiasis, cryptosporidiosis or cytomegalovirus—esp. in AIDS)
8. Metastasis; extension from carcinoma of pancreas
9. Neoplasm, other (eg, gastrointestinal stromal tumor_g—esp. leiomyoma, leiomyosarcoma; carcinoid; Kaposi sarcoma)
10. Parasitic disease (esp. strongyloidiasis; anisakiasis; schistosomiasis with varices)
11. Polyposis of stomach (See G-21, G-106)
12. Pseudolymphoma
13. Zollinger-Ellison S.; multiple endocrine neoplasia (MEN) S. (See J-5)

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Chang MS, Levine MS, Ginsberg GG, et al: Portal hypertensive gastropathy: radiographic findings in eight patients. *AJR* 2000;175:1609–1612
2. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 227–242
3. Farman J, Lerner ME, Ng C, et al: Cytomegalovirus gastritis. *Gastrointest Radiol* 1992;17:202
4. Levine MS: Stomach and duodenum: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 698–703
5. Levine MS, Laufer I: Stomach. In: Levine MS, Rubesin SE, Laufer I: Double Contrast Gastrointestinal Radiology. (ed 3) Philadelphia: WB Saunders, 2000, pp 149–203
6. Reese DF, Hodgson JR, Dockerty MB: Giant hypertrophy of the gastric mucosa (Ménétrier's disease): Correlation of the roentgenographic, pathologic and clinical findings. *AJR* 1962;88:619–626
7. Sato T, Sakai Y, Ishiguro S, Furukawa H: Radiologic manifestations of early gastric lymphoma. *AJR* 1986;146: 513–517

Gamut G-27

LINITIS PLASTICA PATTERN OF THE STOMACH (See G-28)

COMMON

1. Carcinoma of stomach
2. Peptic ulcer (acute ulcer with spasm; chronic ulcer with fibrosis)
3. Stenosing antral gastritis

UNCOMMON

1. Amyloidosis
2. Chemotherapy (hepatic arterial infusion)
3. Corrosive gastritis (esp. acids; ferrous sulfate)
4. Eosinophilic gastritis
5. [Extrinsic mass compressing stomach (esp. marked hepatomegaly)]
6. Granulomatous infiltration of stomach wall (eg, Crohn's disease; sarcoidosis; tuberculosis; histoplasmosis; actinomycosis; syphilis)
7. Idiopathic gastritis
8. Intramural gastric hematoma
9. Lymphoma_g (esp. Hodgkins disease and non-Hodgkins lymphoma)
10. Metastasis (esp. breast carcinoma); direct extension from carcinoma of pancreas or transverse colon; omental "cakes"
11. Opportunistic infection, esp. in AIDS (eg, cytomegalovirus; *Cryptosporidium* gastritis)
12. Parasitic disease (eg, strongyloidiasis; schistosomiasis)
13. Perigastric adhesions
14. Phlegmonous gastritis
15. Postoperative (eg, gastropasty)
16. Postradiation or postfreezing gastritis
17. Pseudolymphoma

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Balthazar EJ, Rosenberg H, Davidian MM: Scirrhus carcinoma of the pyloric channel and distal antrum. *AJR* 1980; 134:669–673

2. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 208–226
3. Gelfand DW: *Gastrointestinal Radiology*. New York: Churchill Livingstone, 1984, p 229
4. Lagasse JP, Causse X, Legoux JL, et al: Cytomegalovirus gastritis simulating cancer of the linitis plastica type on endoscopic ultrasonography. *Endoscopy* 1998;30:S101–102
5. Levine MS: Stomach and duodenum: Differential diagnosis. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 698–702
6. Levine MS, Laufer I: Tumors of the stomach. In: Levine MS, Rubesin SE, Laufer I: *Double Contrast Gastrointestinal Radiology*. (ed 3) Philadelphia: WB Saunders, 2000, pp 204–238

Gamut G-28

NARROWING OR DEFORMITY OF THE GASTRIC ANTRUM (See G-27)

COMMON

1. Antral gastritis
2. Carcinoma of stomach
3. Hypertrophic pyloric stenosis (infantile, adult)
4. Pancreatitis; carcinoma of pancreas; pseudocyst
5. Peptic ulcer scarring
6. Prolapse of gastric mucosa or polyp_g
7. Pylorospasm

UNCOMMON

1. Aberrant pancreatic tissue
2. Adhesions
3. Amyloidosis
4. Antral diaphragm or web
5. Congenital peritoneal bands (Ladd's bands)
6. Corrosive gastritis
7. *Cryptosporidium* antritis
8. Duplication cyst of stomach
9. Eosinophilic gastritis
10. Gastroenterostomy
11. Granulomatous disease of infancy (neutrophil dysfunction)

12. Granulomatous infiltration of stomach wall (eg, Crohn's disease; sarcoidosis; tuberculosis; histoplasmosis; actinomycosis; syphilis)
13. Lymphoma_g
14. Metastasis
15. Parasitic disease (esp. strongyloidiasis; schistosomiasis; anisakiasis)
16. Peptic ulcer perforation (walled off)
17. Radiation therapy

References

1. Gelfand DW: Gastrointestinal Radiology. New York: Churchill Livingstone, 1984, p 229
2. Levine MS: Stomach and duodenum: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 698–702
3. Teplick JG, Haskin ME: Roentgenologic Diagnosis. (ed 3) Philadelphia: WB Saunders, 1976

Gamut G-29

COMBINED GASTRIC ANTRAL AND DUODENAL DISEASE

COMMON

1. Carcinoma of stomach extending to involve duodenum
2. Involvement of stomach and duodenum from adjacent malignancy (esp. carcinoma of pancreas) or pancreatitis
3. Lymphoma_g
4. Peptic ulcer disease (incl. Zollinger-Ellison S.)
5. Prolapse of gastric mucosa, inflamed antral-pyloric fold, or polyp_g into duodenal bulb

UNCOMMON

1. Crohn's disease
2. Eosinophilic gastroenteritis
3. Ménétrier's disease

4. Parasitic disease (eg, strongyloidiasis; schistosomiasis)
5. Tuberculosis

Reference

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott 1996, pp 324–328
2. Levine MS: Inflammatory conditions of the stomach and duodenum. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 546–574

Gamut G-30

GASTRIC OUTLET OBSTRUCTION

COMMON

1. Extrinsic compression (eg, pancreatic, renal, retroperitoneal, duodenal, or colonic lesion)
2. Neoplasm, esp. malignant (eg, carcinoma of gastric antrum or head of pancreas; lymphoma_g)
3. Peptic ulcer disease (eg, antral, pyloric, or duodenal)
4. [Physiologic (eg, gastric atony with poor peristalsis and emptying; post-drug therapy; gastric distention)] (See G-31)
5. Prepyloric inflammation, scarring or stricture (eg, corrosive gastritis; Crohn's disease; tuberculosis; sarcoidosis; syphilis; amyloidosis)
6. Pyloric hypertrophy, adult or infantile (hypertrophic pyloric stenosis)
7. Pylorospasm

UNCOMMON

1. Annular pancreas
2. Bezoar
3. Diaphragm or web, antral or duodenal
4. Gastric duplication
5. Hematoma, intramural
6. Intussusception, gastroduodenal
7. Pancreatitis; cholecystitis

(continued)

8. Prolapsed antral mucosa or polyp_g
9. [Proximal small bowel obstruction]
10. Volvulus (with or without hiatal hernia)

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 289–298
2. Teplick JG, Haskin ME: *Roentgenologic Diagnosis*. (ed 3) Philadelphia: WB Saunders, 1976

Gamut G-31

DILATATION OF THE STOMACH WITHOUT OBSTRUCTION

COMMON

1. Aerophagia; emotional distress; hyperventilation; crying
2. Carbonated beverages; bicarbonate of soda; double contrast; gas pills
3. Coma (uremic or hepatic)
4. Diabetic gastropathy (gastric paresis)
5. Drug therapy (eg, Atropine; morphine; ganglion-blocking agent; Pro-Banthine)
6. Gastritis, acute
7. Iatrogenic (intubation; oxygen tube in esophagus)
8. Immobilization (eg, body cast; paraplegia)
9. Inflammation, acute (eg, pancreatitis; cholecystitis; subphrenic abscess; septicemia)
10. Pain (eg, colic due to renal, ureteral, or biliary stone; porphyria; lead poisoning; sickle cell crisis; migraine)
11. Peritonitis (eg, perforated appendix or peptic ulcer)
12. Postoperative, recent (incl. vagotomy)
13. Small bowel obstruction, proximal
14. Traumatic gastric ileus (eg, spine fracture; ruptured spleen; retroperitoneal hematoma; renal injury)

UNCOMMON

1. Chagas' disease
2. Electrolyte or acid-base imbalance (eg, hypercalcemia; hypocalcemia; hypokalemia; uremia; insulin shock; diabetic ketoacidosis)
3. Idiopathic
4. Muscular disorder_g (esp. muscular dystrophy)
5. Myxedema (hypothyroidism)
6. Neurologic disorder_g (eg, brain tumor; cerebral palsy; bulbar poliomyelitis; tabes dorsalis)
7. Scleroderma; dermatomyositis
8. Tracheoesophageal fistula with esophageal atresia

References

1. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 300–304
2. Marie I, Levesque H, Ducrotté P, et al: Gastric involvement in systemic sclerosis. *Am J Gastroenterol* 2001;96:77–81

Gamut G-32

INTERSTITIAL EMPHYSEMA OF THE STOMACH

COMMON

1. Emphysematous or phlegmonous gastritis (gas-forming organism, esp. in diabetic or alcoholic)
2. Traumatic or iatrogenic emphysema (eg, gastroscopy; intubation; recent surgery; respiratory therapy—esp. PEEP)

UNCOMMON

1. Corrosive gastritis
2. Distention of stomach (eg, bicarbonate of soda; oxygen tube in esophagus) (See G-31)
3. Gastric outlet obstruction (eg, malignancy; volvulus; prepyloric inflammation or stricture) (See G-30)
4. Ischemic gastritis; infarction

5. Necrotizing gastroenterocolitis
6. Peptic ulcer with intramural perforation
7. Perforated appendicitis
8. Pneumatosis cystoides
9. Pneumomediastinum (eg, from emphysema or asthma)

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 320–323
2. Tuck JS, Boobis LH: Case report: Interstitial emphysema of the stomach due to perforated appendicitis. *Clin Radiol* 1987;38:315-317
3. Vaughn BF: Emphysema of the stomach with portal vein gas. *Australas Radiol* 1972;16:377-378

Gamut G-33

GASTROCOLIC OR GASTRODUODENOCOLIC FISTULA

COMMON

1. Carcinoma of colon, stomach, pancreas, or kidney
2. Pancreatitis; pancreatic abscess
3. Peptic ulcer, perforated (incl. aspirin or NSAID-induced greater curvature ulcer)
4. Postoperative (eg, gastrostomy; retained sponge)
5. Trauma with gastric, duodenal, or colonic perforation

UNCOMMON

1. Actinomycosis
2. Amebic colitis
3. Biliary tract perforation (eg, calculus)
4. Crohn's disease
5. Diverticulum, perforated (eg, colonic, duodenal)
6. Foreign body
7. Idiopathic
8. Lymphoma_g
9. Marginal ulcer
10. Metastatic disease

11. Tuberculosis
12. Typhoid fever

References

1. Alexander ES, Weinberg S, Clark RA, et al: Fistulas and sinus tracts: Radiographic evaluation, management, and outcome. *Gastrointest Radiol* 1982;7:135–140
2. Laufer I, Joffe N, Stolberg H: Unusual causes of gastrocolic fistula. *Gastrointest Radiol* 1977;2:21–25
3. Levine MS: Inflammatory conditions of the stomach and duodenum. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 546–574

Gamut G-34

INCREASED RETROGASTRIC OR RETRODUODENAL SPACE

COMMON

1. Ascites
2. Hepatomegaly, marked (esp. caudate lobe)
3. Normal variant
4. Obesity
5. Pancreatic mass (esp. carcinoma; pancreatitis; abscess; pseudocyst; cystadenoma) (See G-213, 214)
6. Renal or adrenal mass (eg, renal cell carcinoma (hypernephroma); renal cyst; hydronephrosis; adenoma or carcinoma of adrenal gland; pheochromocytoma; neuroblastoma; Wilms' tumor; perinephric abscess or hematoma) (See H-38–44, H-118)
7. Retroperitoneal mass (eg, sarcoma; lymphoma_g; metastasis; lymphadenopathy; tuberculosis; cyst; abscess; hematoma)

UNCOMMON

1. Aortic aneurysm
2. Choledochal cyst
3. Gastrointestinal stromal tumor_g of posterior wall of stomach (esp. leiomyoma; leiomyosarcoma)
4. Herniation of omentum (eg, Morgagni hernia)

(continued)

5. Postoperative
6. Retroperitoneal edema, cellulitis, urinary leakage
7. Retroperitoneal fibrosis

Reference

1. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach* (ed 3). Philadelphia: Lippincott, 1996, pp 317–319

Gamut G-35**EXTRINSIC INDENTATION
ON THE DUODENUM (See G-36)****COMMON**

1. Coloduodenal apposition
2. Colon lesion (esp. carcinoma of hepatic flexure or transverse colon; amebic pericolic abscess or ameboma)
3. Common duct dilatation or neoplasm (See G-130, G-134)
4. Duodenal diverticulitis or abscess (esp. with giant duodenal diverticulum)
5. Gallbladder, normal or enlarged (eg, hydrops; carcinoma; “Courvoisier gallbladder”)
6. Hematoma, intramural or mesenteric
7. Hepatic enlargement (esp. caudate lobe) (eg, liver abscess; hepatocellular carcinoma {hepatoma} (See G-141)
8. Renal or adrenal mass (eg, renal cell carcinoma {hypernephroma}; renal cyst; hydronephrosis; adenoma or carcinoma of adrenal gland; pheochromocytoma; neuroblastoma; Wilms’ tumor; perinephric abscess or hematoma) (See H-38–44, 118)
9. Lymph node enlargement (eg, metastasis; lymphoma; tuberculosis)
10. Pancreatic mass (eg, carcinoma; pseudocyst; pancreatitis; abscess; annular pancreas) (See G-213, 214)
11. Papilla of Vater enlargement (See G-138)
12. [Postbulbar peptic ulcer]

13. Retroperitoneal mass (eg, sarcoma; lymphadenopathy; abscess; cyst)
14. Superior mesenteric artery compression (See G-44)

UNCOMMON

1. Aortic aneurysm
2. Choledochal cyst
3. Congenital peritoneal bands (Ladd’s bands)
4. Gastric neoplasm (esp. leiomyosarcoma; carcinoma)
5. Idiopathic
6. Mesenteric or celiac artery collaterals
7. Pericholecystic abscess
8. Varices, duodenal or retroperitoneal

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

Reference

1. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 365–369

Gamut G-36**WIDENING OF THE DUODENAL
C-LOOP (See G-35)****COMMON**

1. Normal variant
2. Pancreatic mass (eg, acute or chronic pancreatitis; abscess; pseudocyst; carcinoma; cystadenoma; cystadenocarcinoma) (See G-213, 214)

UNCOMMON

1. Aortic aneurysm
2. Choledochal cyst
3. Duodenal diverticulitis
4. Duodenal hematoma
5. Gastrointestinal stromal tumor_g of duodenum (esp. leiomyosarcoma)
6. Mesenteric or celiac artery collaterals

7. Mesenteric or omental mass (eg, metastasis; hematoma; cystic lymphangioma)
8. Neoplasm of stomach, colon, or kidney (esp. with spread to head of pancreas)
9. Parasitic disease (eg, strongyloidiasis; amebiasis with pericolic abscess)
10. Retroperitoneal lymphadenopathy (eg, metastasis; lymphoma_g; tuberculosis; sarcoidosis)
11. Retroperitoneal cyst or neoplasm, primary or metastatic

Reference

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 348–364

Gamut G-37

SOLITARY INTRINSIC DUODENAL MASS

COMMON

1. Ectopic pancreas
2. Metastasis (esp. hypernephroma; melanoma)
3. Neoplasm, primary (Brunner's gland adenoma; leiomyoma; neurofibroma; lipoma; myxoma; hamartoma; hemangioma; lymphangioma; islet cell tumor; carcinoid; villous adenoma)
4. Normal variant (eg, redundant duodenal fold; flexure "defect"; normal papilla of Vater)
5. Pancreatic lesion, attached or invading (esp. carcinoma of pancreas; pancreatitis; pseudocyst) (See G-213, 214)
6. Papilla of Vater enlargement (See G-138)
7. Peptic ulcer with edema or deformity
8. Polyp_g
9. Prolapsed gastric mucosa or polyp

UNCOMMON

1. Abscess, juxtaduodenal
2. Blood clot
3. Carcinoma of duodenum or ampulla

4. Cyst (eg, duplication; choledochal—choledochocele)
5. Foreign body in lumen (eg, fruit pit)
6. Gallstone impaction at papilla
7. Intraluminal diverticulum
8. Intramural hematoma
9. Intussusception, gastroduodenal
10. Lymphoma_g
11. Mesenteric or celiac artery collateral
12. Parasite (eg, *Ascaris*)
13. Postoperative defect; stitch abscess; prolapsed gastrostomy tube
14. Sarcoma (gastrointestinal stromal tumor_g, esp. leiomyosarcoma; Kaposi sarcoma)
15. Varix

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 370–396
2. Gelfand DW: Gastrointestinal Radiology. New York: Churchill Livingstone, 1984, p 254
3. Levine MS: Benign tumors of the stomach and duodenum. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 575–600

Gamut G-38

MULTIPLE OR DIFFUSE FILLING DEFECTS IN THE DUODENUM

COMMON

1. Brunner's gland hyperplasia
2. Heterotopic gastric mucosa
3. Metastases (esp. malignant melanoma)
4. Nodular, thickened, or edematous folds (incl. nonerosive duodenitis) (See G-40)
5. Prolapsed gastric mucosa

(continued)

UNCOMMON

1. Ascariasis
2. Blood clots
3. Crohn's disease (cobblestone pattern)
4. Cronkhite-Canada S.
5. Foreign bodies in lumen (eg, fruit pits)
6. Lymphoma_g; Kaposi sarcoma; other bull's-eye lesions (See G-105)
7. Mastocytosis
8. Mesenteric or celiac artery collaterals
9. Nodular lymphoid hyperplasia (esp. in dysgammaglobulinemia)
10. Polyps_g (adenomatous or hamartomatous)
11. Varices

Reference

1. Glick SN, Gohel VK, Laufer I: Mucosal surface patterns of the duodenal bulb. *Radiology* 1984;150:317-322
2. Levine MS, Laufer I, Stevenson G: Duodenum. In: Levine MS, Rubesin SE, Laufer I: *Double Contrast Gastrointestinal Radiology*. (ed 3) Philadelphia: WB Saunders, 2000, pp 239-274

Gamut G-39

**DIMINISHED OR ABSENT
FOLD PATTERN IN THE DUODENUM
AND SMALL BOWEL**

COMMON

1. Crohn's disease
2. Scleroderma
3. Small bowel obstruction or ileus
4. Sprue

UNCOMMON

1. Amyloidosis
2. Cystic fibrosis (mucoviscidosis)
3. Strongyloidiasis, chronic

Gamut G-40

**NODULAR OR THICKENED FOLDS
IN THE DUODENUM; ALSO
THICKENING OF THE DUODENAL
WALL ON CT, US, OR MRI**

COMMON

1. Brunner's gland hyperplasia
2. Cystic fibrosis (mucoviscidosis)
3. Duodenitis
4. Edema (eg, hypoproteinemia; cirrhosis; nephrotic S.; uremia; chronic dialysis; angioneurotic edema; heart failure)
5. Metastatic disease or direct invasion from adjacent neoplasm (esp. carcinoma of pancreas, stomach, or colon)
6. Normal variant
7. Pancreatitis, acute or chronic
8. Parasitic disease (esp. giardiasis; strongyloidiasis; hookworm disease; intestinal capillariasis)
9. Peptic ulcer disease
10. Zollinger-Ellison S.; multiple endocrine neoplasia (MEN) S. (See J-5)

UNCOMMON

1. AIDS-related infection (eg, *Cryptosporidium*; cytomegalovirus; atypical mycobacterial infection) or neoplasm (eg, Kaposi sarcoma; lymphoma_g)
2. Amyloidosis
3. Cholecystitis
4. Corrosive disease
5. Crohn's disease
6. Cronkhite-Canada S.
7. Drug therapy (eg, Pro-Banthine); chemotherapy toxicity
8. Duodenal diverticulitis
9. Ectopic gastric mucosa
10. Eosinophilic enteritis
11. Intestinal lymphangiectasia
12. Intramural hemorrhage (eg, trauma; hemophilia or other bleeding disorder_g; anticoagulant therapy)

13. Ischemia; vasculitis (eg, connective tissue disease (collagen vascular disease)_g; Henoch-Schönlein purpura)
14. Neoplasm, primary (eg, carcinoma; lymphoma_g; Kaposi sarcoma; gastrointestinal stromal tumor_g—esp. leiomyoma, leiomyosarcoma, or neurofibroma; lipoma; carcinoid)
15. Mastocytosis
16. Ménétrier's disease
17. Mesenteric or celiac artery collaterals following occlusion of main trunks
18. Nodular lymphoid hyperplasia (esp. in dysgammaglobulinemia)
19. Postoperative
20. Radiation injury, acute or chronic
21. Sprue; celiac disease
22. Tuberculosis
23. Varices
24. Whipple's disease

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 337–347
2. Glick SN, Gohel VK, Laufer I: Mucosal surface patterns of the duodenal bulb. *Radiology* 1984;150:317–322
3. Halpert RD, Feczko PJ: Gastrointestinal Radiology: The Requisites. (ed 2) St. Louis: Mosby-Year Book, 1999
4. Levine MS, Laufer I, Stevenson G: Duodenum. In: Levine MS, Rubesin SE, Laufer I: Double Contrast Gastrointestinal Radiology. (ed 3) Philadelphia: WB Saunders, 2000, pp 239–274
5. Levine MS: Stomach and duodenum: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 698–703
6. Rubesin SE, Herlinger H: Small bowel: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 884–891

Gamut G-41

POSTBULBAR DUODENAL ULCERATION

COMMON

1. [Diverticulum]
2. Neoplasm, malignant, extrinsic (eg, invasion from pancreas, colon, right kidney, or gallbladder)
3. Peptic ulcer
4. Zollinger-Ellison S.

UNCOMMON

1. Aorticoduodenal fistula (esp. aortic graft)
2. Carcinoma of duodenum
3. Ectopic pancreas
4. Fistula, duodenocolic or other (See G-107)
5. Gastrointestinal stromal tumor_g (esp. leiomyoma; leiomyosarcoma; neurofibroma)
6. Granulomatous disease (eg, Crohn's disease; tuberculosis)
7. Intramural duodenal pseudodiverticulosis
8. Lymphoma_g
9. Metastasis (eg, melanoma; Kaposi sarcoma)
10. Parasitic disease (eg, strongyloidiasis)

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach (ed 3). Philadelphia: Lippincott, 1996, pp 331–336
2. Gelfand DW: Gastrointestinal Radiology. New York: Churchill Livingstone, 1984, p 243
3. Solomon DJ, Kottler RE: Duodenal intramural pseudodiverticulosis. *Gastrointest Radiol* 1992;17:217

Gamut G-42

DUODENAL NARROWING OR OBSTRUCTION (See G-43, 44)**COMMON**

1. Congenital atresia, esp. with trisomy 21 S. (Down S.), stenosis, diaphragm or web
2. Extrinsic mass (eg, mesenteric or para-aortic lymphadenopathy; invasive neoplasm from pancreas, kidney, or colon; aortic aneurysm; choledochal cyst)
3. Pancreatitis, acute or chronic; pseudocyst
4. Postbulbar duodenal ulcer or scar
5. Superior mesenteric artery syndrome (See G-44)

UNCOMMON

1. Adhesions
2. Annular pancreas
3. Aorticoduodenal fistula
4. Cholecystitis
5. Congenital peritoneal bands (Ladd's bands)
6. Duplication cyst
7. Gallstone impaction
8. Hematoma (intramural or extrinsic)
9. Inflammatory disease of duodenum (eg, Crohn's disease; tuberculosis; strongyloidiasis; giardiasis with spasm)
10. Internal hernia (eg, paraduodenal)
11. Intraluminal diverticulum
12. Midgut volvulus with malrotation
13. Neoplasm of duodenum, primary (esp. carcinoma; leiomyosarcoma) or metastatic; also Burkitt lymphoma
14. Preduodenal portal vein
15. Prolapsed gastric lesion (eg, polyp_g)
16. Pseudo-obstruction, idiopathic
17. Stricture (eg, traumatic; radiation)

Gamut G-43

DUODENAL OBSTRUCTION IN AN INFANT (DOUBLE BUBBLE SIGN)**COMMON**

1. Annular pancreas
2. Congenital peritoneal bands (Ladd's bands)
3. Duodenal atresia or stenosis, esp. with trisomy 21 S. (Down S.)
4. Midgut volvulus with malrotation

UNCOMMON

1. Choledochal cyst
2. Diaphragm or web; intraluminal diverticulum
3. Duplication cyst
4. Intramural hematoma
5. Preduodenal portal vein
6. Retroperitoneal tumor (eg, teratoma) or lymphadenopathy

References

1. Kassner EG, Sutton AL, DeGroot TJ: Bile duct anomalies associated with duodenal atresia; paradoxical presence of small bowel gas. *AJR* 1972;116:577-583
2. Silverman FN (ed): *Caffey's Pediatric X-ray Diagnosis: An Integrated Imaging Approach*. (ed 8) Chicago: Year Book Medical Publ, 1985
3. Swischuk LE: *Imaging of the Newborn, Infant, and Young Child*. (ed 3) Baltimore: Williams & Wilkins, 1989
4. Teele RL, Share JC: Diseases of the pediatric stomach and duodenum. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 2090-2107

Gamut G-44

SUPERIOR MESENTERIC ARTERY SYNDROME (BAND-LIKE CONSTRICTION OF TRANSVERSE DUODENUM)

COMMON

1. Immobilization or prolonged bed rest (eg, post-surgery; severe burn; body cast)
2. Normal variant
3. Pancreatic mass; pancreatitis
4. Scleroderma; dermatomyositis; lupus erythematosus
5. Severe weight loss with loss of retroperitoneal fat

UNCOMMON

1. Adhesions; congenital peritoneal bands (Ladd's bands)
2. Aortic aneurysm; postrepair aorticoduodenal fistula
3. Chronic idiopathic intestinal pseudo-obstruction
4. Internal hernia, paraduodenal
5. Loss of abdominal muscle tone (eg, multiple pregnancies)
6. Retroperitoneal inflammatory or neoplastic disease
7. Small vascular (aorticoesenteric) angle
8. Thickening of root of mesentery (eg, Crohn's disease; pancreatitis; tuberculosis; metastatic disease; other lymphadenopathy)

References

1. Anderson JR, Earnshaw PM, Fraser GM: Extrinsic compression of the third part of the duodenum. *Clin Radiol* 1982;33:75-81
2. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 411-417
3. Wallace RG, Howard WB: Acute superior mesenteric artery syndrome in the severely burned patient. *Radiology* 1970;94:307-310

Gamut G-45

DUODENAL DILATATION WITHOUT OBSTRUCTION

COMMON

1. Drug therapy (eg, Pro-Banthine; atropine; morphine; Lomotil)
2. Idiopathic
3. Ileus, localized (eg, acute pancreatitis; cholecystitis; peptic ulcer disease; severe trauma or burn)
4. Immobilization (eg, body cast; burn; paraplegia)
5. Normal variant
6. Postoperative (incl. vagotomy)
7. Scleroderma; dermatomyositis; lupus erythematosus

UNCOMMON

1. Chagas' disease (aganglionosis)
2. Diabetes (incl. acidosis; coma; insulin shock)
3. Emotional state alteration; hyperventilation; aerophagia
4. Pain (eg, lead colic; tabetic crisis; porphyria)
5. Sprue; other malabsorption syndromes
6. Thiamine deficiency neuropathy
7. Zollinger-Ellison S.

Reference

1. Levine MS: Stomach and duodenum: Differential diagnosis. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 698-702

Gamut G-46

ABNORMAL POSITION OF SMALL BOWEL LOOPS

COMMON

1. Anterior abdominal hernia (eg, umbilical; ventral; postoperative incisional)
2. Inguinal or femoral hernia

(continued)

Gamut G-47

3. Lesser sac hernia
4. Malrotation (incl. midgut volvulus)
5. Paraduodenal hernia (right or esp. left)

UNCOMMON

1. Diaphragmatic hernia
2. Internal hernias (pericecal; small bowel mesentery; sigmoid mesentery; pelvic [broad ligament])
3. Obturator hernia (esp. on right)
4. Omphalocele; Cantrell S.
5. Spigelian hernia

References

1. Burgener FA, Korman M: Differential Diagnosis in Conventional Radiology. (ed 2) New York: Thieme Medical Publ, 1991, pp 576-577
2. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 909-924

Gamut G-47

SEPARATION OR DISPLACEMENT OF SMALL BOWEL LOOPS

COMMON

1. Abscess, intraperitoneal (eg, appendiceal; diverticular; interloop)
2. Adhesions
3. Ascites or other peritoneal fluid (eg, cirrhosis; congestive heart failure; peritoneal carcinomatosis)
4. Bladder enlargement
5. Crohn's disease
6. Intestinal neoplasm, primary (eg, carcinoid or carcinoma of small bowel)
7. Lymphadenopathy in mesentery or retroperitoneum
8. Mesenteric mass (eg, cyst; leiomyosarcoma; lipomatosis; lymphangioma) (See G-228, 229)
9. Metastatic disease to mesentery, bowel, peritoneum, or retroperitoneal nodes
10. Neoplasm or cyst in abdomen, pelvis or retroperitoneum, other (eg, gastrointestinal stromal tumor_g;

ovarian cyst or tumor; retroperitoneal sarcoma; renal mass; pancreatic pseudocyst; hydatid cyst; mesothelioma; plexiform neurofibroma)

11. Peritonitis (eg, bacterial; tuberculous; typhoid fever)
12. Postoperative (eg, resection)

UNCOMMON

1. Amyloidosis
2. Graft-versus-host disease
3. Hematoma or hemorrhage (trauma or bleeding disorder_g involving abdominal wall, mesentery, or bowel wall)
4. Hernia (internal; retroperitoneal)
5. Lymphoma_g
6. Mesenteric infarction
7. Mesenteritis (eg, retractile); Weber-Christian disease
8. Radiation enteritis
9. Tuberculosis
10. Whipple's disease

References

1. Burgener FA, Korman M: Differential Diagnosis in Conventional Radiology. (ed 2) New York: Thieme Medical Publ, 1991, pp 574-577
2. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 529-540

Gamut G-48

SOLITARY MASS IN THE SMALL BOWEL WITH PRESERVED MUCOSA

COMMON

1. Benign neoplasm (eg, adenoma; angioma; hamartoma; lipoma; leiomyoma, neurofibroma or other gastrointestinal stromal tumor_g)
2. Carcinoid (esp. in ileum)
3. Food particle; fruit pit; bezoar; enterolith; pill; foreign body
4. Polyp_g (eg, adenomatous; hamartomatous; inflammatory fibroid)

UNCOMMON

1. Carcinoma, early or atypical (usually destroys mucosa)
2. Cyst (eg, duplication)
3. Endometrial implant
4. Gallstone
5. Heterotopic gastric mucosa; ectopic pancreas
6. Intraluminal diverticulum
7. Intramural hematoma; blood clot
8. Inverted Meckel's diverticulum
9. Lymphoma_g
10. Meconium ileus (cystic fibrosis {mucoviscidosis})
11. Metastasis (esp. melanoma)
12. Parasite (eg, *Ascaris bolus*; tapeworm—*Taenia aginata* or *T. solium*; *Anisakis* with ileocecal phlegmon)
13. Sarcoma (eg, leiomyosarcoma; Kaposi sarcoma)
14. Varix

Reference

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 493–506.

Gamut G-49-S1**BENIGN TUMORS OF THE SMALL BOWEL**

1. Adenoma
2. Carcinoid
3. Fibroma
4. Gastrointestinal stromal tumor_g (esp. leiomyoma; neurofibroma)
5. Hamartoma (Peutz-Jeghers S.)
6. Hemangioma; lymphangioma
7. Lipoma

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 493–506
2. Good CA: Tumors of the small intestine. AJR 1963; 89:685–705

Gamut G-49-S2**MALIGNANT TUMORS OF THE SMALL BOWEL**

1. Adenocarcinoma
2. Carcinoid
3. Gastrointestinal stromal tumor (esp. leiomyosarcoma)
4. Kaposi sarcoma
5. Lymphoma_g
6. Metastasis (esp. melanoma)

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 493–506
2. Good CA: Tumors of the small intestine. AJR 1963; 89: 685–705
3. Maglinte DDT, Kelvin FM, Herlinger H: Malignant tumors of the small bowel. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 792–814

Gamut G-50**MULTIPLE INTRALUMINAL, MUCOSAL, OR INTRAMURAL FILLING DEFECTS IN THE SMALL BOWEL****COMMON**

1. Brunner's gland hyperplasia (duodenum)
2. Food particles; seeds; foreign bodies; pills
3. Meconium ileus (cystic fibrosis (mucoviscidosis))
4. Metastases (esp. melanoma; carcinoma of breast, lung, or ovary; Kaposi sarcoma)
5. Nodular lymphoid hyperplasia (esp. in dysgammaglobulinemia)
6. Parasites (ascarids; tapeworms—*Taenia saginata*)
7. Polyposis syndromes (esp. Peutz-Jeghers S.; Gardner S.; Cronkhite-Canada S.,) (See G-106)

(continued)

UNCOMMON

1. Amyloidosis
2. Behçet S.
3. Benign neoplasms (eg, hemangiomas; lipomas; leiomyomas, neurofibromas and other gastrointestinal stromal tumors_g)
4. Blood clots
5. Carcinoids
6. Crohn's disease (cobblestone pattern)
7. Gallstones
8. Hyperplastic Peyer's patches in ileum (typhoid fever)
9. Lymphoma_g
10. Mastocytosis (duodenum)
11. Varices

References

1. Eisenberg RL: Gastrointestinal Imaging: A Pattern Approach (ed 3). Philadelphia: Lippincott, 1996, pp 507–517
2. Rubesin SE, Herlinger H: Small bowel: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 884–891

Gamut G-51-1

SMALL BOWEL DIVERTICULUM

COMMON

1. Duodenal diverticulum

UNCOMMON

1. Diverticulosis of small bowel (esp. jejunal diverticulosis)
2. Giant duodenal diverticulum
3. Jejunal diverticulum
4. Ileal diverticulum
5. Meckel's diverticulum

Reference

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 541–551

Gamut G-51-2

**SMALL BOWEL
PSEUDODIVERTICULUM**

COMMON

1. Chronic duodenal ulcer disease with pseudodiverticular outpouchings
2. Crohn's disease (pseudodiverticula; fistulae)

UNCOMMON

1. Communicating ileal duplication
2. [Giant duodenal ulcer]
3. Intraluminal duodenal diverticulum
4. [Lymphoma (“aneurysmal” dilatation)]
5. Scleroderma

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

Reference

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 541–551

Gamut G-52

**THICKENING OF THE SMALL BOWEL
WALL, GENERALIZED OR LOCALIZED
(BARIUM, US, CT, MRI)**

COMMON

1. Crohn's disease
2. Edema (eg, heart failure; constrictive pericarditis; angioneurotic edema; portal hypertension)
3. Eosinophilic enteritis; amyloidosis (fold thickening may be regular in early stages of these diseases)
4. Hemorrhage, intramural (eg, trauma; anticoagulant therapy; hemophilia; other bleeding or clotting disorder_g; vasculitis; Henoch-Schönlein purpura)

5. Hypoproteinemia (eg, cirrhosis; Budd-Chiari S.; nephrosis; malnutrition; burn; dysproteinemia)
6. Intestinal lymphangiectasia, primary or secondary (eg, mesenteric neoplasm)
7. Ischemic bowel disease or infarction (eg, atherosclerosis; thromboembolism; vasculitis; polyarteritis nodosa; hypotension)
8. Metastatic disease (esp. malignant melanoma; carcinoma of breast, lung or ovary; Kaposi sarcoma)
9. Neoplasm, primary (eg, carcinoma; carcinoid; lipoma; gastrointestinal stromal tumor_g—leiomyoma; leiomyosarcoma)
10. Opportunistic infection, esp, in AIDS (eg, *Cryptosporidium*; *Campylobacter fetus [jejuni]*; *Candida*; *Mycobacterium avium-intracellulare*; cytomegalovirus)
11. Parasitic disease (giardiasis; strongyloidiasis; intestinal capillariasis; hookworm disease; schistosomiasis); terminal ileum—amebiasis; anisakiasis; angiostrongyliasis costaricensis
12. Peptic ulcer; Zollinger-Ellison S.; multiple endocrine neoplasia (MEN) S. (See J-5)

UNCOMMON

1. A-beta-lipoproteinemia
2. Alpha chain disease
3. Amyloidosis
4. Behçet disease
5. Cystic fibrosis (mucoviscidosis)
6. Enterocolitis (eg, typhoid fever; *Yersinia*)
7. Eosinophilic enteritis
8. Graft-versus-host disease
9. Infections, other (eg, *E. coli*; *Vibrio*; histoplasmosis)
10. Interloop abscess
11. Intestinal lymphangiectasia, primary or secondary (eg, mesenteric neoplasm)
12. Lymphoma_g; leukemic infiltration; pseudolymphoma
13. Mastocytosis
14. Menetrier's disease (stomach and duodenum)
15. Pancreatitis
16. Radiation enteropathy, acute or chronic
17. Tuberculous enteritis or peritonitis

18. Waldenström's macroglobulinemia
19. Whipple's disease
20. Xanthomatosis

References

1. Berk RN, Wall SD, McArdle CB, et al: Cryptosporidiosis of the stomach and small intestine in patients with AIDS. *AJR* 1984;143:549-554
2. Chen MYM, Ott DJ, Gelfand DW: Radiologic interpretation of diffuse small bowel diseases. *Appl Radiol* Sept 1990; 30-37
3. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach* (ed 3). Philadelphia: Lippincott, 1996, pp 478-492
4. Goldberg HI, Sheft DJ: Abnormalities in small intestine contour and caliber. *Radiol Clin North Am* 1976;14: 461-475
5. Halpert RD, Feczko PJ: *Gastrointestinal Radiology: The Requisites*. (ed 2) St. Louis: Mosby-Year Book, 1999
6. Olmsted WW, Reagin DE: Pathophysiology of enlargement of the small bowel fold. *AJR* 1976;127:423-428
7. Rubesin SE, Herlinger H: Small bowel: Differential diagnosis. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 884-891

Gamut G-53

MUCOSAL DESTRUCTION OF THE SMALL BOWEL WITH OR WITHOUT STRICTURE (LOCAL OR WIDESPREAD)

COMMON

- *1. Crohn's disease; other nonspecific enteritis
- *2. Lymphoma_g

UNCOMMON

1. [Abscess, interloop]
2. [Adhesions]
- *3. Amyloidosis
4. Carcinoid
5. Carcinoma
- *6. Eosinophilic enteritis

(continued)

7. Fungus disease_g (eg, histoplasmosis; actinomycosis)
- *8. Mastocytosis
- *9. Metastatic disease (esp. from melanoma; carcinoma of breast, lung, ovary, uterus, pancreas, or GI tract)
10. [Pancreatitis]
- *11. Parasitic disease (giardiasis; strongyloidiasis; intestinal capillariasis; hookworm disease; schistosomiasis; also amebiasis, anisakiasis, angiostrongyliasis costaricensis in terminal ileum)
12. Potassium enteritis
- *13. Radiation enteritis
14. Sarcoma (eg, leiomyosarcoma; Kaposi sarcoma)
- *15. Scleroderma
- *16. Tuberculosis
17. Typhoid fever
18. Ulcerative colitis (“backwash ileitis”)
19. Vascular occlusion; ischemia
20. *Yersinia* enterocolitis

* May be widespread.

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Gelfand DW: Gastrointestinal Radiology. New York: Churchill Livingstone, 1984, p 284
2. Papadopoulos VD, Nolan DJ: Carcinoma of the small intestine. Clin Radiol 1985;36:409-413
3. Palmer PES, Reeder MM: The Imaging of Tropical Diseases. Heidelberg: Springer-Verlag, 2001

Gamut G-54

REGULAR THICKENING OF SMALL BOWEL FOLDS (> 3 mm)

1. Angioneurotic edema
2. Eosinophilic enteritis; amyloidosis (fold thickening may be regular in early stages of these diseases)
3. Heart failure; constrictive pericarditis

4. Hypoproteinemia (eg, cirrhosis; Budd-Chiari S.; nephrosis; malnutrition; burn; dysproteinemia; A-beta-lipoproteinemia)
5. Hemorrhage, intramural (eg, trauma; anticoagulant therapy; hemophilia; other bleeding or clotting disorder_g; vasculitis; Henoch-Schönlein purpura)
6. Infection (eg, giardiasis; typhoid fever)
7. Intestinal lymphangiectasia, primary or secondary (eg, mesenteric neoplasm)
8. Ischemic bowel disease or infarction (eg, atherosclerosis; thromboembolism; vasculitis; polyarteritis nodosa; hypotension)
9. Radiation enteropathy
10. Xanthomatosis

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach (ed 3). Philadelphia: Lippincott, 1996, pp 468-477
2. Goldberg HI, Sheft DJ: Abnormalities in small intestine contour and caliber. Radiol Clin North Am 1976;14:461-475
3. Olmsted WW, Reagin DE: Pathophysiology of enlargement of the small bowel fold. AJR 1976;127:423-428
4. Rubesin SE, Herlinger H: Small bowel: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 884-891

Gamut G-55

GENERALIZED IRREGULAR OR DISTORTED SMALL BOWEL FOLDS

COMMON

1. Crohn's disease
2. Opportunistic infection, esp, in AIDS (eg, *Cryptosporidium*, *Candida*, *Mycobacterium avium-intercellulare*, cytomegalovirus)
3. Parasitic disease (giardiasis; strongyloidiasis; intestinal capillariasis; hookworm disease; schistosomiasis); terminal ileum—amebiasis; anisakiasis; angiostrongyliasis costaricensis

4. Peptic ulcer; Zollinger-Ellison S.; multiple endocrine neoplasia (MEN) S. (See J-5)

UNCOMMON

1. A-beta-lipoproteinemia
2. Alpha chain disease
3. Amyloidosis
4. Cystic fibrosis (mucoviscidosis)
5. Enterocolitis (eg, typhoid fever; *Yersinia*)
6. Eosinophilic enteritis
7. Infections, other (eg, *Campylobacter fetus* [jejuni]; *Shigella*; *E. coli*; *Vibrio*; histoplasmosis)
8. Interloop abscess
9. Intestinal lymphangiectasia, primary or secondary (eg, mesenteric neoplasm)
10. Lymphoma_g; pseudolymphoma
11. Mastocytosis
12. Ménétrier's disease (stomach and duodenum)
13. Pancreatitis
14. Radiation injury, acute or chronic
15. Tuberculous enteritis or peritonitis
16. Waldenström's macroglobulinemia
17. Whipple's disease

References

1. Berk RN, Wall SD, McArdle CB, et al: Cryptosporidiosis of the stomach and small intestine in patients with AIDS. *AJR* 1984;143:549-554
2. Chen MYM, Ott DJ, Gelfand DW: Radiologic interpretation of diffuse small bowel diseases. *Appl Radiol Sept* 1990;30-37
3. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach* (ed 3). Philadelphia: Lippincott, 1996, pp 478-492
4. Goldberg HI, Sheft DJ: Abnormalities in small intestine contour and caliber. *Radiol Clin North Am* 1976;14:461-475
5. Olmsted WW, Reagin DE: Pathophysiology of enlargement of the small bowel fold. *AJR* 1976;127:423-428
6. Palmer PES, Reeder MM: *The Imaging of Tropical Diseases*. Heidelberg: Springer-Verlag, 2001

Gamut G-56

SIMULTANEOUS FOLD THICKENING OF THE STOMACH AND SMALL BOWEL

COMMON

1. Crohn's disease
2. Zollinger-Ellison S.; peptic ulcer disease

UNCOMMON

1. Amyloidosis
2. Eosinophilic gastroenteritis
3. Gastric varices with hypoproteinemia
4. Lymphoma_g; pseudolymphoma
5. Ménétrier's disease
6. Opportunistic infection, esp, in AIDS (eg, *Cryptosporidium*; *Candida*; *Mycobacterium avium-intercellulare*; cytomegalovirus)
7. Pancreatitis
8. Parasitic disease (eg, strongyloidiasis; schistosomiasis; anisakiasis)
9. Tuberculosis
10. Whipple's disease

Reference

1. Eisenberg RL: *Clinical Imaging: An Atlas of Differential Diagnosis*. (ed 3) Philadelphia: Lippincott-Raven, 1997, pp 384-385

Gamut G-57

MALABSORPTION PATTERN IN THE SMALL BOWEL

COMMON

1. Blind loop S. (See G-58)
2. Crohn's disease
3. Cystic fibrosis (mucoviscidosis)
4. Pancreatic disease (insufficiency; chronic pancreatitis; carcinoma; gastrinoma)

(continued)

5. Parasitic disease (giardiasis; hookworm disease; strongyloidiasis; schistosomiasis japonica; intestinal capillariasis)
6. Postoperative (eg, postgastrectomy steatorrhea; gastroileostomy; short bowel S.; pancreatectomy)
7. Sprue, tropical or nontropical (celiac disease)
8. Steatorrhea, idiopathic

UNCOMMON

1. A-beta-lipoproteinemia
2. Acrodermatitis enteropathica
3. Acute bacterial infection
4. AIDS
5. Allergy (eg, angioneurotic edema)
6. Amyloidosis
7. Bile duct obstruction
8. Carcinoid syndrome
9. Chronic granulomatous disease of childhood
10. Cronkhite-Canada S.
11. Diabetes
12. Disaccharidosis (eg, lactase deficiency)
13. Drug therapy (eg, antimetabolites)
14. Ehlers-Danlos S.
15. Emotional states; anorexia nervosa
16. Eosinophilic gastroenteritis
17. Fistula (See G-107)
18. Henoch-Schönlein purpura
19. Hepatobiliary disease (eg, biliary cirrhosis; biliary atresia)
20. Hypoparathyroidism
21. Hypopituitarism
22. Hypothyroidism (cretinism); hyperthyroidism
23. Immunologic disorder_g
24. Intestinal lymphangiectasia
25. Ischemia of intestine, chronic
26. Jejunal diverticulosis
27. Johanson-Blizzard S.
28. Lymphoma_g
29. Mastocytosis
30. Metastases, peritoneal
31. Multiple endocrine neoplasia (MEN) S. (eg, gastrinoma; pancreatic non-beta islet cell tumor (VIPoma) or hyperplasia) (See J-5)

32. Nephrotic syndrome
33. Nutritional deficiency (kwashiorkor; pellagra)
34. Protein-losing enteropathy
35. Radiation gastroenteritis
36. Scleroderma; dermatomyositis
37. Tuberculous peritonitis
38. Waldenström's macroglobulinemia; alpha chain disease
39. Whipple's disease
40. Wolman's disease (familial xanthomatosis)
41. Zollinger-Ellison S.

References

1. Herlinger H: Malabsorption. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 759–784
2. Meyer B, Cerda JJ: Malabsorption: Pathophysiologic considerations and diagnosis. *Compr Ther* 1985;11:49–54
3. Riley SA, Marsh MN: Maldigestion and malabsorption. In: Feldman M, Scharschmidt BF, Sleisenger MH: Gastrointestinal and Liver Disease. (ed 6) Philadelphia: WB Saunders, 2000, pp 1501–1522
4. Taybi H, Lachman RS: Radiology of Syndromes, Metabolic Disorders, and Skeletal Dysplasias. (ed 4) St. Louis: Mosby-Year Book, 1996, pp 963–964
5. Teplick JG, Haskin ME: Roentgenologic Diagnosis. (ed 3) Philadelphia: WB Saunders, 1976

Gamut G-58**BLIND LOOP SYNDROME****COMMON**

1. Postoperative (eg, side-to-side anastomosis; gastroileostomy; bypass procedure; short bowel syndrome)
2. Small bowel stricture with proximal dilatation

UNCOMMON

1. Diverticulosis of small bowel (esp. jejunum)
2. Duplication of intestine
3. Meckel's diverticulum, large

- Sluggish transit (eg, myxedema; cretinism; scleroderma)

Reference

- Challacombe DN, Richardson JM, Edkins S, et al: Ileal blind loop in childhood. *Am J Dis Child* 1974;123:719–723

Gamut G-59

SMALL BOWEL DILATATION WITH THICKENED MUCOSAL FOLD PATTERN

COMMON

- Crohn's disease
- Infectious enteritis, esp. in AIDS (eg, cryptosporidiosis; cytomegalovirus; *Candida*; *Salmonella*; *Mycobacterium avium-intracellulare*)
- Mesenteric infarction (venous or embolic arterial) or advanced ischemia (atherosclerosis)
- Metastatic disease to bowel wall or mesentery
- Zollinger-Ellison S.

UNCOMMON

- A-beta-lipoproteinemia; A-alpha-lipoproteinemia
- Amyloidosis
- Compensatory dilatation of remaining bowel after extensive small bowel resection
- Hypoalbuminemia (eg, cirrhosis; nephrotic S.)
- Lymphoma_g
- Parasitic disease (eg, thickened folds with malabsorption and dilated loops can be seen in strongyloidiasis, hookworm disease, intestinal capillariasis, and schistosomiasis japonica)
- Radiation enteritis
- Tropical sprue
- Tuberculosis

Reference

- Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 464–467

Gamut G-60

SMALL BOWEL DILATATION WITH NORMAL FOLD PATTERN

COMMON

- Adynamic (“paralytic”) ileus
- Drug effect (esp. anticholinergics)
- Mechanical obstruction
- Mesenteric ischemia (eg, atherosclerosis; lupus erythematosus)
- Postvagotomy; gastrectomy (dumping syndrome)
- Sprue (esp. nontropical); celiac disease; other malabsorption syndromes (See G-57)

UNCOMMON

- Amyloidosis
- Chagas' disease
- Chronic idiopathic intestinal pseudo-obstruction
- Hypokalemia (esp. in diabetic)
- Lactase deficiency
- Scleroderma; dermatomyositis

References

- Chen MYM, Ott DJ, Gelfand DW: Radiologic interpretation of diffuse small bowel diseases. *Appl Radiol* Sept 1990; 30–37
- Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 453–463

Gamut G-61

ACUTE NONOBSTRUCTIVE SMALL BOWEL DISTENTION (“PARALYTIC ILEUS”)

COMMON

- Drug effect (eg, atropine; morphine; barbiturates; Lomotil; Pro-Banthine; hexamethonium; L-dopa)
- Electrolyte imbalance (eg, hypokalemia; hypochloremia; calcium or magnesium abnormality)

(continued)

3. Gastroenteritis, acute; food poisoning
4. Pain in abdomen (eg, renal, ureteral, or common bile duct stone; torsion of uterine fibroid or ovarian cyst or tumor; lead colic; sickle cell crisis; tabetic crisis; porphyria)
5. Peritonitis, acute
6. Pneumonia; other acute thoracic disease (eg, myocardial infarction; heart failure)
7. Postoperative (abdominal or pelvic surgery)
8. Retroperitoneal hemorrhage
9. "Sentinel loop," localized ileus (eg, acute cholecystitis; appendicitis; acute pancreatitis; acute diverticulitis) (See G-80)
10. Shock; gram-negative septicemia; hypoxia
11. Trauma (esp. spine or lower rib; abdominal contusion; intramural hematoma)
12. Vascular occlusion (eg, mesenteric infarction)

UNCOMMON

1. Adrenal insufficiency
2. Aerophagia; assisted respiration
3. Ceroidosis (malabsorption with prolonged vitamin E depletion)
4. Chronic idiopathic intestinal pseudo-obstruction
5. Diabetic acidosis; insulin shock
6. Enterocolitis (eg, typhoid fever; *Yersinia*)
7. Hypoparathyroidism
8. Hypothyroidism
9. Interloop abscess
10. Myotonic dystrophy; muscular dystrophy
11. Neonatal adynamic ileus (eg, septicemia; hypoxia-induced vasculitis; infantile respiratory distress S.; intestinal infection; peritonitis; mesenteric thrombosis)
12. Neonatal necrotizing enterocolitis
13. Renal failure; uremia; acute glomerulonephritis
14. Urinary retention

References

1. Burgener FA, Korman M: *Differential Diagnosis in Conventional Radiology*. (ed 2) New York: Thieme Medical Publ, 1991, pp 601–602
2. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 442–452

Gamut G-62

CHRONIC NONOBSTRUCTIVE SMALL BOWEL DISTENTION

COMMON

1. Ascites
2. Connective tissue disease (collagen disease)_g (esp. scleroderma)
3. Neurologic or muscular disorder_g (eg, parkinsonism; myotonic dystrophy; tabes; spinal cord lesion)
4. Sprue, tropical or nontropical (celiac disease)
5. Vagotomy

UNCOMMON

1. Adrenal insufficiency
2. Allergic enterocolitis
3. Amyloidosis
4. Ceroidosis (prolonged malabsorption and vitamin E depletion)
5. Chronic idiopathic intestinal pseudo-obstruction
6. Congenital short intestine
7. Cystic fibrosis (mucoviscidosis)
8. Diabetes with hypokalemia
9. Disaccharidase deficiency (eg, lactase deficiency)
10. Drug effect (eg, Lomotil; morphine)
11. Eosinophilic gastroenteritis
12. Hypoparathyroidism
13. Hypoproteinemia (eg, cirrhosis; nephrosis; malnutrition; burn; A-beta-lipoproteinemia)
14. Intestinal lymphangiectasia
15. Jejunal diverticulosis
16. Lymphoma_g
17. Malrotation; internal hernia
18. Mesenteritis
19. Myxedema; hypothyroidism
20. Parasitic disease (esp. Chagas' disease; chronic strongyloidiasis; schistosomiasis japonica)
21. Postoperative (eg, gastrectomy; colectomy; intestinal bypass)
22. Renal failure; uremia; peritoneal dialysis
23. Vascular insufficiency (mesenteric ischemia); vasculitis (eg, lupus erythematosus; polyarteritis nodosa)

24. Waldenström's macroglobulinemia
25. Whipple's disease

References

1. Eisenberg RL: Clinical Imaging: An Atlas of Differential Diagnosis. (ed 3) Philadelphia: Lippincott-Raven, 1997, pp 358–361
2. Rubesin SE, Herlinger H: Small bowel: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 884–891
3. Seaman WB: Motor dysfunction of the gastrointestinal tract. AJR 1972;116:235-244

Gamut G-63

TERMINAL ILEUM LESION

COMMON

1. Appendicitis
2. Carcinoid
3. Crohn's disease
4. Intussusception
5. Mass, extrinsic (eg, ovarian or other pelvic neoplasm; aneurysm of iliac artery)
6. Meconium ileus (cystic fibrosis {mucoviscidosis})
7. Nodular lymphoid hyperplasia; normal lymphoid follicles

UNCOMMON

1. Diverticulitis
2. Endometrial implant
3. Food particles; foreign body; gallstone
4. Fungus disease (eg, actinomycosis; histoplasmosis)
5. Intramural hematoma
6. Laxative abuse
7. Meckel's diverticulum
8. Mesenteric infarction; ischemic enteritis
9. Metastasis (esp. from gastric, colonic or ovarian neoplasm)
10. Neoplasm, benign or malignant (eg, gastrointestinal stromal tumor_g; carcinoma; sarcoma; lymphoma_g)

11. Parasitic disease
 - a. Intraluminal worms (eg, *Ascaris*; tapeworm—*Taenia saginata*)
 - b. Inflammatory changes (eg, schistosomiasis; amebiasis; strongyloidiasis; rarely giardiasis; intestinal capillaritis; anisakiasis; angiostrongyliasis costaricensis)
12. Polyp_g (See G-106)
13. Radiation enteritis
14. Tuberculosis
15. Typhoid fever
16. Ulcerative colitis (“backwash ileitis”)
17. *Yersinia enterocolitis*

References

1. Calenoff L: Rare ileocecal lesions. AJR 1970;110:343–351
2. Gelfand DW: Gastrointestinal Radiology. New York: Churchill Livingstone, 1984, p 335
3. Herlinger H, Ekberg OT: Other inflammatory conditions of the small bowel. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 704–725
4. Jeffrey MA, et al: Primary carcinoid tumors of the ileum: the radiological appearances. Clin Radiol 1984;35:451–455
5. Marshak RH, Lindner AE, Maklansky D: Radiology of the Colon. Philadelphia: WB Saunders, 1980
6. Williams RH, Dixit JK: Filling defect in terminal ileum due to an aneurysm of right common iliac artery. South Med J 1975;68:783–785

Gamut G-64-S

NONDIAPHRAGMATIC HERNIAS

COMMON

1. Femoral
2. Incisional
3. Inguinal
4. Umbilical (incl. omphalocele)
5. Ventral

UNCOMMON

1. Lesser sac (foramen of Winslow)
2. Lumbar

(continued)

3. Mesenteric (small bowel; sigmoid)
4. Obturator
5. Paracecal
6. Paraduodenal
7. Pelvic (broad ligament)
8. Perineal
9. Retroperitoneal
10. Sciatic
11. Spigelian

Reference

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 909–924

Gamut G-65**ABNORMALITIES OF BOWEL ROTATION****COMMON**

1. Malrotation
2. Midgut volvulus with malrotation
3. Mobile cecum (high or midline)
4. Nonrotation

UNCOMMON

1. Exomphalos
2. Extroversion of cloaca
3. Paraduodenal hernia
4. Reverse rotation

References

1. Gaines PA, Saunders AJ, Drake D: Midgut malrotation diagnosed by ultrasound. 1987; 38:51–53
2. Houston CS, Wittenborg MH: Roentgen evaluation of anomalies of rotation and fixation of the bowel in children. Radiology 1965;84:1–17
3. Javors BR: Applied embryology of the gastrointestinal tract. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, p 2020

Gamut G-66**CONGENITAL SYNDROMES ASSOCIATED WITH INTESTINAL MALROTATION**

1. Abdominal heterotaxy
2. Asplenia or polysplenia S.
3. Brachmann-de Lange S.
4. Cantrell S.
5. Coffin-Siris S.
6. FG syndrome
7. Mobile cecum S.
8. Prune-belly S. (Eagle-Barrett S.)
9. Trisomy 13 S.
10. Trisomy 18 S.
11. Trisomy 21 S. (Down S.)

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1. Fernbach SK: Neonatal gastrointestinal radiology. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 2042–2074
2. Jones KL: Smith's Recognizable Patterns of Human Malformation. Philadelphia: WB Saunders, 1988
3. Taybi H, Lachman RS: Radiology of Syndromes, Metabolic Disorders, and Skeletal Dysplasias. (ed 4) St. Louis: Mosby-Year Book, 1996, p 964

Gamut G-67**APHTHOID ULCERS IN THE SMALL BOWEL OR COLON*****COMMON**

1. Crohn's disease

UNCOMMON

1. Amebiasis
2. [Artifacts (eg, fecal debris; flocculated barium; innominate grooves of colon)]
3. Behçet S.

4. Candidiasis
5. Cytomegalovirus infection of ileum and colon (also esophagus and stomach)
6. Ischemic colitis
7. [Lymphoid hyperplasia of colon]
8. Salmonellosis
9. Tuberculosis
10. *Yersinia enterocolitis*

* Tiny discrete central ulcer containing barium surrounded by a halo of edematous mucosa, best seen on air-contrast examination.

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996
2. Gedgudas-McClees EK: Aphthoid ulcerations in ileocecal candidiasis. *AJR* 1983; 141:973-977
3. Gore RM: Inflammatory disease. In: Margulis AR: Modern Imaging of the Alimentary Tube. New York: Springer-Verlag, 1998, pp 185-216
4. Simpkins KC: Aphthoid ulcers in Crohn's colitis. *Clin Radiol* 1977;28:601-608

Gamut G-68

INNUMERABLE TINY NODULES (SAND-LIKE OR GRANULAR LUCENCIES SMALLER THAN 5 MM) IN THE SMALL BOWEL OR COLON

COMMON

1. Crohn's disease ("cobblestone" pattern)
2. [Food particles; seeds; air bubbles]
3. Nodular lymphoid hyperplasia (eg, dysgammaglobulinemia)
4. Normal lymphoid follicles
5. Polyposis syndromes (esp. Cronkhite-Canada S.)
(See G-106)

UNCOMMON

1. A-beta-lipoproteinemia
2. Amyloidosis

3. Cystic fibrosis (mucoviscidosis)
4. Eosinophilic enteritis
5. Histoplasmosis
6. Hyperplastic Peyer's patches (eg, typhoid fever)
7. Intestinal lymphangiectasia
8. Lymphoma
9. Mastocytosis
10. Mycobacterial enteritis
11. Ulcerative colitis
12. Waldenström's macroglobulinemia; heavy chain disease
13. Whipple's disease
14. *Yersinia enterocolitis*

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 518-524
2. Kenney PJ, Koehler RE, Shackelford GD: The clinical significance of large lymphoid follicles of the colon. *Radiology* 1982;142:41-46
3. Reeder MM: RPC of the Month from the AFIP: Nodular lymphoid hyperplasia of the small intestine. *Radiology* 1969;93:427-433
4. Rubesin SE, Herlinger H: Small bowel: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 884-890

Gamut G-69

MESENTERIC VASCULAR COMPROMISE (INTESTINAL ISCHEMIA OR INFARCTION)

COMMON

1. Arterial thromboembolism (eg, secondary to myocardial infarction; rheumatic heart disease; atrial fibrillation)
2. Arteriosclerosis
3. Digitalis toxicity

(continued)

4. Heart failure
5. Iatrogenic (eg, catheter arteriography; drug instillation)
6. Idiopathic (normal vessels)
7. Intestinal obstruction (esp. strangulation)
8. Peritoneal band or adhesion
9. Septicemia (eg, drug abuse; bacterial endocarditis)
10. Vascular compression by extrinsic mass
11. Venous thrombosis

UNCOMMON

1. Abdominal or pelvic inflammatory disease
2. Arteritis (eg, Takayasu's arteritis; polyarteritis nodosa)
3. Coarctation of aorta (esp. postoperative)
4. Dissecting aneurysm
5. Fibromuscular hyperplasia of mesenteric artery
6. Polycythemia
7. Postoperative (esp. surgical ligation)
8. Radiation injury
9. Transient ischemia of children
10. Trauma to the intestine or its vessels

References

1. Kaufman SL, Harrington DP, Siegelman SS: Superior mesenteric artery embolization: An angiography emergency. *Radiology* 1977;124:625–630
2. Smith SL, Tutton RH, Ochsner SF: Roentgenographic aspects of intestinal ischemia. *AJR* 1972;116:249–255
3. Szucs RA, Wolf EL, Gramm HF, et al: Miscellaneous abnormalities of the colon. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1084–1122

Gamut G-70**GAS IN THE BOWEL WALL
(PNEUMATOSIS INTESTINALIS)****COMMON**

1. Colitis (eg, ulcerative; tuberculous; amebic; Crohn's disease)
2. Necrosis of the intestine
 - a. Necrotizing enterocolitis (esp. in premature or debilitated infants)
 - b. Mesenteric thrombosis with infarction
 - c. Gangrenous, pseudomembranous, or other enterocolitis
 - d. Strangulated hernia, volvulus, or other intestinal obstruction
 - e. Primary infection of bowel wall
 - f. Ingestion of corrosives
3. Primary, idiopathic (pneumatosis cystoides intestinalis)
4. Toxic megacolon (See G-94)

UNCOMMON

1. Adynamic ileus (esp. postoperative)
2. Air hose injury of rectum ("goose")
3. Colonic irrigation; hydrogen peroxide enema
4. Congenital obstruction (eg, atresia; stenosis; web; diaphragm; imperforate anus; meconium plug)
5. Connective tissue disease (collagen disease)_g (esp. scleroderma)
6. Diabetes with gas-forming organism
7. Graft-versus-host disease (esp. involving cecum)
8. Hirschsprung's disease or other megacolon (See G-93)
9. Iatrogenic (eg, endoscopy; colonoscopy; catheter jejunostomy; umbilical artery catheterization)
10. Idiopathic
11. Leukemia
12. Malabsorption (eg, sprue)
13. Obstructive pulmonary disease, esp. with coughing (eg, emphysema; bullous disease; asthma; chronic bronchitis)

14. Perforated jejunal diverticulum
15. Pneumomediastinum with abdominal extension of air
16. Postoperative (esp. jejunoileal bypass; postoperative intramural leakage)
17. Pyloroduodenal obstruction (eg, peptic ulcer, esp. with intramural perforation; pyloric stenosis)
18. Steroid and other immunosuppressive therapy
19. Trauma to gut

References

1. Bryk D: Unusual causes of small-bowel pneumatosis: Perforated duodenal ulcer and perforated jejunal diverticula. *Radiology* 1973;106:299–302
2. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 925–937
3. Felson B: Abdominal gas: A roentgen approach. *Ann NY Acad Sci* 1968;150:141–161
4. Gupta A: Pneumatosis intestinalis in children. *Br J Radiol* 1978; 51:589–595
5. Keats TE, Smith TH: Benign pneumatosis intestinalis in childhood leukemia. *AJR* 1974;122:150–152
6. Marshak RH, Lindner AE, Maklansky D: Pneumatosis cystoides coli. *Gastrointest Radiol* 1977;2:85–89
7. Mueller CF, et al: Pneumatosis intestinalis in collagen disorders. *AJR* 1972;115:300–305
8. Naggar CZ: Pneumatosis intestinalis following common upper-respiratory-tract infection. *JAMA* 1976;235:2221–2222
9. Shallal JA, Van Heerden JA, Bartholomew LG, et al: Pneumatosis cystoides intestinalis. *Mayo Clin Proc* 1974;49: 180–184
10. Strain JD, Rudikoff JC, Moore EE, et al: Pneumatosis intestinalis associated with intracatheter jejunostomy feeding. *AJR* 1982;139:107–109

Gamut G-71-1

SMALL AND LARGE BOWEL WALL THICKENING: HOMOGENEOUS ATTENUATION ON POSTCONTRAST CT

COMMON

1. Carcinoma of small bowel and/or colon
2. Lymphoma
3. Submucosal hemorrhage or hematoma

UNCOMMON

1. Crohn's disease, chronic
2. Infarcted bowel
3. [Pseudothickening related to incomplete distention and residual fluid]
4. Radiation injury, chronic

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

Reference

1. Macari M, Baltazar EJ: CT of bowel wall thickening: Significance and pitfalls of interpretation. *AJR* 2001;176: 1105–1116

Gamut G-71-2

SMALL AND LARGE BOWEL WALL THICKENING: HETEROGENEOUS (STRATIFIED OR MIXED) ATTENUATION ON POSTCONTRAST CT

STRATIFIED ATTENUATION*

COMMON

1. Bowel edema related to cirrhosis or hypoproteinemia
2. Crohn's disease
3. Henoch-Schönlein purpura
4. Infectious enterocolitis
5. Ischemia
6. Lupus erythematosus
7. Radiation injury
8. Ulcerative colitis
9. Vasculitis

UNCOMMON

1. Infiltrating scirrhous carcinoma (usually colon or rectum)
2. Pneumatosis
3. [Residual fluid and contrast material]
4. Submucosal fat deposition

(continued)

MIXED ATTENUATION+

1. Carcinoma (esp. mucinous adenocarcinoma)
2. Gastrointestinal stromal tumor_g

* Alternating (stratified) layers of attenuation in a thickened bowel segment may take the form of a double halo or a target configuration. The double halo sign represents an inner low-attenuation (edema) ring surrounded by an outer higher attenuation ring on postcontrast CT. In the target sign, inner and outer layers of high attenuation surround a central area of decreased (edema) attenuation. The high attenuation in these signs is related to hyperemia.

+ The grossly thickened bowel wall has several irregular zones of lower attenuation haphazardly located next to areas of higher attenuation. These findings are related to ischemia and necrosis and are seen in high-grade, poorly differentiated neoplasms such as adenocarcinoma and stromal cell tumors.

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

Reference

1. Macari M, Baltazar EJ: CT of bowel wall thickening: Significance and pitfalls of interpretation. *AJR* 2001;176:1105–1116

Gamut G-72-1

MILD THICKENING (< 2 CM) OF BOWEL WALL ON POSTCONTRAST CT

COMMON

1. Bowel edema in cirrhosis
2. Crohn’s disease
3. Infectious enterocolitis
4. Ischemia
5. Radiation injury
6. Submucosal hemorrhage
7. Ulcerative colitis

UNCOMMON

1. Adenocarcinoma
2. Lymphoma_g

Reference

1. Macari M, Baltazar EJ: CT of bowel wall thickening: Significance and pitfalls of interpretation. *AJR* 2001;176:1105–1116

Gamut G-72-2

MARKED THICKENING (> 2 CM) OF BOWEL WALL ON POSTCONTRAST CT

COMMON

1. Carcinoma
2. Colitis, severe
3. Gastrointestinal stromal tumor_g
4. Lupus erythematosus
5. Lymphoma_g
6. Metastatic disease involving bowel wall

UNCOMMON

1. Crohn’s disease
2. Cytomegalovirus infection
3. Histoplasmosis
4. Submucosal hemorrhage
5. Tuberculosis

Reference

1. Macari M, Baltazar EJ: CT of bowel wall thickening: Significance and pitfalls of interpretation. *AJR* 2001;176:1105–1116

Gamut G-73

SYMMETRIC VERSUS ASYMMETRIC THICKENING OF BOWEL WALL ON POSTCONTRAST CT

SYMMETRIC

1. Bowel edema in cirrhosis
2. Crohn’s disease
3. Infectious enterocolitis
4. Ischemia
5. Lymphoma_g
6. Radiation injury
7. Submucosal hemorrhage
8. Ulcerative colitis

ASYMMETRIC

1. Carcinoma
2. Gastrointestinal stromal tumor_g

Reference

1. Macari M, Baltazar EJ: CT of bowel wall thickening: Significance and pitfalls of interpretation. *AJR* 2001;176:1105–1116

Gamut G-74-1**FOCAL BOWEL WALL THICKENING (< 10 CM) ON POSTCONTRAST CT****COMMON**

1. Carcinoma (esp. adenocarcinoma)
2. Appendicitis
3. Diverticulitis

UNCOMMON

1. Crohn's disease
2. Lymphoma_g
3. Tuberculosis

Reference

1. Macari M, Baltazar EJ: CT of bowel wall thickening: Significance and pitfalls of interpretation. *AJR* 2001;176:1105–1116

Gamut G-74-2**SEGMENTAL BOWEL WALL THICKENING (10–30 CM) ON POSTCONTRAST CT****COMMON**

1. Carcinoma (eg, mucinous or colloid carcinoma of colon; scirrhous carcinoma of colon or rectum)
2. Crohn's disease
3. Infectious ileitis
4. Ischemia
5. Lymphoma_g
6. Radiation injury
7. Submucosal hemorrhage

UNCOMMON

1. Lupus erythematosus

Reference

1. Macari M, Baltazar EJ: CT of bowel wall thickening: Significance and pitfalls of interpretation. *AJR* 2001;176:1105–1116

Gamut G-74-3**DIFFUSE BOWEL WALL THICKENING ON POSTCONTRAST CT****COMMON**

1. Edema from cirrhosis or hypoproteinemia
2. Infectious enterocolitis
3. Lupus erythematosus
4. Ulcerative colitis

(continued)

UNCOMMON

1. Ischemia
2. Pseudomembranous colitis

Reference

1. Macari M, Baltazar EJ: CT of bowel wall thickening: Significance and pitfalls of interpretation. *AJR* 2001;176:1105–1116

Gamut G-75

**RESIDUAL INTESTINAL BARIUM
AFTER GASTROINTESTINAL STUDY
(MORE THAN ONE WEEK)**

COMMON

1. Barium in appendix or diverticula of small bowel or colon
2. Fecal impaction
3. Gastric obstruction
4. Nonobstructive ileus (See G-61)

UNCOMMON

1. Aganglionosis of colon (eg, Hirschsprung disease; Chagas' disease)
2. Blind loop syndrome (See G-58)
3. [Calcification (esp. milk of calcium)]
4. Cryptosporidiosis
5. Drug effect (eg, morphine)
6. Duplication of intestine
7. Hypothyroidism (eg, myxedema; cretinism)
8. Meckel's diverticulum
9. [Medication, opaque]
10. Perforation of intestine
11. Postoperative (eg, side-to-side anastomosis; gastro-ileostomy; bypass procedure)
12. Scleroderma
13. Stricture of intestine

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

Gamut G-76

**INTESTINAL OBSTRUCTION
IN A NEWBORN***

COMMON

- *1. Congenital stenosis or atresia of stomach, duodenum, small bowel, colon*, rectum*, or anus (imperforate anus)*
2. Hernia, incarcerated, internal or external (eg, inguinal, femoral, umbilical, diaphragmatic, mesenteric defects)
- *3. Hirschsprung disease
4. Malrotation with midgut volvulus
- *5. Meconium ileus (cystic fibrosis {mucoviscidosis})
- *6. Meconium plug S.
- *7. Small left colon S.

UNCOMMON

1. Apple peel intestinal atresia
2. Choledochal cyst
3. Congenital peritoneal bands (Ladd's bands)
4. Inspissated milk S.
5. Intestinal duplication
6. Intraluminal diaphragm or web
7. Intramural hematoma (eg, trauma)
- *8. Intussusception (rare in newborn)
9. Meconium peritonitis (eg, meconium ileus)
- *10. Megacystis-microcolon-intestinal hypoperistalsis S. (Berdon S.)
11. Neoplasm (usually distention without obstruction)
12. [Paralytic ileus (eg, from drugs given during labor)]
13. Preduodenal portal vein
14. Segmental dilatation of ileum

* Low intestinal obstruction in a newborn.

