

Key Literature on Vertebral Fracture Assessment

Jager PL, Jonkman S, Koolhaas W, Stiekema A, Wolffenbuttel BH, Slart RH. Combined vertebral fracture assessment and bone mineral density measurement: a new standard in the diagnosis of osteoporosis in academic populations. *Osteoporos Int.* 2011 Apr;22(4):1059-68. doi: 10.1007/s00198-010-1293-3. Epub 2010 Jun 23.

- The purpose of this prospective diagnostic evaluation study was to determine the value of VFA added to BMD measurement in 2,500 consecutive patients referred for BMD.
- “Image quality of VFA now approaches that of a standard radiograph.”
- “Its radiation dose is less than 1% of a comparable radiograph, and is considered extremely low at 3 micro-Sievert, which is in the same order as 1 day of normal life.”
- The detection of a vertebral fracture often leads to medical treatment in patients that would otherwise not have been treated as seen by 27% of 468 physicians that were part of this study.
- “Addition of VFA to BMD therefore appears to give a valuable contribution to the management of osteoporosis.”

Hospers IC, van der Laan JG, Zeebregts CJ, Nieboer P, Wolffenbuttel BH, Dierckx RA, Kreeftenberg HG, Jager PL, Slart RH. Vertebral fracture assessment in supine position: comparison by using conventional semiquantitative radiography and visual radiography. *Radiology.* 2009 Jun;251(3):822-8. doi: 10.1148/radiol.2513080887. Epub 2009 Apr 20.

- The purpose of this study was to evaluate the accuracy of vertebral fracture assessment (VFA) performed on 250 consecutive patients (190 women; mean age, 64 years and 60 men; mean age, 57 years) who were suspected of having osteoporosis and who underwent VFA in the supine position (lower radiation technique) and radiography of the spine.
- “VFA performed with patients in the supine position is an accurate method to help detect vertebral fractures when compared with conventional spine radiography.”

- “Although conventional radiography of the spine is the standard method for the detection of vertebral fractures, VFA has several benefits, including substantially lower radiation dose, lower cost, higher patient convenience, and less operator-dependent variance. Its convenient combination with bone mineral density measurement in a single short session and low radiation dose constitutes a substantial practical advantage.”
- “In the study, it is likely that accuracy was improved with the supine technique owing to a straight spine as compared with VFA performed in the lateral position.”
- “Conventional radiography usually has parallax, while VFA vertebrae are imaged in an orthograde direction without parallax. Also, the determination of which vertebra is affected is difficult on lateral conventional radiographs, while VFA shows all vertebral levels in a single image.”
- “The supine position has fewer problems with additional obliquity because when patients are scanned in the lateral position, VFA will lead to lateral bending of the spine.”

Lindsay R, Silverman SL, Cooper C, Hanley DA, Barton I, Broy SB, Licata A, Benhamou L, Geusens P, Flowers K, Stracke H, Seeman E. Risk of new vertebral fracture in the year following a fracture. *JAMA.* 2001 Jan 17;285(3):320-3.

- The purpose of this study was to determine the incidence of further vertebral fracture in the year following a vertebral fracture in 2725 subjects whose vertebral fracture status was known.
- “Vertebral fractures are a well-recognized consequence of postmenopausal bone loss and are the most common osteoporotic fractures.”
- “All vertebral fractures, whether symptomatic or radiographically identified, are associated with increased mortality and morbidity, including back pain and decreased activity, with consequent increased days of bed rest and are independent of BMD.”
- 23% of incident fractures were clinical events, resulting in less than one third of all vertebral fractures that are clinically diagnosed.
- “Our finding that approximately 20% of women will experience another fracture within the first year of a vertebral fracture justifies a degree of urgency for clinicians in identifying and treating all patients who present with vertebral fractures.”

McCloskey EV, Vasireddy S, Threlkeld J, Eastaugh J, Parry A, Bonnet N, Beneton M, Kanis JA, Charlesworth D. Vertebral fracture assessment (VFA) with a densitometer predicts future fractures in elderly women unselected for osteoporosis. J Bone Miner Res. 2008 Oct;23(10):1561-8. doi: 10.1359/jbmr.080515.

- The purpose of this prospective double-blind intervention study was to examine the prevalence of vertebral fractures by supine lateral VFA, its ability to predict incident fractures, and its use in targeting therapy in 5212 elderly women
- “VFA can frequently detect vertebral fractures in a population cohort of elderly women. These fractures, like radiographic fractures, predict future clinical fractures independent of age, weight, and BMD.”
- “Multiple vertebral fractures were associated with greater clinical fracture risk and also predicted hip fractures after adjustment for age, femoral neck BMD, weight, and treatment effect.”
- “VFA is a more convenient and lower radiation dose alternative to radiographs for incident fracture risk prediction.”

Roux C, Baron G, Audran M, Breuil V, Chapurlat R, Cortet B, Fardellone P, Trémollières F, Ravaud P. Influence of vertebral fracture assessment by dual-energy X-ray absorptiometry on decision-making in osteoporosis: a structured vignette survey. Rheumatology (Oxford). 2011 Dec;50(12):2264-9. doi: 10.1093/rheumatology/ker225. Epub 2011 Oct 19.

- The purpose of this study was to assess the impact of VFA results on decision-making in osteoporosis, using 117 vignettes (117 patients: mean age 65.1 years).
- This study shows that VFA results influence patient management, and changes in treatment in 31% population.
- “VFA is very convenient as it can be done at the same visit as BMD.” “This study also suggests that this procedure is cost saving.”
- “Recognition of vertebral fractures changes estimation of fracture risk and the threshold for pharmacological intervention, independently of BMD.”

Ferrar L, Roux C, Felsenberg D, Glüer CC, Eastell R. Association between incident and baseline vertebral fractures in European women: vertebral fracture assessment in the Osteoporosis and Ultrasound Study (OPUS). Osteoporos Int. 2012 Jan;23(1):59-65. doi: 10.1007/s00198-011-1701-3. Epub 2011 Jul 6.

- The purpose of this study was to test the association and frequency of prevalent and incident vertebral fractures identified on VFA. 674 women were included in the final analysis
- “Women with prevalent fracture had a significantly greater risk of incident VF than women without prevalent fracture.”
- “Baseline (prevalent) vertebral fracture is a powerful independent predictor of future fracture risk, but many fractures do not come to clinical attention.”
- “Prevalent vertebral fracture in postmenopausal women was associated with an eightfold greater risk of incident vertebral fracture ($P < 0.001$). The greater risk remained significant after adjusting for age and BMD.”