Case Report

Case series on use of intrathecal morphine in pediatric thoracic spine surgeries

ABSTRACT

Intrathecal morphine is a very good analgesic agent and was used frequently in the past. Its use has decreased over the years due to side effects such as respiratory depression, nausea, vomiting, pruritis, and so on. Also, with the introduction of drugs like clonidine and the availability of ultrasonography for regional blocks, the role of morphine has declined. Yet, there are surgeries where intrathecal morphine supersedes all other analgesic modalities to provide excellent intraoperative and postoperative analgesia.

Key words: Morphine, pediatric, thoracic

Introduction

The use of intrathecal morphine dates back to 1979 by Wang *et al*.[1] for acute and chronic pain relief. It has been used effectively in postoperative pain management for cardiac, orthopedic, and thoracic surgeries. However, there have always been concerns due to side effects such as nausea, vomiting, pruritis, and respiratory depression.[2] Also, with the introduction of newer drugs like clonidine and techniques like ultrasound-guided nerve blocks, its use has declined over the years. Yet, intrathecal morphine is very useful where other analgesic modalities are inappropriate or impractical.

Case Reports

Case 1

A 7-year-old male child, weighing 18 kg, presented with upper back pain and difficulty in movement for 2 months and anorexia for 1 month. Magnetic Resonance Imaging (MRI) was done and he was diagnosed with Pott's spine at D4-D6.

Case 2

An 8-year-old male child, weighing 20 kg, presented with upper back pain for 5 months. Also, there was a history of progressively increasing lower limb weakness over the last 2 months, associated with loss of appetite and weight loss. The child was diagnosed with Pott's spine at D5-D7 with spastic paraplegia.

Case 3

A 10-year-old male child, weighing 35 kg, presented with upper back pain for the last 3 months, associated with decreased movement in the upper and lower limbs. MRI spine and X-ray spine were done and the child was diagnosed with Pott's spine at level D9-D10 [Figure 1].

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Case 4

A 12-year-old male child, weighing 32 kg, presented with back pain and difficulty in movement. MRI spine showed a lesion at D7-9 which was confirmed as Tubercular pathology [Figure 2].

Anesthetic management

All the children were scheduled for anterolateral decompression at the affected spine level. The sensory and motor deficit was documented and parental consent was taken for each child. After confirming their fasting status, the children were taken to the operating room. Standard monitors were attached and intravenous access was secured. Injection (inj) fentanyl 2 mcg/kg was administered intravenously. General anesthesia was induced with inj propofol 2 mg/kg along with sevoflurane in oxygen and nitrous oxide. After ventilation check, muscle relaxation was achieved with inj rocuronium 0.6 mg/Kg and the trachea was intubated. The children were then positioned laterally for the surgery and in the same position, 3 mcg/kg of preservative-free morphine in 2 ml of saline was administered intrathecally at the L2-L3 level. Anesthesia was maintained with sevoflurane in oxygen and nitrous oxide with intermittent top-ups of rocuronium as required. Intraoperatively, the hemodynamic parameters remained stable and the requirement for neuromuscular blocking agent and opioids were significantly reduced. At the end of the surgery, neuromuscular blockade was reversed and the trachea was extubated. The children were comfortable and pain-free. Inj paracetamol 15 mg/kg was given every 6 h as a component of multimodal analgesia. No side effects related to morphine were observed in the postoperative period of 24 h.

