

External brain tamponade: a rare complication of decompressive craniectomy

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A 2-year-old child presented in neurosurgery clinic with a tense swelling on left side of the scalp and with a progressive decline of mental status for the prior 2–3 days. The patient had undergone a decompressive craniectomy one and a half months prior for a severe traumatic brain injury. A CT head scan was performed, and revealed a left fronto-temporo-parietal craniectomy defect with a large overlying fluid attenuation collection in the subgaleal space (CT attenuation values between 6 and 12 HU). There was compression of underlying brain parenchyma. Post traumatic gliotic areas were also identified in the left cerebral hemisphere (Fig. 1a–c). Considering the operative history and the typical imaging findings, a diagnosis of external brain tamponade was made. The patient underwent emergent drainage of the collection, and made a dramatic post operative recovery.

Decompressive craniectomy implies removal of a portion of the skull to decompress the intracranial contents. This neurosurgical procedure has an established and important role in neurocritical care. The common indications are traumatic brain injury, refractory malignant intracranial hypertension, subarachnoid haemorrhage and

malignant middle cerebral artery infarction [1–3]. The craniectomy procedure can be bilateral in cases of diffuse brain oedema without midline shift, or unilateral in patients with one sided brain swelling with midline shift [2]. Since the operation involves removal of a large piece of skull, it leads to alteration of the cranial pathophysiology, and can also result in a variety of complications like external brain tamponade, trephine syndrome, extra cranial herniations, cerebral contusions, infections, subgaleal or subdural hygromas [2, 4]. External brain tamponade is one of the uncommon, but serious complications, which is characterized by a tense craniectomy flap, neurological decline, subgaleal fluid collection with mass effect on underlying brain, and neurological improvement after drainage [2, 4]. The underlying cause is tense accumulation of fluid in the subgaleal space due to a ball valve type effect or pressure gradient [2]. The CT scan is the imaging modality of choice for evaluation of the post craniectomy complications because of its high speed, relatively low cost and widespread availability. On the CT scan, external brain tamponade is visualized as a fluid attenuation collection in the subgaleal space with bulging of the skin flap, and

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Fig. 1 Volume rendered CT image (a) showing the large tense swelling in the scalp overlying the craniectomy site (*wavy arrows*). Coronal MPR image (b) and axial contrast enhanced CT image

(c) showing the subgaleal collection at the craniectomy site (*arrows*) along with post traumatic gliotic changes in the left cerebral hemisphere (*arrowheads*)

compression of underlying brain parenchyma [2]. All these findings were present in our case.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Statement of human and animal rights All procedures performed in this study involving human participant are in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

Informed consent Informed consent was obtained from parents of patient for voluntary participation in the study.

References

1. Hutchinson P, Timofeev I, Kirkpatrick P (2007) Surgery for brain edema. *Neurosurg Focus* 22:E14
2. Sinclair AG, Scoffings DJ (2010) Imaging of the postoperative cranium. *Radiographics* 30:461–482
3. Schirmer CM, Hoit DA, Malek AM (2007) Decompressive hemicraniectomy for treatment of intractable intracranial hypertension after aneurismal subarachnoid hemorrhage. *Stroke* 38:987–992
4. Akins PT, Guppy KH (2008) Sinking skin flaps, paradoxical herniation and external brain tamponade: a review of decompressive craniectomy management. *Neurocrit Care* 9:269–276