

Epidural analgesia for percutaneous kyphoplasty in a patient with multiple medical comorbidities

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ABSTRACT

Kyphoplasty is a minimally invasive procedure intended to stabilize the fractured bone and restore bone height. It involves percutaneous introduction of an inflatable bone tamp into a fractured vertebral body, followed by injection of bone cement into the ballooned pocket. Anesthetic options typically considered for this procedure include intravenous sedation or general anesthesia. These patients are often elderly, frail, in significant pain, and may poorly tolerate sedation or general anesthesia in the prone position. Spinal anesthesia has been suggested as an alternative method. However, it has major limitations. We would like to report a case of a 79-year-old patient with multiple comorbidities, who presented for kyphoplasty, where epidural anesthesia was conducted and successfully provided adequate analgesia as well as optimal surgical conditions.

Key words: Epidural, frailty, kyphoplasty, regional anesthesia

Key messages:

- Epidural anesthesia can provide successful operating conditions for kyphoplasty.
- General anesthesia need not be a default technique in medically complex patients.
- There may be many other procedures where regional techniques may provide surgical anesthesia.

INTRODUCTION

Vertebral body fracture can result in compression of the vertebral body and pain. Vertebral augmentation procedures aim to stabilize the bone and prevent further collapse. Balloon kyphoplasty with cement (hereafter referred to as “kyphoplasty”) is a minimally invasive form of vertebral augmentation intended to stabilize the fractured bone and restore bone height.^[1] It involves percutaneous introduction of an inflatable bone tamp into a fractured vertebral body, followed by injection of bone cement into the ballooned pocket.^[1] Kyphoplasty has gained increased popularity worldwide because of its minimally invasive approach

and success in relieving the pain of vertebral compression fracture (VCF). Anesthetic options commonly described for this procedure include intravenous (IV) sedation^[2] or general anesthesia (GA).^[1] These patients are often elderly,^[3] frail, in significant pain, and may poorly tolerate sedation or GA in the prone position. Spinal anesthesia has been suggested as an alternative method.^[4,5] However, it has major limitations, some of which include choosing the baricity of the local anesthetic and the inadequate pain control in unexpectedly lengthy procedures.^[5] We would like to report

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a case of kyphoplasty where epidural catheter anesthesia provided adequate analgesia as well as optimal surgical conditions in a patient with multiple comorbidities.

CASE DESCRIPTION

A 79-year-old man presented with a T10 VCF because of osteoporosis and was scheduled for kyphoplasty. Besides his osteoporosis, the patient had a medical history of hypertension, morbid obesity (body mass index, 38), obstructive sleep apnea, and chronic obstructive pulmonary disease on continuous home oxygen. The anesthetic approach was discussed with the surgeon and the option of epidural analgesia was raised as an alternative to sedation or GA, which were felt to carry certain risks to our patient given his comorbidities. The three options were discussed with the patient and the risks/benefits of each were explained. The patient agreed to epidural catheter anesthesia, and an informed consent was obtained.

In the interventional radiology room, the patient was placed in the sitting position. An 18-gauge Tuohy needle was inserted using the midline approach at the L4-L5 intervertebral space. The epidural space was identified at 8 cm. The Tuohy needle was aimed facing upward and the catheter was threaded through the Tuohy needle uneventfully [Figure 1]. The needle was taken out and the catheter was withdrawn and secured at 13 cm on the skin. After negative aspiration, a test dose composed of 3-mL isobaric lidocaine (2%) with epinephrine (1:200,000) was administered through the catheter and was negative. A total of 15 mL of 1.5% isobaric lidocaine was then injected through the catheter. Immediately after incremental injection of 15 mL of 1.5% lidocaine, the patient was assisted in positioning himself prone. Ten minutes after positioning, the block level was tested and found to be adequate. Subsequently, the procedure was started. No local anesthesia infiltration or sedation was used. Hemodynamic parameters were stable, and before the procedure started, another supplemental bolus of 5-mL isobaric lidocaine (1.5%) was administered. Surgery lasted for 80 min and finished uneventfully. The patient tolerated the procedure well without complaint. Epidural blockage was fully resolved 1 h following the end of the procedure.

DISCUSSION

Vertebral augmentation via percutaneous kyphoplasty has recently gained increased popularity as the treatment of choice for VCF. Not only does it provide immediate pain relief but also achieves some vertebral body height restoration and helps preserving the posture.^[1] VCFs commonly occur