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

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Gamut G-77

INTESTINAL OBSTRUCTION IN A CHILD (See G-76)

COMMON

1. Adhesions (inflammatory; postoperative); congenital peritoneal bands (Ladd's bands)
2. Appendicitis (esp. perforated)
3. Hernia, incarcerated (internal or external)
4. Hirschsprung disease
5. Intussusception (eg, ameboma; intestinal duplication; Henoch-Schönlein purpura; idiopathic; Meckel's diverticulum; polyp_g; lymphoma_g; other neoplasm)

UNCOMMON

1. Cast S. (cast treatment for scoliosis causing superior mesenteric artery S.)
2. Chronic granulomatous disease of childhood
3. Crohn's disease
4. Cystic fibrosis (mucoviscidosis)
5. Familial Mediterranean fever
6. Fecal impaction
7. Foreign body; bezoar
8. Kawasaki S.
9. Neoplasm, benign or malignant (eg, gastrointestinal stromal tumor_g; lymphoma_g; sarcoma)
10. Neurofibromatosis I (von Recklinghausen disease)
11. Parasitic disease (esp. *Ascaris* bolus; ameboma)

12. [Pseudo-obstruction, idiopathic]
13. Stenosis, congenital (eg, duodenum; small bowel; rectum)
14. Tuberculous enteritis
15. Volvulus, midgut or other

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

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2. Swischuk LE, John SD: Differential Diagnosis in Pediatric Radiology. (ed 2) Baltimore: Williams & Wilkins, 1995
3. Taybi H, Lachman RS: Radiology of Syndromes, Metabolic Disorders, and Skeletal Dysplasias. (ed 4) St. Louis: Mosby-Year Book, 1996, p 963

Gamut G-78

INTESTINAL OBSTRUCTION IN AN ADULT

COMMON

1. Abscess, abdominal_g (eg, periappendiceal; tubovarian)
2. Adhesions (inflammatory; postoperative); congenital peritoneal bands (Ladd's bands)
3. Carcinoma of colon, rectum, or rarely, small bowel
4. Crohn's disease
5. Diverticulitis (esp. colonic)
6. Fecal impaction
7. Hernia, incarcerated, internal or external (See G-64-S)
8. Intussusception
9. Metastatic disease (esp. melanoma; carcinoma of ovary, breast, lung; peritoneal carcinomatosis) or invasion of bowel by adjacent pelvic or abdominal malignancy
10. Stricture (eg, neoplastic; inflammatory—lymphogranuloma venereum; radiation; potassium-induced; ischemic; posttraumatic; postoperative)
11. Volvulus (esp. cecal or sigmoid)

(continued)

UNCOMMON

1. Amyloidosis
2. Bezoar; enterolith; foreign body
3. Endometriosis
4. Extrinsic pressure from large adjacent neoplasm, distended bladder, or pregnant uterus
5. Familial Mediterranean fever
6. Gallstone ileus
7. Granulomatous disease (eg, actinomycosis; tuberculosis)
8. Hirschsprung disease
9. [Immobilization; Cast S.]
10. Intestinal duplication
11. [Intestinal pseudo-obstruction, idiopathic] (See G-79)
12. Intramural hematoma
13. Lymphoma_g
14. Neoplasm, other (gastrointestinal stromal tumor_g — esp. leiomyoma; carcinoid; sarcoma); cyst
15. Neurofibromatosis I (von Recklinghausen disease)
16. Parasitic disease (*Ascaris* bolus; amebiasis; Chagas' disease; schistosomiasis)
17. Retractable mesenteritis
18. [Spasm (eg, sickle cell crisis; plumbism; porphyria; tabes; diabetic ketosis; potassium deficiency)]
19. Superior mesenteric artery S.
20. Ulcerative colitis, chronic
21. Vascular occlusion (arterial or venous); mesenteric infarction; ischemic colitis (See G-69)

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

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Gamut G-79

INTESTINAL PSEUDO-OBSTRUCTION (OGILVIE SYNDROME); BOWEL OBSTRUCTION IN THE ABSENCE OF MECHANICAL BLOCKAGE

COMMON

1. Idiopathic (“primary”)
2. Paralytic ileus (eg, trauma; hypokalemia; pneumonia; myocardial infarction; pancreatitis; sickle cell crisis)

UNCOMMON

1. Amyloidosis
2. Celiac disease; sprue
3. Ceroidosis (prolonged malabsorption and vitamin E depletion)
4. Connective tissue disorder (collagen disease)_g
5. Diverticulosis of small bowel
6. Drug reaction (eg, phenothiazine; antidepressant; anti-Parkinsonism drugs; morphine)
7. Endocrine disorder (eg, myxedema; diabetes; hypoparathyroidism; pheochromocytoma)
8. Enteric muscle disorder (eg, myotonic dystrophy; scleroderma)
9. Jejunioileal bypass
10. Neonatal adynamic ileus
11. Neurologic disorder (eg, parkinsonism, stroke, paralysis, brain damage)
12. Parasitic disease (eg, Chagas' disease; chronic strongyloidiasis)
13. Pelvic surgery (eg, hysterectomy)
14. Porphyria, acute intermittent
15. Retractable mesenteritis
16. Urinary retention
17. Vitamin D deficiency

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- Gilchrist AM, Mills JOM, Russell CFJ: Acute large bowel pseudo-obstruction. *Clin Radiol* 1985;36:401–404
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Gamut G-80

SENTINEL LOOP (LOCALIZED DILATATION OF SMALL AND/OR LARGE BOWEL)

COMMON

- Acute appendicitis (right lower quadrant)
- Acute cholecystitis (right upper quadrant)
- Acute diverticulitis (left lower quadrant)
- Acute pancreatitis (upper or mid-abdomen)
- Acute ureteral colic (stone)
- Infarction or ischemia of bowel
- “Paralytic ileus” (See G-61)
- Perforated peptic ulcer (upper abdomen)
- [Small bowel obstruction, early or incomplete]

UNCOMMON

- Abdominal trauma
- Drug effect
- Gastroenteritis
- [Normal variant]
- [Volvulus]

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

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Gamut G-81

APPENDICEAL LESION OR MASS ADJACENT TO APPENDIX

COMMON

- Appendiceal abscess
- Appendiceal fecalith (calculus)
- Appendicitis, acute or resolving
- Carcinoid
- Ileocecal valve, normal or prolapsed
- Postoperative (eg, inverted stump; surgical deformity; adhesions)

UNCOMMON

- [Appendix hernia]
- Crohn’s disease
- [Diverticulum]
- Endometrial implant
- Extrinsic mass
- Foreign body
- Invagination or intussusception of appendix
- Mucocele
- Myxoglobulosis
- Neoplasm, benign (eg, gastrointestinal stromal tumor_g; lipoma; polyp_g)
- Neoplasm, malignant, primary (eg, carcinoma; lymphoma_g) or metastatic implant or extension
- Parasitic disease (eg, amebiasis; trichuriasis; ascariasis; anisakiasis; schistosomiasis; angiostrongyliasis costaricensis)
- Tuberculosis
- Typhoid fever
- Ulcerative colitis
- Yersinia enterocolitis*

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

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Gamut G-82-S**CONGENITAL ANOMALIES AND VARIATIONS OF THE APPENDIX****COMMON**

- Abnormal length (under 2 cm or over 25 cm)
- Abnormal location (eg, retrocecal appendix; malposition or malrotation of cecum)
- Abnormal origin (eg, close to or far from ileocecal valve; high on cecum)

UNCOMMON

- Absence of appendix
- Double appendix
- Primitive appendix (very thin lumen)

References

- Balthazar EJ, Gade M: The normal and abnormal development of the appendix. *Radiology* 1976;121:599–604.
- Balthazar EJ: The appendix. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1123–1150

Gamut G-83**SOLITARY FILLING DEFECT IN THE COLON****COMMON**

- Carcinoma
- Diverticulitis; pericolic abscess (See G-89)
- Fecal mass or impaction
- Intussusception; ileal prolapse
- Polyp_g (esp. adenomatous; hyperplastic; juvenile; or hamartomatous) (See G-84-S)

UNCOMMON

- Amyloidoma
- Carcinoid
- Crohn's disease
- Cyst (duplication or other)
- Endometrioma
- Extramedullary plasmacytoma
- Foreign body; gallstone; food particle; bezoar
- Intramural hematoma
- Inverted colonic diverticulum
- Lymphoma_g
- Metastasis (incl. invasive neoplasm)
- Mucormycoma
- Neoplasm, benign (eg, lipoma; hemangioma; leiomyoma or other gastrointestinal stromal tumor_g)
- Parasitic disease (esp. ameboma; schistosomal granuloma; helminthoma; anisakiasis, *Ascaris bolus*)
- Periappendiceal abscess
- Postoperative (eg, anastomosis; suture granuloma)
- Pseudopolyp, "giant" type (in ulcerative colitis)
- Pseudotumor (eg, fibrous band; adhesion)
- Sarcoma (incl. Kaposi)
- Solitary rectal ulcer syndrome
- Tuberculoma
- Varix; hemorrhoid
- Villous adenoma

References

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Gamut G-84-S

CLASSIFICATION OF COLONIC TUMORS AND TUMOR-LIKE LESIONS

I. EPITHELIAL TUMORS

BENIGN—ADENOMA

1. Tubular
2. Villous
3. Tubulovillous

MALIGNANT

1. Adenocarcinoma
2. Adenoacanthoma
3. Adenosquamous carcinoma
4. Squamous cell carcinoma
5. Basaloid (cloacogenic) carcinoma
6. Carcinosarcoma

II. NEUROENDOCRINE TUMORS

1. Adenocarcinoid tumor
2. Carcinoid tumor

III. NONEPITHELIAL TUMORS

BENIGN

1. Smooth-muscle tumor
2. Neurilemmoma
3. Lipoma
4. Vascular tumor

IV. HEMATOPOIETIC AND LYMPHOID TUMORS

V. UNCLASSIFIED TUMORS

VI. SECONDARY (METASTATIC) TUMORS

VII. NONNEOPLASTIC (TUMOR-LIKE) LESIONS

HAMARTOMA

1. Peutz-Jeghers polyp
2. Juvenile polyp

HETEROTOPIA

1. Colitis cystica profunda
2. Hyperplastic polyp
3. Lymphoid polyp
4. Inflammatory polyp

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2. Olmsted WW, Ros PR, Sobin LH, et al: The solitary colonic polyp: Radiologic-histologic differentiation and significance. Radiology 1986;160:9–16

Gamut G-85

ANNULAR (“APPLE CORE” OR “NAPKIN RING”) LESION OF THE COLON

COMMON

1. Carcinoma

UNCOMMON

1. Ameboma
2. [Circular muscle contraction (colonic “sphincter”)]
3. Diverticulitis (esp. with submucosal abscess)
4. Helminthoma
5. Lymphoma
6. Stricture, chronic localized (eg, Crohn’s disease; ulcerative colitis; ischemic colitis; lymphogranuloma venereum)
7. Tuberculoma
8. Villous adenoma

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

(continued)

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1. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach* (ed 3). Philadelphia: Lippincott, 1996, pp 640–682
2. Gore RM: Colon: Differential diagnosis. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1159–1165

Gamut G-86**SEGMENTAL NARROWING OF THE COLON****COMMON**

1. Abscess or other extrinsic inflammatory process (eg, pericolic) (See G-89)
2. Carcinoma (esp. “apple-core” adenocarcinoma or scirrhous)
3. [Circular muscle contraction or spasm, usually transient]
4. Crohn’s disease
5. Diverticulitis
6. Endometriosis
7. Ischemic colitis (See G-69)
8. Postoperative deformity (eg, adhesion; narrow anastomosis)
9. Ulcerative colitis

UNCOMMON

1. Actinomycosis
2. Adhesive bands
3. Amyloidosis
4. Carcinoid
5. Carcinoma developing in ulcerative colitis or Crohn’s disease or adjacent to ureterosigmoidostomy stoma
6. Cathartic colon; caustic colitis
7. Colitis, other (eg, herpes; cytomegalovirus; fungal)
8. Foreign body perforation with pericolic abscess
9. Intramural hematoma
10. Lymphogranuloma venereum
11. Lymphoma_g

12. Metastatic disease (eg, hematogenous or lymphangitic spread; peritoneal seeding; or direct extension to colon)
13. Neoplasm of colon, benign (eg, lipoma, gastrointestinal stromal tumor_g)
14. Neoplasm, extrinsic (eg, pancreatic; ovarian; renal)
15. Pancreatitis with direct spread to transverse colon or splenic flexure
16. Parasitic disease (eg, amebiasis/ameboma; schistosomiasis; helminthoma; strongyloidiasis; angiostrongyliasis costaricensis)
17. Pelvic lipomatosis
18. Radiation fibrosis
19. Retractable mesenteritis
20. Sarcoma (incl. Kaposi)
21. Stricture, idiopathic
22. Tuberculosis
23. Typhlitis
24. Ulcer of colon (esp. solitary rectal ulcer syndrome)

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 640–682
2. Gore RM: Colon: Differential diagnosis. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1159–1165
3. McDonald JB, Middleton PJ: Tuberculosis of the colon simulating carcinoma. *Radiology* 1976;118:293–294
4. Simpkins KC, Young AC: The differential diagnosis of large bowel strictures. *Clin Radiol* 1971;22:449–457
5. Twersky J, Himmelfarb E: Right colonic adhesions. *Radiology* 1976;120:37–40

Gamut G-87**MULTIPLE FILLING DEFECTS IN THE COLON****COMMON**

1. Artifacts (eg, feces; air bubbles; corn or other food particles; mucus strands or globules; oil droplets; foreign bodies)
2. [Diverticulosis]

3. Normal lymphoid follicles
4. Polyposis, familial
5. Polyps_g (See G-84-S)
6. Pseudopolyps (esp. in ulcerative colitis)

UNCOMMON

1. Amebomas
2. Amyloidosis
3. Bannayan-Riley-Ruvalcaba S.
4. Carcinomas, multiple
5. Colitis cystica profunda
6. Colitis, other types (eg, pseudomembranous; ischemic; *Yersinia*; cytomegalovirus; Behçet S.)
7. Cowden S. (multiple hamartoma S.)
8. Cronkhite-Canada S.
9. Cystic fibrosis (mucoviscidosis)
10. Endometriosis
11. Gardner S.
12. Hemangiomas
13. Juvenile polyposis
14. Lipomatous polyposis
15. Lymphoma_g; leukemic infiltration
16. Malakoplakia
17. Metastases
18. Neurofibromatosis
19. Nodular lymphoid hyperplasia (if over 4 mm in size, may be due to AIDS with lymphoid hyperplasia); lymphoid polyps
20. Parasites, intraluminal (eg, *Ascaris*; *Trichuris*)
21. Peutz-Jeghers S. (alimentary tract polyposis)
22. Pneumatosis cystoides intestinalis
23. Polyposis syndromes, other (See G-106)
24. Schistosomiasis (inflammatory polyps)
25. Turcot S.
26. Urticaria, incl. hives, blebs, submucosal edema (secondary to chronic ischemia; colon obstruction; herpes zoster or *Yersinia* colitis; Chagas' disease)
27. Varices; hemorrhoids

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

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3. Gelfand DW: *Gastrointestinal Radiology*. New York: Churchill Livingstone, 1984, p 329
4. Taybi H, Lachman RS: *Radiology of Syndromes, Metabolic Disorders, and Skeletal Dysplasias*. (ed 4) St. Louis: Mosby-Year Book, 1996, p 964
5. Teplick JG, Haskin ME: *Roentgenologic Diagnosis*. (ed 3) Philadelphia: WB Saunders, 1976
6. Wolfson JJ, Goldstein G, Krivit W, et al: Lymphoid hyperplasia of the large intestine associated with dysgammaglobulinemia: Report of a case. *AJR* 1970;108:610–614
7. Yousefzadeh DK: Urticaria of the colon. *Radiology* 1979; 132:315–316

Gamut G-88

COLITIS (ULCERATION, EDEMA, SPASM); ALSO THICKENING OF THE COLON WALL ON CT, US, OR MRI

COMMON

1. Amebiasis
2. Carcinoma, esp. scirrhous or mucinous adenocarcinoma
3. Crohn's disease
4. Diverticulitis
5. *Helicobacter fetus* colitis
6. Ischemic colitis (See G-69)
7. Ulcerative colitis

UNCOMMON

1. Actinomycosis
2. Amyloidosis
3. Bacillary dysentery (shigellosis)
4. Behçet S.
5. Bowel edema from cirrhosis, protein loss, portal hypertension
6. Cathartic colon; enema abuse (caustic colitis)
7. Chronic granulomatous disease of childhood
8. Colitis cystica profunda
9. Collagenous colitis

(continued)

10. Drug therapy (esp. steroids; NSAIDs; antibiotics; chemotherapeutic agents; cimetidine; anti-fungal flucytosine; gold; methyldopa)
11. Fungus disease (eg, histoplasmosis; mucormycosis; candidiasis)
12. Graft-versus-host disease
13. Lymphogranuloma venereum (chlamydia infection)
14. Lymphoma_g; leukemic infiltration (diffuse)
15. Mercury poisoning
16. Metastatic disease
17. Neoplasm, other (eg, gastrointestinal stromal tumor_g; Kaposi sarcoma)
18. Nonspecific benign ulceration of colon
19. Pancreatitis with involvement of transverse colon or splenic flexure
20. Parasitic disease, other (esp. schistosomiasis; strongyloidiasis; helminthoma; Chagas' disease; anisakiasis and angiostrongyliasis costaricensis—ileocecal region)
21. Postoperative colitis (incl. diversion colitis in isolated segment after proximal colostomy or ileostomy; postrectal biopsy ulceration)
22. Proctitis (nonspecific; chemical—paraldehyde; in male homosexuals, often due to gonorrhea, lymphogranuloma venereum, or herpes simplex)
23. Pseudomembranous or necrotizing colitis (eg, *Clostridium difficile* infection, esp. after antibiotic therapy; postoperative; or proximal to colon obstruction)
24. Radiation colitis
25. *Salmonella* colitis
26. Solitary rectal ulcer S.
27. Staphylococcal colitis (eg, after oral tetracycline therapy)
28. Stercoral colitis (in obstruction)
29. Tuberculosis
30. Typhlitis
31. Uremic colitis; hemolytic-uremic S.
32. Urticaria (“colon hives” secondary to chronic ischemia; colon obstruction; herpes zoster or *Yersinia colitis*; Chagas' disease)
33. Viral infection (eg, herpes simplex-anorectal

- herpes; herpes zoster; cytomegalovirus—esp. in AIDS; rotavirus)
34. *Yersinia colitis*

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1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 601–639
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9. Teplick JG, Haskin ME: Roentgenologic Diagnosis. (ed 3) Philadelphia: WB Saunders, 1976

Gamut G-89

PERICOLIC ABSCESS

COMMON

1. Appendicitis
2. Crohn's disease
3. Diverticulitis
4. Neoplasm of colon, perforated primary (esp. carcinoma) or metastatic
5. Pancreatitis
6. Trauma, external or iatrogenic (eg, enema)
7. Tubo-ovarian abscess

UNCOMMON

1. Actinomycosis
2. Foreign body perforation
3. Idiopathic
4. Ischemic colitis

5. Lymphogranuloma venereum (*Chlamydia* infection)
6. Parasitic disease (esp. amebiasis; schistosomiasis; helminthoma; anisakiasis or angiostrongyliasis costaricensis—ileocecal region)
7. Postoperative (eg, suture leak; talc granuloma)
8. Renal infection or abscess
9. Tuberculosis
10. Ulcerative colitis

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2. Wolverson MK, Jagannadharao B, Sundaram M, et al: CT as a primary diagnostic method in evaluating intraabdominal abscess. *AJR* 1979;133:1089–1095

Gamut G-90

DOUBLE TRACKING OF BARIUM IN THE DISTAL COLON*

COMMON

1. Crohn's disease
2. Diverticulitis

UNCOMMON

1. Carcinoma of colon

* Barium in an extraluminal sinus tract paralleling the bowel lumen.

Reference

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 784–787

Gamut G-91

SMOOTH COLON

COMMON

1. Cathartic or enema abuse
2. Chronic obstruction (eg, megacolon; Chagas' disease)
3. Ischemic colitis, late (See G-69)
4. Ulcerative colitis, chronic

UNCOMMON

1. Amyloidosis
2. Bacillary dysentery, chronic (shigellosis)
3. Carcinoma, scirrhous
4. Lymphogranuloma venereum, late (*Chlamydia* infection)
5. Lymphoma_g
6. Parasitic disease, late (eg, schistosomiasis; strongyloidiasis; amebic stricture)
7. Radiation colitis, late

References

1. Caroline DF, Evers K: Colitis: radiographic features and differentiation of idiopathic inflammatory bowel disease. *Radiol Clin North Am* 1987;25:47–63
2. Kim SK, Gerle RD, Rozanski R: Cathartic colitis. *AJR* 1978;130:825–829

Gamut G-92

COLONIC DISTENTION WITHOUT OBSTRUCTION

COMMON

1. Acute nonobstructive distention, “paralytic ileus” (eg, postoperative; peritonitis; appendicitis; pancreatitis; typhoid fever) (See G-61)
- *2. Chronic constipation; cathartic abuse
3. Electrolyte imbalance (hypokalemia; hyponatremia; hypochloremia; calcium abnormality)

(continued)

- *4. Functional megacolon (psychogenic; idiopathic)
- *5. Hirschsprung's disease
- 6. Mesenteric infarction (See G-69)
- 7. Shock; septicemia; hypoxia
- 8. Toxic megacolon (See G-94)
- 9. Trauma (esp. spine or lower rib injury; intramural hematoma)
- 10. Ureteral colic

UNCOMMON

- *1. Aerophagia
- *2. Amyloidosis; familial Mediterranean fever (familial recurrent polyserositis)
- *3. Ceroidosis (vitamin E depletion)
- *4. Chagas' disease
- *5. Connective tissue disease (collagen disease)_g (esp. scleroderma; polyarteritis nodosa)
- *6. Cystic fibrosis (mucoviscidosis)
- *7. Drug therapy (eg, Pro-Banthine; hexamethonium; chlorpromazin; benztrapine; morphine; L-dopa; atropine)
- *8. Endocrine disturbance (eg, adrenal insufficiency; multiple endocrine neoplasia (MEN) S.; hypothyroidism; hypoparathyroidism)
- 9. Functional (eg, diabetic coma; lead colic; sickle cell crisis; tabes; porphyria; pheochromocytoma)
- 10. Idiopathic intestinal pseudo-obstruction
- 11. Kawasaki disease
- *12. Muscular, neurologic, or psychiatric disorder_g (eg, amyotonia congenita {Oppenheim's disease}; multiple sclerosis; parkinsonism, Riley-Day S. {familial dysautonomia}; senility; schizophrenia; brain damage; paralysis)
- 13. Neurofibromatosis (esp. plexiform)
- 14. Pneumonia or other acute thoracic disease (eg, myocardial infarction; heart failure)
- *15. Renal failure; uremia; urinary retention
- 16. Retroperitoneal hemorrhage
- 17. Spinal cord lesion; paraplegia
- *18. Sprue

* Chronic.

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1. Baker DA, Morin ME, Tan A, et al: Colonic ileus. Indication for prompt decompression. *JAMA* 1979; 241:2633–2634
2. Baker SR, Cho KC: The Abdominal Plain Film with Correlative Imaging. Norwalk, CT: Appleton & Lange, 1998
3. Bode WE, Beart RW, Spencer RJ, et al: Colonoscopic decompression for acute pseudo-obstruction of the colon (Ogilvie's syndrome): Report of 22 cases and review of the literature. *Am J Surg* 1984;147:243–254
4. Gilchrist AM, Mills JOM, Russell CFJ: Acute large-bowel pseudo-obstruction. *Clin Radiol* 1985;36:401–404
5. Meyers MA: Colonic ileus. *Gastrointest Radiol* 1977;2: 37–40
6. Passail G, Benacerraf R: Acute pseudo-obstruction of the colon. *Ann Radiol* 1979; 22:508–514
7. Vanek VW, Al-Salti M: Acute pseudo-obstruction of the colon (Ogilvie's syndrome): An analysis of 400 cases. *Dis Colon Rectum* 1986; 29:203–210

Gamut G-93**MEGACOLON****COMMON**

1. Distal obstructing lesion (esp. carcinoma)
- *2. Functional (psychogenic; idiopathic)
- *3. Hirschsprung disease
- *4. Imperforate anus; colon or rectal atresia; anal stenosis
- *5. Nonobstructive distention ("paralytic ileus")
6. Scleroderma; dermatomyositis
- *7. Toxic megacolon (See G-94)

UNCOMMON

- *1. Aerophagia
- 2. Amyloidosis
- 3. Chagas' disease
- *4. Chronic idiopathic intestinal pseudo-obstruction
- *5. Cystic fibrosis (mucoviscidosis); meconium plug S. (dilated colon proximal to plug)
- 6. Diabetes
- *7. Drug therapy (esp. Pro-Banthine; phenothiazine; anti-Parkinsonism agents)

- *8. Duplication
- *9. Fetal cytomegalovirus infection
- *10. Hypothyroidism (esp. myxedema; cretinism)
- *11. Immobilization, prolonged (eg, cast S.)
- *12. Multiple endocrine neoplasia (MEN) S. (See J-5)
- *13. Muscular disorder_g (eg, muscular dystrophy)
- *14. Neurologic disorder_g (eg, plexiform neurofibromatosis; meningomyelocele; spina bifida; paralysis; neuronal intestinal dysplasia; Parkinsonism, brain damage)
- *15. Obstruction of colon from chronic stricture (eg, lymphogranuloma venereum or other rectal stricture; Crohn's disease; postoperative scarring*; post-necrotizing enterocolitis*)
- *16. Purgative abuse
- *17. Riley-Day S. (familial dysautonomia)
- *18. Sacrococcygeal teratoma; other pelvic neoplasm
- *19. Small left colon S. (dilated colon proximally)
- *20. Sotos S. (cerebral gigantism)
- *21. Steatorrhea; celiac disease; sprue

* Megacolon in an infant or child.

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3. Solano Jr FX, Starling RC, Levey GS: Myxedema megacolon. Arch Intern Med 1985;145:231
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Gamut G-94

TOXIC MEGACOLON

COMMON

1. Ulcerative colitis

UNCOMMON

1. Amebic colitis

2. Bacillary dysentery, acute (shigellosis)
3. Behçet S.
4. Cholera
5. Crohn's disease
6. Enterocolitis, other (necrotizing; pseudo-membranous; hemorrhagic)
7. *Helicobacter fetus* colitis
8. Hirschsprung disease
9. Ischemic colitis
10. Strongyloidiasis
11. Typhoid fever

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 768–772
2. Gelfand DW: Gastrointestinal Radiology. New York: Churchill Livingstone, 1984, p 308

Gamut G-95-1

COLON OF REDUCED CALIBER (MICROCOLON) IN A NEWBORN

1. “Apple peel” intestinal atresia S.
2. Berdon S. (megacystis-microcolon-intestinal hypoperistalsis S.)
3. Colon atresia (microcolon to point of atresia)
4. Congenital ileal stenosis, web
5. Distal jejunal atresia (occas. total microcolon of disuse)
6. Hirschsprung disease (aganglionic distal segment may be small)
7. Ileal atresia (total microcolon of disuse)
8. Meconium ileus, esp. with cystic fibrosis {mucoviscidosis} (total microcolon of disuse)
9. Meconium plug S. (entire colon may be slightly small)
10. Microcolon of prematurity
11. Small left colon S. (rectum normal, colon small to splenic flexure)
12. Total aganglionosis coli (entire colon may be slightly small—question mark colon)

(continued)

Reference

1. Taybi H, Lachman RS: Radiology of Syndromes, Metabolic Disorders, and Skeletal Dysplasias. (ed 4) St. Louis: Mosby-Year Book, 1996, p 964

Gamut G-95-2

MECONIUM PLUG IN A NEWBORN

1. Cystic fibrosis (mucoviscidosis) with meconium ileus
2. Hirschsprung disease
3. Meconium plug S.
4. Small left colon S.

References

1. Fernbach SK: Neonatal gastrointestinal radiology. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 2042–2073
2. Taybi H, Lachman RS: Radiology of Syndromes, Metabolic Disorders, and Skeletal Dysplasias. (ed 4) St. Louis: Mosby-Year Book, 1996, p 964

Gamut G-96

CECAL LESION

COMMON

1. Amebiasis
2. Appendiceal stump or lesion (See G-81)
3. Carcinoma
4. Crohn’s disease
5. [Fecal matter; pill; food particle; foreign body]
6. Ileocecal valve, normal or fatty (“lipoma”); ileocecal prolapse
7. Ileocecal intussusception (eg, idiopathic; lymphoma; Meckel’s diverticulum; appendix)
8. Polyp_g
9. Ulcerative colitis
10. Volvulus

UNCOMMON

1. Actinomycosis
2. Benign neoplasm (esp. villous adenoma; angioma; gastrointestinal stromal tumor_g; lipoma)
3. Carcinoid
4. Cathartic abuse
5. Cecal diaphragm, web, or adhesion
6. Cytomegalovirus infection (esp. in AIDS)
7. Diverticulosis; diverticulitis
8. Duplication
9. Endometriosis
10. Enterolith
11. Foreign body perforation
12. [Gallstone]
13. Ileus of cecum
14. Lymphoma_g (incl. Burkitt lymphoma)
15. Metastasis (esp. colon, stomach, pancreas, ovary)
16. Parasitic disease, other (eg, schistosomiasis; strongyloidiasis; ascariasis; trichuriasis; anisakiasis; helminthoma; angiostrongyliasis costaricensis)
17. Pneumatosis cystoides intestinalis
18. Tuberculosis
19. Typhlitis
20. Typhoid fever
21. Ulcer, solitary
22. *Yersinia enterocolitis*

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

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1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 555–598
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5. Margolies MN, Welch CE: Case records of the Massachusetts General Hospital. Case 38–1976. N Engl J Med 1976; 295:666–670
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Gamut G-97

CONICAL OR CONTRACTED CECUM

COMMON

1. Amebiasis
2. Appendicitis; appendiceal abscess
3. Crohn's disease

UNCOMMON

1. Actinomycosis; South American blastomycosis
2. Anisakiasis; angiostrongyliasis costaricensis
3. Carcinoma
4. Cathartic abuse
5. Cytomegalovirus colitis (esp. in AIDS)
6. Diverticulitis of cecum (esp. following perforation)
7. Idiopathic
8. Lymphoma_g; leukemia (esp. in children after treatment)
9. Metastatic disease (eg, from carcinoma of stomach, colon, pancreas, ovary)
10. Radiation therapy
11. Tuberculosis (Stierlin sign)
12. Typhlitis
13. Typhoid fever
14. Ulcerative colitis
15. *Yersinia* enterocolitis

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 589–598
2. Gore RM: Colon: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1159–1165
3. Kreel L: Outline of Radiology. New York: Appleton-Century-Crofts, 1971, p 158

Gamut G-98

ENLARGEMENT OF THE ILEOCECAL VALVE

COMMON

1. Amebiasis
2. Crohn's disease
3. Fatty infiltration (lipomatosis)
4. Intussusception
5. Neoplasm, benign or malignant (esp. villous adenoma; polyp_g; lipoma; carcinoid; adenocarcinoma; lymphoma_g)
6. Normal variant (“hypertrophy”)

UNCOMMON

1. Actinomycosis
2. Anisakiasis
3. Cathartic abuse
4. Foreign body, impacted
5. Gallstone, impacted
6. Ileocolic prolapse
7. Intramural hematoma
8. Lymphoid hyperplasia
9. Tuberculosis
10. Typhoid fever
11. Ulcerative colitis
12. *Yersinia* enterocolitis

Reference

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 555–565

Gamut G-99

ANTERIOR INDENTATION ON THE RECTOSIGMOID JUNCTION

COMMON

1. Abscess, pelvic (eg, bacterial; PID; amebiasis; schistosomiasis; LGV)
2. Ascites (in erect position)
3. Carcinoma of ovary, cervix, uterus, bladder, or rectosigmoid colon
4. Endometriosis
5. Extrinsic pelvic neoplasm, other (eg, teratoma; dermoid or other ovarian cyst; uterine fibroid)
6. Metastasis, peritoneal (Blumer shelf) (esp. from carcinoma of colon, stomach, pancreas, ovary)

UNCOMMON

1. Aneurysm of internal iliac artery
2. Hematoma
3. Hydatid cyst
4. Lymphocele
5. Lymphoma_g; other lymphadenopathy
6. Pelvic lipomatosis
7. Postsurgical sling repair for rectal prolapse
8. Rectovaginal fistula (eg, LGV) (See G-101)
9. Retroperitoneal fibrosis
10. Urinoma
11. Vaginal lesion (eg, carcinoma; hematocolpos)

Reference

1. Schulman A, Fataar S: Extrinsic stretching, narrowing, and anterior indentation of the rectosigmoid junction. *Clin Radiol* 1979;30:463–469

Gamut G-100

RECTAL DISEASE ON BARIUM ENEMA

COMMON

1. Abscess
2. Carcinoma (adenocarcinoma; scirrhous; cloacogenic; anal)
3. Congenital anomaly (eg, Hirschsprung disease; imperforate anus)
4. Crohn's disease
5. Endometriosis
6. Metastasis; invasion from adjacent neoplasm
7. Polyp_g
8. Prolapse
9. Radiation proctitis
10. Trauma (sexual; iatrogenic; puerperal or other)
11. Ulcerative colitis
12. Villous adenoma

UNCOMMON

1. Actinomycosis
2. Amyloidosis
3. Bacillary dysentery (shigellosis)
4. Carcinoid
5. Colitis cystica profunda
6. Diverticulitis
7. Ischemic colitis
8. Lymphogranuloma venereum (*Chlamydia* infection)
9. Lymphoma_g
10. Neoplasm, benign (eg, gastrointestinal stromal tumor_g; lipoma; angioma)
11. Opportunistic infection (eg, herpes)
12. Parasitic disease (esp. amebiasis; schistosomiasis; trichuriasis; Chagas' disease)
13. Pelvic lipomatosis
14. Pneumatosis cystoides intestinalis
15. Proctitis (idiopathic; gonorrheal; chemical—paraldehyde)
16. Retroperitoneal fibrosis

17. Solitary rectal ulcer syndrome
18. Tuberculosis
19. Varices; hemorrhoids

Reference

1. Hama Y, Okizuka H, Odajima K, et al: Gastrointestinal stromal tumor of the rectum. *Eur Radiol* 2001;11:216–219

Gamut G-101

RECTOVAGINAL FISTULA

COMMON

1. Crohn's disease
2. Diverticulitis
3. Lymphogranuloma venereum (*Chlamydia* infection)
4. Neoplasm, malignant (eg, carcinoma of rectum, cervix, or vagina; other pelvic carcinoma)
5. Radiation therapy
6. Trauma (external; sexual; puerperal; iatrogenic)

UNCOMMON

1. Abscess (eg, appendiceal; tubovarian; perirectal)
2. Actinomycosis
3. Endometriosis
4. Foreign body perforation
5. Imperforate anus or other cloacal anomaly
6. Metastasis
7. Schistosomiasis
8. Tuberculosis
9. Ulcerative colitis

Reference

1. Greenall MJ, Levine AW, Nolan DJ: Complications of diverticular disease: a review of the barium enema findings. *Gastrointest Radiol* 1983;8:353–361

Gamut G-102

INCREASED RETRORECTAL OR PRESACRAL SPACE (See C-50)

COMMON

1. Abscess, presacral or pelvic (eg, perforated colon from diverticulitis or carcinoma; tubovarian or peri-appendiceal abscess)
2. Carcinoma of rectum (esp. adenocarcinoma; also scirrhous; cloacogenic; anal)
3. Crohn's disease
4. Diverticulitis
5. Extrinsic soft tissue mass (incl. ovarian cyst or neoplasm; dermoid; teratoma; enteric duplication cyst; tail gut cyst; lipoma)
6. Hematoma (eg, sacral fracture)
7. Lymphadenopathy
8. Metastatic or invasive malignant neoplasm (eg, from bladder, prostate, ovary, cervix)
9. Normal variant
10. Postoperative (eg, resection of rectosigmoid)
11. Radiation proctitis or fibrosis
12. Sacral or coccygeal lesion (eg, metastasis; myeloma; chordoma; osteosarcoma; chondrosarcoma; giant cell tumor; neurofibroma; sacrococcygeal teratoma; hydatid cyst)
13. Trauma (external; sexual; puerperal; iatrogenic—instrumentation)
14. Ulcerative colitis
15. Urinoma

UNCOMMON

1. Amebiasis
2. Amyloidosis of colon
3. Anterior sacral meningocele
4. Colitis cystica profunda; pneumatosis intestinalis
5. Cushing S. (fat deposition)
6. Endometriosis
7. Hemorrhoidal injection
8. Inferior vena cava obstruction (pelvic edema)
9. Inguinal hernia with rectal traction

(continued)

10. Ischemic colitis (See G-69)
11. Lymphocele
12. Lymphogranuloma venereum (*Chlamydia* infection)
13. Lymphoma_g of rectum or retrorectal soft tissues
14. Neoplasm, benign, of soft tissues or rectum (incl. hemangioma; hemangioendothelioma; gastrointestinal stromal tumor_g; lipoma)
15. Pelvic lipomatosis
16. Pneumoretroperitoneum
17. Proctitis (idiopathic; traumatic; gonorrheal; chemical—paraldehyde)
18. Retroperitoneal fibrosis
19. Sarcoma (eg, rhabdomyosarcoma)
20. Schistosomiasis
21. Tuberculosis

References

1. Burgener FA, Korman M: Differential Diagnosis in Conventional Radiology. (ed 2) New York: Thieme Medical Publ, 1991, pp 584–585
2. Eisenberg RL: Clinical Imaging: An Atlas of Differential Diagnosis. (ed 3) Philadelphia: Lippincott-Raven, 1997, pp 420–421
3. Swischuk LE, John SD: Differential Diagnosis in Pediatric Radiology. (ed 2) Baltimore: Williams & Wilkins, 1995, pp 145–146
4. Teplick SK, Stark P, Clark RE, Metz JR, Shapiro JH: The retrorectal space. *Clin Radiol* 1978;29:177–184

Gamut G-103

“THUMBPRINTING” OF THE GASTROINTESTINAL TRACT (MULTIPLE INTRAMURAL DEFECTS)

COMMON

1. Crohn’s disease
2. Diverticulitis
3. Ischemic colitis with hemorrhage into bowel wall (See G-69)
4. Ulcerative colitis

UNCOMMON

1. Amyloidosis
2. Angioneurotic edema
3. Carcinoid S.
4. Cytomegalovirus colitis in AIDS
5. Endometriosis
6. Hemolytic-uremic S. (ischemic enterocolitis preceding onset of renal failure in infants)
7. Intramural hematoma or hemorrhage (eg, trauma; hemophilia or other bleeding diathesis; anticoagulant therapy)
8. Lymphoma_g
9. Metastasis, mural or peritoneal
10. Parasitic disease (esp. amebiasis; strongyloidiasis; schistosomiasis; anisakiasis)
11. Pericolonic abscess (See G-89)
12. Pneumatosis cystoides intestinalis
13. Pseudomembranous or necrotizing colitis
14. Retractable mesenteritis, other mesenteric or peritoneal lesion (See G-228 to G-231)
15. Toxic megacolon (See G-94)
16. Typhlitis
17. Urticaria (“colon hives” secondary to chronic ischemia; colon obstruction; herpes zoster or *Yersinia* colitis; Chagas’ disease)

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 773–783
2. Marshak RH, Lindner AE, Maklansky D: Radiology of the Colon. Philadelphia: WB Saunders, 1980
3. Schwartz S, Boley SJ, Schultz L, et al: A survey of vascular diseases of the small intestine. *Semin Radiol* 1966;1: 178–218

Gamut G-104

INTRAMURAL HEMATOMA OF THE GASTROINTESTINAL TRACT

COMMON

1. Anticoagulant therapy
2. Hemophilia; Christmas disease; other bleeding or clotting disorder_g
3. Trauma

UNCOMMON

1. Connective tissue disease (collagen vascular disease)_g (esp. polyarteritis nodosa)
2. Drug therapy (eg, cytotoxin)
3. Henoch-Schönlein purpura
4. Idiopathic thrombocytopenic purpura
5. Leukemia

Reference

1. Felson B, Levin EJ: Intramural hematoma of the duodenum: A diagnostic roentgen sign. *Radiology* 1954; 63:823–830.

3. Carcinoma
4. Ectopic pancreas
5. Eosinophilic granuloma
- *6. Kaposi sarcoma
- *7. Metastases (esp. from kidney; pancreas; breast; lung)

* May be multiple.

References

1. Balthazar EJ, Megibow A, Bryk D, et al: Gastric carcinoid tumors: Radiographic features in eight cases. *AJR* 1982; 139:1123–1127
2. Cavanagh RC, Buchignani JS Jr, Rulon DB: Metastatic melanoma of the small intestine. *Radiology* 1971;101: 195–200
3. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 903–908
4. Marshak RH, Lindner AE: Polypoid lesions of the stomach. *Semin Roentgenol* 1971; 6:151–167
5. Pandarinath GS, Levine SM, Sorokin JJ, et al: Selective massive amyloidosis of the small intestine mimicking multiple tumors. *Radiology* 1978;129:609–610
6. Pomerantz H, Margolin HN: Metastases to the gastrointestinal tract from malignant melanoma. *AJR* 1962;88: 712–717
7. Wolf BS: Observations on roentgen features of benign and malignant gastric ulcers. *Semin Roentgenol* 1971;6: 140–150

Gamut G-105

BULL'S-EYE LESION (SOLITARY OR MULTIPLE NODULES IN THE GASTROINTESTINAL TRACT WITH LARGE CENTRAL ULCERATION)

COMMON

- *1. Gastrointestinal stromal tumor_g (esp. leiomyoma; leiomyosarcoma; neurofibroma)
- *2. Lymphoma_g
- *3. Metastatic melanoma
- *4. Peptic ulcer

UNCOMMON

1. Amyloid tumor
2. Carcinoid

Gamut G-106

POLYPOSIS SYNDROMES

1. Behçet S.
2. Blue rubber bleb nevus S.
3. Cowden S. (multiple hamartoma S.)
4. Cronkhite-Canada S.
5. Familial adenomatous polyposis (eg, familial polyposis; Gardner S.)
6. Juvenile polyposis of infancy; generalized juvenile polyposis
7. Lipomatous polyposis
8. Peutz-Jeghers S. (alimentary tract polyposis)
9. [Polyps, multiple adenomatous]

(continued)

10. Ruvalcaba-Myhre-Smith S.
11. Turcot S.

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Buck JL, Harned RK: Polyposis syndromes. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1075–1088
2. Dodds WJ: Clinical and roentgen features of the intestinal polyposis syndromes. *Gastrointest Radiol* 1976;1:127–142
3. Itzkowitz SH, Kim YS: Colon polyps and polyposis syndromes. In: Feldman M, Scharschmidt BF, Sleisenger MH: *Gastrointestinal and Liver Diseases*. (ed 6) Philadelphia: WB Saunders, 2000, pp 1865–1905
4. Taybi H, Lachman RS: *Radiology of Syndromes, Metabolic Disorders, and Skeletal Dysplasias*. (ed 4) St. Louis: Mosby-Year Book, 1996, p 964

7. Foreign body (eg, pin; bone; toothpick)
8. Infarction; ischemic colitis (See G-69)
9. Lymphoma_g
10. Peptic ulcer; marginal ulcer
11. Pancreatic fistula (pancreatitis; ruptured pseudocyst; posttraumatic; postsurgical; external drainage of pseudocyst)
12. Prosthetic aortic graft
13. Radiation therapy
14. Rectovaginal, pelvic, or perineal fistula (esp. pelvic inflammatory disease; lymphogranuloma venereum; diverticulitis; Crohn's disease; malignancy) (See G-101)
15. Schistosomiasis
16. Trauma, external or iatrogenic (eg, enema)
17. Tuberculosis
18. Ulcerative colitis

References

1. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach* (ed 3). Philadelphia: Lippincott, 1996, pp 971–981
2. Gore RM, Calenoff L, Rogers LF: Roentgenographic manifestations of ischemic colitis. *JAMA* 1979;241:1171–1173

Gamut G-107

INTERNAL OR EXTERNAL FISTULA INVOLVING THE GASTROINTESTINAL TRACT

COMMON

1. Abscess_g (eg, appendiceal; perirenal)
2. Carcinoma; other malignant neoplasm, primary or metastatic
3. Crohn's disease
4. Diverticulitis
5. Postoperative (eg, surgical complication; dehiscence; ileostomy; colostomy; gastrostomy)

UNCOMMON

1. Actinomycosis
2. Amebiasis
3. Biliary-enteric fistula (See G-139)
4. Colovesical fistula (esp. diverticulitis; malignancy)
5. Duodenal-renal fistula (eg, tuberculosis; pyelonephritis; duodenal ulcer)
6. Entero-ovarian fistula

Gamut G-108

NONVISUALIZATION OF THE GALLBLADDER (US, CT, NM)

COMMON

1. [Calcified gallbladder wall (porcelain gallbladder); milk of calcium bile]
2. Cholecystitis (acute or chronic; gangrenous; emphysematous)
3. Contracted gallbladder (esp. postprandial)
4. Prior cholecystectomy
5. Technical factors, esp. on ultrasound (eg, gallbladder obscured by gas; obese patient or thin patient with superficial gallbladder)

UNCOMMON

1. [Anomalous position of gallbladder (eg, ectopic gallbladder; situs inversus)]
2. Biliary atresia
3. Carcinoma of gallbladder
4. Compression by adjacent mass
5. Congenital absence or hypoplasia
6. Fibrosis of gallbladder
7. Hepatization of the gallbladder (sludge-filled)
8. Hyperalimentation; nonfasting patient
9. Metastatic disease involving gallbladder
10. Pregnancy (last trimester)
11. Syndromes (eg, Dubin-Johnson S.; Kawasaki S.; Mirizzi S.)

