Continuous Cervical Epidural Analgesia in Metastatic Spinal Cord Compression

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ABSTRACT

Metastatic spinal cord compression is a devastating complication of cancer. Patients may often require high doses of opioids that may cause side effects, myoclonus being one such. A 63-year-old male suffering from malignant spinal cord compression was admitted to our institution. The primary team managed him conservatively with pharmacotherapy with no relief of pain, and he experienced myoclonus and sedation as adverse effects. A continuous cervical epidural catheter with local anesthetic infusion was inserted for 5 days to control his pain. This relieved his pain, which was sustained even after we removed the epidural catheter on day 5, for up to 64 days until the time of his death. Continuous cervical epidural local anesthetic infusions may help with refractory pain by deafferentation of noxious stimuli. Central neuraxial blocks may be a valuable rescue in selected patients.

Key words: Continuous cervical epidural analgesia, Metastatic spinal cord compression, Opioid-induced myoclonus

INTRODUCTION

Metastatic spinal cord compression can be a challenge in palliative care. In patients with severe pain, who may not tolerate morphine, one may have to resort to the use of interventions. The present case highlights a real life clinical scenario where the use of a continuous cervical epidural catheter helped in a patient of metastatic spinal cord compression who could not tolerate opioids.

CASE REPORT

Mr. P D, a 63-year-old male, presented to the emergency room in mid-December with chief complaints of new onset of severe pain in his neck, right chest wall (corresponding to the fifth and sixth intercostal spaces) and right arm, and weakness in both lower limbs. The intensity of pain was a constant 10/10 on the numeric rating scale, not responding to intramuscular injections of diclofenac or tramadol at home. He was a known case of locally advanced nonsquamous cell lung cancer (adenocarcinoma), despite having undergone surgical resection of the tumor, chemotherapy, and radiation earlier. Comorbid illnesses included interstitial lung disease, for which the patient was on oral prednisolone 15 mg/day. Neurological examination revealed spastic paraparesis (power grade 2/5 in both lower limbs) with a flexor response on bilateral plantar reflexes. Bilateral upper limb motor power was grade 3/5. He was admitted under the care of his primary critical care physician. Magnetic resonance imaging (MRI), done in view of the symptoms, revealed the right Pancoast's

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tumor infiltrating the chest wall, right brachial plexus, and T1, T2, and T3 vertebrae. There was contiguous infiltration of the vertebral body and posterior elements with enhancing circumferential soft tissue extending the foramina and epidural space resulting in cord compression with intramedullary edema. The emergency neurosurgery team was called in for an opinion, and they ruled out surgery because of the advanced disease status of the patient. He was started on an infusion of injection fentanyl at 25 mcg/h. Dexamethasone 8 mg was started twice a day after admission. Fentanyl was escalated to 50 mcg/h and to 80 mcg/h in a day's time by the primary team for his uncontrolled pain. He continued to have breakthrough pain despite this. Owing to his uncontrolled pains, the pain management team was called in, which increased his doses for breakthrough pain by starting intravenous (i.v) morphine 10 mg every fourth hourly, which was increased to 10 mg (i.v) hourly for pain relief. The i.v fentanyl infusion was gradually titrated downward, and fentanyl transdermal patches were applied. In addition, the patient was on adjuvants for neuropathic pain, including baclofen, nortriptyline, tapentadol, and pregabalin. The pain continued to be consistently severe, and progressive (>7/10) on a numeric rating scale over the next 2 days. The Ramsay sedation score was −1, with pain reported on arousal. There was intermittent, new onset, involuntary jerky movement in the right upper limb. The caregivers, the patient, and the team noticed a vicious cycle of intense pain → opioid administration → transient worrisome drowsiness and an increase in myoclonic jerky movements → return of intense pain at the end-of-dose effect. An MRI screening was done to rule out brain metastases. It revealed an increase in the malignant spinal cord compression at D1–D2. The neurology team diagnosed opioid-induced myoclonus after ruling out possible organic causes. The patient was frustrated and reluctant to take any medication since he would attribute the bothersome drowsiness and jerky movements to medications. The pain was attributed at the time to spinal cord injury at D2 with both neuropathic and nociceptive contributors. At this point, on day 5 of admission, the pain management team recommended a continuous cervical epidural catheter after a detailed discussion within the team and with the family. The rationale was to deafferent the constant nociceptive barrage of signals traveling up the cord from D1 and below. The family physician intervened on our behalf as a patient advocate and helped translate our goals of care to both the doctors and the family.

