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Case Report

Three cases of kyphoplasty performed in the lateral position due to significant comorbidities

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ABSTRACT

Background: More than 700,000 people suffer from vertebral compression fractures attributed to osteoporosis, metastatic disease, or trauma each year in the United States, and undergo kyphoplasty. They are typical. These often undergo kyphoplasty to treat resultant pain or new neurological deficits. Here, we present three patients who, due to significant comorbidities, underwent kyphoplasty performed in the lateral decubitus rather than the prone position.

Case Description: Three females, two with metastatic cancer and one with osteoporosis, presented with lumbar compression fractures and new accompanying pain and/or neurological deficits. Due to significant accompanying comorbidities, kyphoplasty was safely and effectively performed in all three patients utilizing the lateral decubitus rather than the prone position.

Conclusion: Although vertebral kyphoplasties are typically performed in the prone position, here, we present three patients who, due to significant comorbidities, safely and effectively underwent kyphoplasties performed in the lateral decubitus position.

Keywords: Kyphoplasty, Lateral position, Osteoporosis, Vertebral fracture

INTRODUCTION

More than 700,000 people sustain vertebral compression fractures per year in the United States. They are typically due to osteoporosis, metastatic disease/osteolytic lesions, or trauma. Kyphoplasty is typically offered to treat resultant vertebral compression fractures. For patients with significant major comorbidities, including respiratory/compromise, kyphoplasty, rather than being performed in the prone position, may alternatively be safely and effectively performed in the lateral decubitus position.

CASE REPORTS

Case 1

A 64-year-old female, following a fall, presented with bilateral L5 radiculopathy and bilateral L5 pathological vertebral compression fractures attributed to metastatic endometrial adenocarcinoma (i.e., previously managed with radiotherapy [Figure 1]. As she could not

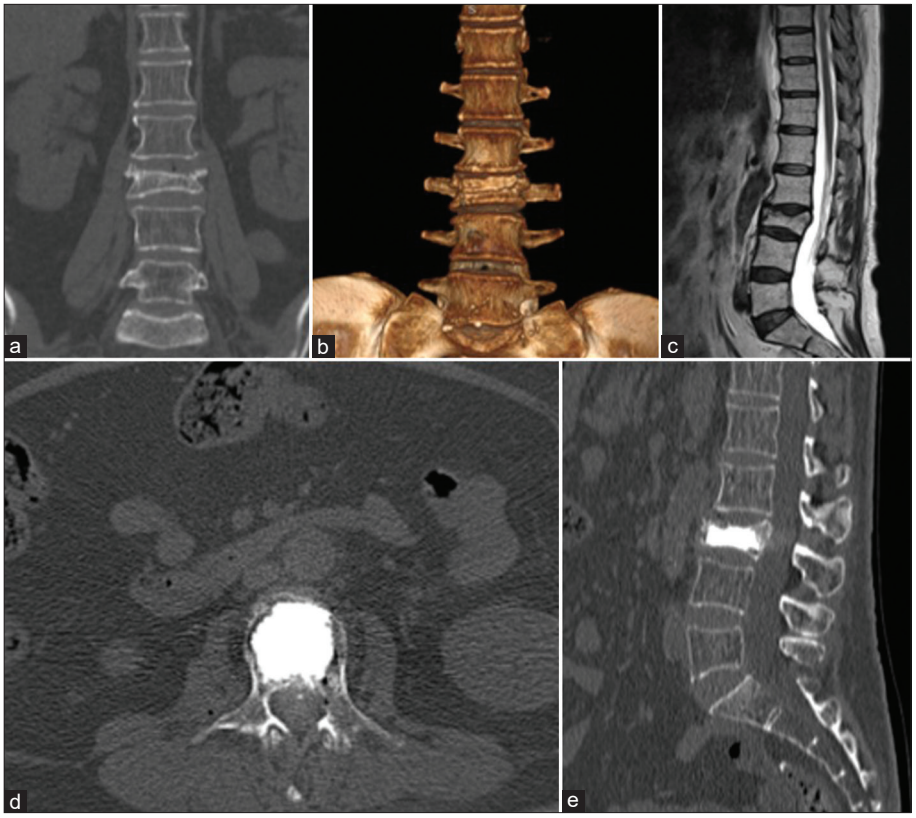

Figure 1: Lumbar tomography in coronal view (a) and 3D reconstruction (b), lumbar MRI in T2 weighting (c), where a L3 vertebral compression fracture is observed. Lumbar tomography in axial (d) and sagittal (e) view after kyphoplasty, with the presence of hyperdensity in the body of L3 corresponding to cementation.

tolerate the prone position, the lumbar L5 kyphoplasty was safely and effectively performed in the lateral decubitus position.