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Abbutt PL: *Ultrasound: A Pattern Approach*. New York: McGraw-Hill, 1995
2. Balthazar U, Dunn J, Gonzalez-Diaz S, et al: Agenesis of the gallbladder. *South Med J* 2000;93:914–915
3. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 803–808
4. Gore RM: Gallbladder and biliary tract: Differential diagnosis. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1408–1414
5. Laing FC: Chapter 6. The gallbladder and bile ducts. The liver. In: Rumack CM, Wilson SR, Charboneau JW (eds): *Diagnostic Ultrasound*. St. Louis: Mosby, 1998, pp 175–223
6. Parulekar SG: Gallbladder and bile ducts. In: McGahan JP, Goldberg BB (eds): *Diagnostic Ultrasound*. Philadelphia: Lippincott-Raven, 1997, chapter 22
7. Shehadi WH: Radiologic examination of the biliary tract. *Radiol Clin North Am* 1966;4:463–482
8. Williamson, MR: Abdominal ultrasound. In: *Essentials of Ultrasound*. Philadelphia: WB Saunders, 1996, p 86

Gamut G-109**SMALL OR CONTRACTED GALLBLADDER (US, CT, MRI)****COMMON**

1. Acute hepatitis
2. Chronic cholecystitis
3. Postprandial status

UNCOMMON

1. Adenomyomatosis of gallbladder
2. Congenital hypoplasia or multiseptate gallbladder
3. Cystic fibrosis (mucoviscidosis)

References

1. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 809–812.
2. Gore RM: Gallbladder and biliary tract disease: Differential diagnosis. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. ed 2 Philadelphia: WB Saunders, 2000, pp 1408–1415
3. Irie H, Honda H, Kuroiwa T, et al: Pitfalls in MR cholangiopancreatographic interpretation. *RadioGraphics* 2001; 21:23–38

Gamut G-110**ENLARGED GALLBLADDER (US, CT, MRI)****COMMON**

1. Acute cholecystitis with cholelithiasis causing obstruction of cystic or common duct
2. Diabetes
3. Drugs (eg, anticholinergics; narcotics)
4. Hydrops; empyema
5. Hyperalimentation
6. Neoplasm arising in head of pancreas, ampulla of Vater, or lower common bile duct (Courvoisier gallbladder)

(continued)

7. Pancreatitis obstructing Vaterian segment
8. Postvagotomy; postsurgical
9. Pregnancy
10. Prolonged fasting

UNCOMMON

1. Acromegaly
2. AIDS-related cholangiopathy (cytomegalovirus; *Cryptosporidium*)
3. Alcoholism
4. Bedridden patient with chronic illness
5. Chagas' disease
6. Kawasaki S.
7. Leptospirosis
8. Mucocele
9. Normal variant

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 809–811
2. Gore RM: Gallbladder and biliary tract: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1408–1414
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4. Parulekar SG: Gallbladder and bile ducts. In: McGahan JP, Goldberg BB (eds): *Diagnostic Ultrasound*. Philadelphia: Lippincott-Raven, 1997, chapter 22

Gamut G-111**DISTENDED GALLBLADDER
IN A CHILD (US, CT)****COMMON**

1. Kawasaki S.
2. Total parenteral nutrition

UNCOMMON

1. Gallstone in cystic duct
2. Gastroenteritis

3. Leptospirosis
4. Normal variant
5. Scarlet fever
6. Upper respiratory infection

References

1. Donaldson JS: Diseases of the pediatric gallbladder. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 2140–2148
2. Gilger MA: Diseases of the gallbladder. In: Wyllie R, Hyams JS: *Pediatric Gastrointestinal Disease*. Philadelphia: WB Saunders, 1999
3. Parulekar SG: Gallbladder and bile ducts. In: McGahan JP, Goldberg BB (eds): *Diagnostic Ultrasound*. Philadelphia: Lippincott-Raven, 1997, chapter 22
4. Siegel MJ: *Pediatric Body CT*. Philadelphia: Lippincott Williams & Wilkins, 1999

Gamut G-112**MULTISEPTATE GALLBLADDER
(US, CT)**

1. Adenomyomatosis
2. Cholesterolosis
3. Congenital malformation
4. Desquamated gallbladder mucosa
5. Normal folded gallbladder (incl. Phrygian cap)

References

1. Chapman S, Nakielny R: *Aids to Radiological Differential Diagnosis*. London: Bailliere Tindall, 1990
2. Rumack CM, Nilson SR, Charboneau JW (eds): *Diagnostic Ultrasound*. (ed 2) St. Louis: Mosby, 1998
3. Gore RM: Gallbladder and biliary tract disease: Differential diagnosis. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1408–1415
4. Gore RM, Fulcher AS, Taylor AJ, et al: Anomalies and anatomic variants of the gallbladder and biliary tract. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1305–1320

Gamut G-113

GALLBLADDER DISEASE SECONDARY TO CYSTIC DUCT OR INFUNDIBULUM OBSTRUCTION

COMMON

1. Cholecystitis
2. Hydrops; empyema; mucocele of gallbladder
3. Milk of calcium bile
4. Porcelain gallbladder (calcified gallbladder wall)

UNCOMMON

1. Choledochoenteric fistula; gallstone ileus (eg, from gallstone perforation)
2. Emphysematous cholecystitis
3. Ruptured gallbladder

Reference

1. Zeman RK: Cholelithiasis and cholecystitis. In Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1321–1345

Gamut G-114

CALCIFICATION IN THE GALLBLADDER OR COMMON BILE DUCT

COMMON

1. Gallstone (eg, calcium bilirubinate or calcium carbonate)
2. [Other right upper quadrant density (eg, stone in kidney or retrocecal appendix; calcified aneurysm; barium in diverticulum)]

UNCOMMON

1. Milk of calcium bile
2. Mucinous adenocarcinoma of gallbladder

3. Porcelain gallbladder
4. Schistosomiasis
5. Stone in common duct or cystic duct remnant

[] This condition does not actually cause the gamuted imaging finding, but can produce similar imaging changes that simulate it.

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 1002–1007
2. Fatoar S, Al Ansari AG, Bassiony H, et al: Calcified pancreas and bile ducts from schistosomiasis. Br J Radiol 1996;59:1064–1066

Gamut G-115-S1

ARTIFACTS THAT MIMIC GALLSTONES

1. Inspissated sludge
2. Intraluminal defect, any cause (See G-116)
3. Partial volume artifact with duodenal impression
4. Refraction from folds in gallbladder neck

References

1. Rumack CM, Nilson SR, Charboneau JW (eds): Diagnostic Ultrasound. (ed 2) St. Louis: Mosby, 1998
2. Gore RM: Gallbladder and biliary tract disease: Differential diagnosis. In: Gore RM Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1408–1415
3. Zeman RK: Cholelithiasis and cholecystitis. In Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1321–1345
4. Palanduz A, Yalcin I, Tonguc E, et al: Sonographic assessment of ceftriaxone-associated biliary pseudolithiasis in children. J Clin Ultrasound 2000;28:166–168

Gamut G-115-S2

STRUCTURES THAT SONOGRAPHICALLY MIMIC THE GALLBLADDER (US)

1. Abscess (esp. Near ligamentum teres)
2. Choledochal cyst
3. Dilated cystic duct remnant
4. Fluid-filled duodenal bulb
5. Hepatic cyst
6. Omental cyst
7. Renal cyst

Reference

1. Gore RM: Gallbladder and biliary tract disease: Differential diagnosis. In Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1408–1415

5. Ectopic pancreatic or gastric tissue
- *6. Hamartomas in Peutz-Jeghers S.
- *7. Inflammatory polyp
8. Metachromatic leukodystrophy
- *9. Metastasis (esp. melanoma)
10. Neoplasm, benign (eg, carcinoid; neurinoma; angioma)
11. Neoplasm, malignant (eg, adenocarcinoma; leiomyosarcoma)
- *12. Parasitic granuloma (eg, *Ascaris*)
13. Postoperative defect
14. [Pseudodeflect in neck of gallbladder; other pseudopolyps]
- *15. Vascular lesion (eg, varix; aneurysm; tortuous artery)
16. Xanthogranulomatous cholecystitis

* May be multiple.

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

Gamut G-116

FIXED POLYPOID LESION(S) OR FILLING DEFECT(S) IN THE GALLBLADDER (US, CT, MRI)

COMMON

- *1. Adenomyoma; adenomyomatosis; hyperplastic cholecystosis
- *2. Cholesterol polyp
- *3. Cholesterosis (“strawberry” gallbladder)
- *4. Gallstone, adherent
5. [Phrygian cap]

UNCOMMON

- *1. Adenoma (incl. adenomatous polyp; villous adenoma; papilloma; fibroadenoma; cystadenoma)
- *2. Cholecystitis glandularis proliferans
3. Congenital fold or septum
4. Cyst (epithelial; mucous retention)

References

1. Berk RN, van der Vegt JH, Lichtenstein JE: The hyperplastic cholecystoses: Cholesterosis and adenomyomatosis. Radiology 1983;146:593–601
2. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 817–836
3. Lichtenstein JE: Adenomyomatosis and cholesterosis: the “hyperplastic cholecystoses.” In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000
4. Parra JA, Acinas O, Bueno J, et al: Xanthogranulomatous cholecystitis: clinical, sonographic, and CT findings in 26 patients. AJR 2000;174:979–983
5. Vogel T, Schumacher V, Saleh A, et al: Extraintestinal polyps in Peutz-Jeghers syndrome: presentation of four cases and review of the literature. Int J Colorectal Dis 2000;15:118–123

Gamut G-117

NONSHADOWING LESION IN THE GALLBLADDER (US)

COMMON

1. Gallstone, nonshadowing or not in the transducer focal zone
2. Polyp (adenomatous or cholesterol)
3. Sludge

UNCOMMON

1. Adenomyomatosis
2. Carcinoma of gallbladder
3. Desquamated mucosa
4. Fibrinous debris
5. Hematoma
6. Inspissated pus
7. Metastasis
8. Parasites (eg, *Ascaris*; *Clonorchis*; *Fasciola*)
9. Precipitated contrast medium from ERCP

References

1. Abbitt PL: *Ultrasound: A Pattern Approach*. New York: McGraw-Hill, 1995
2. Filly RA, Allen B, Minton MJ, et al: In vitro investigation of the origin of echoes within biliary sludge. *J Clin Ultrasound* 1980;8:193–200
3. Gore RM: Gallbladder and biliary tract: Differential diagnosis. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1408–1414
4. Rumack CM, Nilson SR, Charboneau JW (eds): *Diagnostic Ultrasound*. (ed 2) St. Louis: Mosby, 1998

Gamut G-118

ECHO(ES) WITHIN THE GALLBLADDER (US)

COMMON

1. Acute cholecystitis
2. Calculus
3. Fold in gallbladder wall
4. Polyp (adenomatous)
5. Sludge

UNCOMMON

1. AIDS-related cholangiopathy
2. Carcinoma of gallbladder
3. Clonorchiasis; fascioliasis
4. Ectopic pancreas or gastric mucosa
5. Emphysematous cholecystitis
6. Empyema of gallbladder
7. Feces (via fistula)
8. Food particles after cholecystojejunostomy
9. Gangrenous cholecystitis
10. Hemobilia
11. Hemorrhagic cholecystitis
12. Metastasis
13. Milk of calcium
14. Papilloma
15. Sarcoma of gallbladder

References

1. Gore RM: Gallbladder and biliary tract disease: Differential diagnosis. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1408–1415
2. Kabaalio GB, Cubuk M, Senol U, et al: Fascioliasis: US, CT, and MRI findings with new observations. *Abdom Imaging* 2000;25:400–404
3. Williamson MR: Abdominal ultrasound. In: *Essentials of Ultrasound*. Philadelphia: WB Saunders, 1996, p 87

Gamut G-119-1

ECHOGENIC BILE/GALLBLADDER SLUDGE (US); HIGH DENSITY BILE (CT)

1. [Artifact (side lobe and slice thickness artifact on US; volume averaging of normal liver on CT)]
2. Cholelithiasis
3. Extrahepatic biliary obstruction
4. Hemolysis
5. Hemorrhage; hematuria (esp. posttraumatic)
6. Inflammatory debris or pus
7. Milk of calcium
8. Prolonged fasting
9. Sickle cell disease; thalassemia
10. Vicarious excretion of contrast media (eg, renal failure; recent ERCP; occasionally normal)

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Parulekar SG: Gallbladder and bile ducts. In: McGahan JP, Goldberg BB (eds): *Diagnostic Ultrasound*. Philadelphia: Lippincott-Raven, 1997, chapter 22
2. Rumack CM, Nilson SR, Charboneau JW (eds): *Diagnostic Ultrasound*. (ed 2) St. Louis: Mosby, 1998
3. Slone RM, Fisher AJ: *Pocket Guide to Body CT Differential Diagnosis*. New York: McGraw-Hill, 1999, p 230
4. Van Beers BE, Pringot JH: Imaging of cholelithiasis: helical CT. *Abdom Imaging* 2001;26:15–20
5. Zeman RK: Cholelithiasis and cholecystitis. In Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1321–1345

Gamut G-119-2

GALLSTONE OR SLUDGE IN FETAL OR NEONATAL GALLBLADDER (US)

1. Administration of parenteral nutrition and furosemide to premature infant
2. Biliary tree malformation
3. Cholestasis

4. Familial predisposition
5. Hemolysis (eg, Rh or ABO blood group alloimmunization; sickle cell disease; spherocytosis; thalassemia)
6. Hepatic dysfunction
7. Idiopathic
8. Methadone intake
9. Monochorionic twin after intrauterine death of its co-twin
10. Sepsis

References

1. Petrikoveky S, Klein V, Holsten N: Sludge in fetal gallbladder: natural history and neonatal outcome. *Br J Radiol* 1996; 69:1017–1018
2. Devonald KJ, Ellwood DA, Colditz PB: The variable appearance of fetal gallstones. *J Ultrasound Med* 1992; 11:579–585
3. Schweizer P, Lenz MP, Kirschner HJ: Pathogenesis and symptomatology of cholelithiasis in childhood. *Dig Surg* 2000;17:459–467

Gamut G-120

INCREASED ATTENUATION OF GALLBLADDER LUMEN (CT)

COMMON

1. Gallstones
2. Prior endoscopic retrograde cholangiopancreatography (ERCP) or oral cholecystography
3. Sludge; debris

UNCOMMON

1. Empyema of gallbladder with pus
2. Feces (via fistula)
3. Food particles after cholecystojejunostomy
4. Hemobilia
5. Hemorrhagic cholecystitis
6. Hydrops of gallbladder
7. Milk of calcium bile
8. Mucinous adenocarcinoma of the gallbladder
9. Polyp or papilloma projecting into lumen

10. Vicarious excretion of contrast medium
11. Volume averaging with adjacent structures

References

1. Gore RM: Gallbladder and biliary tract disease. In Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1408–1415
2. Van Beers BE, Pringot JH: Imaging of cholelithiasis: helical CT. *Abdom Imaging* 2001;26:15–20

Gamut G-121

HYPERECHOIC FOCUS IN THE GALLBLADDER WALL (US)

COMMON

1. Adenomyomatosis, cholesterosis (“hyperplastic cholecystoses”)
2. Gallstone (embedded)
3. Polyp, cholesterol or other

UNCOMMON

1. Cholecystitis glandularis proliferans
2. Emphysematous cholecystitis
3. Microabscess
4. Rokitansky-Aschoff sinuses

References

1. Graif M, Horovitz A, Itzchak Y, et al: Hyperechoic foci in the gallbladder wall as a sign of microabscess formation or diverticula. *Radiology* 1984;152:781–784
2. Lichtenstein JE: Adenomyomatosis and cholesterosis: the “hyperplastic cholecystoses.” In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1353–1359

Gamut G-122

FOCAL THICKENING OF THE GALLBLADDER WALL (> 3MM) (US, CT)

COMMON

1. Adenomyomatosis
2. Adherent gallstone or sludge
3. Carcinoma of gallbladder
4. Polyp, inflammatory

UNCOMMON

1. Benign neoplasm (eg, adenoma; carcinoid; papilloma)
2. Ectopic mucosa
3. Gangrenous or hemorrhagic cholecystitis
4. Hematoma
5. Metastasis (esp. melanoma)
6. Varices

References

1. Abbitt PL: *Ultrasound: A Pattern Approach*. New York: McGraw-Hill, 1995
2. Pandey M, Sood BP, Shukla RC, et al: Carcinoma of the gallbladder: role of sonography in diagnosis and staging. *J Clin Ultrasound* 2000;28:227–232
3. Parulekar SG: Gallbladder and bile ducts. In: McGahan JP, Goldberg BB (eds): *Diagnostic Ultrasound*. Philadelphia: Lippincott-Raven, 1997, chapter 22
4. Slone RM, Fisher AJ: *Pocket Guide to Body CT Differential Diagnosis*. New York: McGraw-Hill, 1999, p 229
5. Ward LM, Fulcher AS, Pereles FS, et al: Neoplasms of the gallbladder and biliary tract. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1360–1374

Gamut G-123

DIFFUSE THICKENING OF THE GALLBLADDER WALL (US, CT, MRI)

COMMON

1. AIDS-related cholangiopathy (cytomegalovirus; *Cryptosporidium*)
2. Ascites with edema of gallbladder wall (eg, cirrhosis; renal failure; hypoalbuminemia; heart failure)
3. Carcinoma of gallbladder
4. Cholecystitis, acute or chronic, usually with cholelithiasis
5. Cirrhosis; schistosomiasis; liver failure
6. Hepatitis (viral or alcoholic)
7. Portal hypertension
8. Postprandial (physiologic contraction); incomplete distension; inadequate fasting
9. Total parenteral nutrition

UNCOMMON

1. Adenomyomatosis; hyperplastic cholecystosis
2. Brucellosis
3. Extrahepatic portal vein obstruction (eg, pancreatitis; carcinoma of pancreas)
4. Folds in gallbladder wall
5. Gangrenous gallbladder
6. Graft-versus-host disease
7. Hemorrhagic cholecystitis
8. Infectious mononucleosis
9. Kaposi sarcoma (in AIDS)
10. Lymphatic obstruction at porta hepatis
11. Lymphoma_g
12. Multiple myeloma
13. Necrotizing enterocolitis in infants
14. Peptic ulcer adjacent to gallbladder
15. Pyelonephritis of right kidney
16. Sclerosing cholangitis
17. Torsion of gallbladder
18. Varices of gallbladder wall
19. Xanthogranulomatous cholecystitis

References

1. Abbitt PL: Ultrasound: A Pattern Approach. New York: McGraw-Hill, 1995
2. Cohen SM, Kurtz AB: Biliary sonography. *Radiol Clin North Am* 1991;29:1171-1192
3. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 1067-1071
4. Fiske CE, Laing FC, Brown TW: Ultrasonographic evidence of gallbladder wall thickening in association with hypoalbuminemia. *Radiology* 1980;135:713-716
5. Gore RM: Gallbladder and biliary tract: Differential diagnosis. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1408-1414
6. Parulekar SG: Gallbladder and bile ducts. In: McGahan JP, Goldberg BB (eds): *Diagnostic Ultrasound*. Philadelphia: Lippincott-Raven, 1997, chapter 22
7. Ralls PW, Quinn MF, Juttner HU, et al: Gallbladder wall thickening: Patients without intrinsic gallbladder disease. *AJR* 1981;137:65-68
8. Sanders RC: The significance of sonographic gallbladder wall thickening. *J Clin Ultrasound* 1980;8:143-146
9. Shlaer WJ, Leopold GR, Scheible FW: Sonography of the thickened gallbladder wall: A nonspecific finding. *AJR* 1981;136:337-339
10. Williamson MR: Abdominal ultrasound. In: *Essentials of Ultrasound*. Philadelphia: WB Saunders, 1996, p 93

Gamut G-124

STRIATIONS IN A THICKENED GALLBLADDER WALL (US, CT)

COMMON

1. AIDS-related cholangiopathy (cytomegalovirus; *Cryptosporidium*)
2. Gangrenous cholecystitis
3. Non-biliary related edema or inflammation (eg, heart failure; renal failure; liver failure; hypoalbuminemia; ascites)

UNCOMMON

1. Adenomyomatosis
2. Blockage of lymphatic and venous drainage of gallbladder

3. Hepatitis
4. Pancreatitis
5. Varices of gallbladder wall
6. Xanthogranulomatous cholecystitis

References

1. MacCarty RL: Inflammatory disorders of the biliary tract. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1375–1395
2. Teehey SA, Baron RL, Bigler SA: Sonography of the gallbladder: significance of striated (layered) thickening of the gallbladder wall. AJR 1991;156:945–951
3. Williamson MR: Abdominal Ultrasound. In: Essentials of Ultrasound. Philadelphia: WB Saunders, 1996, p 90

Gamut G-125

EXTRINSIC DEFORMITY OR DISPLACEMENT OF THE GALLBLADDER (CAG, MRCP, CT)

COMMON

1. Liver mass (eg, hepatocellular carcinoma; hemangioma; metastases; regenerating nodule; abscess; hydatid cyst; polycystic disease)
2. Normal duodenum or colon

UNCOMMON

1. Choledochal cyst
2. Duodenal mass (eg, neoplasm; hematoma)
3. Lymphadenopathy (eg, lymphoma; metastases)
4. Pancreatic mass (eg, neoplasm; pseudocyst)
5. Retroperitoneal tumor or cyst (eg, renal, adrenal, soft tissue); polycystic kidney

Reference

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 813–816

Gamut G-126

PERICHOLECYSTIC FLUID ON ULTRASOUND

COMMON

1. Acute cholecystitis (with or without perforation)
2. Ascites

UNCOMMON

1. AIDS-related cholangiopathy (cytomegalovirus; *Cryptosporidium*)
2. Hematoma
3. Pancreatitis
4. Peptic ulcer disease
5. Perforated appendix or diverticulum
6. Pericholecystic abscess
7. Peritonitis
8. Torsion of gallbladder

References

1. Rumack CM, Nilson SR, Charboneau JW (eds): Diagnostic Ultrasound. (ed 2) St. Louis: Mosby, 1998
2. Usui M, Matsuda S, Suzuki H, et al: Preoperative diagnosis of gallbladder torsion by magnetic resonance cholangiopancreatography. Scand J Gastroenterol 2000;35:218–222
3. Williamson MR: Abdominal ultrasound. In: Essentials of Ultrasound. Philadelphia: WB Saunders, 1996, p 90

Gamut G-127

DELAYED VISUALIZATION OF THE GALLBLADDER ON SCINTIGRAPHY

COMMON

1. Chronic cholecystitis

UNCOMMON

1. Acalculus cholecystitis
2. Carcinoma of gallbladder

(continued)

3. Dubin-Johnson syndrome
4. Hepatocellular disease (eg, cirrhosis; hepatitis)
5. Pancreatitis
6. Total parenteral nutrition

Reference

1. Gore RM: Gallbladder and biliary tract disease. In Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1408–1415

Gamut G-128**GAS IN THE GALLBLADDER OR BILIARY TRACT****COMMON**

1. Biliary-enteric fistula to duodenum or colon (eg, perforated ulcer or adenocarcinoma of duodenum, ampulla, bile duct, gallbladder, stomach, pancreas, or colon; metastasis; lymphoma_g) (See G-139)
2. Cholecystitis with perforation
3. Emphysematous cholecystitis, cholangitis (esp. in diabetic)
4. [Gas in portal vein]
5. Postoperative (eg, sphincterotomy; biliary-intestinal anastomosis {cholecystoenterostomy; choledochenterostomy; Whipple procedure}; internal or external biliary drainage)
6. Recent passage of gallstone from gallbladder or common duct (eg, gallstone ileus)

UNCOMMON

1. Common duct entry into duodenal diverticulum
2. Crohn's disease
3. [Gas in gallstone]
4. [Normal periductal fat]
5. Pancreatitis
6. Parasitic disease (clonorchiasis; ascariasis; ruptured amebic abscess of liver; strongyloidiasis of duodenum)
7. Peptic ulcer with perforation into common duct and fistula

8. Physiologic (incompetent, patulous sphincter, esp. in elderly)
9. Postbulbar duodenal ulcer adjacent to ampulla with spasm (acute) or fibrosis (healing)
10. Trauma, external penetrating or iatrogenic (eg, intubation; ERCP)

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 888–893
2. Laing FC: The gallbladder and bile ducts. The liver. In: Rumack CM, Wilson SR, Charboneau JW (eds): Diagnostic Ultrasound. St. Louis: Mosby, 1998, pp 175–223
3. Martin DF, Tweedle DEF: The aetiology and significance of distal choledochoduodenal fistula. Br J Surg 1984;71:632–634
4. Shimono T, Nishimura, Hayakawa K: CT imaging of biliary enteric fistula. Abdom Imaging 1998;23:172–176
5. Tamada K, Tomiyama T, Wada S, et al: Hyperechoic lines as a sonographic confirmatory sign during percutaneous transhepatic biliary drainage. Abdom Imaging 2001;26:39–42

Gamut G-129**CONGENITAL DISORDERS OR SYNDROMES WITH AN ABNORMAL BILIARY TRACT****COMMON**

1. Asplenia S. (Ivemark S.); polysplenia S.
2. Biliary atresia
3. Caroli disease
4. Choledochal cyst
5. Cystic fibrosis (mucoviscidosis)

UNCOMMON

1. Bardet-Biedl S.
2. Bile duct hypoplasia (Alagille S. or arteriohepatic S.)
3. Bile plug S.
4. Hepatic fibrosis-renal cystic disease

5. Meckel S.
6. Spontaneous (idiopathic) perforation of common bile duct

References

1. Arcemont CM, Meza MP, Arumanla S, et al: MRCP in the evaluation of pancreaticobiliary disease in children. *Pediatr Radiology* 2001;31:92–97
2. Nicotra JJ, Kramer SS, Bellah RD, Redd DCB: Congenital and acquired biliary disorders in children. *Semin Roentgenol* 1997;32:215–227
3. Park KB, Auh YH, Kim JH, et al: Diagnostic pitfalls in the cholangiographic diagnosis of choledochoceles: cholangiographic quality and its effect on visualization. *Abdom Imaging* 2001;26:48–54
4. Rosenthal P: Biliary atresia and neonatal disorders of the bile ducts. In: Wyllie R, Hyams JS: *Pediatric Gastrointestinal Disease*. Philadelphia: WB Saunders, 1999, pp 568–578
5. Siegel MJ: *Pediatric Body CT*. Philadelphia: Lippincott Williams & Wilkins, 1999
6. Taybi H, Lachman RS: *Radiology of Syndromes, Metabolic Disorders, and Skeletal Dysplasias*. (ed 4) St. Louis: Mosby-Year Book, 1996, p 962

Gamut G-130

DILATATION OF BILE DUCTS (CAG, MRCP, US, CT, MRI)

COMMON

1. Advanced age
2. Calculus in biliary duct (choledocholithiasis)
3. Chronic pancreatitis
4. Lymphadenopathy with extrinsic compression
5. Neoplasm of pancreas, ampulla of Vater, common duct, or major bile duct (eg, papilloma; adenocarcinoma; mucin-producing cholangiocarcinoma)
6. Papillitis or fibrosis of ampulla of Vater
7. Parasitic disease (eg, ascariasis; clonorchiasis; opisthorchiasis; fascioliasis; hydatid disease)
8. Sclerosing cholangitis
9. Stricture of distal biliary duct (eg, postoperative; intubation; inflammatory; congenital)

UNCOMMON

1. Aneurysm of hepatic artery or aorta (compression)
2. Biliary atresia, extrahepatic
3. Biliary duct web or diaphragm
4. Caroli disease
5. Cholangitis, infectious (eg, AIDS-related; bacterial; parasitic)
6. Choledochal cyst
7. Choledochoceles
8. Diverticulum of duodenum or biliary duct (compression)
9. Duodenal ulcer, penetrating
10. Hepatic fibrosis-renal cystic disease
11. Liver abscess (pyogenic, amebic, or fungal)
12. Liver infarcts following transcatheter embolization of hepatic artery branches
13. Lymphadenopathy in periportal area with ductal compression (eg, metastatic carcinoma of liver, stomach, or pancreas; lymphoma; sarcoidosis)
14. Metastasis
15. Mirizzi syndrome
16. Papillitis or fibrosis of ampulla
17. [Periportal edema]
18. Retroperitoneal fibrosis

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Alexander ES, Mitchell SE: Dilatation of biliary ducts (extrahepatic, intrahepatic). *Semin Roentgenol* 1981;16:3–4
2. Berk RN, Clemett AR: *Radiology of the Gallbladder and Bile Ducts*. Philadelphia: WB Saunders, 1977
3. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 872–881
4. Gore RM: Gallbladder and biliary tract: Differential diagnosis. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1408–1414
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Gamut G-131

BILIARY DILATATION WITHOUT JAUNDICE OR OBSTRUCTION

1. Advanced age
2. Choledochal cyst (type I)
3. Common duct exploration sequela
4. Early ductal obstruction
5. Nonobstructive gallstone
6. Normal variant
7. Parasitic disease (eg, *Ascaris*; *Clonorchis*; *Fasciola*; *Opisthorchis*; ruptured hydatid cyst or amebic abscess into duct)
8. Postcholecystectomy
9. Post-ductal obstruction
10. Recent passage of stone with ampullary edema

Reference

1. Gore RM: Gallbladder and biliary tract disease. In Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1408–1415

Gamut G-132

BILIARY OBSTRUCTION WITHOUT DILATATION

1. Acute severe biliary obstruction (first 3 days)
2. Cholangiocarcinoma with tumor encasement
3. Cholangitis (eg, ascending; sclerosing; recurrent pyogenic)
4. Hemobilia
5. Pancreatitis
6. Parasitic disease (eg, solitary or few *Ascaris*, *Clonorchis*, or *Fasciola*; ruptured hydatid cyst or amebic abscess into duct with debris)

Reference

1. Gore RM: Gallbladder and biliary tract disease. In Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1408–1415

Gamut G-133-1

CYSTIC AND SACCULAR LESIONS OF THE BILE DUCTS— WITH NORMAL-SIZED INTRAHEPATIC BILE DUCTS (CAG, MRCP)

1. Choledochal cyst (common duct)
2. Choledochocele (intraduodenal)
3. Cystic duct remnant
4. Diverticulum of common duct or rarely, an intrahepatic duct
5. Simple central dilatation of common duct

References

1. Burgener FA, Kormano M: *Differential Diagnosis in Conventional Radiology*. (ed 2) New York: Thieme Medical Publ, 1991, pp 730–731
2. DeBacker AI, Van den Abbeele K, DeSchopper AM: Choledochocele: diagnosis by magnetic resonance imaging. *Abdom Imaging* 2000;25:508–510
3. Gore RM, Fulcher AS, Taylor AJ: Anomalies and anatomic variants of the gallbladder and biliary tract. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000

Gamut G-133-2

CYSTIC AND SACCULAR LESIONS OF THE BILE DUCTS— WITH DILATATION OF INTRAHEPATIC BILE DUCTS (CAG, MRCP)

1. Bacterial cholangitis with tiny saccular abscesses (acute, suppurative, ascending cholangitis)
2. Caroli disease
3. Choledochal cyst
4. Hepatic fibrosis-renal cystic disease
5. Parasitic disease (esp. opisthorchiasis; also clonorchiasis; ascariasis)
6. Recurrent pyogenic cholangitis (Oriental cholangiohepatitis)

7. Reversible dilatation of intrahepatic bile ducts
8. Sclerosing cholangitis with prestenotic saccular out-pouchings

References

1. Burgener FA, Kormano M: Differential Diagnosis in Conventional Radiology. (ed 2) New York: Thieme Medical Publ, 1991, pp 730–731
2. Donaldson JS: Diseases of the pediatric gallbladder and biliary tract. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000
3. Jequier S, Capusten B, Guttman F, et al: Childhood choledochal cyst with intrahepatic enlarged cyst-like bile ducts. *J Can Assoc Radiol* 1984;35:73–76
4. Turner MA, Fulcher AS: The cystic duct: normal anatomy and disease processes. *RadioGraphics* 2001;21:3–22

Gamut G-134

FILLING DEFECT OR SEGMENTAL LESION IN THE BILE DUCTS (CAG, MRCP, CT)

COMMON

1. Air bubble
2. Calculus
3. Contraction of choledochal sphincter (pseudocalculus) in distal common duct
4. Edema of ampullary segment (eg, after passage of calculus; pancreatitis)
5. Extrinsic vascular impression (eg, right hepatic artery; bile duct varices)
6. Malignant neoplasm of bile duct (cholangiocarcinoma), gallbladder, ampulla, duodenum, or pancreas; hepatocellular carcinoma (hepatoma); Klatzkin tumor
7. Stricture (eg, cholangitis or Oriental cholangiohepatitis with dilated ducts and calculi)

UNCOMMON

1. Blood clot
2. Congenital membranous diaphragm (web) of common hepatic duct

3. Debris or mucus in ducts from obstructing tumor or parasites
4. Foreign body or food particle
5. Lymphadenopathy in porta hepatis
6. Metastasis (eg, lung; melanoma; lymphoma)
7. Mirizzi syndrome
8. Neoplasm, benign (eg, adenoma; papilloma; carcinoid; gastrointestinal stromal tumor; lipoma; hamartoma; polyp)
9. Normal variant (eg, cystic duct insertion; valves of Heister; redundant walls of tortuous duct)
10. Parasite (*Ascaris*; *Clonorchis*; *Fasciola*; hydatid cyst)
11. Pericholedochal adhesions
12. Postoperative defect (eg, plication defect at the site of duct-to-duct anastomosis)
13. Sarcoma botryoides (child)
14. Spasm of sphincter of Oddi

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 837–871
2. Fulcher AS, Turner MA: Pitfalls of MR cholangiopancreatography. *J Comput Assist Tomogr* 1998;22:845–850
3. Gallix BP, Régent D, Bruel J-M: Use of magnetic resonance cholangiography in the diagnosis of choledocholithiasis. *Abdom Imaging* 2001;26:21–27
4. Pickuth D: Radiologic diagnosis of common bile duct stones. *Abdom Imaging* 2000;25:613–621
5. Vilgrain V, Palazzol L: Choledocholithiasis: role of US and endoscopic ultrasound. *Abdom Imaging* 2001;26:7–14

Gamut G-135

THICKENING OF BILE DUCT WALLS (US)

COMMON

1. AIDS-related cholangiopathy
2. Ascending (bacterial) cholangitis
3. Choledocholithiasis
4. Pancreatitis (common duct)
5. Recurrent pyogenic cholangitis (Oriental cholangiohepatitis)
6. Sclerosing cholangitis

UNCOMMON

1. Cholangiocarcinoma
2. Parasitic disease (liver flukes {clonorchiasis; opisthorchiasis}; ascariasis; schistosomiasis; ruptured amebic hepatic abscess into bile ducts)

References

1. Berger J, Linsell DRM: Thickening of the walls of non-dilated bile ducts. *Clin Radiol* 1997;52:474–476
2. Parulekar SG: Gallbladder and bile ducts. In: McGahan JP, Goldberg BB (eds): *Diagnostic Ultrasound*. Philadelphia: Lippincott-Raven, 1997, chapter 2
3. Vitellas KM, Keogan MT, Freed KS, et al: Radiologic manifestations of sclerosing cholangitis with emphasis on MR cholangiopancreatography. *RadioGraphics* 2000;20:959–975

Gamut G-136

ECHOES WITHIN THE BILE DUCTS (US)

COMMON

1. Calculus
2. Hemobilia
3. Pneumobilia
4. Pus
5. Sludge

UNCOMMON

1. Cholangiocarcinoma
2. Feces (via fistula)
3. Food particles (via reflux)
4. Hepatoma
5. Mesenchymal tumor, benign
6. Metastasis
7. Parasites (*Ascaris*; *Clonorchis*; *Fasciola*; hydatid debris)
8. Recurrent pyogenic cholangitis (Oriental cholangiohepatitis)
9. Surgical clips

References

1. Kabaalio GB, Cubuk M, Senol U, et al: Fascioliasis: US, CT, and MRI findings with new observations. *Abdom Imaging* 2000;25:400–404
2. Williamson MR: Abdominal ultrasound. In: *Essentials of Ultrasound*. Philadelphia: WB Saunders, 1996, p 77

Gamut G-137

BILE DUCT NARROWING OR OBSTRUCTION (CAG, MRCP)

COMMON

1. Calculus in biliary duct (choledocholithiasis) (eg, impacted stone in Vaterian segment; papillary edema from recent passage of stone; Mirizzi syndrome)
2. Cholangitis
3. Contraction of choledochal sphincter (pseudocalculus); papillary stenosis
4. Iatrogenic or posttraumatic (eg, surgical injury; trauma; radiation therapy; hepatic artery chemotherapy or embolization)
5. Neoplasm, malignant (eg, cholangiocarcinoma; ampullary, pancreatic, duodenal, or gallbladder carcinoma; hepatocellular carcinoma; Klatzkin tumor; villous tumor)
6. Pancreatitis, acute or chronic (incl. pseudocyst)
7. Sclerosing cholangitis

UNCOMMON

1. Abscess (pyogenic, amebic, or fungal)
2. AIDS-related cholangiopathy (eg, cytomegalovirus or *Cryptosporidium* infection)
3. Artifact from post-processing technique of MRCP
4. Biliary hypoplasia or atresia
5. Caroli disease (complicated)
6. Congenital membranous diaphragm (web)
7. Debris or mucus in ducts from obstructing tumor or parasites
8. Duodenal diverticulum
9. Hepatic fibrosis-renal cystic disease
10. Hepatocellular disease, advanced (eg, cirrhosis; cholangiolytic hepatitis)
11. Liver cyst, neoplasm, or abscess
12. Lymphadenopathy in porta hepatis (eg, metastasis; lymphoma; tuberculosis; sarcoidosis)
13. Metastasis (esp. from carcinoma of pancreas, gallbladder, stomach)
14. Neoplasm, benign (incl. adenoma; papilloma; gastrointestinal stromal tumor; myoblastoma; cystadenoma)
15. Papillitis of ampulla
16. Parasitic disease of bile ducts, liver, or duodenum (esp. ascariasis; clonorchiasis; fascioliasis; hydatid disease; amebic abscess; schistosomiasis; strongyloidiasis)
17. Postbulbar duodenal ulcer with scarring or perforation
18. Recurrent pyogenic cholangitis {Oriental cholangiohepatitis}
19. Stricture, traumatic or iatrogenic (eg, postoperative; intubation)
20. Vascular compression (eg, aneurysm of aorta or hepatic artery; calcified portal vein)

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1. Dähnert W: Radiology Review Manual. Baltimore: Williams & Wilkins, 1999
2. Chapman S, Nakielny R: Aids to Radiological Differential Diagnosis. London: Bailliere Tindall, 1990
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Gamut G-138**ENLARGED PAPILLA OF VATER****COMMON**

1. Calculus impacted in distal common duct
2. Carcinoma of Vaterian segment
3. Idiopathic; normal variant
4. Mucinous (ductectatic) adenocarcinoma of pancreas
5. Pancreatitis
6. Papillitis

