



KYPHOPLASTY CASE STUDY



**Clinical Application of Percutaneous Balloon
Kyphoplasty to Treat Pain and Disability
Associated with a Vertebral Compression Fracture**



SYNERGY
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Interventional Radiology

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KYPHOPLASTY CASE STUDY

Overview

Physicians are seeing more patients with osteopenia or osteoporosis as the population ages and longevity increases. A significant percentage of these patients have symptomatic vertebral compression fractures (VCFs) and are referred for minimally invasive vertebral augmentation procedures due to trauma, conservative management failure – including pain medication failure – or contraindication to open surgery. Vertebral augmentation procedures have also been used to stabilize VCFs subsequent to cancer and other disease processes.

Percutaneous vertebroplasty (PVP) is a minimally invasive surgical procedure that uses image-guided percutaneous injection of bone cement (polymethylmethacrylate or PMMA) into a fractured vertebra bone. Percutaneous balloon kyphoplasty (BKP)

is an increasingly common variation of this approach in which an inflatable bone tamp is placed in the collapsed vertebra prior to cement injection.⁽¹⁾ Balloon kyphoplasty may have the added benefit of partially restoring vertebral height and minimizing kyphotic deformity. A decreased rate of asymptomatic cement extravasation – leakage into the spinal canal – has also been reported with kyphoplasty as compared to vertebroplasty.⁽²⁾ However, in recent medical literature, PVP and BKP have been found about equally effective in significantly reducing pain and disability in severe VCFs.

We review the use of percutaneous balloon kyphoplasty in an elderly female patient determined to be a candidate for this minimally invasive therapy performed by a Synergy Radiology Associates interventional radiologist.

Discussion

More than 700,000 spinal fractures are attributed to osteoporosis each year in the U.S.,⁽³⁾ accounting for more than 100,000 hospital admissions and resulting in close to \$1.5 billion in annual costs.⁽⁴⁾ The lifetime risk of a symptomatic VCF has been estimated at 18% for women and 11% for men.⁽⁵⁾ Although VCFs are the most common osteoporotic fractures:

- approximately two-thirds are undiagnosed and untreated
- patients have as much as a 5-fold increased risk of another fracture within one year of initial fracture
- the incidence of vertebral compression fracture increases progressively with age throughout later life⁽⁶⁾

Left untreated, as many as one in five women with a spinal fracture will sustain another within 12 months.⁽³⁾ Older women in particular are at increased risk of developing

VCFs. A 2015 Mayo Clinic Proceedings study reported 4.9 million hospitalizations for osteoporotic fractures in women between 2000 and 2011, more than hospitalizations for myocardial infarction, stroke or breast cancer.⁽⁷⁾ Spinal fractures can also be caused by cancer, the most common forms being multiple myeloma, breast, lung and prostate.⁽⁸⁾

Vertebroplasty and balloon kyphoplasty are indicated for the treatment of patients with persistent severe focal back pain related to fractures of the vertebral body due to osteoporosis, cancer, benign lesions or trauma; and where conservative management – including bed rest, analgesics and bracing – has failed, resulting in a reduction of daily living activities.^(9,10) BKP typically takes less than an hour, and patients usually go home the same day. However, patient age and medical comorbidities play an important role in determining length of stay.

CASE REPORT

Clinical Summary

An 84-year-old female was admitted to the hospital complaining of lower back pain after an accidental fall. The patient has a history of chronic low back pain, but this became worse after the fall. The patient also has

coronary artery disease, mild Alzheimer's dementia and usually walks with a walker at home; however, she has limited mobility and has not used the walker consistently since the fall.

Findings

CT revealed an age-indeterminate compression deformity of the T12 vertebral body (Fig. 1). The patient expressed persistent complaints of back pain when sitting up or standing, and consequent difficulty ambulating, with 8/10 pain at baseline on the visual analog scale for pain. Given this patient's localized back pain, mobility issues and history of recent fall, spine MRI was obtained, which demonstrated high-signal marrow edema at T12, confirming the presence of an acute compression fracture (Fig. 2). The patient was referred to one of Synergy Radiology Associates' interventional radiologists and scheduled for vertebral augmentation using minimally invasive balloon kyphoplasty (Kyphon®, Medtronic, Sunnyvale, CA, USA). Preoperative physical therapy was initiated, Plavix was held for the necessary five days, and inpatient rehabilitation was arranged post procedure.



