Labour pain management in a parturient with an implanted intrathecal pump

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Purpose: We report the peripartum anaesthetic management for vaginal delivery of a chronic pain patient with an implanted intrathecal pump. This is the first report describing labour analgesia in a patient with such a device. As intrathecal systems become more popular for the management of nonmalignant pain, this situation is likely to be encountered with increasing frequency in the future.

Clinical features: The patient was a nulliparous 23-yr-old with a history of chronic hereditary pancreatitis whose intractable pain had been managed with intrathecal morphine 3 $mg \cdot day^{-1}$ via an implantable pump for four years. Inadequate time between presentation and onset of labour prevented us from using this system. Intravenous patient controlled analgesia with fentanyl using a bolus of 25 μg and a lockout of five minutes was ineffective and epidural analgesia using bupivacaine was initiated and resulted in satisfactory analgesia.

Conclusion: The presence of an existing intrathecal delivery system does not preclude the use of supplemental epidural analgesia during labour.

Objectif : Nous décrivons la prise en charge périgestationnelle de l'anesthésie d'une patiente porteuse d'une pompe sous-arachnoïdienne implantée. Il s'agit du premier compte rendu de l'analgésie en cours de travail d'une porteuse de ce dispositif. Comme le système de pompe sous-arachnoïdien est maintenant plus souvent utilisé pour la gestion de la douleur non cancéreuse, il est probable que cette situation se présentera plus fréquemment à l'avenir.

Éléments cliniques : La patiente. une nullipare de 23 ans, avait des antécédents de pancréatite chronique héréditaire et souffrait d'une douleur réfractaire contrôlée depuis quatre années par une pompe implantée. À cause du court délai entre l'admission et le début du travail, il était impossible de faire usage de ce système. L'analgésie intraveineuse contrôlée par la patiente au fentanyl avec un bolus de 25 μg et un intervalle de sécurité de cinq minutes étant inefficace, une analgésie épidurale à la bupivacaïne a été mise en marche et a été satisfaisante.

Conclusion : La présence d'un système sous-arachnoïdien implanté pour l'analgésie n'est pas un obstacle à l'analgésie épidurale complémentaire pendant le travail.

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HEREDITARY pancreatitis is a rare cause of chronic pain. This disorder begins in childhood and is characterised by recurring bouts of epigastric pain with intervening asymptomatic periods.[1] Therapy with intrathecal opioids may be needed to control the disabling pain when surgical interventions fail. Our case involved a parturient with hereditary pancreatitis and an implanted intrathecal pump who presented for peripartum anaesthetic management. There is no information regarding the advantages or risks of employing such a device for labour and delivery. This report highlights the importance of careful planning by the surgical and anaesthesia teams to optimise analgesia or anaesthesia for patients in the perioperative period.

Case report

A 23-yr-old G2P0 term parturient with juvenile onset pancreatitis and mild scoliosis presented to the obstetrical anaesthesia service for consultation. A lateral pancreato-jejunostomy at age 12 yr, and a total pancreatectomy at 15 yr had failed to relieve her epigastric pain. The disabling pain was unresponsive to coeliac plexus blockade and high dose oral opioids, so an intrathecal pump (SynchroMed, Medtronic) was implanted subcutaneously at age 19 yr. The implantation was performed under general anaesthesia, and involved direct surgical exposure through a midline incision in the back from the level of L1 to L3. It had provided excellent analgesia for several years, and allowed her to be gainfully employed.

The pump delivered 0.12 ml·day^{-1} of a solution containing 25 mg·ml^{-1} morphine (3 mg·day^{-1}). The main reservoir and side injection port could be accessed percutaneously (see Figure 1). The tubing between the injection port and the tip of the intrathecal catheter had a volume of 0.2 ml, and therefore contained 5 mg morphine (1.7 times the daily dose). In consultation with the pain service, we planned to replace the reservoir solution with dilute morphine (2 mg·ml^{-1}), allow two days for the tubing to clear, and then reprogram the pump to deliver the same dose of morphine (i.e., 3 mg·day^{-1}). We could then bolus the side port safely (as the tubing would only contain 0.4 mg morphine) to administer intermittent doses of local anaesthetic and/or opioid as required, for labour analgesia or caesarean section, should one become necessary.

