

Low-dose epidural anesthesia for percutaneous spinal fusion and kyphoplasty due to metastatic fracture of L2 lumbar vertebrae

Dear Editor,

Cancer patients often suffer from painful spinal metastatic fractures that require surgical fixation. However, the performance of spinal fusion and kyphoplasty may be complicated due to the severe patient's co-morbidities, implicating with anesthetic management. We describe the successful anesthetic management of a patient undergoing percutaneous spinal fusion along with kyphoplasty under low-dose epidural anesthesia in prone position. A full consent for publication was obtained by the patient.

A 69-year-old patient was scheduled for kyphoplasty and percutaneous L1-L3 fusion due to pathological metastatic fracture of the 2nd lumbar vertebrae (L2). The patient was referred to the orthopedic department due to severe and persistent low back pain that was not responding to medical treatment. Plain radiographs and magnetic resonance imaging (MRI) showed bony destruction of the body of L2 [Figures 1 and 2]. Chest computed tomography (CT) revealed a mass to the right lung and ^{99m}Tc bone scintigraphy depicted increased tracer uptake at the level of L2. The patient's symptoms were rapidly deteriorating, and high-doses of analgesics were necessary (transdermal fentanyl combined to non-steroidal antiinflammatory drugs), while any attempt to ambulate was inhibited by severe pain; the patient had a VAS (visual analogue scale) score of 9/10. The diagnosis of vertebral metastatic disease secondary to lung cancer was made, and it was decided to proceed with surgery in order to: 1) achieve adequate pain relief and 2) obtain biopsy samples to confirm the diagnosis. The affected lumbar segment was

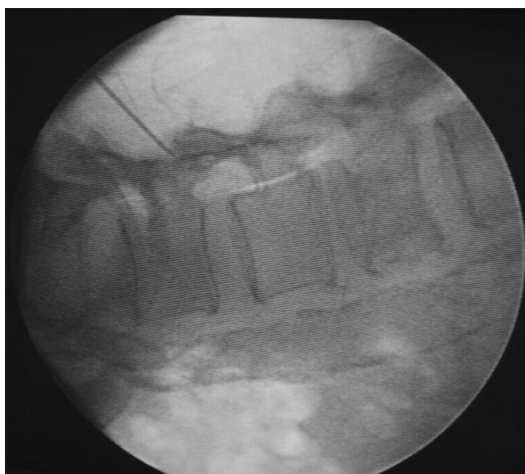


Figure 1: Fluoroscopy-guided epidural anesthesia



Figure 2: Final X-ray of spinal fusion

judged as unstable and the decision was made upon L2 balloon kyphoplasty and percutaneous L1-L3 fusion.

A detailed preanesthetic evaluation was performed. The patient was classified as ASA IV due to significant comorbidities, mainly from the cardiovascular and respiratory system. He had a history of myocardial infarction and consequent angioplasty, with a left ventricular ejection fraction (LVEF) 29% and a severe mitral valve regurgitation. The patient also had a pulmonary tumor, emphysematic deformations, and chronic obstructive pulmonary disease. Auscultation revealed markedly diminished breath sounds and arterial blood gas analysis showed a PO₂ of 57.5 mmHg at FiO₂ 21%. He was under systemic medication with inhaled bronchodilators and corticosteroids, carvedilol and ezetimibe.

After thorough discussion between the anesthesia and orthopedic teams, it was decided that general anesthesia in prone position would be extremely difficult and dangerous for

this patient, due to the multiple comorbidities. Hence, it was decided to try a safer anesthetic technique that would retain the cardiovascular and respiratory reserves, while providing sufficient analgesia for surgery. Therefore, an epidural anesthesia was performed, under fluoroscopic guidance, at the level of the fracture, using dilute concentrations of local anesthetics combined to opioids. The surgeons would also locally infiltrate local anesthetic in case required. The patient was placed under standard monitoring (SpO₂, ECG, HR, BP), combined to invasive blood pressure measurement. The patient was premedicated (iv) with ranitidine 50 mg, ondansetron 8 mg, dimethindene 4 mg, dexamethasone 8 mg, midazolam 1 mg, and fentanyl 30 µg. He was then placed into left lateral decubitus position, and the epidural block was performed under fluoroscopic guidance and verification of the epidural space with radiopaque contrast medium. The identification of the epidural space was successful at the level of L3-L4 level and an epidural catheter was inserted. Drugs administered epidurally included: ropivacaine 0.375% (total volume 8 ml), fentanyl 50 µg, and dexamethasone 8 mg that were administered initially, followed by repetitive doses of ropivacaine 0.375% 3 ml whenever required (3 repetitive doses). After achievement of adequate level of analgesia, the operation was allowed to begin. No additional doses of sedative/analgesic drugs were administered systemically, except of paracetamol 1 g.

The procedure included percutaneous pedicle screw fixation and kyphoplasty [Figure 2], with a total duration of surgery of 3 h. The patient was fully-awake throughout the procedure, cooperative, without complaining about the prone position or the surgical maneuvers. At the end of the operation, he was transferred to the post-Anesthesia care unit where he remained for 90 min. The epidural catheter was removed after obtaining complete motor function of the lower limbs, and instructions were given about postoperative pain control and fluid administration. At day-1 after surgery, he was mobilized and a significant reduction of pain was observed. Three days later, the patient was discharged.

The anesthetic management of cancer patients with compromised cardiovascular and respiratory systems, in addition to multiple systemic drug administration, can be challenging, especially when prone position is required. General anesthesia may be inappropriate, leading to increased rate of postoperative complications. Therefore, regional anesthesia should be an option, in a way that cardiovascular and respiratory reserves are well maintained. Epidural anesthesia with usual concentrations of local anesthetics is difficult to administer in patients at prone position or patients with impaired cardiac reserve. On the other hand, a spinal fusion requires adequate analgesia and prone position of

long duration.^[1-5] The technique we used, that included low concentrations of local anesthetic combined to opioids, administered epidurally via an epidural catheter placed under fluoroscopic guidance succeeded in these goals, without any patient compromise or postoperative complications. The dilute concentration allowed adequate analgesia, without any hemodynamic or respiratory compromise.

There are limited studies in the literature describing the application of epidural for minimally invasive procedures of the spine. Apan *et al.*^[1] performed epidural injection in 26 patients undergoing kyphoplasty and revealed a favorable outcome compared to general anesthesia, while Cagli *et al.*^[2] report the performance of 91 vertebroplasties/kyphoplasties under local anesthesia alone. To our knowledge, the only report for the use of epidural anesthesia for spinal fusion is described by Cabarique-Serrano *et al.*,^[3] at a patient suffering from thrombasthenia Glanzmann.

To conclude, the performance of a minimally invasive spinal fusion under low-dose epidural anesthesia was possible and led to a successful perioperative outcome, with early patient mobilization and discharge. Regional techniques should always be an option for compromised patients, in order to achieve the best outcome.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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