Have We Found the Optimal Screening Tool for Fragility Fractures?  
A Review and Meta-analysis

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PURPOSE
Osteoporosis and associated fractures (the significant complication of this condition) have an enormous impact on global health systems. Osteoporosis often underlies distal radius fractures, which are commonly treated by hand surgeons, and as such osteoporosis is frequently encountered in our field. A first fragility fracture puts patients at increased risk for a subsequent fracture. Prevention includes treatment of osteoporosis and avoidance of subsequent falls. The current screening system using dual-energy X-ray absorptiometry (DXA) has limited ability to identify bones more vulnerable to fractures. Our purpose was to evaluate the current literature for a method that may constitute a screening test better able to predict fragility fractures. Specifically since distal radius fractures occur earlier than vertebral or hip fractures, we consider whether evaluating the distal radius may provide earlier identification.

METHODS
A review of studies evaluating osteoporosis and fragility fractures was performed. Multiple modalities were reviewed. MRI though sensitive and specific to predict osteoporosis has limited data on fracture prediction. Ultrasound (US) had sufficient data on fracture prediction to perform a meta-analysis, therefore prospective US cohort studies were analysed. Six study populations, with 29,299 individuals, 87,296 person-years of observation and including nine hundred and ninety-two fractures were analysed.

Studies that described fractures in different body areas were analysed by creating a variable that included all fracture locations. In studies in which different ultrasound methods were used for the same site but did not coincide with the same participants, hazard ratio estimates were combined into one estimate. The pooled effect across studies was calculated.

RESULTS
The three main modalities used to predict fracture occurrence in osteoporosis were magnetic resonance imaging (MRI), computed tomography (CT) scans and ultrasound (US). US was a good predictor of any fracture occurrence with an increased risk of 1.45 (95% CI 1.21-1.73) to fracture. The ability to predict a hip fracture was 1.52 (95% CI 0.94-2.48). MRI is sensitive and specific for osteoporosis but its use for screening has not been sufficiently evaluated. Computed tomography seems to have the ability to predict fracture occurrence but at this time there are relatively few studies using this modality.

CONCLUSIONS
• US has not taken the place of DXA as a screening tool for osteoporosis, perhaps due to operator dependency and difficulty in standardization of testing.
• CT has been shown to have the potential for fracture prediction, however may be problematic as a screening tool due to cost, radiation and availability.
• MRI has not yet been thoroughly evaluated. More study taking into account cost, accessibility, technical challenges and sensitivity and specificity of the tool is needed.

References: