

Osteoporotic vertebral fracture

Generalized [osteoporosis](#) and “osteoporotic vertebral body compression fractures” are interrelated geriatric problems.

[Vertebral compression fractures](#) (VCFs) are the most common type of fracture secondary to [osteoporosis](#).

Epidemiology

It is found most commonly in post-menopausal white [females](#), and is rare prior to [menopause](#).

The age-standardised annual incidence of vertebral compression fractures (VCF) in [osteoporosis](#) is 10.7/1000 in women and 5.7/1000 in men, increasing markedly with age ¹⁾.

With the prevalence of an aging American population on the rise, osteoporotic vertebral fractures are becoming a common occurrence, resulting in an increase in [vertebral augmentation](#) procedures and associated complications such as cement leakage, vertebral compressions, and pulmonary embolism.

Risk factors

1. weight < 58kg
2. cigarette [smoking](#) ²⁾.
3. low-trauma vertebral body fracture in the patient or a first degree relative
4. drugs
 - a) heavy alcohol consumption
 - b) AEDs (especially [phenytoin](#))
 - c) warfarin
 - d) steroid use:
 - bone changes can be seen with 7.5 mg/d of prednisone for >6 months
 - VB fractures occur in 30–50% of patients on prolonged glucocorticoids
5. postmenopausal female
6. males undergoing androgen deprivation therapy (e.g. for prostate Ca). Orchiectomy or ≥ 9 doses of gonadotropin-releasing hormone agonists had a 1.5 fold increase in risk of all fractures ³⁾.
7. physical inactivity
8. low calcium intake
9. low serum levels of vitamin D (which decreases calcium absorption). Lab: serum 25-hydroxyvitamin D [25(OH)D], AKA calcidiol is the best indicator of vitamin D status.

Factors that protect against osteoporosis include impact exercise and excess body fat.

Classification

The main types of low lumbar OVC were flat-type and concave type, which resulted in neurological symptoms by retropulsed bony fragments generating foraminal stenosis and/or canal stenosis. For patients with low lumbar OVC, decompression of the foraminal and canal stenosis with short fusion surgery via posterior approach can improve neurological symptoms. Since these patients are elderly with poor bone quality and other complications, treatments for both OVC and osteoporosis should be provided to achieve good clinical outcome ⁴⁾.

Thoracolumbar osteoporotic fracture

[Thoracolumbar osteoporotic fracture.](#)

Diagnosis

[DEXA scan](#)

Differential diagnosis

Malignant compression fracture

[Diffusion Weighted Imaging](#) and standard spine [magnetic resonance imaging](#) to differentiate between acute osteoporotic and malignant compression fractures at 3.0 T.

In 62 patients with acute compression fractures. Three radiologists independently interpreted MR images for the presence of malignancy by using conventional MR images alone and in combination with axial DW images with qualitative and quantitative analysis. Apparent diffusion coefficients (ADCs) were measured within solid portion with careful use of a small region of interest (ROI). The Mann-Whitney U test was performed.

There were 30 malignant and 32 acute osteoporotic compression fractures. At qualitative analysis, hyperintensity relative to spinal cord was more frequent in malignant compression fractures than in acute osteoporotic compression fractures (87% vs 22%, respectively; $P < .001$). Median ADCs of malignant fractures were significantly lower than those of benign fractures ($P < .001$). With conventional MR imaging alone, sensitivity, specificity, and accuracy were 100%, 94%, and 97%, respectively, for reader 1; 97%, 78%, and 87% for reader 2; and 100%, 84%, and 92% for reader 3.

With conventional and DW MR imaging combined, sensitivity, specificity, and accuracy were 100%, 97%, and 98% for all three readers. The addition of DW imaging led to correct changes in diagnosis: Reader 1 improved by 1.6% (one of 62 fractures), reader 2 improved by 11% (seven of 62 fractures), and reader 3 improved by 6.5% (four of 62 fractures).

The addition of axial DW imaging to a conventional MR imaging protocol improved diagnostic accuracy in the differentiation of acute osteoporotic from malignant compression fractures by measuring ADCs in the solid portion with careful use of a small ROI ⁵⁾.

Treatment

see [Osteoporotic vertebral fracture treatment](#).

Outcome

These fractures are associated with significant rates of morbidity and mortality and annual direct medical expenditures of more than \$1 billion in the United States. Although many patients will respond favorably to nonsurgical care of their VCF, contemporary natural history data suggest that more than 40% of patients may fail to achieve significant pain relief within 12 months of symptom onset. As a result, percutaneous vertebral augmentation is often used to hasten symptom resolution and return of function. However, controversy regarding the role of [kyphoplasty](#) and [vertebroplasty](#) in the treatment of symptomatic VCFs exists ⁶⁾.

Case series

In a [multicenter study](#), Kallmes et al., randomly assigned 131 patients who had one to three painful [osteoporotic vertebral compression fractures](#) to undergo either vertebroplasty or a simulated procedure without [cement](#) (control group). The primary [outcomes](#) were [scores](#) on the modified [Roland Morris Disability Questionnaire](#) (RDQ) (on a scale of 0 to 23, with higher scores indicating greater [disability](#)) and patients' ratings of average [pain](#) intensity during the preceding 24 hours at 1 month (on a scale of 0 to 10, with higher scores indicating more severe pain). Patients were allowed to cross over to the other study group after 1 month.

All patients underwent the assigned intervention (68 vertebroplasties and 63 simulated procedures). The baseline characteristics were similar in the two groups. At 1 month, there was no significant difference between the vertebroplasty group and the control group in either the RDQ score (difference, 0.7; 95% confidence interval [CI], -1.3 to 2.8; P=0.49) or the pain rating (difference, 0.7; 95% CI, -0.3 to 1.7; P=0.19). Both groups had immediate improvement in disability and pain scores after the intervention. Although the two groups did not differ significantly on any secondary outcome measure at 1 month, there was a trend toward a higher rate of clinically meaningful improvement in pain (a 30% decrease from baseline) in the vertebroplasty group (64% vs. 48%, P=0.06). At 3 months, there was a higher crossover rate in the control group than in the vertebroplasty group (51% vs. 13%, P<0.001) [corrected]. There was one serious adverse event in each group.

Improvements in pain and pain-related disability associated with osteoporotic compression fractures in patients treated with vertebroplasty were similar to the improvements in a control group ⁷⁾.

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Last update: **2021/03/04 21:46**