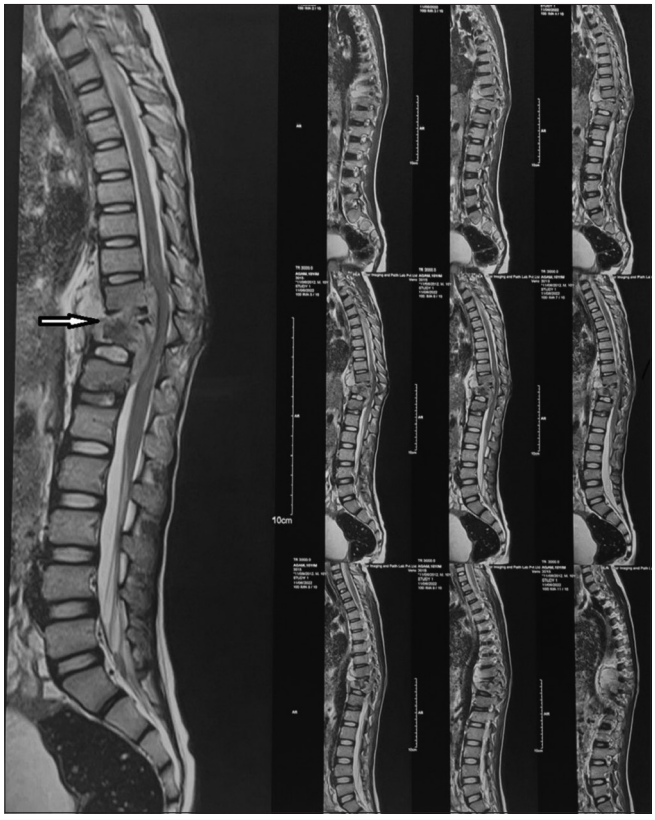

Figure 1: Magnetic Resonance Imaging of the spine (case 3) showing lesion at D9-10

Discussion

Thoracotomy and soft tissue dissection of the spine lead to severe postoperative pain. If this pain is not relieved adequately, it can cause difficulty in breathing, leading to respiratory complications and infections like pneumonia. To counter this pain, several analgesic modalities are being used [Table 1]. Analgesia by using non-steroidal anti-inflammatory drugs (NSAIDs) administered intravenously (iv) or intramuscularly (im) may not be very effective analgesia and requires frequent dosing.

Epidural analgesia, though being the gold standard was not recommended in this case as the procedure was technically difficult due to degenerative changes and the risk of dura puncture. Also, disruption of the epidural space during the surgery may lead to the unpredictable spread of the drug and its absorption, catheter migration or blockade, and the dilution of epidural drug from surgical bleeding.[3] Moreover, postoperative assessment of neurological function becomes difficult due to local anesthetic (LA)-induced sensory or motor deficits.

Interpleural block provides good analgesia in thoracotomy by placing local anesthetic between the parietal and visceral pleura to produce an ipsilateral somatic block of thoracic dermatomes. However, there is a concern about pneumothorax and LA toxicity. Intercostal block with LA at multiple levels is usually given by the surgeon at the end of the surgery, under direct vision, but the effect is short lasting and requires additional analgesics. Both these techniques would have relieved the incision pain of thoracotomy, leaving behind the pain due to dissection of the vertebrae untreated and hence not preferred in our cases.

Paravertebral analgesia is achieved by depositing LA alongside the vertebral column in paravertebral space, to block the emerging spinal nerves. Although it produces effective analgesia, it was not preferred as the surgery mandated bilateral administration which is associated with complications such as pneumothorax, hypotension, and LA toxicity owing to the requirement of high doses.[4] Also, since the surgical site was infective, the block at the site would have led to an increased risk of spread of infections.