UNCOMMON

1. Edema secondary to active duodenal ulcer
2. Heterotopic pancreatic tissue
3. Neoplasm (eg, adenomatous polyp of papilla; carcinoma; gastrointestinal stromal tumor of duodenum)
4. Pancreatic abscess
5. Parasitic disease (eg, strongyloidiasis; ascariasis)
6. Postoperative; instrumentation
7. Zollinger-Ellison syndrome

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 882–887
2. Poppel MH, Jacobson HG, Smith RW: The Roentgen Aspects of the Papilla and Ampulla of Vater. Springfield, IL: CC Thomas, 1953

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3. Schutz SM: Papillary tumors. In: DiMarino AJ, Benjamin SB: *Gastrointestinal Disease: An Endoscopic Approach*. Malden, MA: Blackwell Science, 1997, pp 952–960

2. Zuckerman AM, Goldschmid S, Hunter JG, et al: Biliary fistulas. In: Pitt HA, Carr-Locke DL, Ferrucci JT, et al: *Hepatobiliary and Pancreatic Disease*. Boston: Little, Brown and Company, 1995

Gamut G-139

**BILIARY-ENTERIC FISTULA
(See G-128)**

COMMON

1. Cholecystitis (perforative, acute or chronic)
2. Gallstone fistula from gallbladder or bile duct (eg, choledochoduodenal fistula)
3. Malignant neoplasm of gallbladder, bile duct, pancreas, or intestine
4. Postoperative (eg, sphincterotomy; biliary-intestinal anastomosis—Whipple procedure)

UNCOMMON

1. Abscess (pancreatic; hepatic; pericolic; pericholecystic)
2. Common duct entry into duodenal diverticulum
3. Diverticulitis of duodenum or hepatic flexure of colon
4. Granulomatous disease of duodenum or colon (eg, Crohn's disease; tuberculosis; actinomycosis)
5. Lymphoma^g
6. Parasitic disease (esp. amebiasis; ascariasis; hydatid disease)
7. Passage of common duct stone
8. Peptic ulcer perforation into biliary tract
9. [Physiologic reflux at ampulla; incompetent sphincter]
10. Trauma, external or iatrogenic (eg, intubation; ERCP)

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Martin DF, Tweedle DEF: The aetiology and significance of distal choledochoduodenal fistula. *Br J Surg* 1984;71:632–634

Gamut G-140

**BILIARY-PLEURAL
(OR BRONCHIAL) FISTULA**

1. Biliary obstruction
2. Congenital
3. Parasitic disease (eg, amebic abscess; hydatid disease)
4. Trauma, external or iatrogenic

References

1. Bamberger PK, Stojadinovic A, Shaked G, et al: Biliary-pleural fistula presenting as a massive pleural effusion after thoracoabdominal penetrating trauma. *J Trauma* 1997;43:162–163
2. Böni RAH, Peter J, Marincek B: Amebic abscess of the liver manifested by “hemoptysis”: US, CT, and MRI findings. *Abdom Imag* 1995;20:214–216
3. Feld R, Wechsler RJ, Bonn J: Biliary-pleural fistula without biliary obstruction. *AJR* 1997;169:381–383
4. Palmer PES, Reeder MM: *The Imaging of Tropical Diseases*. Heidelberg: Springer-Verlag, 2001

Gamut G-141-1

HEPATOMEGALY (See G-141-2)

COMMON

1. Abscess, solitary or multiple (pyogenic, amebic, or fungal)
2. Cirrhosis, early
3. Congenital hepatomegaly (See G-141-2)
4. Cyst (bile duct cyst; simple; posttraumatic; hydatid) (See G-157)

5. Elevated venous pressure (eg, heart failure; constrictive pericarditis; tricuspid stenosis or insufficiency)
6. Fatty change (steatosis) (See G-144)
7. Hemochromatosis
8. Hepatitis (viral, infectious, or serum)
9. Infectious disease, other (eg, infectious mononucleosis; candidiasis; brucellosis; miliary tuberculosis or histoplasmosis; malaria)
10. Metastases
11. Neoplasm (esp. hepatocellular carcinoma {hepatoma}; cholangiocarcinoma; hepatoblastoma; giant hemangioma; hemangioendothelioma; angiosarcoma)
12. Obstruction of common bile duct (biliary cirrhosis) (See G-137)

UNCOMMON

1. Amyloidosis
2. Anemia, primary (eg, thalassemia major)
3. Chronic granulomatous disease of childhood
4. Extramedullary hematopoiesis
5. Gaucher disease; Niemann-Pick disease
6. Glycogen storage disease (eg, type I—von Gierke)
7. Hematoma
8. Hydatid disease (*Echinococcus granulosus* and *E. multilocularis*)
9. Kala-azar
10. Langerhans cell histiocytosis_g
11. Lymphoma_g
12. Myeloid metaplasia; myelofibrosis
13. Polycystic disease of liver
14. Polycythemia vera
15. Reye S.
16. Sarcoidosis
17. Schistosomiasis
18. Thrombosis of hepatic vein or upper inferior cava (Budd-Chiari S.); veno-occlusive disease (See G-189)
19. Wilson disease

Reference

1. Lefkowitz JH: Pathologic diagnosis of liver disease. In: Zakim D, Boyer TD: Hepatology. (ed 3) Philadelphia: WB Saunders, 1996, pp 844–874

Gamut G-141-2

CONGENITAL HEPATOMEGALY

COMMON

1. Anemia_g, primary (esp. thalassemia; sickle cell disease)
2. Cystic fibrosis (mucoviscidosis)
3. Gaucher disease; Niemann-Pick disease
4. Glycogen storage disease, types I (von Gierke), III and IV
5. Infant of diabetic mother
6. Langerhans cell histiocytosis_g
7. Mucopolysaccharidoses (esp. Hurler S., Hunter S.); mucopolipidosis II (I-cell disease) (See J-4)
8. Polycystic disease of liver

UNCOMMON

1. Aase S.
2. Alagille S. (arteriohepatic S.)
3. Alpha-1-antitrypsin deficiency
4. Beckwith-Wiedemann S.
5. Budd-Chiari S.
6. Chédiak-Higashi S.
7. Cholesterol ester storage disease
8. Chronic granulomatous disease of childhood
9. Congenital transplacental infection (eg, toxoplasmosis; rubella; cytomegalovirus; herpes simplex)
10. Cystinosis
11. Ethanolaminosis
12. Farber disease (lipogranulomatosis)
13. Felty S.
14. Galactosemia
15. Galactosialidosis
16. GM₁ gangliosidosis; fucosidosis; mannosidosis
17. Hepatic fibrosis-renal cystic disease
18. Homocystinuria
19. Hyperlipoproteinemia
20. Infantile multisystem inflammatory disease (NOMID)
21. Lipoatrophic diabetes
22. Mauriac S.
23. Osteopetrosis

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24. POEMS S.
25. Pyruvate kinase deficiency
26. Sea-blue histiocyte S.
27. Tyrosinemia (type I)
28. Weber-Christian S.
29. Wilson disease
30. Wolman disease (familial xanthomatosis)
31. Zellweger S. (cerebrohepatorenal S.)

References

1. Siafakis CG, Jonas MM: Neonatal hepatitis. In: Wyllie R, Hyams JS: *Pediatric Gastrointestinal Disease*. Philadelphia: WB Saunders, 1999, pp 563–567
2. Siegel MJ: *Pediatric Body CT*. Philadelphia: Lippincott, Williams & Wilkins, 1999
3. Taybi H, Lachman RS: *Radiology of Syndromes, Metabolic Disorders, and Skeletal Dysplasias*. (ed 4) St. Louis: Mosby-Year Book, 1996, p 959

Gamut G-142

DIFFUSE HEPATIC CALCIFICATIONS (PF, US, CT)

COMMON

1. Hyperparathyroidism, secondary (incl. chronic renal failure; uremia; hemodialysis)
2. Ischemia, with or without shock; infarction (chronic)
3. Metastatic disease (eg, mucinous adenocarcinoma of colon, stomach, breast, or thyroid; carcinoma of ovary, pancreas, or lung; islet cell carcinoma; melanoma; neuroblastoma; osteosarcoma; chondrosarcoma; teratoma; also postradiation and post-chemotherapy)
4. [Neoplasm of liver, large, advanced, often necrotic (eg, hepatocellular carcinoma; cholangiocarcinoma; hemangioma; infantile hemangioendothelioma; hepatoblastoma; fibrolamellar carcinoma; mesenchymal hamartoma)—calcifications may be extensive in a localized area or even multifocal, but not truly diffuse]

UNCOMMON

1. Amyloidosis
2. Chronic granulomatous disease of childhood
3. Congenital transplacental infection (eg, toxoplasmosis; rubella; cytomegalovirus; herpes simplex; varicella)
4. Granulomas, multiple healed (eg, tuberculosis; histoplasmosis; coccidioidomycosis; brucellosis)
5. Hemochromatosis
6. Hydatid disease (*Echinococcus multilocularis* or multiple calcified *E. granulosus* cysts)
7. Infection, severe (eg, multiple healed abscesses)
8. Pentastomiasis (*Armillifer* infection)
9. [Peritoneal calcifications overlying liver capsule in infancy (eg, meconium peritonitis; ruptured hydro-metrocolpos)]
10. Schistosomiasis (esp. *S. japonica*)
11. [Thorotrast residual]

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Gore RM: Liver: Differential diagnosis. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1712–1727
2. Kennan NM, Evans C: Hepatic and splenic calcification due to amyloid. *Clin Radiol* 1991;44:60–61
3. Milstein MJ, Moulton JS: Diffuse hepatic calcification after ischemic liver injury in a patient with chronic renal failure. *AJR* 1993;161:75–76
4. Parulekar SG, Bree RL: Liver. In: McGahan JP, Goldberg BB (eds): *Diagnostic Ultrasound*. Philadelphia: Lippincott-Raven, 1997, chapter 21

Gamut G-143

FETAL OR NEONATAL LIVER CALCIFICATION

COMMON

1. Congenital transplacental infection (eg, toxoplasmosis; rubella; cytomegalovirus; herpes simplex; varicella)
2. Metastatic neuroblastoma
3. [Peritoneal calcifications overlying liver capsule (eg, meconium peritonitis; ruptured hydrometrocolpos)]

UNCOMMON

1. Infarcts
2. Primary liver tumor (eg, hemangioma; hepatoblastoma; infantile hemangioendothelioma; hamartoma; teratoma)
3. Thromboemboli in portal vein [or IVC]

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Brugman SM, Bjelland JJ, Thomason JE, et al: Sonographic findings with radiologic correlation in meconium peritonitis. *J Clin Ultrasound* 1979;7:305–306
2. Chapman S, Nakielny R: *Aids to Radiological Differential Diagnosis*. (ed 3) London: WB Saunders, 1995, p 267
3. Friedman AP, Haller JO, Boyer B, Cooper R: Calcified portal vein thromboemboli in infants: radiography and ultrasonography. *Radiology* 1981;140:381–382
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5. Schackelford GD, Kirks DR: Neonatal hepatic calcification secondary to transplacental infection. *Radiology* 1977;122:753–757
6. Siegel MJ: *Pediatric Body CT*. Philadelphia: Lippincott, Williams & Wilkins, 1999

Gamut G-144

FATTY CHANGE IN THE LIVER (STEATOSIS) (US, CT, MRI)

COMMON

- *1. AIDS
2. Alcoholism; cirrhosis
- *3. Cystic fibrosis (mucoviscidosis)
4. Diabetes mellitus
- *5. Drug therapy (esp. tetracycline; steroids; chemotherapy with cytotoxic agents)
- *6. Idiopathic
- *7. Obesity

UNCOMMON

1. Carbon tetrachloride exposure
- *2. Cushing S.
- *3. Fever, prolonged
- *4. Hepatitis, acute or viral
- *5. Hepatotoxins
6. Hyperalimentation
7. Hyperlipidemia, familial
8. Jejunoileal bypass
- *9. Lipoatrophic diabetes (congenital total lipodystrophy)
- *10. Malabsorption syndrome (See G-57)
11. Peritoneal dialysis
12. Pregnancy
- *13. Reye S.
- *14. Starvation, acute or chronic (incl. malnutrition; kwashiorkor)
- *15. Storage diseases (eg, Gaucher disease; Niemann-Pick disease; glycogen storage disease, type I—von Gierke)

* Children affected.

References

1. Baron RL, Gore RM: Diffuse liver disease. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1590–1638

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2. Bashist B, Hecht HL, Harley WD: Computed tomographic demonstration of rapid changes in fatty infiltration of the liver. *Radiology* 1982;142:691–692
3. Taybi H, Lachman RS: *Radiology of Syndromes, Metabolic Disorders, and Skeletal Dysplasias*. (ed 4) St. Louis: Mosby-Year Book, 1996
4. Wilson SR, Rosen IE, Chin-Sang HB, et al: Fatty infiltration of the liver: an imaging challenge. *J Can Assoc Radiol* 1982; 33:227–232

Gamut G-145**PERFUSION ABNORMALITIES OF THE LIVER****LOBAR OR SEGMENTAL**

1. Cirrhosis with arterial-portal shunt
2. Hypervascular gallbladder disease
3. Mass effect due to tumor, cyst, abscess within liver
4. Portal vein ligation, obstruction or thrombosis

SUBSEGMENTAL

1. Acute cholecystitis
2. Ethanol ablation
3. Obstruction of peripheral portal branches
4. Percutaneous needle biopsy

References

1. Gore RM: Liver: Differential diagnosis. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1712–1727
2. Gore RM, Marn CS, Baron RL: Vascular disorders of the liver and splanchnic circulation. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1639–1668
3. Gabata T, Kadoya M, Matsui O, et al: Dynamic CT of hepatic abscess: significance of transient segmental enhancement. *AJR* 2001;176:675–680
4. Rozeik PE, Huppert PE, Münch H: Angiographic pseudolesion in the liver in asymptomatic subacute cholecystitis. *Eur Radiol* 2001;11:346–347
5. Semelka RC, Chung J-J, Hussain SM, et al: Chronic hepatitis: correlation of early patchy and late enhancement patterns on gadolinium-enhanced MR images with histopathology. *JMRI* 2001;385–391

Gamut G-146**PATCHY HEPATOGRAM (AREAS OF LOW DENSITY ON ANGIOGRAPHY OR POSTCONTRAST CT)****COMMON**

1. Budd-Chiari syndrome
2. Cirrhosis
3. Heart failure
4. Hepatitis
5. Portal vein thrombosis

UNCOMMON

1. Lymphomatous infiltration
2. Sarcoidosis
3. Schistosomiasis
4. Thyrotoxicosis
5. Tricuspid atresia

References

1. Gore RM: Liver: Differential diagnosis. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1712–1727
2. Gore RM, Marn CS, Baron RL: Vascular disorders of the liver and splanchnic circulation. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1639–1668
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5. Semelka RC, Chung J-J, Hussain SM, et al: Chronic hepatitis: correlation of early patchy and late enhancement patterns on gadolinium-enhanced MR images with histopathology. *JMRI* 2001;385–391

Gamut G-147

**GENERALIZED OR MULTIFOCAL
DECREASED ECHOGENICITY
OF THE LIVER ON ULTRASOUND
(HYPOECHOIC)**

COMMON

1. Hepatitis, acute viral
2. Malignant infiltration of liver by primary or metastatic neoplasm
3. Schistosomiasis, early

UNCOMMON

1. Amyloidosis
2. Leukemia; lymphoma_g; Burkitt lymphoma
3. [Renal disease, end stage; nephrocalcinosis]

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

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Gamut G-148

**GENERALIZED OR MULTIFOCAL
INCREASED ECHOGENICITY
OF THE LIVER ON ULTRASOUND
(HYPERECHOIC)**

COMMON

1. AIDS
2. Fatty infiltration (eg, alcoholism; various toxins; diabetes; malabsorption S.; jejunoileal bypass; protein deficiency; starvation—malnutrition, kwashiorkor; familial hyperlipidemia) (See G-144)
3. Fibrosis of liver parenchyma (eg, alcoholism; cirrhosis; schistosomiasis; chronic hepatitis; glycogen storage disease)
4. Hepatocellular carcinoma (hepatoma), diffuse
5. Hydatid disease (*Echinococcus multilocularis* or multiple healed, calcified *E. granulosus* cysts)
6. Idiopathic
7. Lipoatrophic diabetes
8. Obesity
9. Technical—excessive gain

UNCOMMON

1. Budd-Chiari S. (focal)
2. Carbon tetrachloride exposure
3. Cystic fibrosis (mucoviscidosis)
4. Drug therapy (esp. tetracycline; steroids; chemotherapy)
5. Gaucher disease
6. Hyperalimentation
7. Lipoatrophic diabetes (congenital total lipodystrophy)
8. Lymphoma_g; leukemia
9. Miliary tuberculosis
10. Pregnancy
11. Reye S.
12. Tyrosinemia
13. Wilson disease

References

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(continued)

2. Cosgrove DO: Liver and biliary tree. In: Barnett E, Morley P (eds): *Clinical Diagnostic Ultrasound*. Oxford: Blackwell Scientific Publ, 1985, pp 365–386
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Gamut G-149**GENERALIZED HIGH DENSITY LIVER (NONENHANCED CT)****COMMON**

1. Hemochromatosis
2. Hemosiderosis

UNCOMMON

1. Chronic arsenic poisoning
2. Drug therapy (eg, amiodarone; gold; cisplatin)
3. Glycogen storage disease, type I—von Gierke (may be low density liver)
4. Iron overload of liver (eg, multiple transfusions)
5. Storage diseases (usually low density)
6. Thorotrast
7. Wilson disease

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Gamut G-150**GENERALIZED OR MULTIFOCAL LOW DENSITY LIVER (NONENHANCED CT)****COMMON**

1. Diffuse malignancy, primary or metastatic (incl. lymphoma)
2. Fatty infiltration (steatosis) (See G-144)
3. Hepatic congestion (eg, heart failure; constrictive pericarditis; tricuspid stenosis or insufficiency)

UNCOMMON

1. Amyloidosis
2. Budd-Chiari syndrome, acute or chronic
3. Cysts, numerous (eg, hydatid disease; Caroli disease; polycystic liver disease; Von Hippel-Lindau disease)
4. Storage diseases (eg, Gaucher disease; Niemann-Pick disease; glycogen storage disease, type I—von Gierke)

References

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5. Mergo PJ, Ros PR: Benign lesions of the liver. *Radiol Clin North Am* 36:319–332, 1998

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8. Suzuki S, et al: CT findings in hepatic and splenic amyloidosis. *J Comput Assist Tomog* 1986;10:332–334
9. Vogelzang RL, Anscheutz SL, Gore RM: Budd Chiari syndrome: CT observations. *Radiology* 1987;163:329–333
10. Yates CK, Streight RA: Focal fatty infiltration of the liver simulating metastatic disease. *Radiology* 1986;159:83–84

Gamut G-151

MULTIPLE HYPOINTENSE LIVER LESIONS ON T2-WEIGHTED MR IMAGES

COMMON

1. Calcified granulomas
2. Regenerating nodules in cirrhosis

UNCOMMON

1. Gamna-Gandy bodies
2. Gas in biliary ducts or portal vein
3. Hydatid disease (*Echinococcus granulosus* or *E. multilocularis* with multiple calcified cysts)
4. Multifocal acute intrahepatic hemorrhages
5. Osler-Weber-Rendu disease
6. Periportal vascular collaterals

Reference

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2. Gore RM, Marn CS, Baron RL: Vascular disorders of the liver and splanchnic circulation. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology* (ed 2) Philadelphia: WB Saunders, 2000, pp 1639–1668
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Gamut G-152

DIFFUSELY DECREASED LIVER INTENSITY ON MRI

1. Hemochromatosis
2. Hemosiderosis
3. Superparamagnetic contrast medium
4. Wilson disease

References

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2. Gore RM: Liver: Differential diagnosis. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1712–1727
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Gamut G-153

SPONTANEOUS LIVER RUPTURE

1. Hepatic tumor (eg, hepatocellular adenoma; hemangioma; hepatocellular carcinoma {hepatoma})
2. Oral contraceptive use
3. Oral estrogen therapy, long-term
4. Peliosis hepatis
5. Toxemia of pregnancy

Reference

1. Lundell CJ: Spontaneous hepatic rupture in postmenopausal women receiving oral estrogen replacement. *JVIR* 1993;4:245–249

Gamut G-154

NEOPLASM OF THE LIVER (CHILD OR ADULT)

COMMON

1. Hepatocellular adenoma
2. Cholangiocarcinoma, intrahepatic
3. [Cyst (eg, simple; posttraumatic; hydatid)]
4. Hemangioma (cavernous; capillary)
5. Hepatocellular carcinoma (hepatoma)
6. Metastasis
7. Multiple bile duct hamartoma (von Meyenburg complex) (microbiliary hamartoma)
8. [Nodular regenerative hyperplasia; focal nodular hyperplasia]

UNCOMMON

1. [Adrenal rest]
2. Biliary cystadenoma
3. Carcinoid of liver, primary or metastatic
4. Cholangioma
5. Epithelioid hemangioendothelioma
6. Fibrolamellar carcinoma
7. Gastrointestinal stromal tumor_g (eg, leiomyoma; fibroma)
8. Mesenchymal hamartoma (child)
9. Infantile hemangioendothelioma of liver (child)
10. Hepatoblastoma
11. Lymphangioma
12. Lymphoma_g
13. [Pancreatic rest]
14. Sarcoma (esp. angiosarcoma; also nonvascular sarcomas; Kaposi sarcoma)
15. [Splenositis]
16. Teratoma

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

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Gamut G-155-1

SOLID LIVER LESION—ADULT (US, CT, MRI)

COMMON

1. Abscess (pyogenic, amebic, or fungal)
2. Focal fatty change (focal steatosis)
3. Focal nodular hyperplasia; adenomatous hyperplastic nodule
4. Hemangioma, cavernous or capillary
5. Hematoma
6. Hepatocellular adenoma
7. Hepatocellular carcinoma (hepatoma)—usually in cirrhotic or other damaged liver (eg, postradiation)
8. Metastasis (esp. from carcinoma of lung, breast, colon, kidney)

9. Multiple bile duct hamartoma (von Meyenburg complex) (microbiliary hamartoma)
10. Regenerating or dysplastic nodule (cirrhosis)

UNCOMMON

1. Aneurysm of hepatic artery
2. Angiomyolipoma of liver
3. Angiosarcoma of liver
4. Bacillary angiomatosis (in AIDS)
5. Biliary cystadenoma, cystadenocarcinoma
6. Cholangiocarcinoma
7. Extramedullary hematopoiesis
8. Fibrolamellar carcinoma
9. Fungus disease (esp. histoplasmosis; candidiasis)
10. Hydatid disease (*Echinococcus multilocularis* or healed *E. granulosus* cyst)
11. Infarct
12. Kaposi sarcoma
13. Lipoma
14. Lymphoma_g
15. Tuberculosis; other granulomatous disease
16. Visceral larval migrans granuloma

References

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Gamut G-155-2

SOLID LIVER LESION—OLDER CHILD OR ADOLESCENT

COMMON

1. Abscess (pyogenic, amebic, or fungal)
2. Hepatocellular carcinoma (hepatoma)
3. Metastasis (esp. neuroblastoma; sarcoma)

UNCOMMON

1. Angiomyolipoma
2. Fibrolamellar carcinoma
3. Focal nodular hyperplasia
4. Hemangioma
5. Hematoma
6. Hepatocellular adenoma (usually associated with glycogen storage disease, type I or Fanconi anemia)
7. Hydatid disease (*Echinococcus multilocularis* or healed *E. granulosus* cyst)
8. Infarct
9. Lipoma
10. Lymphoma_g; leukemia; Burkitt lymphoma
11. Mesenchymal hamartoma
12. Multiple bile duct hamartoma
13. Peliosis hepatis
14. Sarcoma of liver (eg, undifferentiated (embryonal); mixed mesenchymal); rhabdomyosarcoma of bile ducts
15. Teratocarcinoma
16. Tuberculosis; other granulomatous disease

References

1. Ros PR, Taylor HM: Benign and malignant tumors of the liver. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1487–1568
2. Ros PR, Taylor HM, Barreda R, et al: Focal hepatic infections. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1569–1589
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Gamut G-155-3

SOLID LIVER LESION—INFANT OR YOUNG CHILD (Under Age 5)

COMMON

- *1. Hemangioma
2. Hepatoblastoma
- *3. Infantile hemangioendothelioma

UNCOMMON

1. Abscess
2. Hematoma
3. Mesenchymal hamartoma
4. Metastasis (esp. neuroblastoma; sarcoma)

* Especially newborn to 6 months.

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1. Cohen MD: Imaging of Children with Cancer. St. Louis: Mosby-Year Book, 1992, pp 20–42
2. Ros PR, Taylor HM: Benign and malignant tumors of the liver. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1487–1568
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Gamut G-156

SOLID LIVER MASSES—MULTIPLE

COMMON

1. Abscess (pyogenic, amebic, or fungal)
2. Fatty change in liver (steatosis)
3. Focal nodular hyperplasia
4. Fungus disease (eg, candidiasis; histoplasmosis)
5. Granulomatous disease (eg, sarcoidosis; tuberculosis)
6. Hemangioma
7. Hematoma (intrahepatic or subcapsular)
8. Lymphoma; Burkitt lymphoma
9. Metastases (esp. from carcinoma of lung, breast, colon, kidney)
10. Regenerating or dysplastic nodules (cirrhosis)

UNCOMMON

1. Angiosarcoma of liver
2. Bacillary angiomatosis (in AIDS)
3. Cholangiocarcinoma
4. Cytomegalovirus infection, multifocal
5. Drug-induced toxicity (eg, erythromycin; diphenylhydantoin)
6. Extramedullary hematopoiesis
7. Hepatic cystadenoma
8. Hepatocellular adenoma; adenomatosis
9. Hepatocellular carcinoma (hepatoma)
10. Hydatid disease (*Echinococcus multilocularis* or healed, calcified *E. granulosus* cysts)
11. Kaposi sarcoma
12. Mesenchymal hamartoma

References

1. Gore RM: Liver: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1712–1727
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- Choledochal cyst
- Cystic duct remnant with mucocele
- Cystic hepatocellular carcinoma (hepatoma)
- Cystic lymphangioma, mesenchymal hamartoma, or other unusual cystic or necrotic tumor
- Intrahepatic gallbladder
- Mesenchymal hamartoma
- Multiple bile duct hamartoma (Von Meyenburg complex)
- Polycystic liver disease
- Undifferentiated (embryonal) sarcoma
- Von Hippel-Lindau disease

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

Gamut G-157

CYSTIC LIVER LESION(S) (US, CT, MRI) (Usually Anechoic or Hypoechoic on US and Low Density on CT)

COMMON

- Abscess (pyogenic, amebic, or fungal)
- Cyst, congenital or acquired (eg, epithelial; post-traumatic; hydatid)
- Cystic metastasis (eg, mucinous adenocarcinoma of colon, stomach; cystadenocarcinoma of pancreas, ovary, or uterus; melanoma, carcinoid, or sarcoma with necrosis)
- [Chilaiditi disease (interposition of colon between liver and diaphragm)]
- Hematoma, acute
- Hydatid disease (*Echinococcus granulosus* and *E. multilocularis*)

UNCOMMON

- Aneurysm of hepatic artery or portal vein
- Biliary cystadenoma, cystadenocarcinoma
- Biloma
- Caroli disease
- Cat-scratch disease
- Cholangiocarcinoma

References

- Eisenberg RL: *Clinical Imaging: An Atlas of Differential Diagnosis*. (ed 3) Philadelphia: Lippincott-Raven, 1997, pp 484–487
- Ferrozzi F, Bova D, Campodonico F: Cystic primary neoplasms of the liver of the adult: CT features. *Clin Imag* 1993;17:292–296
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Gamut G-158-1

LIVER LESION CHARACTERIZED BY LINEAR OR STELLATE CENTRAL SCAR (CT, US, ANGIO)

1. Cholangiocarcinoma
2. Fibrolamellar carcinoma
- *3. Focal nodular hyperplasia
4. Hemangioma, giant cavernous
5. Hepatocellular adenoma
- *6. Hepatocellular carcinoma (hepatoma)
7. Metastasis, hypervascular

* Usually isoechoic mass with hyperechoic linear or stellate central scar on ultrasound.

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2. Parulekar SG, Bree RL: Liver. In: McGahan JP, Goldberg BB (eds): Diagnostic Ultrasound. Philadelphia: Lippincott-Raven, 1997, chapter 21
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Gamut G-158-2

LIVER LESION WITH CENTRAL SCAR ON MRI

1. Cavernous hemangioma: hypo- or hyperintense T2-weighted image (either inflammatory or fibrous scar)
2. Fibrolamellar hepatocellular carcinoma: hypointense T1-WI, hyperintense T2-WI (fibrotic-repair of scar)

3. Focal nodular hyperplasia: hypointense T1-WI, hyperintense T2-WI (inflammatory scar)
4. Hepatocellular adenoma: variable signal

References

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2. Ros PR, Taylor HM: Benign and malignant tumors of the liver. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1487–1568
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Gamut G-159

LIVER LESION CHARACTERIZED BY BLOOD OR HEMORRHAGE

COMMON

1. Hemangioma
2. Hematoma
3. Hepatocellular adenoma
4. Hepatocellular carcinoma (hepatoma)

UNCOMMON

1. Angiosarcoma of liver
2. Bacillary angiomatosis (in AIDS)
3. Kaposi sarcoma
4. Peliosis hepatis

References

1. Mergo PJ, Ros PR: Benign lesions of the liver. Radiol Clin North Am 1998;36:365–376
2. Ros PR, Taylor HM: Benign and malignant tumors of the liver. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1487–1568

Gamut G-160

LIVER LESION CHARACTERIZED BY CALCIFICATION

COMMON

1. Abscess, healed (pyogenic, amebic, or fungal)
2. Calculus(i) in biliary tract
3. Granuloma (eg, tuberculosis; histoplasmosis; coccidioidomycosis; brucellosis)
4. Hemangioma, cavernous
5. Hematoma, old
6. Hepatocellular carcinoma (hepatoma), esp. treated
7. Hydatid disease (*Echinococcus granulosus* or *E. multilocularis*)
8. Metastases (eg, from osteosarcoma; chondrosarcoma; mucinous or colloid adenocarcinoma of colon, rectum, ovary, breast, pancreas, stomach, or thyroid; islet cell carcinoma; carcinoid; teratocarcinoma; leiomyosarcoma; neuroblastoma; pheochromocytoma; treated melanoma or lymphoma)

UNCOMMON

1. Biliary cystadenocarcinoma
2. Calcified gallbladder (porcelain gallbladder)
3. Calcified hepatic artery (incl. aneurysm)
4. Cholangiocarcinoma
5. Cyst, nonparasitic, congenital or acquired
6. Fibrolamellar carcinoma
7. Gumma (hepar lobatum)
8. Hemangioendothelioma (epithelioid or infantile)
9. Hepatoblastoma
10. Hepatocellular adenoma
11. Mesenchymal hamartoma
12. Regenerating nodules in cirrhosis (rarely)

13. Schistosomiasis (turtleshell appearance, esp. *S. japonica*)
14. Thromboembolus of portal vein, calcified

References

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2. Paley MR, Ros PR: Hepatic calcification. *Radiol Clin North Am* 1998;36:391–398
3. Parulekar SG, Bree RL: Liver. In: McGahan JP, Goldberg BB: *Diagnostic Ultrasound*. Philadelphia: Lippincott-Raven, 1997, chapter 21
4. Stoupis C, Taylor HM, Paley MR, et al: The rocky liver: radiologic-pathologic correlation of calcified hepatic masses. *Radiographics* 1998;18:675–685

Gamut G-161

LIVER LESION CHARACTERIZED BY FAT (CT, MRI)

1. Angiomyolipoma of liver
2. Focal fatty change
3. Focal nodular hyperplasia
4. Hepatocellular adenoma
5. Hepatocellular carcinoma (hepatoma)
6. Langerhans cell histiocytosis_g
7. Lipoma
8. Metastasis (eg, liposarcoma; teratoid tumor)
9. Myelolipoma

References

1. Roberts JL, Fishman EK, Hartman DS, et al.: Lipomatous tumors of the liver: evaluation with CT and US. *Radiology* 1986;158:613–617
2. Ros PR: Hepatic angiomyolipoma: is fat in the liver friend or foe? *Abdom Imaging* 1994;19:552–553

Gamut G-162

LIVER LESION CHARACTERIZED BY BULL'S-EYE APPEARANCE

1. Fungus disease (eg, candidiasis, usually in immunocompromised individual); other opportunistic infections
2. Kaposi sarcoma
3. Lymphoma_g; leukemia
4. Metastasis
5. Sarcoidosis
6. Septic emboli

References

1. Dähnert W: Radiology Review Manual. (ed 4) Baltimore, Williams & Wilkins, 1999
2. Paley MR, Ros PR: Hepatic metastases. Radiol Clin North Am 1998;36:349–364

Gamut G-163

LIVER LESION CHARACTERIZED BY FLUID-FLUID LEVEL

1. Biliary cystadenoma
2. Hemangioma
3. Hematoma
4. Hepatic cyst (with hemorrhage or infection)
5. Hepatocellular adenoma (hemorrhagic)
6. Hepatocellular carcinoma (hepatoma), cystic
7. Metastasis (eg, leiomyosarcoma; adenocarcinoma of lung or ovary; carcinoid)

Reference

1. Soyer P, Bluemke DA, Fishman EK, Rymer R: Fluid-fluid levels within focal hepatic lesions: imaging appearance and etiology. Abd Imag 1998;23:161–165

Gamut G-164

LIVER LESION CHARACTERIZED BY “FILL-IN” (ANGIO, POSTCONTRAST CT OR MRI)

1. Cholangiocarcinoma
2. Focal nodular hyperplasia
3. Hemangioendothelioma (epithelioid or infantile)
4. Hemangioma
5. Hepatocellular carcinoma (hepatoma)
6. Kaposi sarcoma
7. Leiomyosarcoma
8. Lymphoma_g
9. Metastasis
10. Vascular malformation

References

1. Ito K, Honjo K, Fujita T, et al: Liver neoplasms: diagnostic pitfalls in cross sectional imaging. RadioGraphics 1996; 16:273–283
2. Shirkhoda A, Salmanzadeh A: Hepatic lesions which “fill-in” on contrast-enhanced CT and MR imaging: patterns and diagnostic pitfalls

Gamut G-165-S

LIVER LESIONS—CLINICAL CONSIDERATIONS

Nonsurgical Liver Lesions

1. Abscess (except for possible drainage)
2. Cyst (eg, simple; posttraumatic; hydatid)
3. Fatty liver
4. Focal nodular hyperplasia
5. Hemangioma

Painless Liver Lesions

1. Cyst (eg, simple; hydatid)
2. Focal nodular hyperplasia
3. Hemangioma
4. Hepatocellular adenoma (small)

Liver Lesions Related to Excessive Steroids

1. Focal nodular hyperplasia
2. Hemangioma
3. Hepatocellular adenoma
4. Hepatocellular carcinoma (hepatoma)
5. Nodular regenerative hyperplasia

Liver Neoplasms With Elevated Alpha Fetal Protein (AFP)

1. Hepatoblastoma
2. Hepatocellular carcinoma (hepatoma)

Sex Predilection for Liver Neoplasms

1. Hepatic neoplasm is usually benign in women
2. Hepatic neoplasm is usually malignant in men

Reference

1. Ros PR, Taylor HM: Benign and malignant tumors of the liver. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1487–1568

Gamut G-166**LIVER METASTASES—CALCIFIED****COMMON**

1. Endocrine carcinoma of pancreas (esp. islet cell tumor)
2. Malignant melanoma
3. Medullary or colloid carcinoma of breast or thyroid
4. Mucinous adenocarcinoma of colon or stomach
5. Neuroblastoma
6. Papillary serous cystadenocarcinoma of ovary
7. Sarcoma (esp. osteosarcoma; chondrosarcoma; leiomyosarcoma)

UNCOMMON

1. Carcinoma of lung or testis
2. Lymphoma, treated

3. Mesothelioma
4. Renal cell carcinoma

References

1. Burgener FA, Korman M: Differential Diagnosis in Computed Tomography. New York: Thieme, 1996
2. Dähnert W: Radiology Review Manual. (ed 4) Baltimore: Williams & Wilkins, 1999, p 596
3. Paley MR, Ros PR: Hepatic metastases. Radiol Clin North Am 1998;36:349–364
4. Ros PR, Taylor HM: Malignant tumors of the liver. In: Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1523–1568

Gamut G-167**LIVER METASTASES—
HYPERVASCULAR****COMMON**

1. Carcinoid
2. Carcinoma of breast
3. Carcinoma of colon
4. Choriocarcinoma
5. Endocrine carcinoma of pancreas (esp. islet cell tumor)
6. Malignant melanoma
7. Renal cell carcinoma (hypernephroma)

UNCOMMON

1. Cystadenocarcinoma of ovary
2. Pheochromocytoma
3. Sarcoma (esp. osteosarcoma; chondrosarcoma; leiomyosarcoma)

References

1. Dähnert W: Radiology Review Manual. (ed 4) Baltimore: Williams & Wilkins, 1999, p 596
2. Paley MR, Ros PR: Hepatic metastases. Radiol Clin North Am 1998;36:349–364
3. Ros PR, Taylor HM: Malignant tumors of the liver. In: Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1523–1568

Gamut G-168

LIVER METASTASES—HEMORRHAGIC

COMMON

1. Carcinoma of breast
2. Carcinoma of colon
3. Carcinoma of thyroid
4. Choriocarcinoma
5. Malignant melanoma
6. Renal cell carcinoma (hypernephroma)

References

1. Dähnert W: Radiology Review Manual. (ed 4) Baltimore: Williams & Wilkins, 1999, p 597
2. Paley MR, Ros PR: Hepatic metastases. Radiol Clin North Am 1998;36:349–364
3. Ros PR, Taylor HM: Malignant tumors of the liver. In: Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1523–1568

Gamut G-169

LIVER METASTASES—CYSTIC

COMMON

1. Carcinoma of colon
2. Choriocarcinoma
3. Malignant melanoma
4. Mucinous carcinoma of ovary
5. Sarcoma (eg, osteosarcoma; chondrosarcoma; leiomyosarcoma)

UNCOMMON

1. Carcinoid
2. Carcinoma of lung (esp. small cell)
3. Carcinoma of stomach
4. Endometrial carcinoma of uterus

Reference

1. Dähnert W: Radiology Review Manual. (ed 4) Baltimore: Williams & Wilkins, 1999, p 597

Gamut G-170

LIVER METASTASES—
ULTRASOUND CHARACTERISTICS

HYPOECHOIC LESIONS (37.5%)

COMMON

1. Carcinoma of breast
2. Carcinoma of pancreas (36%)
3. Carcinoma of cervix (20%)
4. Lymphoma

UNCOMMON

1. Adenocarcinoma of lung
2. Carcinoma of nasopharynx

MIXED ECHOGENICITY (37.5%)

COMMON

1. Carcinoma of breast
2. Carcinoma of rectum
3. Carcinoma of lung
4. Carcinoma of stomach
5. Hepatocellular carcinoma (hepatoma)

UNCOMMON

1. Anaplastic carcinoma
2. Carcinoma of cervix
3. Vascular primaries (carcinoid; islet cell carcinoma of pancreas; choriocarcinoma; renal cell carcinoma)

HYPERECHOIC LESIONS
WITH SHADOWING (25%)

COMMON

1. Adenocarcinoma of stomach
2. Cystadenocarcinoma of pancreas
3. Melanoma
4. Mucinous or colloid carcinoma of colon or breast
5. Pseudomucinous cystadenocarcinoma of ovary

UNCOMMON

1. Chondrosarcoma
2. Neuroblastoma
3. Osteosarcoma
4. Teratocarcinoma

CYSTIC METASTASES (See G-169)

1. Central necrosis of any malignant lesion, esp. sarcomas
2. Mucin-secreting metastases from carcinoma of the ovary, colon, pancreas, or stomach

BULL'S-EYE OR TARGET PATTERN

1. Carcinoma of lung
2. Other carcinomas (occasionally)

INFILTRATIVE PATTERN

1. Carcinoma of breast
2. Carcinoma of lung
3. Melanoma

References

1. Dähnert W: Radiology Review Manual. (ed 4) Baltimore: Williams & Wilkins, 1999, p 597
2. Gore RM: Liver: Differential diagnosis. In Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1712–1727
3. Paley MR, Ros PR: Hepatic metastases. Radiol Clin North Am 1998;36:349–364

Gamut G-171**AVASCULAR OR HYPOVASCULAR LIVER LESION (ANGIO, POSTCONTRAST CT OR MRI)****COMMON**

- *1. Abscess (eg, pyogenic, amebic, or fungal)
- 2. Cholangiocarcinoma
- *3. Cyst (congenital; inflammatory; hydatid; traumatic)
- 4. [Extrinsic mass (eg, gallbladder; adrenal neoplasm; subphrenic abscess)]
- *5. Focal fatty change
- *6. Metastasis

UNCOMMON

1. Adrenal rest
2. [Biloma, traumatic or iatrogenic (eg, needle biopsy)]
3. Hematoma
- *4. Lymphoma_g
5. Mesenchymal hamartoma
6. Neoplasm, benign or malignant, other (eg, gastrointestinal stromal tumor_g; teratoma; lipoma)
- *7. Polycystic disease of liver

* May be multiple.