(Fig. 1) CT Spine. Initial CT demonstrates an age-indeterminate compression fracture of the T12 vertebral body with nearly 70% anterior height loss.

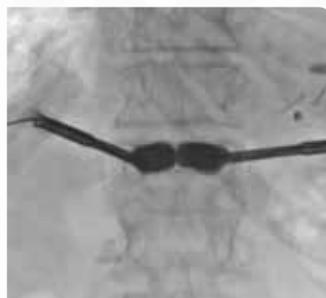


(Fig. 2) MRI confirms presence of marrow edema in the fractured vertebra, confirming fracture acuity.

Kyphoplasty balloons were advanced into the fractured vertebra from each side, creating a cavity for cement augmentation (Figs. 3A, 3B). PMMA was used to fill the anterior portion of the vertebral body (Figs. 4A, 4B), partially restoring vertebral body height and reducing kyphotic deformity while stabilizing the fracture, preventing further vertebral body collapse and alleviating fracture-related pain.



(Fig. 3A) Kyphoplasty Balloon, Lateral View.



(Fig. 3B) AP View. Kyphoplasty balloons are advanced into the fractured vertebra from each side, partially restoring vertebral body height and reducing kyphotic deformity while creating a cavity for cement augmentation.



(Fig. 4A) Kyphoplasty Cement, AP View.



(Fig. 4B) Kyphoplasty Cement, Lateral View. Kyphoplasty cement fills the anterior two thirds of the vertebral body, stabilizing the fracture and preventing further vertebral body collapse.

For more information on vertebral kyphoplasty and other minimally invasive procedures, see our vascular and interventional services at www.synergyrad.org/our-services. Physician practices interested in learning more about kyphoplasty and vertebral augmentation should **contact the Synergy Radiology interventional team at 713-621-1103.**



Follow Up and Outcomes

The post-procedure clinical course proceeded normally. The patient was discharged two hours after the procedure and resumed physical therapy the following day. She was able to ambulate with her walker on post-op day one, and she had fully returned to her baseline level of physical activity by post-op day four. At time of discharge from the rehabilitation facility, she was able to make the bed and pack her own belongings while waiting for family to pick her up.

Narcotics were tapered over the course of stay from every 4-6 hours around the clock after the injury; to twice per day for 3-5 days after the procedure/rehab; to last dose given day of discharge. Flexeril® was added post-procedure (5 mg 2 times per day for 3 days, then as needed) for symptomatic relief of muscle spasms, which is expected after kyphoplasty. The patient did not resume use of narcotics at home after discharge, taking OTC ibuprofen as needed.

The patient's level of physical activity was not only restored but improved from baseline prior to the injury. The patient's daughter reported that her mom "is better than ever before" and stated she needs to be constantly reminded to use her walker to ambulate throughout the home. The daughter expressed gratitude for the procedure and how it helped restore her mother's mobility. She noted the injury had left her mother bedbound from the pain and depressed from loss of mobility and independence. Daughter was amazed by the rapid recovery period and how soon her mother was able to resume activities of daily living, with noticeable improvement immediately post-procedure.

Conclusion

A 2014 multi-society consensus statement concluded that percutaneous vertebral augmentation with the use of vertebroplasty or kyphoplasty is a safe, efficacious and durable procedure in appropriately selected patients with symptomatic osteoporotic or neoplastic fractures, when performed in accordance with published standards.⁽¹¹⁾ The group further noted that kyphoplasty literature reports uniformly high levels of clinical improvement with only rare complications.

This case demonstrates the successful clinical application of balloon kyphoplasty as a treatment option for improving patient care by addressing and significantly resolving the pain and disability that often accompany VCFs.

Synergy radiologists are now performing this advanced, minimally invasive procedure at most Memorial Hermann hospitals using a multidisciplinary team approach to treatment.

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