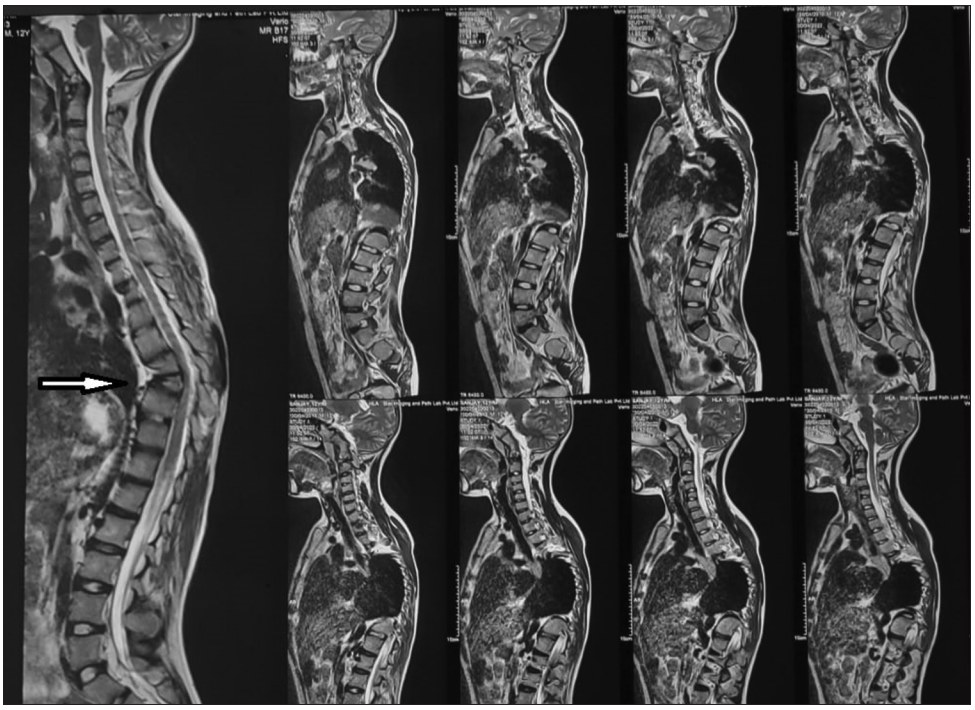

Figure 2: Magnetic Resonance Imaging of the spine (case 4) showing lesion at D7-9

Table 1: Analgesic modalities described for thoracic spine surgery

Analgesic Modalities	Advantages	Disadvantages
Epidural analgesia	Familiar technique, Repeated top ups	Technically difficult due to degenerative changes, unpredictable drug spread
Interpleural block	Good analgesia	LA toxicity, Relieves incision pain only and is ineffective for spine tissue dissection
Intercostal nerve block	Can be aseptically given by surgeon at the time of incision closure	Multiple levels, LA toxicity, Relieves incision pain only and is ineffective for spine tissue dissection
Paravertebral block	Effective analgesia	Bilateral block has to be given, Procedure-related complications
Patient Controlled analgesia by intravenous opioids	Easy but impractical in	Impractical in children, iv cannula care, high dose of opioids
NSAID (iv or im)	Safe, easy	Ineffective, frequent doses

*iv: intravenous; im: intramuscular; NSAID: Non steroidal anti-inflammatory drugs; LA: Local Anaesthetic

Patient-controlled analgesia using intravenous opioids is another method for postoperative pain control. However, it requires a higher dose of opioid administration causing increased opioid-related complications, intensive monitoring, and a dedicated staff nurse.[5] There is an increased risk of intravenous catheter occlusion or removal in pediatric patients, leading to inadequate analgesia.

We used intrathecal morphine in our cases. It was simple and easy to give as a single shot injection at the lumbar region, which was away from the surgical site and no special equipment was required. Even at a low dose, it produced effective analgesia lasting for approximately 24 h and reduced the requirement for additional analgesics. The long duration of intrathecal morphine is because of its hydrophilic nature resulting in prolonged intrathecal stay and rostral spread to the cerebrum with the ascending flow of cerebrospinal fluid. Complications like postoperative nausea and vomiting, and pruritis were not seen and the very rare occurrence of complications with the low doses used intrathecally is corroborated in the published literature.[6]

Conclusion

Intrathecal morphine, although underused, can be considered an economical, safe, effective, and easy technique for providing excellent postoperative pain relief in pediatric thoracic spinal surgeries when other modalities are not feasible.

Patient consent

Taken from the guardian of each patient.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have

given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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