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A PATIENT'S EXPERIENCE WITH PAINFUL VERTEBRAL COMPRESSION FRACTURES

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INTRODUCTION:

Osteoporosis is a disease characterized by decreased bone mass and strength and increased risk of fracture. It is defined as bone mineral density more than 2.5 standard deviations below that of an average young adult. An imbalance of osteolysis and ossification can be partially corrected through the use of pharmacotherapies². However, the lifetime fracture risk may still be as high as 40%³. Osteoporosis is estimated to account for more disability-adjusted life years than all neoplasms with the exception of lung cancer⁴. Vertebral compression fractures (VCFs) are among the most common osteoporotic fractures in individuals under 65⁴. Lyles and colleagues showed that these fractures are associated with decreased physical performance and independence in daily living, and increased pain with activities, difficulty with activities, and psychiatric symptoms⁵. The natural history of the VCF can be understood as occurring in one of two types. Type I VCFs are due to wedge fractures obvious from the beginning and that remain unchanged. They result in acute severe pain that improves gradually of 4-8 weeks. Type II fractures are due to fractures that lead to gradual vertebral wedging. They cause less severe pain of shorter duration than type I, but lead to repeat pain attacks after 6-16 weeks. This can repeat for 6-18 months⁶.

Balloon kyphoplasty is a minimally invasive procedure used to treat VCFs. It is commonly used but remains controversial⁷. Kyphoplasty involves insertion of a bone tamp with an attached balloon into the affected vertebral body via the pedicle. Inflation of the balloon creates a potential space for injection of polymethylmethacrylate (PMMA) cement, which hardens *in vivo*⁸. Recent research suggests a lower risk of cement extravasation and subsequent adverse effects during kyphoplasty compared to vertebroplasty, a similar procedure that does not use a balloon to create space in the vertebral body prior to PMMA injection^{9,10}. Wardlaw and colleagues found that individuals with acute VCFs who received balloon kyphoplasty rather than conservative treatment required less additional therapy and assistance; had a greater increase in self-reported quality of life and physical ability at 1, 3, 6, and 12 months; and decreased reported pain at 1, 3, 6, and 12 months¹¹. However, two sham-control studies published in 2009 found no difference in clinical outcomes between vertebroplasty and sham treatment^{12,13}. These studies, though, have been criticized for being underpowered by the author's own power estimates, using a sham that potentially leads to some pain relief, and not using the appropriate volume of PMMA^{14,15}.

We present a single patient's experience with VCFs, vertebroplasty, and kyphoplasty to highlight the debilitating nature of these fractures and the immediate relief some patients experience with vertebroplasty and kyphoplasty. Her course of multiple fractures and treatments is quite common. However, the lateralized refracture of T12 likely due to asymmetric cement distribution is atypical.

PATIENT'S PERSPECTIVE:

First, a little about me. I am currently 68 years old, retired, have been married 51 years, and have two sons. I have no medical expertise or background.

In 2005 I slipped in the bathtub. There was no immediate problem apparent, but the next day I could barely bend my back without excruciating pain. I could walk, even climb stairs without hurting, but sitting, bending or turning my body created great pain at my waist. It took 15 to 20 minutes to lie down and the same amount of time to stand up again. I tried strong pain relievers, cold compresses, heat packs, muscle relaxers, and bed rest, but nothing helped. After two months without pain relief, I saw a doctor who recommended I get an MRI to check my candidacy for vertebroplasty. I was eligible. I left my house at 7 a.m. two days later, had the procedure, and by 11 a.m. was home and without pain.

I began to have a new backache in early 2014 that progressed to frank pain. Daily chores, riding in a car, lying down, walking, and just about anything I tried to do brought unbearable pain. I could not sleep without waking to pain. The only relief I found was a hot pad, which only made the pain tolerable. My primary care doctor referred me to radiology where I had a bone scan that showed a recent fracture at T10. Within a week I was getting cement put in my spine again. The doctor identified a second broken level at T12 during the procedure and worked on it, too. By noon, I was eating lunch without pain. However, I did feel a slight pressure-like backache in the area for three days that resolved.

My back started aching a little over a month later. It was an uncomfortable ache that would not ease, but it was not what I would call a pain. I had another bone scan, and this one showed a recent fracture on the side of T12 that did not get cement during the last procedure. I went in to get another kyphoplasty and the ache was totally gone within two hours. It has not returned since.