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Guermazi A, Brice P, de Kerviler E, et al: Extranodal Hodgkin disease: spectrum of disease. RadioGraphics 2001; 21:161–179
2. Ros PR, Taylor HM: Benign and malignant tumors of the liver. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1487–1568

Gamut G-172

HYPERVASCULAR OR HYPERDENSE LIVER LESION (ANGIO, POSTCONTRAST CT OR MRI)

COMMON

- *1. Focal fatty sparing (simulates enhancing mass)
- *2. Focal nodular hyperplasia
- *3. Hemangioma, cavernous or capillary
 4. Hepatoblastoma
 5. Hepatocellular adenoma
 6. Hepatocellular carcinoma (hepatoma)
- *7. Metastasis, hypervascular (eg, carcinoid; islet cell tumor of pancreas; pheochromocytoma; leiomyosarcoma; other sarcomas; choriocarcinoma; carcinoma of breast, colon, kidney, or thyroid; malignant melanoma)

UNCOMMON

1. Aneurysm of hepatic artery, true or false (incl. arteriohepatic fistula) or portal vein
 2. Angiosarcoma of liver
 - *3. Arteriovenous fistula (eg, congenital; traumatic; iatrogenic); arterio-portal shunt in some hepatomas
 4. Fibrolamellar carcinoma
 5. Hemangioendothelioma, epithelioid
 6. Vascular phenomena (eg, SVC obstruction; Budd-Chiari S.; transient hepatic attenuation difference {THAD})
- * May be multiple.

References

1. Adler J, Goodgold M, Mitty H, et al: Arteriovenous shunts involving the liver. *Radiology* 1978;129:315–322
2. Bressler EL, Alpern MB, Glazer GM, et al: Hypervascular hepatic metastases: CT evaluation. *Radiology* 1987;162:49–51
3. Kehagias D, Mouloupoulos L, Antoniou A, et al: Focal nodular hyperplasia: imaging findings. *Eur Radiol* 2001;11:202–212
4. Murakami T, Kim T, Takamura M, et al: Hypervascular hepatocellular carcinoma: detection with double arterial phase multi-detector helical CT. *Radiology* 2001;218:763–767

5. Oliver JH, Baron RL, Federle MP, et al: Hypervascular liver metastasis: do unenhanced and hepatic arterial phase CT images affect tumor detection? *Radiology* 1997;205:709–715
6. Quiroga S, Sebastia C, Pallisa E, et al: Improved diagnosis of hepatic perfusion disorders: Value of hepatic arterial phase imaging during helical CT. *RadioGraphics* 2001;21:65–81
7. Slone RM, Fisher AJ: *Pocket Guide to Body CT Differential Diagnosis*. New York: McGraw-Hill, 1999, pp 219–220

Gamut G-173

ANECHOIC LIVER LESION (USUALLY CYSTIC ON US)

COMMON

- *1. Caroli disease
- *2. Congenital simple cyst
 3. Metastasis, cystic (eg, from mucinous carcinoma of colon; carcinoma of stomach or uterus; cystadenocarcinoma of ovary or pancreas; squamous cell carcinoma, esp. bronchogenic; carcinoid; malignant melanoma; sarcoma, esp. leiomyosarcoma)
- *4. Polycystic liver disease

UNCOMMON

1. Abscess (pyogenic, amebic, or fungal)
- *2. Acquired cyst (eg, posttraumatic; inflammatory)
- *3. Aneurysm of hepatic artery or portal vein
 4. Biliary cystadenoma, cystadenocarcinoma
- *5. Biloma
- *6. [Chilaiditi disease (interposition of colon between liver and diaphragm)]
- *7. Choledochal cyst
 8. Cystic or necrotic neoplasm
- *9. Cystic duct remnant with mucocele
10. Hematoma, acute
11. Hydatid cyst
- *12. Intrahepatic gallbladder
13. Lymphoma_g

* Usually unilocular with smooth walls and distal acoustic enhancement.
[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Eisenberg RL: Clinical Imaging: An Atlas of Differential Diagnosis. (ed 3) Philadelphia: Lippincott-Raven, 1997, pp 484–487
2. Parulekar SG, Bree RL: Liver. In: McGahan JP, Goldberg BB (eds): Diagnostic Ultrasound. Philadelphia: Lippincott-Raven, 1997, chapter 21
3. Skolnick ML: Guide to the Ultrasound Examination of the Abdomen. New York: Springer-Verlag, 1986, pp 89–90
4. Williamson MR: Abdominal ultrasound. In: Essentials of Ultrasound. Philadelphia: WB Saunders, 1996, p 81
5. Withers CE, Wilson SR: The liver. In: Rumack CM, Wilson SR, Charboneau JW (eds): Diagnostic Ultrasound. (ed 2) St. Louis: Mosby, 1998, pp 87–154

Gamut G-174

HYPOECHOIC LIVER LESION (US)

COMMON

1. Abscess (pyogenic, amebic, or fungal)
2. Cyst, complicated (eg, with cholesterol crystals)
- *3. Cystic liver tumor (eg, cholangiocarcinoma; biliary cystadenoma or cystadenocarcinoma; lymphangioma; mesenchymal hamartoma)
- +4. Focal nodular hyperplasia
5. Hematoma, acute
- +6. Hepatocellular carcinoma (hepatoma)
7. Infarct
8. Lymphoma_g; Burkitt lymphoma
- +9. Metastasis, incl. cystic metastasis (eg, from carcinoma of breast, lung, colon, stomach, ovary, pancreas)

UNCOMMON

1. Biloma
- +2. Candidiasis (wheel within a wheel)
3. Extramedullary hematopoiesis
4. Focal hepatic necrosis
5. Focal sparing in fatty liver (steatosis)
6. Granuloma (eg, tuberculosis)
7. Hemangioendothelioma of liver
8. Hemangioma, cavernous (more often hyperechoic)

- +9. Hepatocellular adenoma
- *10. Hydatid disease (*Echinococcus granulosus* or *E. multilocularis*)

* Usually a multicystic image on ultrasound.
+ Hepatic mass with hypoechoic halo.

References

1. Gore RM: Liver: differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1712–1726
2. Parulekar SG, Bree RL: Liver. In: McGahan JP, Goldberg BB (eds): Diagnostic Ultrasound. Philadelphia: Lippincott-Raven, 1997, chapter 21
3. Skolnick ML: Guide to the Ultrasound Examination of the Abdomen. New York: Springer-Verlag, 1986, pp 91–92
4. Weill FS: Ultrasound Diagnosis of Digestive Diseases. (ed 3 revised) Berlin: Springer-Verlag, 1990, pp 239–246
5. Withers CE, Wilson SR: The liver. In: Rumack CM, Wilson SR, Charboneau JW (eds): Diagnostic Ultrasound. St. Louis: Mosby-Year Book, 1998, pp 87–154

Gamut G-175

HYPERECHOIC LIVER LESION (US)

COMMON

1. Cirrhosis (multifocal regenerating nodules)
2. Focal fatty infiltration (focal steatosis)
- *3. Hemangioma
4. Hepatocellular adenoma
- *5. Hepatocellular carcinoma (hepatoma)
6. Lipoma
7. Metastasis {esp. from carcinoma of colon, stomach, ovary, kidney or pancreas {incl. islet cell carcinoma}; carcinoid*; choriocarcinoma}

UNCOMMON

1. Angiomyolipoma
2. Debris inside abscess or hematoma
3. Dysplastic nodule
4. Focal nodular hyperplasia
- *5. Hemangioendothelioma
6. Hepatic fissure

(continued)

7. Hydatid disease (old healed, calcified *E. granulosus* cyst; *Echinococcus multilocularis*—multifocal)
8. Infection (eg, cytomegalovirus or *Candida*)
9. Lymphoma_g
10. Omentum inserted into bed of hepatic resection
- *11. Peliosis hepatis
12. Postradiation therapy
13. Solitary fibrous tumor of the liver

* Hyperechoic hepatic mass(es) with punctate calcifications and/or acoustic enhancement on ultrasound.

References

1. Fuksbrumer MS, Klimstra D, Panicek DM: Solitary fibrous tumor of the liver: Imaging findings. *AJR* 2000;175:1683–1687
2. Numata K, Tanaka K, Kiba T, et al: Contrast-enhanced, wide-band harmonic gray scale imaging of hepatocellular carcinoma. *J Ultrasound Med* 2001;20:89–98
3. Parulekar SG, Bree RL: Liver. In: McGahan JP, Goldberg BB (eds): *Diagnostic Ultrasound*. Philadelphia: Lippincott-Raven, 1997, chapter 21
4. Ros PR, Taylor HM: Benign and malignant tumors of the liver. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1487–1568
5. Rumack CM, Wilson SR, Charboneau JW (eds): *Diagnostic Ultrasound*. St. Louis: Mosby, 1998
6. Weill FS: *Ultrasound Diagnosis of Digestive Diseases*. (ed 3 revised) Berlin: Springer-Verlag, 1990, pp 239–246
7. Withers CW, Wilson SR: The liver. In: Rumack CM, Wilson SR, Charboneau JW (eds): *Diagnostic Ultrasound*. St. Louis: Mosby-Year Book, 1998, pp 87–154

Gamut G-176

ISOECHOIC LIVER LESION (US)

1. Focal nodular hyperplasia
2. Hepatocellular adenoma
3. Hepatocellular carcinoma (hepatoma)

Reference

1. Withers CW, Wilson SR: The liver. In: Rumack CM, Wilson SR, Charboneau JW (eds): *Diagnostic Ultrasound*. St. Louis: Mosby-Year Book, 1998, pp 87–154

Gamut G-177

HETEROGENEOUS HEPATIC ECHOGENICITY ON ULTRASOUND (COMPLEX HEPATIC MASS OR DIFFUSE PARENCHYMAL INVOLVEMENT)

COMMON

1. Abscess
2. Cavernous hemangioma
- *3. Cirrhosis
- *4. Fatty change in liver
5. Focal nodular hyperplasia
6. Hepatocellular carcinoma (hepatoma)
7. Hydatid cyst (with collapsed daughter cysts)
- *8. Metastasis with mixed echogenicity or diffuse infiltration (eg, from carcinoma of breast, lung, or ovary; melanoma)
9. Neoplasm with liquefaction necrosis (hypoechoic) and infarcted nonliquefied areas (hyperechoic)

UNCOMMON

1. Biliary cystadenoma
2. Cholangiocarcinoma
3. Hemangioendothelioma; angiosarcoma
4. Hepatic adenoma, esp. after oral contraceptive use, or in glycogen storage disease, type I (von Gierke disease)
5. Hepatoblastoma
- *6. Peliosis hepatis

* Usually generalized or multifocal.

References

1. Eisenberg RL: *Clinical Imaging: An Atlas of Differential Diagnosis*. Gaithersburg, MD: Aspen Publ, 1992
2. Parulekar SG, Bree RL: Liver. In: McGahan JP, Goldberg BB (eds): *Diagnostic Ultrasound*. Philadelphia: Lippincott-Raven, 1997, chapter 21
3. Skolnick ML: *Guide to the Ultrasound Examination of the Abdomen*. New York: Springer-Verlag, 1986, p 93
4. Withers CW, Wilson SR: The liver. In: Rumack CM, Wilson SR, Charboneau JW (eds): *Diagnostic Ultrasound*. St. Louis: Mosby, 1998, pp 87–154

Gamut G178-S

HEPATIC PSEUDOLESION (US)

1. Diaphragmatic leaflets: peripheral echogenic pseudolesion may simulate hemangiomas
2. Falciform ligament: echogenic “mass” (pseudolesion) in left lobe
3. Focal fatty infiltration: echogenic pseudolesion may simulate metastases
4. Focal hepatic sparing in steatosis: hypoechoic pseudolesion often seen in porta hepatis
5. Gallbladder inflammation: hypoechoic hepatic pseudolesion in adjacent parenchyma
6. Ligamentum venosum: fibrous tissue attenuates sound, causing hypoechoic pseudolesion in caudate lobe
7. Perihepatic fat may invaginate liver causing hyper-echoic masses

Reference

1. Gore RM: Liver: Differential diagnosis. In Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1712–1727

Gamut G-179

INTRAHEPATIC ACOUSTIC SHADOWING (LINEAR VERSUS FOCAL) ON US

LINEAR OR BRANCHING SHADOWING

1. Air in biliary tract
2. Air in portal vein
3. Calculi in biliary ducts

FOCAL SHADOWING

1. Calcification (eg, primary or metastatic tumor; granuloma; healed abscess; aneurysm)
2. Foreign material (eg, surgical clips, drains, catheters, stents, sponges)

3. Gas (eg, in abscess; necrotic tumor; sequela of tumor embolization or biopsy)
4. Parasites in bile ducts (eg, *Clonorchis*; *Ascaris*; *Fasciola*) (may also show linear shadowing)
5. Parasitic disease in liver parenchyma (eg, hydatid disease; amebic abscess; pentastomiasis (*Armillifer* infection))
6. Refractile artifacts (eg, junction of vessels; gallbladder neck)

References

1. Gore RM: Liver: Differential diagnosis. In Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1712–1727
2. Parulekar SG, Bree RL: Liver. In: McGahan JP, Goldberg BB (eds): Diagnostic Ultrasound. Philadelphia: Lippincott-Raven, 1997, chapter 21
3. Withers CW, Wilson SR: The liver. In: Rumack CM, Wilson SR, Charboneau JW (eds): Diagnostic Ultrasound. St. Louis: Mosby, 1998, pp 87–154

Gamut G-180

FOCAL LOW DENSITY (DECREASED ATTENUATION) LIVER LESION (NONENHANCED CT)

COMMON

1. Abscess (pyogenic, amebic, or fungal)
2. Cyst (eg, congenital; epithelial; posttraumatic; hydatid)
3. Focal fatty infiltration (focal steatosis)
4. Focal nodular hyperplasia
5. Hemangioma
6. Hematoma; laceration (posttraumatic)
7. Hepatocellular adenoma
8. Hepatocellular carcinoma (hepatoma)
9. Hydatid disease (*Echinococcus granulosis* and *E. multilocularis*)
10. Lymphoma
11. Metastasis (esp. from carcinoma of lung, breast, colon, kidney)

(continued)

UNCOMMON

1. Angiosarcoma of liver (may have high density regions with hemorrhage)
2. Biliary cystadenoma, cystadenocarcinoma (near water density on CT)
3. Biloma
4. Caroli disease
5. Cholangiocarcinoma
6. Choledochal cyst
7. Fibrolamellar carcinoma
8. Fungus disease with multiple microabscesses (eg, *Candida*; *Cryptococcus*)
9. Hemangioendothelioma
10. Hepatoblastoma
11. Infarct
12. Mesenchymal hamartoma
13. Multiple bile duct hamartoma
14. Polycystic liver disease
15. Radiation therapy (fatty replacement)
16. Schistosomiasis
17. Von Hippel-Lindau disease

References

1. Mathieu D, Bruneton JN, Drouillard J, et al: Hepatic adenomas and focal nodular hyperplasia: dynamic CT study. *Radiology* 1986;160:53–58
2. Slone RM, Fisher AJ: Pocket Guide to Body CT Differential Diagnosis. New York: McGraw-Hill, 1999, pp 212–214

Gamut G-181**FOCAL LOW DENSITY LIVER LESION
(POSTCONTRAST CT)****COMMON**

1. Abscess (pyogenic, amebic, or fungal)
2. Cyst (eg, congenital; epithelial; posttraumatic; hydatid)
3. Focal fatty infiltration (focal steatosis)
4. Hemangioma, giant
5. Hematoma
6. Hydatid disease (*Echinococcus granulosus* and *E. multilocularis*)

7. Metastasis (esp. from carcinoma of lung, breast, colon, kidney)
8. Regenerating nodules

UNCOMMON

1. Biloma
2. Caroli disease
3. Cholangiocarcinoma (late enhancement)
4. Fungus disease with multiple microabscesses (eg, *Candida*; *Cryptococcus*)
5. Lymphangioma
6. Polycystic liver disease
7. Radiation therapy (fatty replacement)
8. Schistosomiasis
9. Von Hippel-Lindau disease

Reference

1. Slone RM, Fisher AJ: Pocket Guide to Body CT Differential Diagnosis. New York: McGraw-Hill, 1999, pp 215–216

Gamut G-182**FOCAL HIGH DENSITY LIVER LESION
(NONENHANCED CT)**

1. Granuloma (esp. tuberculoma)
2. Hematoma, subcapsular or intrahepatic (first few days)
3. Hepatic tumor (eg, hepatocellular carcinoma {hepatoma}; hepatoblastoma; hemangioendothelioma)
4. Hepatocellular adenoma with acute hemorrhage
5. Hydatid disease (old healed, calcified *E. granulosus* cyst; *Echinococcus multilocularis*—with calcification)
6. Metastasis with calcification (eg, from colon, rectum, stomach, ovary)

References

1. Bressler EL, et al: Hypervascular hepatic metastases: CT evaluation. *Radiology* 1987; 162:49–51
2. Chapman S, Nakielny R: Aids to Radiological Differential Diagnosis. (ed 2) London, Bailliere Tindall, 1990, p 235.

3. Ros PR, Rosado de Christenson ML, Buetow PC, et al: Image interpretation session: 1997. *Radiographics* 1998;18:199–202
4. Scatarige JC, Fishman EK, Saksouk FA, Siegelman SS: Computed tomography of calcified liver masses. *J Comput Assist Tomogr* 1983; 7:83–89

Gamut G-184-S

MRI CHARACTERISTICS OF VARIOUS LIVER LESIONS

	T1W	T2W	Gadolinium
1. Adenoma	Hyperintense	Hypointense	
2. Focal nodular hyperplasia			
central scar	Hypointense	Hyperintense+	+
margins	Isointense	Hyperintense	+/-
3. Hemangioma	Hypointense	Hyperintense ++	+
4. Hemochromatosis/ Iron deposition	Hypointense	Hypointense++	(like CT)
5. Hepatocellular carcinoma	Hypo-, iso-, or hyperintense (due to fat degeneration)	Hyperintense	+
6. Metastasis	Hypointense	Hyperintense	+
7. Regenerating nodule	Hypo- or insointense	Hypointense	

References

- Chapman S, Nakielny R: *Aids to Radiological Differential Diagnosis*. (ed 3) London: Saunders, 1995, p 279
- Choi BI, Takayasu K, Han MC: Small hepatocellular carcinomas and associated nodular lesions of the liver: pathology, pathogenesis and imaging findings. *AJR* 1993;160:1177–1187
- Vilgrain V, Flejou J-F, Arrive L: Focal nodular hyperplasia of the liver: MR imaging and pathologic correlation in 37 patients. *Radiology* 1992;184:699–703

Gamut G-185

LIVER LESIONS WITH CIRCUMFERENTIAL RIM ON MRI

HYPOINTENSE RIM ON T1-WEIGHTED IMAGE

- Abscess, pyogenic or amebic (concentric rims; rim of collagen)
- Hematoma, chronic (hemosiderin)
- Hepatocellular carcinoma (hepatoma) (pseudo-capsular rim is thin)
- Hydatid cyst (thick, homogeneous rim; no perilesional edema)

HYPOINTENSE RIM ON T2-WEIGHTED IMAGE

- Abscess, pyogenic or amebic (one or two concentric rings of mixed signal intensity)
- Hematoma, subacute to chronic (white rim also seen on T1-weighted images)
- Hydatid cyst (thick, homogeneous rim; no perilesional edema; high signal cyst contents on T2)
- Metastasis (peritumoral edema with double ring pattern)

NO RIM

- Cavernous hemangioma
- Cyst, simple

(continued)

3. Focal nodular hyperplasia
4. Hepatocellular adenoma

References

1. Elizondo G, Weissleder R, Stark DD, et al: Amebic liver abscess—diagnosis and treatment evaluation with MR imaging. *Radiology* 1987;165:795–800
2. Gore RM: Liver: Differential diagnosis. In Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1712–1727
3. Hahn PF, Stark DD, Saini S, et al: The differential diagnosis of ringed hepatic lesions in MR imaging. *AJR* 1990;154:287–290
4. Hoff FL, Aisen AM, Walden ME, Glazer GM: MR imaging in hydatid disease of the liver. *Gastrointest Radiol* 1987;12:39–42
5. Rummeny E, Weissleder R, Stark DD, et al: Primary liver tumors: diagnosis by MR imaging. *AJR* 1989;152:63–72
6. Wittenberg J, Stark DD, Forman BH, et al: Differentiation of hepatic metastases from hepatic hemangiomas and cysts by using MR imaging. *AJR* 1988;151:79–84

10. Proteinaceous material in dependent portion of abscess or hematoma
11. [Pulsation artifact from aorta]

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Chapman S, Nakielny R: *Aids to Radiological Differential Diagnosis*. (ed 3) London:WB Saunders, 1995, p 280
2. Gore RM: Liver: Differential diagnosis. In Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1712–1727
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4. Mathieu D, Paret M, Mahfouz AE, et al.: Hyperintense benign liver lesions on spin-echo T1-weighted MR images: pathologic correlations. *Abdom Imaging* 1997;22:410–417
5. Mergo PJ, Ros PR: Benign lesions of the liver. *Radiol Clin North Am* 1998;36:319–332

Gamut G-186**FOCAL HIGH SIGNAL INTENSITY LIVER LESION ON T1-WEIGHTED MR IMAGES**

1. [Contrast agent (eg, gadolinium; lipiodol)]
2. Dysplastic nodule(s)
3. Fatty lesion (eg, lipoma; angiomyolipoma; focal fatty deposit; surgical defect packed with omental fat; occasional hepatoma with fatty degeneration)
4. Focal nodular hyperplasia
5. Hematoma or hemorrhage, acute (eg, trauma; blood dyscrasia; anticoagulants)
6. Hepatocellular adenoma
7. Hepatocellular carcinoma (hepatoma)
8. Metastasis (esp. melanoma)
9. Normal signal intensity liver surrounded by low signal intensity liver (eg, hemochromatosis; hemosiderosis; cirrhosis with regenerating nodules; edema)

Gamut G-187**DAMPING OF HEPATIC VEIN DOPPLER WAVEFORM (US)**

1. Budd-Chiari syndrome
2. Cirrhosis
3. Extrinsic compression of hepatic veins
4. Passive hepatic congestion
5. Various parenchymal abnormalities of liver

Reference

1. Gore RM, Marn CS, Baron RL: Vascular disorders of the liver and splanchnic circulation. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1639–1668

Gamut G-188

HEPATIC VEIN DILATATION

COMMON

1. Constrictive pericarditis
2. Inferior vena cava obstruction or thrombus
3. Normal with Valsalva maneuver in young patient
4. Right-sided congestive heart failure
5. Thrombus in hepatic vein
6. Tricuspid atresia or stenosis

UNCOMMON

1. Right atrial tumor

Reference

1. Gore RM, Marn CS, Baron RL: Vascular disorders of the liver and splanchnic circulation. In: Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1639–1668

3. Coagulopathy (incl. polycythemia vera; sickle cell disease)
4. Iatrogenic (eg, catheterization; vena cavography)
5. Infection of liver (eg, aspergillosis)
6. Intravenous web
7. Metastasis, hepatic
8. Neoplastic compression (eg, carcinoma of pancreas; retroperitoneal sarcoma; lymphoma)
9. Oral contraceptive use
10. Parasitic disease (eg, amebic liver abscess; schistosomiasis; hydatid disease)
11. Postoperative (eg, splenectomy)
12. Pregnancy; postpartum
13. Trauma

References

1. Deutsch V, Rosenthal T, Adar R, et al: Budd-Chiari syndrome. *AJR* 1972;116:430–439
2. Gore RM, Marn CS, Baron RL: Vascular disorders of the liver and splanchnic circulation. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1639–1668
3. Henderson JM, Boyer TD: Budd-Chiari syndrome. In: Zakim D, Boyer TD: Hepatology. (ed 3) Philadelphia: WB Saunders, 1996
4. Young RC: The Budd-Chiari syndrome caused by aspergillus. *Arch Intern Med* 1969;124:754–757

Gamut G-189

HEPATIC VEIN THROMBOEMBOLISM OR OBSTRUCTION (BUDD-CHIARI S.) (INCL. OBSTRUCTION OF UPPER INFERIOR VENA CAVA)

COMMON

1. Cirrhosis
2. Heart failure
3. Idiopathic
4. Neoplasm invading inferior vena cava (esp. renal cell carcinoma; hepatocellular carcinoma)
5. Thrombophlebitis

UNCOMMON

1. Alkaloid ingestion (bush tea disease)
2. Behçet syndrome

Gamut G-190

PORTAL VEIN THROMBOSIS OR OBSTRUCTION*

COMMON

1. Cirrhosis plus portal hypertension
2. Extrinsic compression or invasion by carcinoma of pancreas or stomach; lymphadenopathy of porta hepatis
3. Hepatocellular carcinoma (hepatoma) or cholangiocarcinoma (tumor thrombus or invasion)
4. Hypercoagulable state (eg, blood dyscrasia; clotting disorder; polycythemia vera; protein c or s deficiency; paroxysmal nocturnal hemoglobinuria)

(continued)

5. Iatrogenic (eg, TIPS; umbilical venous catheterization; estrogen therapy; oral contraceptive use)
6. Idiopathic
7. Neonatal sepsis; perinatal omphalitis
8. Pancreatitis
9. Postoperative (esp. postsplenectomy)
10. Schistosomiasis (periportal fibrosis causing presinoidal intrahepatic obstruction)
11. Sclerosing cholangitis

UNCOMMON

1. Behçet S.
2. [Budd-Chiari S. causing reversal of portal venous blood return]
3. Dehydration, severe
4. Liver transplantation
5. Portal phlebitis (from abdominal infection)
6. Postpartum
7. Trauma

* May result in cavernous transformation of portal vein.

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Dähnert W; Radiology Review Manual. (ed 4) Baltimore: Williams & Wilkins, 1999, p 610
2. Gore RM, Marn CS, Baron RL: Vascular disorders of the liver and splanchnic circulation. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1639–1668
3. Mitchel DG, Nazarian LN: Hepatic vascular disease: CT and MRI. *Semin US, CT, MR* 1995;16:49–68

3. Pancreatic disease with portal obstruction (eg, neoplasm; pancreatitis)
4. Portal vein thrombosis
5. Schistosomiasis (periportal fibrosis causing presinoidal intrahepatic obstruction)
6. Splenic vein thrombosis

UNCOMMON

1. Alagille S. (arteriohepatic S.)
2. Alpha 1-antitrypsin deficiency
3. Banti S.
4. Budd-Chiari S.
5. Caroli disease
6. [Cavernous transformation of portal vein]
7. Cholesterol ester storage disease
8. Cruveilhier-Baumgarten S.
9. Cystic fibrosis (mucoviscidosis)
10. Fatty change in liver (steatosis) (See G-144)
11. Gaucher disease
12. Glycogen storage disease, types III and IV
13. Hemochromatosis; multiple transfusion effect
14. Hepatic fibrosis-renal cystic disease
15. Increased portal flow (eg, splenomegaly; splenic, mesenteric, or hepatic arteriovenous fistula)
16. Nodular regenerative hyperplasia
17. Osler-Weber-Rendu S.
18. Polycythemia vera
19. Retroperitoneal inflammatory disease
20. Tropical splenomegaly S.
21. Wilson disease

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Baron RL, Gore RM: Diffuse liver disease. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1590–1638

Gamut G-191**PORTAL HYPERTENSION****COMMON**

1. Cardiac (eg, heart failure; constrictive pericarditis)
2. Cirrhosis (incl. hepatitis; liver atrophy)

2. Sutton D, Young JWR: A Short Textbook of Clinical Imaging. London: Springer-Verlag, 1990, p 252
3. Taybi H, Lachman RS: Radiology of Syndromes, Metabolic Disorders, and Skeletal Dysplasias. (ed 4) St. Louis: Mosby-Year Book, 1996, pp 973–974

Gamut G-192

GAS IN THE PORTAL VEINS

COMMON

1. Abscess, abdominal_g or pelvic (eg, gas abscess of pancreas; diverticulitis)
2. [Gas in the biliary tract]
3. Iatrogenic (eg, catheterization of umbilical or mesenteric artery or vein; percutaneous abscess drainage; hydrogen peroxide enema or gastric lavage; post-hepatic artery embolization)
4. Mechanical bowel obstruction with ischemia (incl. closed loop obstruction)
5. Mesenteric ischemia or occlusion and bowel infarction (See G-69)
6. Necrotizing enterocolitis

UNCOMMON

1. Acute gastric dilatation
2. Carcinoma of colon, necrotic
3. Corrosive ingestion causing gastritis
4. Diabetic acidosis or coma
5. Emphysematous cholecystitis
6. Erythroblastosis fetalis
7. Gastric emphysema
8. Hemorrhagic pancreatitis

9. Neonatal gastroenteritis
10. Peptic ulcer eroding into mesenteric vein
11. Postcolonoscopy or post-air contrast barium enema in inflammatory bowel disease (eg, diverticulitis; Crohn's disease; ulcerative colitis;)
12. Postoperative (eg, bowel resection; operation for congenital bowel obstruction)
13. Pseudomembranous colitis
14. Sepsis
15. Toxic megacolon

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Bach MC, Anderson LG, Martin TA: Gas in the hepatic portal venous system. A diagnostic clue to an occult intra-abdominal abscess. *Arch Intern Med* 1982; 142:1725–1726
2. Benson MB: Adult survival with intrahepatic portal venous gas secondary to acute gastric dilatation, with a review of portal venous gas. *Clin Radiol* 1985; 36:441–443
3. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 894–899
4. Gore RM: Liver: differential diagnosis. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1712–1726
5. Kirks DR, O'Byrne SA: The value of the lateral abdominal roentgenogram in the diagnosis of neonatal hepatic portal venous gas (HPVG). *AJR* 1974;122:153–158
6. Merritt CRB, Goldsmith JP, Shary MJ: Sonographic detection of portal venous gas in infants with NEC. *Am J Roentgenol* 1984;143:1059
7. Mindelzun R, McCort JJ: Hepatic and perihepatic radiolucencies. *Radiol Clin North Am* 1980; 18:221–238
8. Sisk PB: Gas in the portal venous system. *Radiology* 1961;77:103–106
9. Wiot JF, Felson B: Gas in the portal venous system. *AJR* 1961;86:920–929

Gamut G-193

PERIORTAL HYPOECHOGENICITY ON US/PERIORTAL LOW DENSITY ON CT

1. AIDS-related cholangitis
2. Cholangitis
3. Congestive hepatomegaly
4. Liver transplant rejection (occasionally seen in non-rejecting liver transplant)
5. Malignant lymphatic obstruction
6. Schistosomiasis mansoni
7. Trauma, blunt abdominal
8. Viral hepatitis

References

1. Chapman S, Nakielny R: Aids to Radiological Differential Diagnosis. (ed 3) London: WB Saunders, 1995, p 272
2. Fataar S, Bassiony H, Satyanath S, et al: CT of hepatic Schistosomiasis mansoni. AJR 1985;145:63–66
3. Kaplan SB, Sumkin JH, Campbell WL, et al: Periportal low-attenuation areas on CT: value as evidence of liver transplant rejection. AJR 1989;152:285–287
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5. Siegel MJ, Herman TE: Periportal low attenuation at CT in childhood. Radiology 1992;183:685–688
6. Wechsler RJ, Munoz SJ, Needleman L, et al: The periportal collar: a CT sign of liver transplant rejection. Radiology 1987;165:57–60

Gamut G-194

PROMINENT PERIORTAL ECHOES (STARRY SKY LIVER) IN ADULTS (US)

COMMON

1. Air in biliary tree (pneumobilia)
2. Cholangiocarcinoma
3. Cholangitis
4. Cholecystitis, acute or chronic

5. Hepatitis
6. Hepatocellular carcinoma (hepatoma)
7. Recurrent pyogenic cholangitis (Oriental cholangio-hepatitis)
8. Sclerosing cholangitis

UNCOMMON

1. Cystic fibrosis (mucoviscidosis)
2. Embolism of oily contrast medium after lymphangiogram
3. Infectious mononucleosis
4. Kaposi sarcoma of liver
5. Lymphoma; Burkitt lymphoma; leukemia
6. Periportal fibrosis (incl. schistosomiasis)
7. Right heart failure
8. Toxic shock syndrome

References

1. Gore RM: Liver: Differential diagnosis. In Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1712–1727
2. Williamson MR: Abdominal ultrasound. In: Essentials of Ultrasound. Philadelphia: WB Saunders, 1996, p 81

Gamut G-195

PROMINENT PERIORTAL ECHOES IN NEONATES ON ULTRASOUND

COMMON

1. Acute hepatitis
2. Biliary atresia
3. [Idiopathic; transient (disappears within a year)]
4. Idiopathic neonatal jaundice

UNCOMMON

1. [Air in portal venous system]
2. Alpha-1-antitrypsin deficiency
3. Cytomegalovirus infection

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

Reference

1. Gore RM: Liver: Differential diagnosis. In Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1712–1727

Gamut G-196**INCREASED PERIORTAL SIGNAL INTENSITY ON MRI**

1. Acute hepatitis
2. AIDS-related cholangitis
3. Cholangiocarcinoma
4. Cholangitis
5. Cirrhosis
6. Obstructive jaundice

Reference

1. Gore RM: Liver: Differential diagnosis. In Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1712–1727

Gamut G-197**SPLENOMEGALY:
A CLASSIFICATION (See G-198)****BLOOD DYSCRASIA**

1. Anemia_g (esp. hemolytic, incl. sickle cell disease; thalassemia; hereditary spherocytosis; pyruvate kinase deficiency)
2. Dysgammaglobulinemia
3. Extramedullary hematopoiesis
4. Hemochromatosis
5. Leukemia (esp. chronic myelogenous)
6. Myelofibrosis (hypersplenism)
7. Osteopetrosis
8. Polycythemia vera

9. Thrombotic thrombocytopenic purpura
10. Waldenström macroglobulinemia

INFECTION

1. Bacterial (eg, miliary tuberculosis; tularemia; subacute bacterial endocarditis; septicemia; typhoid fever; brucellosis; syphilis; pyogenic abscess; tropical splenic abscess)
2. Chronic granulomatous disease of childhood
3. Fungal (esp. histoplasmosis; candidiasis)
4. Parasitic disease (eg, malaria; schistosomiasis; hydatid disease; kala-azar {leishmaniasis})
5. Rickettsial (eg, typhus)
6. Viral (eg, viral hepatitis; AIDS; infectious mononucleosis; cytomegalovirus infection; herpes simplex; rubella)

NEOPLASM

1. Benign neoplasm (eg, fibroma; hamartoma)
2. Cyst, epidermoid (simple, primary); dermoid; post-traumatic; hydatid
3. Hemangioma; cystic lymphangioma
4. Lymphoma_g
5. Metastases (esp. from carcinoma of breast, lung, colon, ovary; melanoma)
6. Sarcoma (esp. angiosarcoma)

PORTAL HYPERTENSION

1. Cirrhosis, nutritional or alcoholic
2. Congestive splenomegaly (Banti syndrome)
3. Schistosomiasis
4. Splenic or portal vein obstruction (eg, thrombosis; pancreatic neoplasm; lymphadenopathy)

STORAGE DISEASES

1. Gaucher disease
2. Glycogen storage disease
3. Langerhans cell histiocytosis_g
4. Mucopolysaccharidoses (incl. gargoylism); mucopolipidoses (See J-4)
5. Niemann-Pick disease

(continued)

TRAUMA

1. Hematoma (subcapsular; intrasplenic; perisplenic)
2. Hemorrhagic pseudocyst

OTHER

1. Alpha-1-antitrypsin deficiency
2. Amyloidosis
3. Congenital syndromes (See G-198)
4. Connective tissue diseases_g (collagen vascular diseases) (esp. lupus erythematosus)
5. Cystic fibrosis (mucoviscidosis)
6. Diabetes
7. Heart failure
8. Hemodialysis
9. Infarction
10. Rheumatoid arthritis (Felty S.); juvenile rheumatoid arthritis; juvenile chronic arthritis (Still's disease)
11. Sarcoidosis
12. Tropical splenomegaly

References

1. Ayers AB: The spleen. In: Grainger RG, Allison DJ: Diagnostic Radiology. An Anglo-American Textbook of Imaging. (ed 2) Edinburgh: Churchill Livingstone, 1992, vol 3, p 2408
2. Dähnert W: Radiology Review Manual. (ed 4) Baltimore, Williams & Wilkins, 1999, p 556
3. Gore RM: Spleen: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1925–1928
4. Siegel MJ: Pediatric Body CT. Philadelphia: Lippincott Williams & Wilkins, 1999
5. Teplick JG, Haskin ME: Roentgenographic Diagnosis. (ed 3) Philadelphia: WB Saunders, 1976

Gamut G-198**CONGENITAL SYNDROMES
WITH SPLENOMEGALY****COMMON**

1. Anemia_g (eg, sickle cell disease; thalassemia; spherocytosis; pyruvate kinase deficiency)
2. Chronic granulomatous disease of childhood
3. Dysgammaglobulinemia
4. Fetal infection (eg, rubella; cytomegalovirus; herpes simplex)
5. Gaucher disease; Niemann-Pick disease
6. Glycogen storage disease, type I (von Gierke disease) and type III
7. Hemochromatosis
8. Langerhans cell histiocytosis_g
9. Mucopolysaccharidoses; mucolipidoses; GM₁ gangliosidosis (See J-4)

UNCOMMON

1. Aase S.
2. Alpha-1-antitrypsin deficiency
3. Aspartylglucosaminuria
4. Beckwith-Wiedemann S.
5. Chédiak-Higashi S.
6. Cholesterol ester storage disease
7. Cogan S.
8. Cruveilhier-Baumgarten S.
9. Cystinosis
10. Ethanolaminosis
11. Farber disease (lipogranulomatosis)
12. Felty S.
13. Fucosidosis; galactosialidosis; mannosidosis
14. Hepatic fibrosis-renal cystic disease
15. Hyperlipoproteinemia
16. Infantile multisystem inflammatory disease (NOMID)
17. Lipoatrophic diabetes
18. Osteopetrosis
19. POEMS S.
20. Sea-blue histiocyte S.