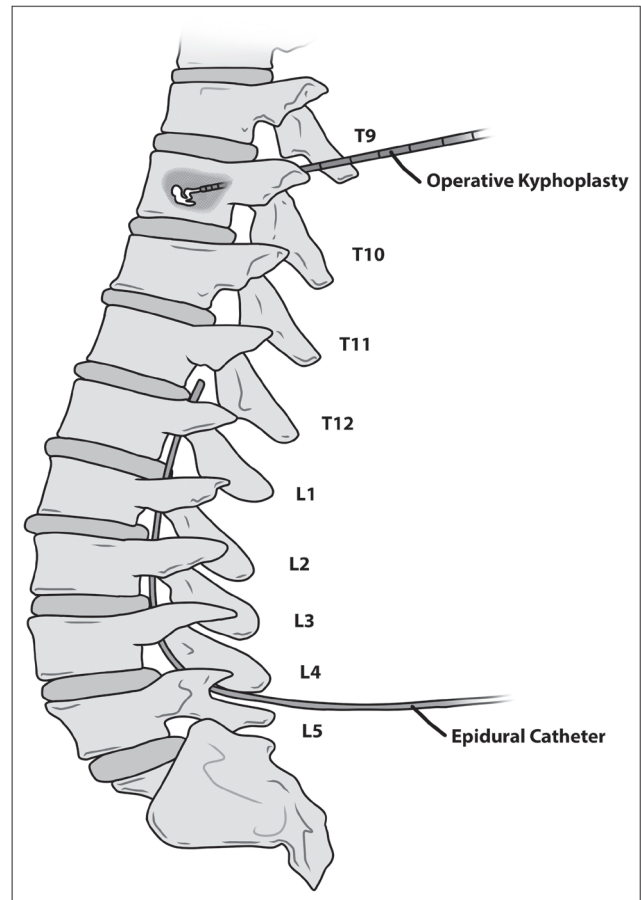


Figure 1: Illustration of vertebral augmentation kyphoplasty on fractured T10 vertebrae with an epidural catheter inserted at L4

in the elderly population,^[3] usually in the seventh decade of life. The most common cause is osteoporosis, followed by malignancy and trauma.^[6]

Patients who present with VCF are predominantly elderly and are likely to have multiple comorbidities. The anesthetic options are still a matter of controversy. According to some authors, surgeons prefer GA for this procedure^[7,8] even though local anesthesia with sedation may also achieve adequate surgical conditions.^[2] However, either one of these options could be problematic, particularly in this age group. GA carries higher risks in such patients with multiple comorbidities and is associated with increased postanesthesia care unit (PACU) and hospital stay as well as higher incidence of postoperative pulmonary complications.^[9] Local anesthesia is a reasonable alternative, however, it might not provide adequate analgesia, especially during the balloon inflation and therefore, could be unsatisfying for both the surgeon and the patient.

Although not very common, evidence of using spinal anesthesia for kyphoplasty has recently emerged in the literature. Hannallah *et al.*^[4] reported, in a letter to the

editor, a case of kyphoplasty where they used small-dose spinal anesthesia with minimal sedation for a high-risk patient. Despite having adequate level of analgesia, part of the pain control could have been due to the concomitant administration of the IV fentanyl and the propofol. This alternative method was further discussed by Souvatzis *et al.*^[5] who published their experience on spinal anesthesia administration for 11 patients undergoing kyphoplasty. Although local anesthesia infiltration was used along with the spinal anesthesia, four patients experienced pain during the procedure. Another problem they faced was choosing the baricity of the local anesthetic used for the intrathecal injection. After using hyperbaric lidocaine with the first six patients, they switched to isobaric lidocaine as they experienced high incidence of hemodynamic instability; presumably because of the more cephalad spread of hyperbaric lidocaine, particularly in the prone position. The third limitation they reported was the inability to extend the time of the block in case of unexpected prolongation of the procedure, especially if more than one vertebral level is included.

When possible, neuraxial anesthesia is preferred over GA in elderly comorbid patients.^[9] Spinal anesthesia, however, can be unpredictable in terms of the distribution of the local anesthetic and the duration of the blockade. Epidural anesthesia for kyphoplasty was assessed by Apan *et al.*,^[10] who compared the administration of segmental epidural anesthesia with GA for kyphoplasty. According to their results, not only did epidural anesthesia provide better pain control but also was associated with shorter PACU stay and decreased incidence of postoperative nausea. Apan *et al.*^[10] relied on single-shot epidural blockade. They did not use a catheter as they presumed it interferes with the surgical field. Of note, our case was conducted before this study was published and included the novel use of epidural catheter for intermittent titration of epidural analgesia. We feel that reporting this case highlights the importance of more attention toward regional approaches in the future. We inserted the catheter four levels below the affected vertebra and directed it upward so it could reach close to the level of interest [Figure 1]. Given the bidirectional spread of epidural injectate, we were comfortable being within three to four levels of the surgical site. The catheter was taped away from the field and did not transverse the surgical area or the affected vertebral level. Leaving the catheter allowed us to give incremental doses of local anesthetic, thus reaching the desired level of local anesthesia distribution. If a spring wound “radiopaque” catheter were to be used, its tip could be detected with fluoroscopy. With the catheter tip in close proximity to the surgical site, reports recommending a dose of 1–1.5 mL per segment could be followed.^[11]

CONCLUSION

In conclusion, we report a case of vertebral augmentation kyphoplasty in which epidural catheter anesthesia was safely conducted and provided adequate analgesia for a patient with multiple comorbidities. In such patients, epidural anesthesia offers advantages including segmental block and intermittent titration for optimal analgesia and avoidance of GA and/or moderate-to-deep sedation. Therefore, it may be considered a reasonable alternative to sedation or GA for the management of high-risk patients undergoing percutaneous kyphoplasty.

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Conflicts of interest

There are no conflicts of interest.

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