I have had two breast cancer surgeries and coronary bypass surgery. The recovery after kyphoplasty and vertebroplasty is nothing compared to them. A few doctors have said that I may have problems with my calcium or vitamin D levels, or might just be losing bone too fast because of my age. I am currently working with my primary care doctor to make sure I do not get more fractures.

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REFERENCES:

1. Kanis JA, Melton LJ, Christiansen C, Johnston CC, Khaltaev N. The diagnosis of osteoporosis. *J Bone Miner Res.* 1994;9(8):1137-1141. doi:10.1002/jbmr.5650090802.
2. Manolagas SC. Birth and Death of Bone Cells: Basic Regulatory Mechanisms and Implications for the Pathogenesis and Treatment of Osteoporosis. *Endocr Rev.* 2000;21(2):115-137. doi:10.1210/edrv.21.2.0395.
3. Rachner TD, Khosla S, Hofbauer LC. Osteoporosis: now and the future. *The Lancet.* 2011;377(9773):1276-1287. doi:10.1016/S0140-6736(10)62349-5.
4. Johnell O, Kanis JA. An estimate of the worldwide prevalence and disability associated with osteoporotic fractures. *Osteoporos Int J Establ Result Coop Eur Found Osteoporos Natl Osteoporos Found USA.* 2006;17(12):1726-1733. doi:10.1007/s00198-006-0172-4.
5. Lyles KW, Gold DT, Shipp KM, Pieper CF, Martinez S, Mulhausen PL. Association of osteoporotic vertebral compression fractures with impaired functional status. *Am J Med.* 1993;94(6):595-601.
6. Lyritis GP, Mayasis B, Tsakalacos N, et al. The natural history of the osteoporotic vertebral fracture. *Clin Rheumatol.* 1989;8 Suppl 2:66-69.
7. Buchbinder R, Golmohammadi K, Johnston RV, et al. Percutaneous vertebroplasty for osteoporotic vertebral compression fracture. *Cochrane Database Syst Rev.* 2015;4:CD006349. doi:10.1002/14651858.CD006349.pub2.
8. Garfin SR, Yuan HA, Reiley MA. New technologies in spine: kyphoplasty and vertebroplasty for the treatment of painful osteoporotic compression fractures. *Spine.* 2001;26(14):1511-1515.
9. Vogl TJ, Pflugmacher R, Hierholzer J, et al. Cement directed kyphoplasty reduces cement leakage as compared with vertebroplasty: results of a controlled, randomized trial. *Spine.* 2013;38(20):1730-1736. doi:10.1097/BRS.0b013e3182a14d15.
10. Gu CN, Brinjikji W, Evans AJ, Murad MH, Kallmes DF. Outcomes of vertebroplasty compared with kyphoplasty: a systematic review and meta-analysis. *J Neurointerventional Surg.* May 2015. doi:10.1136/neurintsurg-2015-011714.
11. Wardlaw D, Cummings SR, Van Meirhaeghe J, et al. Efficacy and safety of balloon kyphoplasty compared with non-surgical care for vertebral compression fracture (FREE): a randomised controlled trial. *Lancet.* 2009;373(9668):1016-1024. doi:10.1016/S0140-6736(09)60010-6.
12. Buchbinder R, Osborne RH, Ebeling PR, et al. A randomized trial of vertebroplasty for painful osteoporotic vertebral fractures. *N Engl J Med.* 2009;361(6):557-568. doi:10.1056/NEJMoa0900429.
13. Kallmes DF, Comstock BA, Heagerty PJ, et al. A randomized trial of vertebroplasty for osteoporotic spinal fractures. *N Engl J Med.* 2009;361(6):569-579. doi:10.1056/NEJMoa0900563.
14. Boszczyk B. Volume matters: a review of procedural details of two randomised controlled vertebroplasty trials of 2009. *Eur Spine J Off Publ Eur Spine Soc Eur Spinal Deform Soc Eur Sect Cerv Spine Res Soc.* 2010;19(11):1837-1840. doi:10.1007/s00586-010-1525-4.
15. Anderson PA, Froysheter AB, Tontz WL. Meta-analysis of vertebral augmentation compared with conservative treatment for osteoporotic spinal fractures. *J Bone Miner Res Off J Am Soc Bone Miner Res.* 2013;28(2):372-382. doi:10.1002/jbmr.1762.