Case 2

A 58-year-old female with a history of colon cancer (i.e., status postradiotherapy, surgery, and a secondary diverting colostomy) presented with lumbar pain (8/10). When the X-ray, computed tomography (CT), and magnetic resonance studies revealed a pathological L3 compression fracture, she successfully underwent a kyphoplasty performed in the lateral decubitus rather than prone position [Figures 2 and 3].

Case 3

A 62-year-old female with a history of osteoporosis treated with teriparatide presented with a 4-week history of falling from a height. When the CT scan revealed a T7 vertebral fracture, she successfully underwent a kyphoplasty performed in the lateral decubitus rather than prone position [Figure 4].

Figure 2: Positioning of the patient in lateral decubitus before starting kyphoplasty. (a) Anterior view showing the presence of a colostomy, (b) posterior view, and (c) lateral view.

DISCUSSION

More than 700,000 people suffer from vertebral compression fractures each year in the U.S., and kyphoplasty

Table 1: Summary table of kyphoplasty versus others management for verterbral fractures.

Author [Reference number] Journal Year	Patient data	Studies	Pathology	Treatment	Conclusion
Alsoof *et al.*[1] American Journal of Medicine, 2022.	No Surg vs. Kypho for VCF	No Surg Rx Failure No Surg Results Persist Pain Deformity Pseud Neuro Deficits Kyph	Consider Kyph	Augment Vertebropl vs. Kypho	Conclusion No Surg Rx for VCF can be used initially, but if this fails, vertebro and kyph should be considered.
Astur and Avanzi,[2] Global Spine Journal, 2019.	No Surg vs. Kypho for VCF.	No Surg Rx Failure No Surg Results Persist Pain Disability Kyph	Consider Kyph	Conventional treatment vs. Kypho.	Kypho could be considered as an early option for VCF.
Boss *et al.*[3] Physical Medicine and Rehabilitation Clinics of North America, 2022.	No Surg vs. VAP in VFC.	VAPs. Results. Pain relief. Complication. Disabiliy. Height restoration.	Consider VAPs option.	VAPs comparison (Kypho and vertebro).	Kypho improved pain and recover vertebral height in VFC.
Daher *et al.*[4] World Neurosurgery, 2023.	Vertebro vs. Kypho in VCF.	Vertebro and Kypho. Complications. Quality of life. Vertebral restoration.	Consider Kypho.	Vertebro vs Kypho.	Kypho improved pain. Also was superior reducing cement leakage and vertebral restoration.
Imamudeen *et al.*[5] Clinical Medicine and Research, 2022.	No surg vs. Kypho	No surg Rx. Disability, mortality and quality of life.	Consider Kypho.	No surg Rx and Kypho.	Kypho resulted in better pain reduction compared to no surg Rx.
Mooney *et al.*[6] Journal of Spine Surgery, 2019.	Kypho	Kypho, height restoration, pain, disability, and quality of life.	Consider Kypho	Kypho.	Kypho increased vertebrql height, improved pain, function and quality life.
Musti *et al.*[7] Journal of Anaesthesiology Clinical Pharmacology, 2023.	Prone vs. supine position in spine surgery.	SPI, hemodynamic changes, prone and supine position.	Consider an alternative surgical position.	Prone vs. supine in spine surgery.	Prone positioning leads to significant increase in SPI.
Sun *et al.*[8] World Neurosurgery, 2019.	Vertebro in prone vs. lateral for VCF.	Operation time, scores for respiratory condition and complications.	Consider lateral position for VAP.	Prone versus lateral position for VAP in obese patients.	Lateral position was safe and effective, associated with shorter operation time.

VCF: Vertebral compression fractures, MR: Magnetic resonance imaging, CT: CAT scans, Rx: Treatment, VAP: Vertebral augmentation procedures, Kyph: Kyphoplasty, Surg: Surgery, Vertebro: Verteboplasty, SPI: Surgical pleth index

could be recommended as an early treatment for this population.[2,6] This procedure involves the insertion of an inflatable balloon into the bone tissue where the balloon is inflated, creating a cavity where cement will subsequently be injected.[1,6] In (Beall, cited by Imamideen N, 2022), kyphoplasty accomplished significantly better pain reduction versus conservative management.[5] Usually is performed on patients in the prone position.[3] In another study, kyphoplasty demonstrated a lower cement leak rate and greater frequency of restoration of vertebral body height versus vertebroplasty.[4] Reviews comparing kyphoplasty with other managements for vertebral fractures [Table 1].

