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Kyphoplasty vs Vertebroplasty: A Systematic Review of Height Restoration in Osteoporotic Vertebral Compression Fractures

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Background – Back pain & OVCF
• Back pain is a leading cause of morbidity in older US adults, especially those with osteoporosis
• Osteoporotic vertebral compression fractures (OVCF) commonly occur in people with osteoporosis
• ~1/3 of OVCF are symptomatic with acute or chronic low back pain
• Annual US cases of osteoporosis with OVCF are ~700,000/year
• OVCF and osteoporosis cause high levels of morbidity, decreased functional independence, and chronic pain
• Conservative treatment for OVCF is often insufficient for many patients
• Insufficient vertebral height caused by OVCF can lead to spinal deformities, reduced pulmonary function, depression, reduced mobility, and lower quality of life
• Surgical correction is a viable option for increasing vertebral height in patients with OVCF

Methods

• We performed a systematic review per the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) protocol (Figure 1)
• Level II randomized controlled trials assessing kyphoplasty and/or vertebroplasty were included
• Study selection inclusion criteria: patients > 18 years, in English, study of OVCF, active comparator vs placebo, outcome measure of height restoration, with pain relief and functionality as secondary outcomes
• Of 4147 individual articles, 238 articles were screened, and 33 were analyzed
• Of the 33 analyzed studies, 6 compared kyphoplasty to vertebroplasty

Results

Vertebral Height Restoration
7 studies of vertebroplasty
• 2 showed height loss
• 1 showed height restoration
• 2 showed absolute height gain
20 studies of kyphoplasty
• None showed height loss
• 8 showed height restoration
• 8 showed absolute height gain
6 head-to-head comparisons
• 3 showed correlation of cement injection volume with improved height
• 5 favored kyphoplasty for height restoration

Assessed of Pain
• Assessed by visual analogue scale (VAS) score
• 6 of 6 vertebroplasty studies showed reduced postop pain
• 6 of 18 kyphoplasty studies showed sustained reduced pain at 12 months
• 6 studies compared kyphoplasty & vertebroplasty and none saw a difference between the 2 for reducing postop pain

Restoration of Function
• Assessed by Oswestry disability index (ODI)
• 3 studies showed improved ODI after vertebroplasty at 18 to 36 months postop
• 4 studies showed improved ODI at 12 months after kyphoplasty
• 3 studies compared kyphoplasty & vertebroplasty and all showed lower postop ODI

Conclusions
• Both kyphoplasty and vertebroplasty are effective treatments for OVCF and are viable options for OVCF patients
• Both treatments restored some vertebral body height, reduced kyphosis angle, improved Cobb’s angle, and improved wedge angle
• Both treatments showed similar benefits of pain reduction and improved functionality
• It was unclear whether fracture type or age of fracture influence procedure outcomes
• Kyphoplasty has the possibility of cement leakage, which can lead to negative outcomes
• It was not possible to conclude whether one approach was superior

References

Hypothesis and Purpose
• Purpose: To critically investigate whether vertebral body height restoration correlates with pain relief after kyphoplasty and vertebroplasty.
• Secondary Outcomes: pain relief, functionality, cement leakage, Cobb’s Angle, wedge angle restoration, kyphosis angle restoration, and Gardner's angle
• We assessed only randomized controlled trials (RCTs) to generate a more robust and clinically applicable review
• We also provide an update on the literature comparing kyphoplasty versus vertebroplasty for height restoration, pain relief, and function restoration.
• We searched 6 databases to ensure that the review was comprehensive.