However, 12 hr after the initial consultation, the patient went into active labour. Intravenous patient-controlled analgesia with 25 μg fentanyl bolus doses, and lockout interval of five minutes was initiated. It provided excessive sedation between contractions and inadequate analgesia during contractions. An epidural catheter was then placed below the level of her scar, at L3-L4. A midline approach failed, and a paramedian approach resulted in a dural puncture. A subsequent paramedian approach was successful and a multiorifice catheter (B. Braun) was advanced 8 cm into the epidural space. Slow titration of 12 ml bupivacaine 0.25% produced a patchy block. An additional 10 ml bupivacaine 0.1% resulted in excellent analgesia until the spontaneous vaginal delivery of a healthy infant two and one half hours later. Apgar scores were 9 at one and five minutes. There was no evidence of opioid withdrawal in the neonate. The patient did not develop a post dural puncture headache, and was discharged home 48 hr postpartum. Six months later she remained comfortable receiving intrathecal morphine, 3 mg·day^{-1}. Her dose requirement was unaltered during the pregnancy and postpartum period.

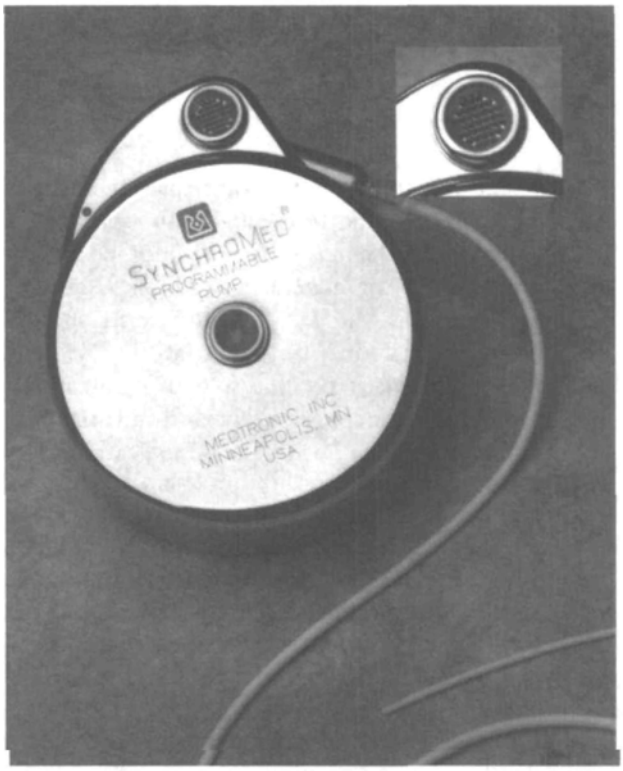

FIGURE 1 The SynchroMed infusion system (Medtronic). The centre port refills the reservoir, and the side port allows direct intrathecal injection.

Discussion

Chronic administration of intrathecal opioids which has long been used to treat malignant pain[2-5] has recently gained popularity for the treatment of non-malignant pain.[6-9] Our report is the first describing a

parturient undergoing labour analgesia and delivery with such a device. After failure of intravenous fentanyl an epidural catheter was inserted and provided excellent analgesia. Although the existing intathecal system could have been used to deliver analgesia, we elected not to do so.

Installation of the system involves placement of an intrathecal catheter, and tunnelling it to a pump that is implanted subcutaneously in the abdomen or low thorax under local or general anaesthesia. Rigorous patient selection is the key to long term success. Patient criteria include: pain unresponsive to high dose oral opioids, lack of success with co-analgesics such as tricyclic antidepressants or anti-inflammatory drugs, intolerable side effects of oral medications, lack of response or patient refusal of nerve blocks or spinal cord stimulators, psychological screening, and trial of neuraxial opioids demonstrating ≥50% reduction in pain. Some authors recommend alternating opioid with placebo during this trial period.[10] If effective analgesia is achieved, care must be taken after implantation to gradually taper high doses of oral opioids to prevent withdrawal symptoms.[11] Regardless of selection criteria, however, some patients still have a poor response or are unhappy with an implanted mechanical device, and request its removal.[7]