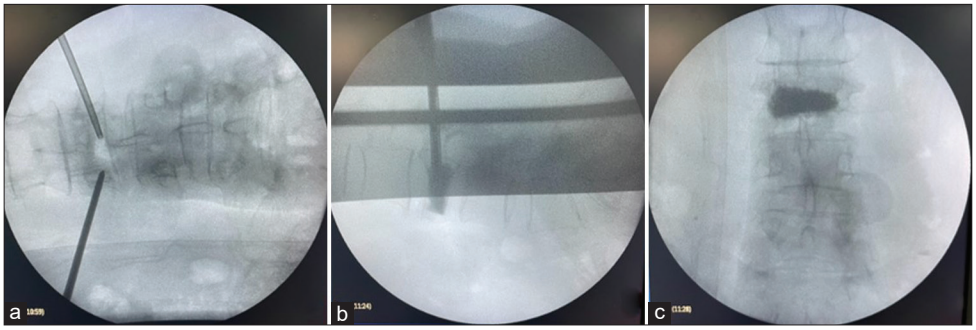

Figure 3: Intraoperative fluoroscopy images, showing (a) AP X-ray with the presence of transpedicular cannulas, Subsequently, (b) lateral X-ray is observed during cement injection through the cannula in the vertebral body, Finally, (c) AP X-ray with the presence of intracorporeal cement at the end of the procedure and removal of cannulas.

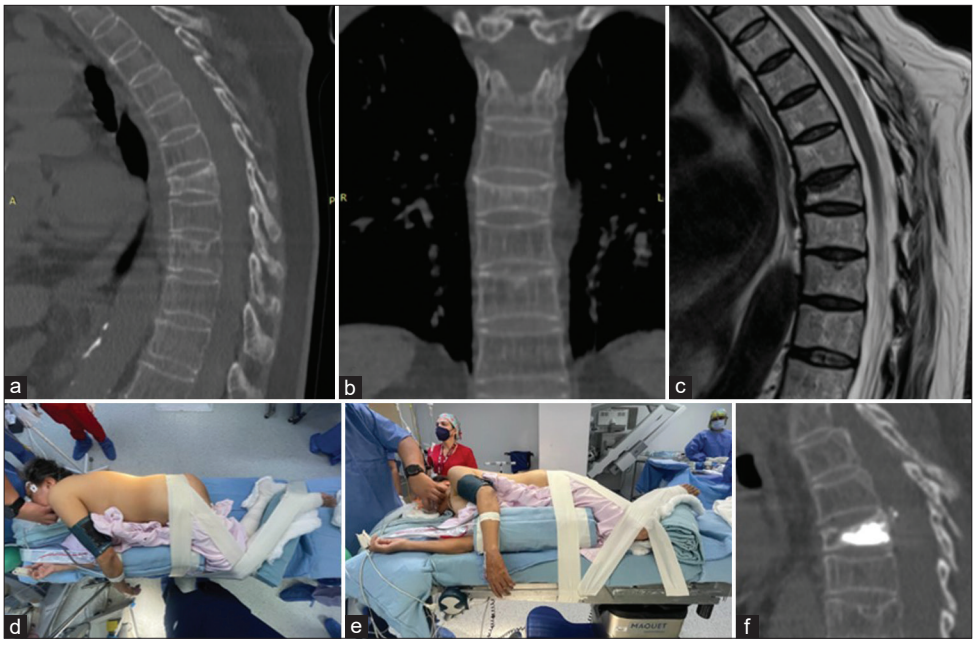

Figure 4: Tomography images (a and b) and magnetic resonance imaging (c) showing vertebral fracture of T7. (d and e): Images of lateral decubitus positioning in the operating room. (f) Postoperative tomography, with the presence of cementation at T7.

Advantages of kyphoplasty performed in the lateral decubitus position

Patients with significant comorbidities may safely/effectively undergo kyphoplasty performed in the lateral decubitus versus the prone position. Advantages of this include reductions in the cardiac index/stroke volume and reduced left ventricular distention/venous return.[7,8] Sun *et al*. documented the increased safety/efficacy of the lateral decubitus position for performing vertebroplasties in obese patients with chronic obstructive pulmonary disease. [8] In our cases, in all patients with major comorbidities, three kyphoplasties were performed in the lateral position without contributing to any intraoperative/postoperative adverse events.

CONCLUSION

The lateral decubitus position proved to be a safe and effective alternative for performing three kyphoplasties in patients with significant comorbidities and resultant vertebral compression fractures.

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Ethical approval

The Institutional review board approval is not required.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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