

OP10

Diagnosis of Vertebral Fracture in the IMPACT Study _ Are Fractures really Underdiagnosed in Osteoporosis Research?

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The algorithm-based qualitative method (ABQ) diagnoses vertebral fracture (VF) based on endplate depression. Vertebrae with short height but no endplate depression are not diagnosed as VF. The semi-quantitative method (SQ) is based on apparent reduction in vertebral height greater than 20%. Radiological differential diagnosis has been emphasised as an advantage of the SQ method. However, this could be in conflict with the height reduction criterion, and therefore difficult to apply. The aim of this study was to compare the identification of VF between the ABQ method and the SQ method.

The IMPACT trial comprised 2451 postmenopausal women aged 65 to 80 years. The present analysis examined prevalent VF in a subset of spinal radiographs for 466 women in 2002. The subset audited comprised all those where there was a discrepancy (n=350) by SQ between the local reader and the central (SQ-central) readings, together with a random selection (n=116) of women where there was agreement. The radiographs were re-evaluated by an expert ABQ reader (ABQ) and an expert SQ reader (SQ-expert) blinded to each other and any previous diagnosis. Agreement between readers was calculated using kappa statistics.

Women diagnosed as having at least one VF by ABQ, SQ-central, and SQ-expert numbered 200 (43%), 316 (68%), and 323 (69%) respectively. There were marked differences in the distribution of VF by vertebral level between methods. For ABQ reading, VFs were most frequent at the junction of thoracic and lumbar spine. For the two SQ readers, VFs were most common at the middle thoracic levels, particularly for SQ-expert. There were 389 women identified as having VF by at least one of the three assessments. In less than half of these women (n=176) was there agreement between all three assessments. Kappa score on subject basis was 0.41 between ABQ and SQ-central, and 0.40 between ABQ and SQ-expert. Kappa between the two SQ assessments was 0.33. Even when individual women were agreed to have a VF between any two assessments, there was disagreement in 41% of the paired comparisons as to which vertebra was fractured. In 96 women, vertebrae identified as moderate fractures by one SQ assessment, were diagnosed as mild fractures or as normal by the other SQ assessment. Most discrepancies were those identified by SQ as VF at the middle thoracic spine, but as non-fracture deformities by ABQ.

There was a considerable disagreement in VF diagnosis between readers. VF may be over-diagnosed by SQ.

Next page: Powerpoint presentation

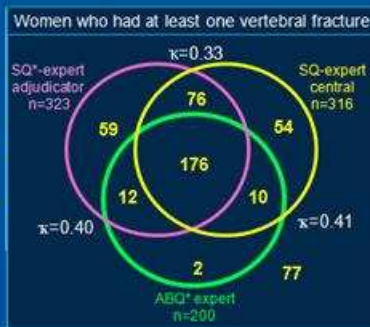
Diagnosis of Vertebral Fracture in the IMPACT Study _ Are Fractures Really Under-diagnosed in Osteoporosis Research?

Jiang G - work conducted at the University of Sheffield, Sheffield, UK

- Considerable doubt about methods used to diagnose vertebral fractures in clinical research
 - Definitions based on apparent height reduction may take insufficient account of common sense radiology, e.g. anatomical and developmental variation
 - Fracture prevalence varies significantly by different methods, or different assessments using the same methods
- IMPACT study, published in 2005
 - Underdiagnosis of Vertebral Fractures Is a Worldwide Problem: The IMPACT Study. *J Bone Miner Res* 20 (4), 557-63.