Patients receiving chronic opioids often have special needs. Mixed agonists-antagonists, such as nalbuphine or butorphanol, which are commonly used for labour analgesia, may precipitate withdrawal symptoms. Additionally, tolerance may develop and opioid dose requirements may increase, owing to increased nociceptive stimulation, or to downregulation of receptors. In our patient the dose remained constant for several years as has been observed in a subset of patients with neuropathic pain.[6] Initially we administered fentanyl by patient controlled analgesia, to allow titration to her own analgesic requirements. It proved ineffective although safety and efficacy of this drug during labour have been reported.[12]

The decision to perform neuraxial anaesthesia after back surgery with or without instrumentation is not straightforward. Spinal anaesthesia is usually uneventful, but epidural anaesthesia may be difficult to perform or result in a patchy block due to obliteration and/or scarring of the epidural space.[13] We administered epidural analgesia, and despite difficulty locating the epidural space and an inadvertent dural puncture, effective analgesia was achieved, albeit using 33% more bupivacaine than our patients usually require. Although there was concern regarding potential shearing of the indwelling catheter during epidural placement, we considered this risk minimal when accessing a remote interspace. An abdominal radiograph (or fluoroscopy in the non-pregnant patient) can be valuable in delineating the insertion point and direction of the intrathecal catheter.

Use of the existing intrathecal system, though appealing and easily accessible, is not without hazard. Many infusion systems allow direct intrathecal access through a port on the pump housing (see Figure 1). When implanted subcutaneously, however, the purpose and location of the pump's access ports may be difficult to discern. Aspiration is usually possible through the side port provided the tubing is not kinked nor partially obstructed.

The pump reservoir and tubing contained highly concentrated opioid, which could be inadvertently injected into the subarachnoid space. In our case, the tubing had a volume of approximately 0.2 ml, containing morphine 25 $mg \cdot ml^{-1}$. Injection via the side port, without prior aspiration of its contents, would have resulted in a bolus of 5 mg of morphine (1.7 times her daily dose). Moreover, the injection port itself had a volume of 0.3 ml, (i.e., total dead space 0.5 ml) which should be considered as it may affect the amount of injected drug that would actually reach the subarachnoid space. Owing to our unfamiliarity with these parameters, and unplanned presentation of this patient, we thought it prudent not to utilise the existing system to administer intrathecal agents.

Pumps differ in their characteristics and contents. Pump specifications are published,[14] or available from the manufacturer or the local pain service. Even with this knowledge, care must be taken when any intervention is planned. For example, one report has described an attempt to refill a reservoir with 18 ml morphine 25 $mg \cdot ml^{-1}$, which accidentally resulted in an injection into a subcutaneous seroma, instead of the reservoir.[15] There may have been serious sequelae had that dose been given intrathecally via the side port.

Infection is a concern with any implanted device, and prophylactic antibiotics are recommended for procedures that cause bacteraemia. Byers *et al.* looked at infectious complications of implanted systems, and found an infection rate of 0.77 per 1000 catheter days, in a population of mostly cancer patients. Almost all of these occurred in the first two weeks following implantation.[16] Treatment was with antibiotics; catheter removal was usually, but not always, performed.[17] Whether antibiotic treatment of patients with implantable pumps is necessary for labour and delivery is unclear. Nevertheless, we considered the potential benefits to outweigh the risks, and administered paripartum antibiotics.

The failure rate of pumps in pregnancy is unknown. A considerable change in pain in a previously stable

patient often indicates mechanical system failure. Causes include battery depletion, pump malfunction, and catheter problems, such as blockage, discontinuity, or withdrawal from the intrathecal space. It seems conceivable that an expanding pregnant abdomen could dislocate the pump housing and dislodge the catheter. This patient's pump was located laterally and was noted to remain in place as her pregnancy progressed. Perhaps a lateral anatomical site would be preferable in women of childbearing age to minimise the risk of system failure during pregnancy.

Another complication of chronic intrathecal opioids occurring more commonly in young women than men, involves a syndrome of polyarthralgia and amenorrhea.[5] The cause of these symptoms is unclear, but appears dose-related and often resolves with a drug holiday or dose reduction.

In summary, this report describes a chronic pain patient with an implanted intrathecal pump who received supplemental epidural analgesia for labour and vaginal delivery. With increasing use of intrathecal opioids for nonmalignant pain, it is likely that anaesthetists will encounter these patients more frequently. Careful multidisciplinary planning can optimise pain management in the perioperative or peripartum period. Epidural analgesia can be used safely and effectively for labour analgesia in this population.

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