21. Tyrosinemia, type I
22. Vaquez-Osler S.
23. Wilson disease
24. Wolman disease

Reference

1. Taybi H, Lachman RS: Radiology of Syndromes, Metabolic Disorders, and Skeletal Dysplasias. (ed 4) St. Louis: Mosby-Year Book, 1996, p 961

Gamut G-199

SPLENOMEGALY WITH NORMAL ECHOGENICITY (US)

1. Congestion from portal hypertension
2. Felty syndrome
3. Hemolysis
4. Hereditary spherocytosis
5. Infection
6. Juvenile chronic arthritis (Still's disease) (eg, juvenile rheumatoid arthritis)
7. Myelofibrosis
8. Leukemia, myelogenous
9. Parasitic disease (eg, malaria; leishmaniasis {kala-azar}; schistosomiasis)
10. Polycythemia vera
11. Sickle cell disease (early)
12. Wilson disease

Reference

1. Gore RM: Spleen: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1925–1928

Gamut G-200

SPLENOMEGALY WITH DIFFUSE HYPOECHOIC PATTERN (US)

1. Congestion from portal hypertension
2. Leukemia (esp. chronic lymphocytic)
3. Lymphoma_g
4. Multiple myeloma
5. Noncaseating granulomatous disease

Reference

1. Gore RM: Spleen: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1925–1928

Gamut G-201

SPLENOMEGALY WITH DIFFUSE HYPERECHOIC PATTERN (US)

COMMON

1. Hematoma
2. Infection (eg, malaria; brucellosis; tuberculosis—esp. miliary)
3. Leukemia (acute lymphocytic, chronic lymphocytic, or myelogenous after chemotherapy or radiation therapy)
4. Lymphoma_g
5. Myelofibrosis (hypersplenism)

UNCOMMON

1. Dysgammaglobulinemia
2. Hereditary spherocytosis
3. Malignant neoplasm (esp. angiosarcoma)
4. Metastasis
5. Polycythemia
6. Portal vein thrombosis
7. Sarcoidosis

(continued)

References

1. Gore RM: Spleen: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1925–1928
2. Mathieson JR, Cooperberg PL: The Spleen. In Rumack CM, Wilson SR, Charboneau JW (eds): Diagnostic Ultrasound. (ed 2) St. Louis: Mosby, 1998, pp 155–174
3. Siler J, Hunter TB, Weiss J, et al: Increased echogenicity of the spleen in benign and malignant disease. AJR 1980; 134:1011–1014

Gamut G-202

SMALL OR NONVISUALIZED SPLEEN

1. Asplenia S.; polysplenia S.
2. Atrophy
3. Hereditary hypoplasia
4. Inflammatory bowel disease
5. Postinfarction (esp. sickle cell disease)
6. Postradiation therapy
7. Sickle cell disease
8. Traumatic fragmentation
9. Wandering spleen

References

1. Dähnert W: Radiology Review Manual. (ed 4) Baltimore, Williams & Wilkins, 1999, p 556
2. Gore RM: Spleen: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1925–1928

Gamut G-203

SPLENIC CALCIFICATION—SOLITARY

COMMON

1. Splenic artery aneurysm
2. Splenic artery atherosclerosis

UNCOMMON

1. Abscess, healed (eg, pyogenic; *Candida*; tuberculous)
2. Capsular ascites (“zuckerguss” spleen)
3. Cyst (eg, congenital; dermoid; epidermoid; hydatid; posttraumatic)
4. Granuloma (esp. tuberculosis)
5. Hamartoma
6. Hemangioma; phlebolith
7. Hematoma, healed
8. Infarct, healed
9. Metastasis

References

1. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 991–997
2. Gore RM: Spleen: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1925–1928

Gamut G-204

SPLENIC CALCIFICATIONS—MULTIPLE

COMMON

1. Granulomas, healed (eg, tuberculosis; histoplasmosis)
2. Phleboliths; hemangioma
3. Splenic artery

UNCOMMON

1. AIDS (healed *Pneumocystis carinii* infection)
2. Brucellosis

3. Hematomas
4. Hemochromatosis
5. Hemosiderosis
6. Infarcts
7. Metastases
8. Parasitic disease, esp. pentastomiasis (*Armillifer* infection); hydatid disease
9. Sarcoidosis
10. Sickle cell disease (stippled)
11. [Thorotrast residual]

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Baker SR, Cho KC: The Abdominal Plain Film with Correlative Imaging. Norwalk, CT: Appleton & Lange, 1998
2. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 991–997
3. Gore RM: Spleen: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1925–1928

Gamut G-205

SOLITARY LESION OF THE SPLEEN (US, CT, MRI)

COMMON

1. Aneurysm of splenic artery
2. Cyst (congenital; epidermoid; dermoid or teratoma; hydatid; traumatic)
3. Hemangioma, cavernous or capillary
4. Hematoma (posttraumatic)
5. Infarct (esp. sickle cell disease)
6. Lymphoma; leukemia

UNCOMMON

1. Abscess (pyogenic; *Candida*; *Pneumocystis carinii*)
2. Arteriovenous malformation
3. Cystic lymphangioma
4. Hamartoma
5. Hemangiosarcoma

6. Metastasis (esp. from carcinoma of breast, lung, colon, ovary; melanoma)
7. Peliosis
8. Pseudocyst (secondary to pancreatitis)
9. Sarcoidosis
10. Splenic sequestration crisis

References

1. Dachman AH, Ros PR, Murari PJ, et al: Nonparasitic splenic cysts: A report of 52 cases with radiologic-pathologic correlation. *AJR* 1986;147:537–542
2. Guermazi A, Brice P, deKerviler E, et al: Extranodal Hodgkin disease: spectrum of disease. *RadioGraphics* 2001; 21:161–179
3. Mathieson JR, Cooperberg PL: Chapter 5. In: Rumack CM, Wilson SR, Charboneau JW (eds): *Diagnostic Ultrasound*. St. Louis: Mosby, 1998, pp 162–171
4. Reddy SC: Hemangiosarcoma of the spleen: Helical computed tomography features. *South Med J* 2000;93:825–827
5. Slone RM, Fisher AJ: *Pocket Guide to Body CT Differential Diagnosis*. New York: McGraw-Hill, 1999, pp 237–238
6. Solviati L, Bossi MC, Bellotti E, et al: Focal lesions in the spleen: Sonographic patterns and guided biopsy. *AJR* 1983; 140:59–65
7. Urrutia M, Mergo PJ, Ros LH, Torres GM, Ros PR: Cystic masses of the spleen: radiologic-pathologic correlation. *RadioGraphics* 1996;16:107–129

Gamut G-206

FOCAL CYSTIC OR LOW DENSITY SPLENIC LESION (CT, MRI—USUALLY HYPOECHOIC ON US)

COMMON

1. Abscess (pyogenic; *Candida*; *Pneumocystis carinii*)
2. Aneurysm of splenic artery
3. Cyst (congenital; epidermoid; dermoid or teratoma; hydatid; posttraumatic)
4. Hematoma
5. Infarction

UNCOMMON

1. Cystic lymphangioma
2. Hamartoma
3. Hemangioma, cavernous or capillary

(continued)

4. Hemangiosarcoma
5. Metastasis
6. Peliosis
7. Pseudocyst (secondary to pancreatitis)

References

1. Dachman AH, Ros PR, Murari PJ, et al: Nonparasitic splenic cysts: A report of 52 cases with radiologic-pathologic correlation. *AJR* 1986;147:537–542
2. Mathieson JR, Cooperberg PL: Chapter 5. In: Rumack CM, Wilson SR, Charboneau JW (eds): *Diagnostic Ultrasound*. St. Louis: Mosby, 1998, pp 162–171
3. Solviati L, Bossi MC, Bellotti E, et al: Focal lesions in the spleen: Sonographic patterns and guided biopsy. *AJR* 1983;140:59–65
4. Urrutia M, Mergo PJ, Ros LH, Torres GM, Ros PR: Cystic masses of the spleen: radiologic-pathologic correlation. *RadioGraphics* 1996;16:107–129

Gamut G-207**FOCAL HYPERECHOIC SPLENIC LESION (US)****COMMON**

1. Hematoma
2. Infarct
3. Lymphoma_g

UNCOMMON

1. Abscess with gas bubbles
2. Hemangioma
3. Hemangiosarcoma
4. Hydatid cyst with “hydatid sand”
5. Metastasis
6. Plasmacytoma
7. Simple cyst with cholesterol crystals

References

1. Gore RM: Spleen: Differential diagnosis. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1925–1928

2. Mittelstaedt CA, Partain CL: Ultrasonic-pathologic classification of splenic abnormalities: Gray-scale patterns. *Radiology* 1980;134:697–705
3. Solviati L, Bossi MC, Bellotti E, et al: Focal lesions in the spleen: Sonographic patterns and guided biopsy. *AJR* 1983;140:59–65

Gamut G-208**DIFFUSE INCREASED SPLENIC DENSITY ON CT**

1. Fanconi anemia
2. Hemochromatosis
3. Hemosiderosis
4. Lymphoma_g (treated)
5. Sickle cell disease
6. Thorotrast residual

References

1. Kawashima A, Urban BA, Fishman EK: Benign lesions of the spleen. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp. 1879–1904
2. Gore RM: Spleen: Differential diagnosis. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp. 1925–1929

Gamut G-209**MULTIPLE SPLENIC HYPINTENSITIES ON MRI*****COMMON**

- *1. Abscesses (pyogenic)
- *2. Cysts (eg, congenital; hydatid; posttraumatic)
- 3. Gamna-Gandy bodies
- 4. Granulomas, calcified
- *5. Hemangiomas
- *6. Hematomas
- *7. Infarcts

*8. Metastases (incl. hemorrhagic choriocarcinoma)

*9. Lymphoma_g

UNCOMMON

1. Amyloidosis
2. Flow void in arteriovenous malformation or Osler-Weber-Rendu S.
3. Fungemia with multifocal microabscess formation
- *4. Peliosis
5. Sarcoidosis

* On T1-weighted images.

References

1. Gore RM: Spleen: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1925–1928
2. Kelekis NL, Burdeny DA, Semelka RC: Spleen. In: Semelka RC, Ascher SM, Reinhold C (eds): MRI of the Abdomen and Pelvis. New York: Wiley-Liss, 1997, pp 239–256

Gamut G-210

MULTIPLE SPLENIC HYPERINTENSITIES ON T2-WEIGHTED MR IMAGES

COMMON

1. Abscesses (pyogenic)
2. Cysts (eg, congenital; hydatid; posttraumatic)
3. Hemangiomas
4. Hematomas
5. Infarcts
6. Metastases

UNCOMMON

1. Fungemia with multifocal microabscess formation
2. Lymphangioma (T1 and T2-WI)
3. Peliosis

References

1. Gore RM: Spleen: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1925–1928
2. Kelekis NL, Burdeny DA, Semelka RC: Spleen. In: Semelka RC, Ascher SM, Reinhold C (eds): MRI of the Abdomen and Pelvis. New York: Wiley-Liss, 1997, pp 239–256

Gamut G-211

ABNORMALITY ON SPLENIC ARTERIOGRAPHY

COMMON

1. Accessory spleen
2. Anomalous origin of splenic or celiac artery
3. Splenic artery arteriosclerosis; aneurysm; fibromuscular hyperplasia (incl. stenosis; occlusion)
4. Splenic vein abnormality (See G-212)

UNCOMMON

1. Arteriovenous fistula; angiomatous malformation
2. Avascular mass
 - a. Abscess
 - b. Cyst (eg, dermoid; epidermoid; hydatid; post-traumatic)
 - c. Infarction
 - d. Lymphoma_g
 - e. Metastasis
3. Displacement by extrinsic mass
4. Splenic artery encasement (eg, pancreatic carcinoma)
5. Splenic laceration; pericapsular hematoma
6. Thromboembolism
7. Vascular mass (eg, metastasis, esp. melanoma; hemangiosarcoma of spleen)

Gamut G-212

SPLENIC VEIN OBSTRUCTION (US, POSTCONTRAST CT, MRI, OR ANGIO)

COMMON

1. Lymphadenopathy (eg, lymphoma_g; metastases)
2. Neoplasm (eg, pancreatic; retroperitoneal sarcoma)
3. Pancreatitis (incl. pancreatic pseudocyst)
4. Thromboembolism of portal or splenic vein (esp. portal hypertension; polycythemia vera; heart failure)

UNCOMMON

1. Aneurysm of splenic artery or aorta
2. Postoperative
3. Retroperitoneal inflammation
4. Schistosomiasis
5. Trauma; hematoma

References

1. Gore RM, Marn CS, Baron RL: Vascular disorders of the liver and splanchnic circulation. In Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1639–1668
2. Rosch J, Dotter CT: Extrahepatic portal obstruction in childhood and its angiographic diagnosis. *AJR* 1971;112:143–149
3. Yale CE, Crummy AB: Splenic vein thrombosis and bleeding esophageal varices. *JAMA* 1971; 217:317–320

Gamut G-213

SOLID PANCREATIC LESION (US, CT, MRI)

COMMON

1. Adenocarcinoma
2. Pancreatitis, focal

UNCOMMON

1. [Accessory spleen]
2. Aneurysm, thrombosed
3. Annular pancreas; pancreatic divisum
4. Hemangioma
5. Islet cell tumor (eg, insulinoma; gastrinoma; glucagonoma; somatostatinoma; VIPoma; non-functioning)
6. Lipoma
7. [Lymphadenopathy in celiac axis (eg, metastatic; tuberculous; Castleman disease)]
8. Lymphoma_g
9. Metastasis (esp. from carcinoma of breast, lung, stomach, gallbladder, kidney; melanoma)
10. Pancreaticoblastoma
11. Sarcoma
12. Serous cystadenoma (microcystic adenoma)
13. Solid and papillary epithelial neoplasm

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Cheszmar JL: Pancreatic neoplasms. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1796–1811
2. Clark LR, Jaffe MH, Choyke PL, et al: Pancreatic imaging. *Radiol Clin North Am* 1985;23:489–501
3. Helmberger TK, Ros LH, Baretton G, et al: Solid pancreatic lesions. *Eur Radiol* 1999;9(suppl 1):s195–s205
4. Sato M, Ishida H, Konno K, et al: Pancreatic metastasis: sonographic findings. *Abdom Imaging* 2001;26:72–75
5. Sato M, Ishida H, Konno K, et al: Pancreatic uncinata carcinoma: sonographic findings. *Abdom Imaging* 2001;26:64–68
6. Scatarige JC, Horton KM, Sheth S, et al: Pancreatic parenchymal metastases: observations on helical CT. *AJR* 2001;176:695–701
7. Slone RM, Fisher AJ: *Pocket Guide to Body CT Differential Diagnosis*. New York: McGraw-Hill, 1999, pp 237–238

Gamut G-214

CYSTIC OR LOW DENSITY PANCREATIC LESION (CT, MRI—HYPOECHOIC ON US)

COMMON

1. Acute pancreatitis, focal
2. Chronic pancreatitis (inhomogeneous, often hyper-echoic)
3. Fluid collection, peripancreatic
4. Mucinous cystadenoma or cystadenocarcinoma (macrocytic adenoma)
5. Pancreatic duct dilatation, ectasia, or obstruction (from carcinoma; calculus; stricture)
6. Pancreatic ductal adenocarcinoma (eg, duct ectatic mucinous adenocarcinoma; papillary intraductal adenocarcinoma; anaplastic adenocarcinoma)
7. Pseudocyst of pancreas
8. Serous cystadenoma (microcystic adenoma)

UNCOMMON

1. Abscess_g
2. [Aneurysm or pseudoaneurysm of aorta, pancreaticoduodenal arcade, or splenic artery]
3. [Biloma]
4. [Cystic lymphangioma, retroperitoneal]
5. Cystic teratoma
6. Cysts, congenital (in adult polycystic kidney disease; Von Hippel-Lindau disease; or cystic fibrosis)
7. [Duodenal cyst or diverticulum]
8. Hemangioma
9. Hematoma
10. Hydatid cyst
11. Islet cell tumor or insulinoma, cystic
12. Liquefaction necrosis of pancreas
13. Lymphoma_g
14. Metastasis, cystic (eg, renal cell carcinoma; hepatoma; carcinoma of lung, breast, or ovary; melanoma)
15. Posttraumatic cyst

16. Solid and papillary epithelial neoplasm
17. [Varix of left renal vein]

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Curry CA, Eng J, Horton KM, et al: CT of primary cystic pancreatic neoplasms: can CT be used for patient triage and treatment? *AJR* 2000;175:99–103
2. Kobayashi T, Kawabe A, Uenoyama S, et al: Macrocytic serous cystadenoma of the pancreas: case report. *Abdom Imaging* 2001;26:69–71
3. Ros PR, Hamrick-Turner JE, Chiechi MV, et al: Cystic pancreatic mass. *Radiographics* 1992;12:673–686
4. Ros LH, Helmberger T, Ros PR: Cystic pancreatic lesions. *Eur Radiol* 1999;9(suppl 1):s207–s215
5. Sato M, Ishida H, Konno K, et al: Pancreatic metastasis: sonographic findings. *Abdom Imaging* 2001;26:72–75
6. Scatarige JC, Horton KM, Sheth S, et al: Pancreatic parenchymal metastases: observations on helical CT. *AJR* 2001;176:695–701
7. Skolnick ML: *Guide to the Ultrasound Examination of the Abdomen*. New York: Springer-Verlag, 1986, pp 137–142
8. Williamson MR: *Abdominal ultrasound*. In: *Essentials of Ultrasound*. Philadelphia: WB Saunders, 1996, p 72

Gamut G-215

COMPLEX PANCREATIC LESION (US)

COMMON

1. Mucinous cystadenoma or cystadenocarcinoma (macrocytic adenoma)
2. Pseudocyst of pancreas

UNCOMMON

1. Hematoma, nonacute
2. Metastasis
3. Serous cystadenoma (microcystic adenoma)

References

1. Sato M, Ishida H, Konno K, et al: Pancreatic metastasis: sonographic findings. *Abdom Imaging* 2001;26:72–75
2. Skolnick ML: *Guide to the Ultrasound Examination of the Abdomen*. New York: Springer-Verlag, 1986, pp 137–142

Gamut G-216

**INCREASED ECHOGENICITY
OF PANCREAS (US)**

COMMON

1. Advanced age
2. Chronic pancreatitis
3. Fatty infiltration
4. Hemorrhagic pancreatitis

UNCOMMON

1. Adenocarcinoma of pancreas
2. Cystic fibrosis
3. Diabetes
4. Hereditary pancreatitis
5. Malabsorption
6. Pancreatic insufficiency
7. Shwachman-Diamond S.
8. Steroid ingestion

References

1. Scafidi DE, Young LW: Diseases of the pediatric pancreas. In: Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 2162–2173
2. Williamson MR: Abdominal ultrasound. In: Essentials of Ultrasound. Philadelphia: WB Saunders, 1996, p 70

Gamut G-217

**FOCAL SHADOWING PANCREATIC
LESION (US)**

COMMON

1. Calcifications in chronic pancreatitis
2. Calculi in pancreatic duct

UNCOMMON

1. Arterial calcification
2. Gas in pancreatic abscess

3. Gas in pancreatic pseudocyst communicating with gut
4. Serous cystadenoma (microcystic adenoma) with calcifications
5. Solid and papillary epithelial neoplasm

References

1. Gore RM: Pancreas: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1836–1843
2. Skolnick ML: Guide to the Ultrasound Examination of the Abdomen. New York: Springer-Verlag, 1986, pp 137–142

Gamut G-218

**PANCREATIC CALCIFICATION
WITHOUT MASS**

COMMON

1. Chronic pancreatitis

UNCOMMON

1. Acute pancreatitis (saponification)
2. [Aneurysm or atherosclerosis of aorta or its branches]
3. Cystic fibrosis (mucoviscidosis)
4. Hemochromatosis
5. Hemorrhage (eg, trauma; infarction)
6. Hereditary pancreatitis (large clumps of calcium)
7. Hyperparathyroidism with pancreatitis
8. Idiopathic (pancreatic duct stenosis)
9. Kwashiorkor
10. Pancreatitis due to biliary disease (eg, gallstone in common duct)

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Burgener FA, Kormano M: Differential Diagnosis in Conventional Radiology. (ed 2) New York: Thieme Medical Publ, 1991, pp 538–540

2. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 997–1002
3. Ring EJ, Eaton SB, Ferrucci JT, Short WF: Differential diagnosis of pancreatic calcification. *AJR* 1973;177:446–452

Gamut G-219

PANCREATIC LESION CHARACTERIZED BY CALCIFICATION

COMMON

1. [Aneurysm of aorta, pancreaticoduodenal arcade, or splenic artery, thrombosed]
2. Chronic pancreatitis, focal
3. Hemorrhage, intraparenchymal (eg, old abscess; hematoma; infarction)

UNCOMMON

1. Adenocarcinoma of pancreas (rarely)
2. Hemangioma (plebolith)
3. Hydatid cyst
4. Islet cell tumor
5. Lymphangioma, cavernous
6. Lymphoma (treated)
7. Metastasis (esp. mucinous adenocarcinoma of colon)
8. Mucinous cystadenoma or cystadenocarcinoma (macrocytic adenoma) (peripheral calcium)
9. Pancreaticoblastoma
10. Pseudocyst of pancreas
11. Serous cystadenoma (microcystic adenoma) (central stellate calcium)
12. Solid and papillary epithelial neoplasm
13. Teratoma

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Burgener FA, Korman M: *Differential Diagnosis in Conventional Radiology*. (ed 2) New York: Thieme Medical Publ, 1991, pp 538–540
2. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 997–1002
3. Ring EJ, Eaton SB, Ferrucci JT, Short WF: Differential diagnosis of pancreatic calcification. *AJR* 1973;177:446–452

Gamut G-220

PANCREATIC LESION CHARACTERIZED BY BLOOD OR HEMORRHAGE

1. [Aneurysm of aorta, pancreaticoduodenal arcade, or splenic artery]
2. Hemangioma
3. Hemorrhagic pancreatitis
4. Hemorrhagic pseudocyst
5. Islet cell tumor
6. Metastasis (esp. from carcinoma of colon)
7. Serous cystadenoma (microcystic adenoma)
8. Sarcoma
9. Solid and papillary epithelial neoplasm

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

Reference

1. Amano Y, Oishi, Takahashi M, et al: Nonenhanced magnetic resonance imaging of mild acute pancreatitis. *Abdom Imaging* 2001;26:59–63

Gamut G-221

PANCREATIC LESION CHARACTERIZED BY FAT

UNCOMMON

1. Focal fat deposit
2. Lipoma
3. Liposarcoma (possible in well-differentiated type)
4. Shwachman-Diamond S.
5. Teratoma

Reference

1. Itai Y, Saida Y, Kurosaki Y, et al: Focal fatty masses of the pancreas. *Acta Radiol* 1995;36:178–181

Gamut G-222

FATTY REPLACEMENT OR INFILTRATION OF PANCREAS

COMMON

1. Aging
2. Cystic fibrosis (mucoviscidosis)
3. Obesity
4. Steroid therapy

UNCOMMON

1. Chronic pancreatitis
2. Diabetes mellitus
3. Hemochromatosis
4. Hereditary pancreatitis
5. Johanson-Blizzard S.
6. Lipomatous pseudohypertrophy
7. Malnutrition
8. Shwachman-Diamond S.

References

1. Barzilai M, Lerner A, Branski D: Increased reflectivity of the pancreas in rare hereditary pancreatic insufficiency syndromes. *Clin Radiol* 1996;51:575–576
2. Gore RM: Pancreas: Differential diagnosis. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1836–1843
3. Matsumoto S, Mori H, Miyake H, et al: Uneven fatty replacement of the pancreas: evaluation with CT. *Radiology* 1995;194:453–458
4. Scafidi DE, Young LW: Diseases of the pediatric pancreas. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 2162–2173
5. Siegel MJ: *Pediatric Body CT*. Philadelphia: Lippincott Williams & Wilkins, 1999

Gamut G-223

HYPERVASCULAR PANCREATIC LESION (POSTCONTRAST CT, MRI, OR ANGIO)

COMMON

1. Acute pancreatitis
2. Adenocarcinoma, pancreatic ductal (hypovascular but with neovascularity)
3. Aneurysm or pseudoaneurysm of hepatic, gastroduodenal, pancreaticoduodenal or splenic arteries
4. Islet cell tumor, incl. insulinoma; gastrinoma (esp. with Zollinger-Ellison S. or MEN S. Type I (tumor blush); glucagonoma; nonfunctioning islet cell tumor; somatostatinoma)
5. Metastasis, hypervascular (eg, from angiosarcoma; leiomyosarcoma; carcinoid; melanoma; renal cell carcinoma; carcinoma of adrenal or thyroid)
6. Mucinous cystadenoma or cystadenocarcinoma (macrocytic adenoma)
7. Serous cystadenoma (microcytic adenoma)

UNCOMMON

1. Abscess of pancreas
2. Castleman disease
3. Hemangioma
4. Intraductal papillary mucinous tumor of pancreas
5. Solid and papillary epithelial neoplasm (hypovascular but with enhanced solid tissue toward center of mass)

References

1. Adsay NV, Longnecker DS, Klimstra DS: Pancreatic tumors with cystic dilatation of the ducts: intraductal papillary mucinous neoplasms and intraductal oncocytic papillary neoplasms. *Semin Diagn Pathol* 2000;17:16–30
2. Gore RM: Pancreas: Differential diagnosis. In: Gore RM, Levine MS: *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1836–1843
3. Irie H, Honda H, Kuroiwa T, et al: Pitfalls in MR cholangiopancreatographic interpretation. *RadioGraphics* 2000; 24:229–234

4. Larena JA, Astigarraga E, Saralegui I, et al: Magnetic resonance cholangiopancreatography in the evaluation of pancreatic duct pathology. *Br J Radiol* 1998;71:1100–1106
5. Scatarige JC, Horton KM, Sheth S, et al: Pancreatic parenchymal metastases: observations on helical CT. *AJR* 2001;176:695–701

Gamut G-224

PANCREATIC ANGIOGRAPHIC ABNORMALITY (VIA CELIAC, SUPERIOR MESENTERIC, OR SUBSELECTIVE ARTERIOGRAPHY)

DISPLACEMENT OF VESSELS

1. Gallbladder enlargement
2. Lymphoma
3. Pancreatic mass (See G-213)

ENCASEMENT

1. Irregular (esp. carcinoma of pancreas)
2. Long segment with arterial cuffing (esp. carcinoma)
3. Smooth (eg, carcinoma; pancreatitis)

EXTRAVASATION

1. Pancreatic abscess
2. Pancreatitis

HYPERVASCULARITY (See G-223)

1. Carcinoma
2. Cystadenoma; cystadenocarcinoma (florid neovascularity)
3. Islet cell tumor, esp. Zollinger-Ellison S.; MEN S. Type I (tumor blush)
4. Pancreatic abscess
5. Pancreatitis

HYPOVASCULARITY

1. Lymphoma_g
2. Metastasis

3. Pancreatic pseudocyst
4. Pancreatitis

OTHER

1. Microaneurysms (esp. pancreatitis; polyarteritis nodosa)
2. Occlusion or truncation, arterial or venous (eg, carcinoma; surgical ligation; vascular disease)

Gamut G-225

DILATED PANCREATIC DUCT

1. Aging
2. Calculus in distal common duct
3. Chronic pancreatitis
4. Pancreatic or ampullary mass (esp. carcinoma of pancreas or ampulla; focal acute pancreatitis)

NOTE: NATURE OF DILATATION

Suggesting Pancreatitis

1. Calculi in duct
2. Irregular dilatation of duct

Suggesting Neoplasm

1. Duct occupies >50% of anteroposterior gland diameter
2. Smooth and beaded appearance of duct

References

1. Cheszmar JL: Pancreatic neoplasms. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1796–1811
2. Gore RM: Pancreas: Differential Diagnosis. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1836–1843

Gamut G-226

PANCREATIC DUCT STRICTURE (ERCP, MRCP)

WITH NORMAL PANCREATIC PARENCHYMA

1. Osteophyte of spine
2. Vascular compression (eg, aneurysm or pseudoaneurysm of aorta, gastroduodenal, pancreaticoduodenal, or splenic arteries)

WITH ABNORMAL PARENCHYMA

1. Carcinoma of pancreas
2. Chronic pancreatitis
3. Duct hyperplasia

Reference

1. Gore RM: Pancreas: Differential Diagnosis. In Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1836–1843.

Gamut G-227

GAS IN PANCREATIC DUCT

COMMON

1. Abscess
2. Patulous Vaterian sphincter
3. Post-endoscopic retrograde cholangiopancreatography (ERCP)
4. Prior Vaterian papillotomy

UNCOMMON

1. Duodenal diverticulum communication
2. Enteropancreatic fistula (spontaneous; surgical)

Reference

1. Gore RM: Pancreas: Differential diagnosis. In: Gore RM, Levine MS: Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1836–1843

Gamut G-228

CYSTIC MESENTERIC OR INTRAPERITONEAL LESION (US, CT, MRI)

COMMON

1. Abscess
2. Cystic lymphangioma
3. Hematoma
4. Mesenteric cyst

UNCOMMON

1. Ascites, complicated
2. Cystic mesothelioma
3. Cystic or necrotic stromal cell tumor_g (eg, leiomyoma; leiomyosarcoma)
4. Duplication cyst (enteric)
5. Hydatid disease
6. Lymphadenopathy, cystic or necrotic (eg, bacillary angiomatosis in AIDS)
7. Papillary serous carcinoma of peritoneum
8. Pseudocyst of pancreas invading mesentery
9. Pseudomyxoma peritonei
10. Teratoma

References

1. Chopra S, Laurie LR, Chintapalli KN, et al: Primary papillary serous carcinoma of the peritoneum: CT-pathologic correlation. *J Comput Assist Tomogr* 2000;24:395–399
2. Inman DS, Lambert AW, Wilkins DC: Multicystic peritoneal inclusion cysts: the use of CT guided drainage for symptom control. *Ann R Coll Surg Eng* 2000; 82:196–197
3. Ros P, Olmsted W, Moser R, Dachman A, et al: Mesenteric and omental cysts: Histologic classification with imaging correlation. *Radiology* 1987;164:327–332
4. Ros PR: Bubbles and marbles of the belly: cystic and solid masses of the mesentery and omentum. In: Balfe DM, Levine MS: RSNA Categorical Course in Diagnostic Radiology: Gastrointestinal. 1997, pp 59–66
5. Silverman PM, Cooper C: Mesenteric and omental lesions. In Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 1980–1992

Gamut G-229

SOLID LESION OF THE MESENTERY OR MESENTERIC ROOT (US, CT, MRI)

COMMON

1. Abscess_g
2. Hematoma (trauma; bleeding disorder)
3. Lymphadenopathy (eg, metastatic carcinoma; tuberculosis; Crohn's disease; Castleman disease; AIDS—bacillary angiomatosis)
4. Lymphoma_g
5. Metastasis (esp. from colon or ovary)
6. Omental "cakes" (eg, metastatic disease; carcinoid; lymphoma; tuberculosis)
7. Stromal cell tumor_g (esp. leiomyosarcoma; leiomyoma; neurofibroma)

UNCOMMON

1. Desmoid tumor (mesenteric fibromatosis); desmoplastic small round cell tumor
2. Hemangioma
3. Hydatid disease
4. Lipoma; lipomatosis; liposarcoma
5. Lymphangioma
6. Malignant fibrous histiocytoma
7. Mesothelioma
8. Phlegmon (pancreatitis); pseudocyst of pancreas
9. Retractable mesenteritis (chronic fibrosing mesenteritis; mesenteric lipodystrophy; panniculitis; Weber-Christian disease)
10. Splenosis
11. Teratoma

References

1. Nicolas AI, Ros PR: Imaging of the mesentery and omentum. In: Grainger RG, Allison DJ: *Grainger & Allison's Diagnostic Radiology*. (ed 3) New York: Churchill Livingstone, 1997, pp 1059–1079
2. Silverman PM, Cooper C: Mesenteric and omental lesions. In Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1980–1992
3. Slone RM, Fisher AJ: *Pocket Guide to Body CT Differential Diagnosis*. New York: McGraw-Hill, 1999, pp 191–192

Gamut G-230

ALTERATION IN DENSITY OF THE MESENTERIC FAT ON CT ("Misty Mesentery")

1. Hemorrhage (eg, trauma)
2. Inflammation (eg, Crohn's disease)
3. Lymphedema
4. Mesenteric edema
5. Neoplasm, eg, carcinomatosis; mesothelioma (esp. after chemotherapy)
6. Retractable mesenteritis (chronic fibrosing mesenteritis; mesenteric lipodystrophy; panniculitis; Weber-Christian disease)

References

1. Mindelzun RE, Jeffrey RB Jr, Lane MJ, Silverman PM: The misty mesentery on CT: differential diagnosis. *AJR* 1996; 167:61–65
2. Silverman PM, Cooper C: Mesenteric and omental lesions. In Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1980–1992

Gamut G-231

PERITONEAL DISEASE

COMMON

1. Abscess_g, abdominal or pericolic (See G-89)
2. Adhesions (eg, inflammatory; postoperative); congenital peritoneal bands (Ladd's bands)
3. Crohn's disease
4. Endometriosis
5. Fluid, ascites (See G-233, 234)
6. Lymphoma_g
7. Metastasis, implantation, or invasion by malignant neoplasm
8. Obesity

(continued)

9. Pancreatitis (incl. saponification)
10. Peritonitis
11. Tuberculosis

UNCOMMON

1. Amyloidosis
2. Carcinoid
3. Cyst of mesentery
4. Desmoid tumor (mesenteric fibromatosis), isolated or with Gardner S.
5. Fungus disease_g (eg, actinomycosis)
6. Medication (eg, practolol peritonitis; Sansert)
7. Mesothelioma
8. Parasitic disease (esp. hydatid disease; amebiasis; pentastomiasis-*Armillifer* infection)
9. Pseudomyxoma peritonei
10. Radiation peritonitis
11. Retractable mesenteritis (chronic fibrosing mesenteritis; mesenteric lipodystrophy; panniculitis; Weber-Christian disease)
12. Sarcoma
13. Typhoid fever

References

1. Banner MP, Gohel VK: Peritoneal mesothelioma. *Radiology* 1978; 129:637-640
2. Sacks B, Joffe N, Harris N: Isolated mesenteric desmoids (mesenteric fibromatosis). *Clin Radiol* 1978; 29:95-100
3. Silverman PM, Cooper C: Mesenteric and omental lesions. In Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1980-1992

Gamut G-232

DIFFUSE PERITONEAL THICKENING (US, CT, MRI)

COMMON

1. Carcinomatosis
2. Peritonitis
3. Postoperative state

UNCOMMON

1. Lymphoma_g
2. Mesothelioma
3. Pseudomyxoma peritonei
4. Sarcomatosis
5. Tuberculosis

Reference

1. Silverman PM, Cooper C: Mesenteric and omental lesions. In Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1980-1992

Gamut G-233

PERITONEAL FLUID COLLECTION (ASCITES) IN AN ADULT (ESP. ON US, CT, MRI)

INFECTION OR INFLAMMATION OF THE PERITONEAL CAVITY (PERITONITIS)

1. Abscess
2. Pancreatitis
3. Pelvic inflammatory disease (PID)
4. Rupture of a hollow viscus (eg, appendicitis; diverticulitis; empyema of gallbladder; peptic ulcer; typhoid fever)
5. Tuberculosis or other primary infection causing peritonitis

LYMPHATIC OBSTRUCTION WITH CHYLOUS OR LYMPH ASCITES (See G-235)

Congenital

1. Milroy disease
2. Tuberous sclerosis

Elevated lymphatic pressure

1. Cirrhosis
2. Constrictive pericarditis
3. Heart failure

Infection

1. Filariasis

Neoplastic disease

1. Lymphoma_g; leukemia
2. Metastatic disease in lymphatics

Radiation therapy

Trauma

1. Rupture of abdominal lymphatics

NEOPLASM

1. Benign (eg, Meigs S.—benign ovarian tumor)
2. Malignant (eg, carcinoma of gastrointestinal tract or ovary with mesenteric or peritoneal metastases; mesothelioma)

VENOUS OBSTRUCTION

Cardiac disease with chronic elevation of venous pressure

1. Chronic right heart failure due to other causes
2. Constrictive pericarditis
3. Mitral stenosis

External pressure on the portal vein

1. Inflammatory lymph nodes (eg, tuberculosis)
2. Lymphoma_g
3. Malignant tumor, primary or metastatic
4. Sarcoidosis

Obstruction of the inferior vena cava above the hepatic vein

1. Mediastinal mass
2. Thrombosis of IVC

Portal vein obstruction secondary to diffuse hepatic disease

1. Hepar lobatum
2. Portal cirrhosis
3. Schistosomiasis

Portal vein thrombosis

1. Chronically ill patients
2. Invasion by neoplastic disease

Veno-occlusive disease

Thrombosis or web in inferior vena cava

OTHER CAUSES

1. Bile peritonitis
2. Ectopic pregnancy
3. Hemoperitoneum (eg, trauma; surgery)
4. Hypoalbuminemia (eg, nephrotic S.; protein-losing gastroenteropathy)
5. Peritoneal lavage; dialysis

[CONDITIONS THAT MAY MIMIC ASCITES]

1. [Mesenteric cyst]
2. [Ovarian cyst]
3. [Pancreatic pseudocyst]
4. [Pregnancy]

References

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2. Williamson MR: Chapter 5. Abdominal Ultrasound. In: *Essentials of Ultrasound*. Philadelphia: WB Saunders, 1996, p 66

Gamut G-234

PERITONEAL FLUID (ASCITES) IN AN INFANT OR CHILD

COMMON

1. Appendiceal perforation
2. Cardiac disease (eg, anasarca; constrictive pericarditis)
3. Cirrhosis, portal or biliary (eg, biliary atresia; polycystic liver)
4. Hemorrhage
5. Hydrops fetalis; erythroblastosis fetalis
6. Hypoproteinemia (eg, malnutrition; kwashiorkor; intestinal lymphangiectasia)
7. Peritonitis (eg, meconium; sepsis; toxoplasmosis; rubella S.; cytomegalovirus infection; typhoid fever; amebiasis)
8. Portal vein or IVC obstruction, extrahepatic (eg, neoplasm; lymphadenopathy; thromboembolism)
9. Renal failure (eg, nephrotic S. with hypoproteinemia; glomerulonephritis; uremia)
10. Trauma; surgery
11. Urinary outlet obstruction with hydronephrosis (urine ascites)
12. Ventriculoperitoneal shunt

UNCOMMON

1. Antitrypsinase deficiency
2. Chylous or lymphatic ascites, neonatal (See G-235)
3. Galactosemia; tyrosinemia
4. Gaucher disease; lysosomal storage disease
5. Hemolytic anemia with ascites
6. Hydrometrocolpos with rupture and plastic peritonitis
7. Meckel diverticulum, perforated
8. Meigs S. (benign ovarian tumor)
9. Metastatic disease to peritoneum
10. Ovarian cyst, ruptured
11. Pancreatitis, acute
12. Preduodenal portal vein
13. Schistosomiasis

14. Thromboembolism of inferior vena cava, renal vein, or hepatic veins
15. Tuberculosis
16. Wilson disease

References

1. Meyer JI, Donaldson JS: Diseases of the pediatric abdominal wall, peritoneum, and mesentery. In Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 2179–2185
2. Moncada R, Wang JJ, Love L, Bush I: Neonatal ascites associated with urinary outlet obstruction (urine ascites). *Radiology* 1968; 90:1165–1170
3. Siegel MJ: *Pediatric Body CT*. Philadelphia: Lippincott Williams & Wilkins, 1999
4. Silverman FN (ed): *Caffey's Pediatric X-ray Diagnosis: An Integrated Imaging Approach*. (ed 8) Chicago: Year Book Medical Publ, 1985
5. Swischuk LE: *Radiology of the Newborn, Infant, and Young Child*. (ed 3) Baltimore: Williams & Wilkins, 1989
6. Swischuk LE, John SD: *Differential Diagnosis in Pediatric Radiology*. (ed 2) Baltimore: Williams & Wilkins, 1995, pp 160–16

Gamut G-235

CHYLOUS OR LYMPHATIC ASCITES*

COMMON

1. Filariasis
2. Lymphoma
3. Metastatic disease (esp. to lymph nodes)
4. Neoplasm, benign (esp. lymphangioma)
5. Neoplasm, malignant, compressing or invading lymphatic system (eg, carcinoma of pancreas, lung, esophagus; mediastinal tumor)
6. Postoperative
7. Trauma

UNCOMMON

1. Adhesive bands
2. Cirrhosis (hepatic lymphatics visible)
3. Congenital absence or hypoplasia of lymphatic system

4. Idiopathic
5. Lymphangiomyomatosis; tuberous sclerosis
6. Lymphangiomas, disseminated (benign metastasizing lymphangiomas)
7. Tuberculosis; histoplasmosis

* Obstruction of abdominal lymphatic vessels, cisterna chyli, or thoracic duct on lymphangiography.

References

1. Gore RM, Gore MD: Ascites and peritoneal fluid collections. In Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 1969–1979
2. Griscom NT, Colodny AH, Rosenberg HK, et al: Diagnostic aspects of neonatal ascites: Report of 27 cases. *AJR* 1977;128:961–970

Gamut G-236

SPONTANEOUS PNEUMOPERITONEUM WITHOUT PERITONITIS

COMMON

1. Iatrogenic (incl. postoperative; anesthesia; respiratory therapy; peritoneal dialysis; Rubin test; bronchoscopy; endoscopy; diagnostic pneumoperitoneum)
2. Idiopathic
3. Perforation of GI tract, forme fruste type (eg, peptic ulcer; neoplasm; Crohn's disease; bowel infarction or obstruction)
4. Vaginal "aspiration" (eg, douching; sudden squatting; oral sex; postpartum exercises)

UNCOMMON

1. ARDS
2. Distention of stomach (eg, aerophagia; gastroscopy; sodium bicarbonate ingestion; misplaced oxygen tube)
3. Idiopathic dilatation of colon (eg, pseudo-obstruction)
4. Jejunal diverticulosis

5. Pneumatosis cystoides intestinalis (See G-70)
6. Pneumomediastinum (eg, pulmonary emphysema; ruptured bulla)
7. Pneumothorax (eg, via congenital pleuroperitoneal fistula)
8. Sclerotherapy of esophageal varices

References

1. Ashai S, Lipton D, Colon A, et al: Pneumoperitoneum secondary to cunnilingus. *N Engl J Med* 1976; 295:117
2. Baker SR, Cho KC: *The Abdominal Plain Film with Correlative Imaging*. Norwalk, CT: Appleton & Lange, 1998
3. Campbell RE, Boggs TR Jr, Kirkpatrick JA Jr: Early neonatal pneumoperitoneum from progressive massive tension pneumomediastinum. *Radiology* 1975;114:121–126
4. Eisenberg RL: *Gastrointestinal Radiology: A Pattern Approach*. (ed 3) Philadelphia: Lippincott, 1996, pp 939–949
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6. Stringfield JT III, Graham JP, Watts CM, et al: Pneumoperitoneum: a complication of mechanical ventilation. *JAMA* 1976;235:744–746

Gamut G-237

PNEUMOPERITONEUM WITH PERITONITIS

COMMON

1. Perforated hollow viscus (eg, peptic ulcer; intestinal obstruction; diverticulitis; appendicitis; necrotic tumor; penetrating or blunt abdominal trauma; emphysematous cholecystitis) (See G-238)

UNCOMMON

1. Meconium peritonitis
2. Megacolon with rupture (eg, Chagas' disease; Hirschsprung disease)
3. Perforation of colon following immunosuppressive therapy in renal transplant patient
4. Septic peritonitis with gas forming organism

(continued)

5. Ulcerating bowel disease (eg, typhoid fever; amebiasis; toxic megacolon; ulcerative colitis; Crohn's disease; tuberculosis; pseudomembranous colitis; necrotizing enterocolitis; ischemic colitis; lymphogranuloma venereum)

References

1. Baker SR, Cho KC: The Abdominal Plain Film with Correlative Imaging. Norwalk, CT: Appleton & Lange, 1998
2. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 939–946

Gamut G-238**PERFORATED HOLLOW VISCUS IN AN INFANT****COMMON**

1. Iatrogenic (eg, intubation; rectal thermometer; enema; resuscitation; intrauterine transfusion)
2. Intestinal obstruction (eg, atresia; volvulus)
3. Meconium ileus (cystic fibrosis {mucoviscidosis})
4. Necrotizing enterocolitis
5. Respirator therapy
6. Trauma; battered child S.

UNCOMMON

1. Gastric rupture of newborn
2. Hirschsprung disease
3. Idiopathic
4. Ischemic enteritis (eg, umbilical artery thromboembolism; sepsis; malrotation with midgut volvulus)
5. Meconium plug S.
6. Perforated peptic or stress ulcer
7. [Pneumoperitoneum without peritonitis] (See G-236)
8. Small left colon S.

References

1. Fernbach SK: Neonatal gastrointestinal radiology. In: Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 2042–2073

2. Leonidas JC, Hall RT, Rhodes PG, et al: Pneumoperitoneum in ventilated newborns. A medical or a surgical problem? *Am J Dis Child* 1974;128:677–6803.
3. Tucker AS, Soine L, Izant Jr RJ: Gastrointestinal perforations in infancy: Anatomic and etiologic gamuts. *AJR* 1975; 123:755–763

Gamut G-239**ABNORMAL GAS COLLECTION IN THE RIGHT UPPER QUADRANT****COMMON**

1. Abscess, abdominal (eg, subphrenic, hepatic, pericolic, renal, or perirenal) (See G-243)
2. Colon interposition (Chilaiditi S.); colon distention
3. Gas in the biliary tract; biliary fistula (See G-128, G-139)
4. Pneumoperitoneum, free or loculated (eg, perforation of hollow viscus; postoperative) (See G-236–238)
5. Subhepatic gas or abscess (eg, perforated duodenal ulcer or appendix)

UNCOMMON

1. Abdominal wall gas or abscess (postoperative; traumatic; drainage tube)
2. Emphysematous cholecystitis
3. Gastric rupture of newborn
4. Iatrogenic pneumoretroperitoneum (incl. interventional embolization of a viscus; needle or catheter drainage; postnephrectomy; endoscopy)
5. Pneumatosis intestinalis (See G-70)
6. Pneumomediastinum with retroperitoneal extension
7. Portal vein gas (See G-192)
8. Retroperitoneal rupture of gut (esp. duodenum or rectum)
9. Stomach (heterotaxy)

References

1. Anschuetz SL: Extraluminal gas in the upper abdomen. *Semin Roentgenol* 1984;19:255

- Baker SR, Cho KC: The Abdominal Plain Film with Correlative Imaging. Norwalk, CT: Appleton & Lange, 1998
- Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 950–964
- Love L, Baker D, Ramey R: Gas producing perinephric abscess. AJR 1973;119:783–7925.
- Rice RP, Thompson WM, Gedgaudas RK: The diagnosis and significance of extraluminal gas in the abdomen. Radiol Clin North Am 1982;20:819–837

Gamut G-240

ABNORMAL GAS COLLECTION IN THE LEFT UPPER QUADRANT

COMMON

- Abscess_g, other abdominal (eg, subphrenic, splenic, pericolic, renal or perirenal)
- Pneumoperitoneum, free or loculated (eg, perforation of hollow viscus; postoperative) (See G-236–238)

UNCOMMON

- Abdominal wall gas or abscess (postoperative; traumatic; drainage tube)
- Emphysematous gastritis
- Iatrogenic pneumoretroperitoneum (incl. interventional embolization of a viscus; needle or catheter drainage; postnephrectomy; endoscopy)
- Lesser sac gas or abscess (eg, postsplenectomy; perforation of gut; pancreatic abscess or infected pseudocyst)
- Pancreatic gas abscess (peritoneal fat necrosis)
- Pneumatosis intestinalis
- Pneumomediastinum with retroperitoneal extension
- Retroperitoneal rupture of gut (esp. duodenum or rectum)

References

- Anschuetz SL: Extraluminal gas in the upper abdomen. Semin Roentgenol 1984;19:255
- Baker SR, Cho KC: The Abdominal Plain Film with Correlative Imaging. Norwalk, CT: Appleton & Lange, 1983.

- Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 950–964.
- Love L, Baker D, Ramey R: Gas producing perinephric abscess. AJR 1973;119:783–792

Gamut G-241

LARGE ABDOMINAL GAS POCKET

COMMON

- Abscess_g, abdominal (eg, subphrenic, splenic, renal or perirenal, pericolic, pancreatic, lesser sac, abdominal wall)
- Bladder distended with air (eg, iatrogenic; emphysematous cystitis)
- Cecal distention (eg, nonobstructive “paralytic” ileus; pseudo-obstruction; colon obstruction)
- Diabetic gastropathy; acute gastric dilatation (eg, cast S.)
- Duodenal obstruction (See G-42, 43)
- Gastric outlet obstruction (See G-30)
- Hernia, obstructed (eg, hiatal; diaphragmatic; internal; external)
- Pneumoperitoneum, free or loculated (subphrenic; lesser sac; greater sac)
- Retroperitoneal or extraperitoneal gas (eg, duodenal or rectal perforation)
- Sentinel loop (localized ileus) (See G-80)
- Small bowel or colon obstruction, chronic (eg, Crohn’s disease; adhesions; congenital stenosis)

UNCOMMON

- Abdominal wall gas (postoperative)
- Amnionitis; endometritis (physometra); infected fetus
- Blind loop S. (esp. postoperative) (See G-58)
- Diverticulum of colon or duodenum (giant size)
- Duplication cyst, communicating
- Emphysematous cholecystitis
- Emphysematous peritonitis
- Fibroid, infected

(continued)

9. Gangrene of liver
10. Hydropneumometrocolpos; vaginitis emphysematosa
11. Meckel's diverticulum (giant size)
12. Ovarian cyst (eg, gas infection; intestinal fistula)

References

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2. Blatt ES, Schneider HJ, Wiot JF, et al: Roentgen findings in obstructed diaphragmatic hernia. *Radiology* 1962;79:648–6573.
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6. Phillips JC: A spectrum of radiologic abnormalities due to tubo-ovarian abscess. *Radiology* 1974;110:307–311

Gamut G-242**ABDOMINAL OR PELVIC ABSCESS****COMMON**

1. Appendicitis
2. Carcinoma or other malignancy with perforation
3. Crohn's disease
4. Diverticulitis
5. Pancreatitis
6. Pelvic inflammatory disease (eg, endometritis)
7. Peptic ulcer perforation
8. Postoperative
9. Posttraumatic (eg, gunshot or knife wound)
10. Tubo-ovarian (eg, sexually transmitted diseases; ectopic pregnancy)

UNCOMMON

1. Intestinal perforation, other (eg, intestinal obstruction; meconium ileus)
2. Ischemic colitis
3. Lymphogranuloma venereum
4. Parasitic disease (eg, amebiasis; schistosomiasis; ascariasis)
5. Perinephric abscess; pyelonephritis
6. Tuberculosis
7. Typhoid fever

Gamut G-243**RIGHT ANTERIOR PARARENAL SPACE ABSCESS (ESPECIALLY ON US, CT, OR MRI)**

1. Duodenal perforation secondary to
 - a. Ulcer
 - b. Foreign body
 - c. Inflamed diverticulum of duodenum
2. Crohn's disease of small bowel or ascending colon
3. Colitis involving ascending colon
 - a. Amebiasis
 - b. Diverticulitis
 - c. Tuberculosis
4. Ruptured retrocecal or retroperitoneal appendix
5. Pancreatic abscess or infected pseudocyst
6. Renal or perirenal abscess extending into pararenal space

Reference

1. Meyers MA: *Dynamic Radiology of the Abdomen* (ed 5) New York: Springer-Verlag, 2000

Gamut G-244-S

ABSCESS MIMICS ON ABDOMINAL US, CT, OR MRI

COMMON

1. Cyst (eg, ovarian; renal; splenic; dermoid; mesenteric; hepatic; hydatid)
2. Hematoma
3. Loop of bowel
4. Necrotic neoplasm (eg, hepatoma; metastasis)
5. Pseudocyst of pancreas

UNCOMMON

1. Biloma
2. Iatrogenic (eg, retained Foley catheter)
3. Herniation of bowel through diaphragm
4. Lymphocele
5. Seroma
6. Urinoma

Gamut G-245

DECREASED ABDOMINAL GAS IN A NEWBORN

COMMON

1. Congenital diaphragmatic hernia
2. Duodenal atresia or stenosis; annular pancreas
3. Endotracheal intubation
4. Esophageal obstruction (eg, atresia without T-E fistula; web) (See G-12, G-19)
5. Medication (esp. maternal)
6. Neonatal sepsis
7. Obstruction of pylorus (eg, hypertrophic pyloric stenosis at 2 to 8 weeks), duodenum, or proximal jejunum (esp. atresia or stenosis)
8. Suction, orogastric or nasogastric

UNCOMMON

1. Dehydration
2. Dysphagia; impaired swallowing physiology (eg, severe prematurity; depressed swallowing reflex; impending death)
3. Fluid-filled bowel
4. Large abdominal mass
5. Midgut volvulus
6. Normal
7. Peritoneal fluid (ascites)
8. Vomiting (eg, gastroenteritis; electrolyte imbalance)

References

1. Cohen MD, Jansen R, Lemons J, et al: Evaluation of the gasless abdomen in the newborn and young infant with metrizamide. *AJR* 1984;142:393–396
2. Fernbach SK: Neonatal gastrointestinal radiology. In Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 2042–2073

Gamut G-246

DECREASED ABDOMINAL GAS IN AN ADULT

COMMON

1. Acute pancreatitis
2. Ascites
3. Normal

UNCOMMON

1. Dysphagia
2. Fluid-filled bowel (eg, closed loop obstruction)
3. Hernia (esp. hiatal)
4. Large abdominal mass displacing bowel laterally
5. Mesenteric infarction, early
6. Obstruction of esophagus (eg, cardiospasm; neoplasm), stomach (eg, volvulus; pyloric obstruction from ulcer or neoplasm), or duodenum (eg, neoplasm)
7. Vomiting; inanition

Gamut G-247-1

ABDOMINAL CALCIFICATION(S) IN AN INFANT OR CHILD (See G-143, G-203, 204, G-247-2)

COMMON

1. Adrenal calcification (See H-123)
2. Appendiceal fecalith (calculus)
3. [Foreign material; pills; pica; medication; contrast medium; heavy metal]
4. Histoplasmosis or tuberculosis in liver, spleen, lymph node, peritoneum
5. Meconium in peritoneum (meconium peritonitis from intestinal perforation), intestinal lumen or wall
6. Neuroblastoma; other neurogenic neoplasm
7. Urinary tract calcification (See H-24)

UNCOMMON

1. Abscess_{es}, abdominal (esp. liver)
2. Arterial calcification (eg, metastatic calcinosis; primary or secondary hyperparathyroidism)
3. Calculus in Meckel's diverticulum or urachal cyst
4. Chronic granulomatous disease of childhood
5. Congenital syndromes (See G-247-2)
6. Cyst of spleen, kidney, pancreas, ovary, mesentery
7. Dermoid cyst; teratoma; fetus in fetu
8. Duplication, atresia, other obstruction of gut (mural or luminal calcification)
9. Enterolith; also enterolithiasis associated with anal atresia
10. Fetal infection (toxoplasmosis; rubella; cytomegalovirus; herpes simplex; varicella)
11. Gallstone (esp. thalassemia; sickle cell disease; other hemolytic anemia)
12. Hemangioma; lymphangioma (phlebolith; lympholith)
13. Hematoma, old (liver; spleen; retroperitoneal)
14. Hemochromatosis of liver
15. Hydrometrocolpos (ruptured) with plastic peritonitis
16. Ischemic infarct or necrosis of liver

17. Liver neoplasm (hemangioma; hamartoma; metastatic neuroblastoma; occasionally hepatoma; hepatoblastoma) (See G-154, 155)
18. Mucocele of appendix
19. Pancreatitis, chronic
20. Parasitic disease (eg, hydatid cysts or *Armillifer* infestation of peritoneum or mesentery; guinea worm infection or cysticercosis of abdominal wall or back)
21. Retroperitoneal neoplasm
22. Thromboembolism of inferior vena cava, portal vein, renal vein
23. Tuberculous psoas abscess

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Baker SR, Cho KC: The Abdominal Plain Film with Correlative Imaging. Norwalk, CT: Appleton & Lange, 1998
2. Berdon WE, Baker DH, Wigger HJ, et al: Calcified intraluminal meconium in newborn males with imperforate anus: enterolithiasis in the newborn. *AJR* 1975;125:449-455
3. Friedman AP, Haller JO, Boyer B, Cooper R: Calcified portal vein thromboemboli in infants: Radiography and ultrasonography. *Radiology* 1981;140:381-382
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5. Schackelford GD, Kirks DR: Neonatal hepatic calcification secondary to transplacental infection. *Radiology* 1977;122:753-757
6. Siegel MJ: Pediatric Body CT. Philadelphia: Lippincott Williams & Wilkins, 1999
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Gamut G-247-2

CONGENITAL SYNDROMES WITH ABDOMINAL CALCIFICATIONS

1. Beckwith-Wiedemann S. (adrenal)
2. Cholesterol ester storage disease (adrenal)
3. Chondroectodermal dysplasia (Ellis-van Creveld S.) (gallstones; nephrocalcinosis)
4. Chronic granulomatous disease of childhood (liver; spleen; lymph nodes)

5. Cushing S. (adrenal)
6. Cystic fibrosis (mucoviscidosis) (pancreas; meconium peritonitis)
7. Cystinosis (urinary calculi)
8. Fetal cytomegalovirus infection (gonads)
9. Fetal herpes simplex infection (liver; adrenal)
10. Fetal toxoplasmosis infection (liver)
11. Fetal varicella infection (liver)
12. Gorlin S. (nevoid basal cell carcinoma S.) (ovarian)
13. Hirschsprung disease (enterolith)
14. Milk-alkali S. (nephrocalcinosis)
15. Multiple endocrine neoplasia (MEN) S., type IIA and IIB (eg, pheochromocytoma) (See J-5)
16. Oxalosis (nephrocalcinosis)
17. Prune-belly S. (Eagle-Barrett S.) (bladder wall; renal)
18. Renal tubular acidosis S. (nephrocalcinosis)
19. Wolman disease (familial xanthomatosis) (adrenal)

References

1. Kirks DR, Taybi H: Prune belly syndrome: an unusual cause of neonatal abdominal calcification. *AJR* 1975;123:778–782.
2. Swischuk LE, John SD: *Differential Diagnosis in Pediatric Radiology*. (ed 2) Baltimore: Williams & Wilkins, 1995
3. Taybi H, Lachman RS: *Radiology of Syndromes, Metabolic Disorders, and Skeletal Dysplasias*. (ed 4) St. Louis: Mosby-Year Book, 1996, p 958

Gamut G-248

NONVISCERAL ABDOMINAL CALCIFICATION

COMMON

1. Aneurysm; arteriovenous malformation
- *2. Appendiceal fecalith (calculus), extruded into peritoneal sac
3. Atherosclerosis
- *4. Dermoid cyst; teratoma; fetus in fetu
- *5. [Foreign material (eg, pill; pica; medication; contrast medium; heavy metal)]

- *6. Gallstone extruded into peritoneal sac
- *7. Lymph nodes (eg, tuberculosis; histoplasmosis)
- *8. Meconium in peritoneum, intestinal wall or lumen
- *9. Phlebolith; lympholith (incl. hemangioma; lymphangioma)
- *10. [Rib cartilage]

UNCOMMON

- *1. [Barium in peritoneum]
2. [Bone lesion with matrix or sclerosis]
- *3. Epiploic appendage
4. Fluorosis (ligamentous)
5. Hydrometrocolpos
6. Lipoma
- *7. Lithopedion; extrauterine pregnancy
- *8. Mesenteric cyst
9. Mesothelioma of peritoneum
10. Metastasis (esp. from colloid carcinoma; papillary cystadenocarcinoma of ovary)
- *11. Mineral oil granuloma (instilled in peritoneum)
12. Myositis (fibrodysplasia) ossificans progressiva
13. Neoplasm of soft tissues (eg, osteoma; osteosarcoma; chondrosarcoma; undifferentiated abdominal malignancy)
14. Neuroblastoma
15. Pancreatitis with saponification; fat necrosis; Weber-Christian disease
- *16. Parasitic disease (eg, hydatid cysts or *Armillifer* infestation of peritoneum or mesentery; guinea worm infection or cysticercosis of abdominal wall or back)
17. Pheochromocytoma
18. Pseudomyxoma peritonei (eg, from pseudomucinous cystadenoma of ovary; mucocele of appendix)
19. Retroperitoneal hematoma
20. Retroperitoneal neoplasm
21. Scar or burn (abdominal wall)
22. Scleroderma; dermatomyositis
23. Thrombosis of portal vein, renal vein, or inferior vena cava
24. Tuberculous peritonitis, psoas abscess

* May be mobile.

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

(continued)

References

1. Baker SR, Cho KC: The Abdominal Plain Film with Correlative Imaging. Norwalk, CT: Appleton & Lange, 1998
2. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 1043–1064

Gamut G-249

ABDOMINAL CALCIFICATIONS THAT LAYER IN THE UPRIGHT POSITION

COMMON

1. Bladder calculi
2. Gallstones

UNCOMMON

1. [Contrast medium; barium]
2. Dermoid cyst (eg, teeth)
3. Enteroliths in small bowel or Meckel's diverticulum
4. Milk of calcium (eg, in gallbladder or kidney, Pott's abscess, meconium, granulomatous lymph node, or chronic tubo-ovarian abscess)
5. Myxoglobulosis of appendix
6. Renal calculi (eg, in calyceal diverticulum or hydro-nephrosis)
7. Urachal cyst calculi

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

Reference

1. Baker SR, Cho KC: The Abdominal Plain Film with Correlative Imaging. Norwalk, CT: Appleton & Lange, 1998

Gamut G-250

ABDOMINAL CALCIFICATION(S) WITH A CONCRETION OR ANNULAR MORPHOLOGY

COMMON

1. Aneurysm; arteriovenous malformation; atherosclerosis
2. Appendiceal fecalith (calculus)
3. [Foreign body (eg, pill)]
4. Gallstone
5. Meconium
6. Pancreatic calculus
7. Phlebolith or lympholith (eg, normal pelvic veins; splenolith or hepatolith; hemangioma or lymphangioma; varicocele)
8. Prostatic calculus
9. Urinary tract calculus
10. Varix

UNCOMMON

1. Cyst (mesenteric; ovarian; renal; splenic)
2. Dermoid cyst
3. Diverticulum calculus (eg, colonic; duodenal; Meckel's)
4. Enterolith
5. Epiploic appendage
6. Lithopedion
7. Mineral oil granuloma
8. Mucocele or myxoglobulosis of appendix
9. Parasitic disease (esp. hydatid disease—*Echinococcus granulosus* or *E. multilocularis*; *Armillifer* infection; guinea worm infection or cysticercosis of abdominal wall or back)
10. Pseudomyxoma peritonei (eg, from pseudomucinous cystadenoma of ovary; mucocele of appendix)
11. Urachal calculus
12. Urethral calculus

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

Reference

1. Baker SR, Cho KC: The Abdominal Plain Film with Correlative Imaging. Norwalk, CT: Appleton & Lange, 1998

Gamut G-251**WIDESPREAD ABDOMINAL CALCIFICATIONS****COMMON**

1. Atherosclerosis
2. Phleboliths (eg, normal; hemangioma)
3. Tuberculosis or histoplasmosis in liver, spleen, lymph nodes, or peritoneum

UNCOMMON

1. Fat necrosis (esp. pancreatitis; Weber-Christian disease)
2. [Hemochromatosis (liver and spleen)]
3. Meconium peritonitis
4. Metastases (eg, neuroblastoma; ovarian cystadenocarcinoma; colloid carcinoma of colon)
5. Mineral oil granulomas (peritoneal instillation)
6. Myositis (fibrodysplasia) ossificans progressiva (esp. abdominal wall)
7. Parasitic disease (esp. hydatid cysts or *Armillifer* infestation of peritoneum or mesentery; guinea worm infection or cysticercosis of abdominal wall or back)
8. Pseudomyxoma peritonei (eg, from pseudomucinous cystadenoma of ovary; mucocele of appendix)
9. Scleroderma; dermatomyositis (abdominal wall)
10. Undifferentiated abdominal malignancy

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Baker SR, Cho KC: The Abdominal Plain Film with Correlative Imaging. Norwalk, CT: Appleton & Lange, 1998
2. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 1044–1049
3. Swischuk LE, John SD: Differential Diagnosis in Pediatric Radiology. (ed 2) Baltimore: Williams & Wilkins, 1995

Gamut G-252**ABDOMINAL WALL CALCIFICATION**

1. Fat necrosis
2. Hypercalcemic state; idiopathic calcinosis
3. Myositis (fibrodysplasia) ossificans progressiva; myositis ossificans
4. Neoplasm of abdominal wall (incl. osteoma; osteosarcoma; chondrosarcoma)
5. [Opaque medication]
6. Parasitic disease (esp. guinea worm infection or cysticercosis of abdominal wall or back; *Armillifer* infection of peritoneum)
7. Scar; burn
8. Scleroderma; dermatomyositis
9. [Skin nodule; tattoo; colostomy orifice]

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Baker SR, Cho KC: Abdominal calcifications. In Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 178–189
2. Eisenberg RL: Gastrointestinal Radiology: A Pattern Approach. (ed 3) Philadelphia: Lippincott, 1996, pp 1049–1051

Gamut G-253**ABDOMINAL WALL MASS
(ESP. ON US, CT, OR MRI)****COMMON**

1. Abscess_g
2. Hematoma
3. Umbilical or ventral hernia

UNCOMMON

1. Endometrioma in scar
2. Neoplasm (eg, desmoid tumor; lipoma; neurofibroma; malignant fibrous histiocytoma; metastasis)
3. Omphalomesenteric cyst
4. Seroma; cellulitis
5. Urachal cyst

References

1. Marn CS: Anterior abdominal wall. In: Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 2010–2019
2. Siegel MJ: Pediatric Body CT. Philadelphia: Lippincott Williams & Wilkins, 1999
3. Williamson MR: Chapter 5. Abdominal ultrasound. In: Essentials of Ultrasound. Philadelphia: WB Saunders, 1996, p 68

Gamut G-254**CYSTIC ABDOMINAL MASS IN A
FETUS OR NEWBORN (US)****COMMON**

1. Dilated bladder
2. [Dilated bowel]
3. Hydronephrosis
4. Multicystic dysplastic kidney
5. Ovarian cyst

UNCOMMON

1. Choledochal cyst
2. Dilated ureter
3. Enteric duplication cyst
4. Hepatic cyst or cystic tumor (eg, mesenchymal hamartoma)
5. Hydrometrocolpos
6. Lymphangioma (incl. mesenteric cyst)
7. Persistent cloaca
8. Splenic cyst
9. Urachal cyst
10. Urinoma

[] This condition does not actually cause the gamuted imaging finding, but can produce imaging changes that simulate it.

References

1. Bryan, PJ: Lecture at Eastern Radiological Society Meeting, Dublin, Ireland, 1990.
2. Fernbach SK: Neonatal gastrointestinal radiology. In: Gore RM, Levine MS (eds): Textbook of Gastrointestinal Radiology. (ed 2) Philadelphia: WB Saunders, 2000, pp 2042–2073

Gamut G-255**UPPER ABDOMINAL MASS
IN A NEONATE OR CHILD****COMMON**

1. Abscess_g, abdominal (eg, retrocecal appendiceal)
2. Adrenal hemorrhage, cyst, or tumor (See H-124)
3. Fecal masses (esp. Hirschsprung disease)
4. Gastric dilatation (fluid filled stomach)
5. Hematoma (esp. splenic)
6. Hepatomegaly (See G-141-1 and -2)
7. Hydronephrosis
8. Intestinal obstruction (fluid-filled loop)
9. Intussusception
10. Lymphoma_g
11. Metastasis
12. Multicystic dysplastic kidney
13. Neuroblastoma; other neural tumor

14. Pyloric stenosis
15. Renal neoplasm (eg, Wilms' tumor; mesoblastic nephroma) (See H-42)
16. Splenomegaly (See G-197, 198)

UNCOMMON

1. Bezoar, gastric
2. Bone lesion (eg, aneurysmal bone cyst or sarcoma of spine)
3. Cyst (eg, mesenteric; omental; renal; splenic; pancreatic; hepatic; choledochal; duplication; dermoid; hydatid)
4. Hepatic mass (eg, abscess; cyst; hepatoblastoma; hemangioma; hemangioendothelioma; hepatoma) (See G-154–157)
5. Infantile polycystic kidneys
6. Lymphangioma of mesentery or omentum
7. Meconium (eg, in cystic fibrosis)
8. Meningocele (anterior; lateral)
9. Renal vein thrombosis
10. Retroperitoneal lesion (eg, teratoma; sarcoma; hematoma)
11. Urinoma; lymphocele

References

1. Chan CY, Chan SM, Liauw L: A large abdominal mass in a young girl. *Br J Radiol* 2000;7:913–914
2. Fernbach SK: Neonatal gastrointestinal radiology. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 2042–2073
3. Kirks DR, Merten DF, Grossman H, Bowie JD: Diagnostic imaging of pediatric abdominal masses: an overview. *Radiol Clin North Am* 1981;19:527–545
4. Koop CE: Abdominal mass in the newborn infant. *N Engl J Med* 1973;289:569–571
5. Melicow MM, Uson AC: Palpable abdominal masses in infants and children: A report based on a review of 653 cases. *J Urol* 1959;81:705–710
6. Siegel MJ: *Pediatric Body CT*. Philadelphia: Lippincott Williams & Wilkins, 1999
7. Swischuk LE, John SD: *Differential Diagnosis in Pediatric Radiology*. (ed 2) Baltimore: Williams & Wilkins, 1995
8. Tank ES, Poznanski AK, Holt JF: The radiologic discrimination of abdominal masses in infants. *J Urol* 1973;109:128–132
9. Wedge JJ, Grosfeld JL, Smith JP: Abdominal masses in the newborn: 63 cases. *J Urol* 1971;106:770–775

Gamut G-256

LOWER ABDOMINAL MASS IN A NEONATE OR CHILD

COMMON

1. Abscess, abdominal (eg, appendiceal)
2. Bladder, distended
3. Fecal impaction and masses (esp. Hirschsprung disease)
4. Intestinal obstruction (fluid-filled loop)
5. Intussusception
6. Lymphoma
7. Metastasis
8. Ovarian cyst
9. Pregnancy

UNCOMMON

1. Bone lesion (eg, aneurysmal bone cyst or sarcoma of pelvis or LS spine)
2. Cyst, other (eg, mesenteric; dermoid; urachal; duplication; hydatid)
3. Hydrometrocolpos
4. Meconium (eg, in cystic fibrosis)
5. Meningocele (anterior; lateral)
6. Retroperitoneal lesion (eg, teratoma; sarcoma; hematoma)
7. Urinoma; lymphocele

References

1. Chan CY, Chan SM, Liauw L: A large abdominal mass in a young girl. *Br J Radiol* 2000;7:913–914
2. Fernbach SK: Neonatal gastrointestinal radiology. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 2042–2073
3. Kirks DR, Merten DF, Grossman H, Bowie JD: Diagnostic imaging of pediatric abdominal masses: an overview. *Radiol Clin North Am* 1981;19:527–545
4. Koop CE: Abdominal mass in the newborn infant. *N Engl J Med* 1973;289:569–571
5. Melicow MM, Uson AC: Palpable abdominal masses in infants and children: A report based on a review of 653 cases. *J Urol* 1959;81:705–710

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6. Moss H, Wright DW, Weiss RG: Abdominal masses in pediatric patients. In: Wyllie R, Hyams JS: Pediatric Gastrointestinal Disease. (ed 2) Philadelphia: WB Saunders, 1999, pp 126–127
7. Siegel MJ: Pediatric Body CT. Philadelphia: Lippincott Williams & Wilkins, 1999
8. Swischuk LE, John SD: Differential Diagnosis in Pediatric Radiology. (ed 2) Baltimore: Williams & Wilkins, 1995
9. Tank ES, Poznanski AK, Holt JF: The radiologic discrimination of abdominal masses in infants. *J Urol* 1973;109:128–132
10. Wedge JJ, Grosfeld JL, Smith JP: Abdominal masses in the newborn: 63 cases. *J Urol* 1971;106:770–775

Gamut G-257**ABDOMINAL LYMPHADENOPATHY
(US, CT, MRI)****BENIGN**

- +1. AIDS (eg, bacillary angiomatosis); AIDS related complex
2. Amyloidosis
3. Castleman disease
4. Cavitory mesenteric lymph node syndrome
5. Cirrhosis (alcohol induced); primary biliary cirrhosis
6. Crohn's disease
7. Diverticulitis
- *8. Mycobacterial infection (eg, *Mycobacterium tuberculosis*; *M. avium intracellulare*)
9. Pyogenic infection
10. Sarcoidosis
11. Sclerosing cholangitis
12. Whipple's disease

MALIGNANT

- +1. Kaposi sarcoma
2. Lymphoma; Hodgkin disease; leukemia
- *3. Metastatic disease

* Lymph nodes may show low attenuation.

+ Lymph nodes may show very high attenuation.

References

1. Chintapalli KN, Esola CC, Chopra S, et al: Pericolonic mesenteric lymph nodes: an aid in distinguishing diverticulitis from cancer of the colon. *AJR* 1997;125:3
2. Dodd GD, Baron RL, Oliver JH, et al: Enlarged abdominal lymph nodes in end-stage cirrhosis: CT—histopathologic correlation in 507 patients. *Radiology* 1997; 203:127–130
3. Dodd GD, Baron RL, Oliver JH, et al: Spectrum of imaging findings of the liver in endstage cirrhosis: part I, gross morphology and diffuse abnormalities. *AJR* 1999;173:1185–1192
4. Okada Y, Yao YK, Yunoki M, et al: Lymph nodes in the hepatoduodenal ligament: US appearances with CT and MR correlation. *Clin Radiol* 1996;51:160–166
5. Warshauer DM, Dumbleton SA, Molina PL, et al: Abdominal CT findings in sarcoidosis: radiologic and clinical correlation. *Radiology* 1994;192:93–98

Gamut G-258**FAT DENSITY IN THE ABDOMEN
(CT, MRI)****COMMON**

1. Dermoid cyst; teratoma
2. Fatty change in liver or pancreas
3. Lipoma; liposarcoma
4. Lipomatosis (pelvic; retroperitoneal; renal sinus)
5. Obesity

UNCOMMON

1. Angiomyolipoma of kidney or liver
2. Omental or mesenteric hernia
3. Steroid therapy; Cushing syndrome
4. Xanthogranulomatous pyelonephritis

Reference

1. Katz DL: Fatty densities on CT. *Semin Roentgenol* 1978; 13:187

Gamut G-259

“PSEUDOKIDNEY” OR “BULL’S-EYE” SIGN IN THE ABDOMEN (US)

COMMON

1. Gastroesophageal junction
2. Hypertrophic pyloric stenosis
3. Inflammatory bowel disease with wall thickening (eg, amebiasis; Crohn’s disease; diverticulitis; Whipple’s disease)
4. Intussusception (multiple concentric rings)
5. Malignant neoplasm with thickening of bowel wall (eg, carcinoma; lymphoma_g; leiomyosarcoma; metastasis to serosa)

UNCOMMON

1. Amyloidosis
2. Intramural hematoma (eg, trauma; anticoagulants; blood dyscrasia_g)

Reference

1. Eisenberg RL: Clinical Imaging: An Atlas of Differential Diagnosis. Gaithersburg, MD: Aspen Publ, 1992, pp 452–453

Gamut G-260

ABNORMAL ABDOMINAL VESSELS ON ANGIOGRAPHY

COMMON

1. Aneurysm_g
2. Anomalous origin or congenital absence of a vessel (eg, sequestration of lung)
3. Arterial occlusion, incl. collateral circulation (eg, via artery of Drummond; arc of Riolan; meandering mesenteric artery)
4. Arteritis, microaneurysms (eg, Behçet S.; Takayasu arteritis; necrotizing angiitis from drug abuse; my-

cotic aneurysms; polyarteritis nodosa; other connective tissue disease {collagen disease}_g)

5. Atherosclerosis
6. Fibromuscular dysplasia
7. Neoplasm, incl. neovascularity (eg, angiomyolipoma; pheochromocytoma; renal cell carcinoma) or vascular cuffing or displacement (esp. carcinoma)
8. Thromboembolism
9. Trauma (lacerated or transected vessel)
10. Varices (eg, portal venous hypertension or obstruction; inferior vena cava obstruction)

UNCOMMON

1. Anomalous pulmonary vein draining below the diaphragm (incl. venolobar S.)
2. Arteriovenous communication
3. Azygos continuation of inferior vena cava
4. Coarctation of abdominal aorta
5. Neurofibromatosis, arterial
6. Phlebitis (esp. pylephlebitis)
7. Portal vein occlusion (“cavernous transformation”)
8. Pregnancy (eg, hypertrophied uterine vessels; compression of iliac vein)
9. Pseudoxanthoma elasticum
10. Telangiectasia (eg, Osler-Weber-Rendu S.)

References

1. Moskowitz M, Zimmerman H, Felson B: The meandering mesenteric artery of the colon. *AJR* 1964;92:1088–1099
2. Nemcek AA, Vogelzang RL: Angiography and interventional radiology of the alimentary tract. In: Gore RM, Levine MS (eds): *Textbook of Gastrointestinal Radiology*. (ed 2) Philadelphia: WB Saunders, 2000, pp 509–511

Gamut G-261

**COMPLICATIONS OF AIDS
IN THE GASTROINTESTINAL TRACT
AND ABDOMEN**

ESOPHAGITIS

1. Candidiasis (moniliasis)
2. Cytomegalovirus
3. Herpes
4. HIV

GASTRITIS

1. *Cryptosporidium* antritis
2. Cytomegalovirus infection (aphthoid ulcers; thick rugae, esp. at esophagogastric junction and antrum)

**ENTERITIS WITH THICK IRREGULAR FOLDS,
SPASM, AND OCCASIONAL DILATATION**

1. Cryptosporidiosis
2. Cytomegalovirus infection
3. *Mycobacterium avium-intracellulare* infection
4. Parasitic disease (esp. giardiasis; strongyloidiasis)

COLITIS

1. Acute appendicitis
2. Cytomegalovirus infection of ileum and colon
3. Infectious colitis, esp. in rectum of homosexual men (eg, amebiasis; shigellosis; lymphogranuloma venereum {chlamydial proctitis}; gonorrhea)
4. Pseudomembranous colitis

**NEOPLASM OF GI TRACT, OCCASIONALLY
WITH INTUSSUSCEPTION OR OBSTRUCTION**

1. Kaposi sarcoma
2. Lymphoma

LIVER AND BILE DUCT INVOLVEMENT

1. AIDS-related cholangitis (eg, cytomegalovirus; *Cryptosporidium*)

2. Liver abscess, infection (eg, *Mycobacterium avium-intracellulare*; *Pneumocystis carinii*; cytomegalovirus; histoplasmosis; cryptococcosis; bacillary angiomatosis)
3. Neoplasm (incl. lymphoma)
4. Peliosis hepatis

SPLENIC INVOLVEMENT

1. Lymphoma
2. Splenic abscess, infection (eg, *Mycobacterium avium-intracellulare*; istoplasmosis; cryptococcosis; cytomegalovirus; *Pneumocystis carinii*)
3. Splenic infarcts (septic emboli)
4. Splenomegaly

References

1. Gore RM, Miller FH, Yaghamai V: Acquired immunodeficiency syndrome (AIDS) of the abdominal organs; imaging features. *Semin US, CT, and MR* 1998;19:175–189
2. Janoff EN, Smith PD: Emerging concepts in gastrointestinal aspects of HIV-1 pathogenesis and management. *Gastroenterology* 2001;120:607–621