On Christmas eve, after an informed consent, with anesthesiology stand by, the pain team inserted a cervical epidural catheter under strict aseptic precautions in the operation theater, under antibiotic cover. The patient was placed in the semi-prone position, an 18-gauge Tuohy needle was inserted between the cervical spinous processes in the midline (translaminar approach), under c arm guidance at C5–C6 level. Needle position was confirmed using a loss of resistance technique with saline and after visualizing tip in anteroposterior and lateral views under single shot and continuous fluoroscopy using water-soluble radiocontrast (iohexol 300). The 19-gauge catheter was threaded through this needle to a depth of 4 cm inside the epidural space, tunneled subcutaneously, and a bacterial filter was attached. We administered an initial bolus of a mixture of injection dexamethasone 4 mg and injection xylocard 2% 4 mL. The rationale for using the steroid was to deliver the steroid as close to the area of the cord compression as possible. The patient tolerated this procedure well. We shifted the patient to the intensive care unit for observation in the night, and he was started on an epidural infusion of the local anesthetic ropivacaine 0.1% concentration at a rate of 3 ml/h. The patient reported an immediate reduction of pain to 3/10 on the numeric rating scale. Mr. P D slept that night, and injection morphine was prescribed for rescue analgesia. He required one dose that night but refused to take any further doses after it made him drowsy. He did not report any episode of intense pain thereafter. The patient was shifted to the ward on Christmas day with a continuous cervical epidural infusion via a nonelectronic, ambulatory, disposable, elastomeric, silastic infusion device (Baxter™) filled with ropivacaine at 5 ml/h at 0.1% concentration. The patient was cheerful, pain-free, and alert with adequate pain relief and improved quality of life. The involuntary movements had stopped, and he was not on any opioids after the 1st day. The only adjunct was pregabalin (450 mg/day). As per protocol for continuous local anesthetic infusions in our institution, on day 5, we stopped the infusion for up to 12 h (pain score was 0) and removed the catheter subsequently. We discussed the possibility of an intrathecal continuous drug delivery implant in the future. However, the pain did not recur after this 5-day period of desensitization, and the patient was subsequently discharged the next day. The patient continued to be absolutely pain-free until day 64 when he passed away due to pneumonia, which was a complication of his spinal cord injury. His words to our team at the time of his terminal discharge from the ward, were, "this has been the best Christmas gift of my life."

DISCUSSION

In advanced lung cancer, the incidence of bone metastases is 30%–40%.[1] The impact is not just on morbidity, the median survival for such patients is 6 months.[2] Of the bone complications, metastatic spine disease is a particularly worrisome complication. It may account for 10%–30% of

new diagnoses of cancer annually.[3] Compression of the spinal cord by metastases may affect about 5%–10% of all cancer patients during their disease.[4]

The following is a list of symptoms reproduced from the National Institute for Health and Care Excellence quality standards website that are suggestive of metastatic spinal cord compression (MSCC):[5]

- Progressive pain in the spine
- Severe unremitting spinal pain
- Spinal pain aggravated by straining (for example, when passing stools, when coughing or sneezing, or when moving)
- Pain described as "band like"
- Localized spinal tenderness
- Nocturnal spinal pain preventing sleep
- Neurological symptoms: Radicular pain, any limb weakness, difficulty in walking, sensory loss, or bladder or bowel dysfunction.

Usually, a "window of opportunity" for diagnosis of about a median of 3 months exists, before the signs and symptoms of this devastating complication appear. A Scottish prospective study examined potential delays in diagnosis and outcomes of malignant spinal cord compression in 319 patients. In it, 94% of the patients interviewed reported pain, which had been present for approximately 3 months. Eighty-four percentage of cases reported it to be severe and the distribution and characteristics of nerve root pain were reported in 79%. The study also reported examining the reliability of an MRI as opposed to plain radiographs and bone scans.[6]

The quality guidelines indicate that definitive treatment (if appropriate) should start in adults with MSCC with neurological signs and symptoms within 24 h of the confirmed diagnosis.[5] In our patient, the diagnosis of spine metastases was made early in the disease course, and he was treated with radiotherapy, i.v bisphosphonates and his pain was being managed at home with opioid analgesics. In addition, the clinical diagnosis was established within 24 h of admission, and steroids were initiated, and the spine team was called in.

In view of his advanced disease, the treatment algorithm veered toward supportive care without definitive correction/surgery.

A recent review noted the role of interventional pain management in selected cases of cancer pain. Advances in definitive cancer treatment have increased survival, and we see patients with more complex pains due to disease.[7] The WHO analgesic ladder is undoubtedly relevant and useful. Modifying the ladder would ensure its continued use for knowledge transfer in pain management.[8] One such modification is the integration of interventional pain services in palliative care.