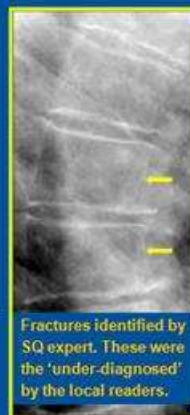
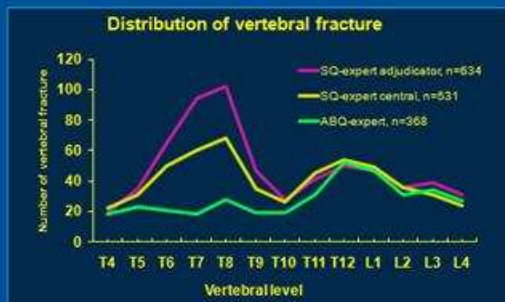
The IMPACT Study: Fractures Are 'Under-diagnosed'

- It was asserted that local radiologists under-diagnose vertebral fracture compared to experts at the central facility (34% false negatives)
- I was invited to independently review this study in 2002
- Another expert (the adjudicator) reviewed the same subset of images
- However, the paper did not focus on disagreement between the 'experts'
- The only three images shown in publication were rare examples



Genant et al, 1993, *JBMR* 8:1137
Jiang et al, 2004 *OI* 15:887

Findings and Summary



Fractures identified by SQ expert. These were the 'under-diagnosed' by the local readers.

- Lack of transparency
 - spine images are the data

Next page: more illustrations of SQ fractures. Are these true fractures?

Example of discrepant images, which are radiologically questionable

1). Fractures by experts at the central facility



T6,7

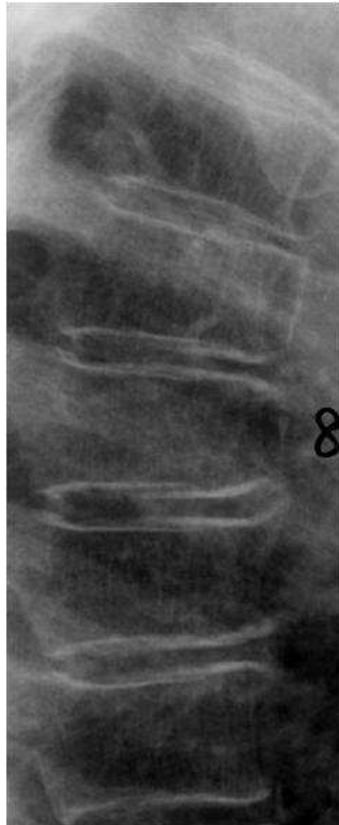


T7



T7,8

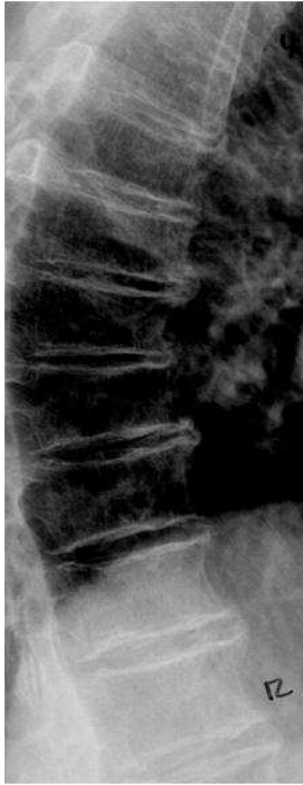
2). Fracture by expert adjudicator



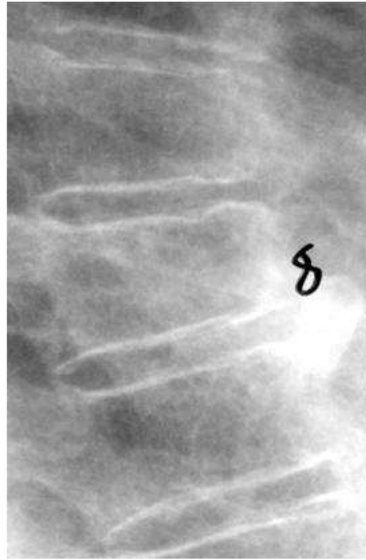
T7,8,9



T8,9,11



T6,7,8,9,10,11



T7,8

3). T8 fracture by local readers