Our case is an example where the patient experienced distressing side effects of opioids. In high-dose opioid therapy for cancer pain, myoclonus (sudden, brief, shock-like involuntary muscular contractions) may occur in 2.7–8.7%. This phenomenon is variously attributed to the metabolites of morphine such as morphine-3 glucuronide, morphine-6-glucuronide, or to its preservative such as sodium metabisulfite, to metabolic disturbances as seen in renal impairment or to the adjuvants that may have antidopaminergic actions such as haloperidol, and prochlorperazine.[9] This complication is reported to be more in the presence of coexisting neurological dysfunction.[10] We also suspect opioid-induced hyperalgesia (OIH) in our patient. OIH is a clinically challenging condition, which paradoxically increases the sensitivity to pain, and it may cause an increase in pain in the same or different distribution. This may be a case for the increasing pain and the loss of effect of the opioid administered.[11] The hyperalgesia response characterized by diffuse pain is usually less defined in quality, and it may extend to other areas of distribution from preexisting pain, this was not classic. We suspect tolerance to have played a more important role in our patient. Treatment options for OIH have included agents that act at the N-methyl-D-aspartate receptor as antagonists (ketamine, methadone, and dextromethorphan), agonists acting on the alpha-2 adrenergic receptor (clonidine), agents interacting with the gamma-aminobutyric acid receptor (propofol), and agents acting as cyclooxygenase inhibitors.[11] The patient and family were unwilling to try switching opioids or using medications that would have had any central effects in the form of drowsiness. The main symptoms evoking distress were pain, involuntary movement, and drowsiness. In our patient, the therapeutic challenge was to balance minimal intervention with maximal comfort.

After a due discussion of the risks and benefits, and a translation of the treatment goals through the family physician, the neuraxial procedure was undertaken. Neuraxial opioid and local anesthetic infusions are reported in literature. This could be via the epidural route,[12] or the spinal route.[13] While the former route utilizes the effect of the drug in the epidural space, the latter acts using the cerebrospinal fluid as a drug repository for analgesia. Neuraxial administration of opioids remains a weakly recommended option in view of the paucity and low quality of supporting literature.[14]

In our case, we administered a continuous local anesthetic infusion in the cervical epidural space. The local anesthetic administered in the cervical epidural space possibly worked as a segmental numbing agent. This may have possibly desensitized the cervical spinal cord to the barrage of noxious stimuli, prevented sensitization, and broken the vicious cycle of pain.

Invasive interventions in refractory cancer pain may serve 10%–15% of patients with cancer pain.[15] Cervical epidural analgesia is described in literature on cancer pain.[16,17] Techniques commonly used in continuous blockade of neural structures, such as subcutaneous tunneling and catheter fixation, use of bacterial filters, and general care of continuous catheters are recommended in such cases with advanced cancer.[16,18] A recent review of literature that examined cervical epidural analgesia in overall practice remained equivocal on its role while highlighting the need for careful selection of cases for this intervention.[19]

Finally, we selected ropivacaine as the local anesthetic in the cervical spine in our procedure. Ropivacaine is a single (S)-stereoisomer developed in a hope to attenuate the cardiac toxicity of bupivacaine (which is a mixture of (R) and (S) stereoisomers). Epidural ropivacaine has a better safety profile than bupivacaine, despite its slightly lower potency.[20] Ropivacaine also seems to have anti-allodynia and anti-hyperalgesia actions in developing neuropathic pain and established models of neuropathic pain.[21] This could be the possible mechanism to reduce the patient's pain and make it manageable with a single agent, pregabalin at the time of home discharge.

CONCLUSIONS

Interventional pain management is a useful tool in the management of intractable pain in selected patients with advanced cancers. Neuraxial epidural local anesthetic infusions may help to desensitize severe neuropathic pains and significantly bring down opioid requirements. Cervical epidural infusions can be valuable for the upper limb and upper thoracic region pains secondary to malignancy. Continuous cervical epidural catheters are not common in literature and continuous local anesthetic epidural infusions to deafferent a hypersensitive neuraxial segment are not commonly reported. This case report highlights the rewarding role of pain interventions in terminal patients. More research is needed in this area in palliative care, and a comprehensive care approach that integrates pain medicine and palliative care can help patients with pain that is described as "refractory" at present. As our patient said, it can be the "best Christmas gift," for such patients.

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Conflicts of interest

There are no conflicts of interest.

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