Can Trauma Surgeons' Subjective Intraoperative Conclusions on Patients' Bone Quality Be Trusted?

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Background/Purpose: How are my bones; do I have osteoporosis? Orthopaedic trauma surgeons are occasionally asked this question. A response from a medical doctor often has a major impact on the patients, but how valid is the surgeon's answer? The purpose of this study was to validate trauma surgeons' estimation of bone quality and conclusions as to whether a patient undergoing surgery for a fracture has osteoporosis or not.

Methods: Trauma surgeons were asked immediately after performing fracture surgery to evaluate the quality of the bone on a 10-cm visual analog scale (VAS) ranging from very poor to extremely high bone quality. The surgeons were also asked if they would answer "osteoporosis," "not osteoporosis," or "not able to answer" if the patients asked for their status of osteoporosis. Within 3 months after surgery all patients were invited to undergo dual x-ray absorptiometry (DXA) for measuring bone mineral density. Receiver operating characteristic (ROC) curves were used as diagnostic tools to describe the accuracy of VAS score against prevalence of osteoporosis based on DXA or bone status category: normal, osteopenia, or osteoporosis. Nonparametric methods were used to calculate area under the ROC curves, and DXA outcome was binary. An area between 0.7-0.8 represents a fair test and from 0.6-0.7 represents a poor test.

Results: 53 patients were included in this study and evaluated by 13 trauma surgeons. Location of fracture varied between distal radius (24%), hip (19%), ankle (19%), lower leg (15%), and forearm (15%).

Area under the ROC curve measuring accuracy of VAS as diagnostics tool for osteoporosis was 0.698 and for diagnosing a status of osteopenia or osteoporosis the area under the curve was 0.727. Using a cut point on the VAS scale 4 cm or less as diagnostics for osteoporosis, the sensitivity was 84%, the specificity 42%, and 75% were correctly classified. Using the same cut point of 4 cm for diagnosing osteopenia or osteoporosis from the VAS scale the sensitivity was 93%, specificity 27%, and 45% were correctly classified. In 15 cases (28%) the surgeons were not able to conclude if osteoporosis was present or not. The positive predictive value of the surgeons' conclusion of osteoporosis was 50% and the negative predictive value was 83%. If surgeons' conclusion of osteoporosis was used as a surrogate for any abnormal low bone density (osteopenia or osteoporosis), the positive predictive value raised to 86%.

Conclusion: The trauma surgeon's intraoperative experiences and conclusions concerning a patients bone quality can be trusted to some degree. The positive predictive value of surgeons' conclusions of abnormal bone quality is high. The VAS scale has been found to be a simple tool to identify patients with potential abnormal bone quality who might need further diagnostics with DXA scans.

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.
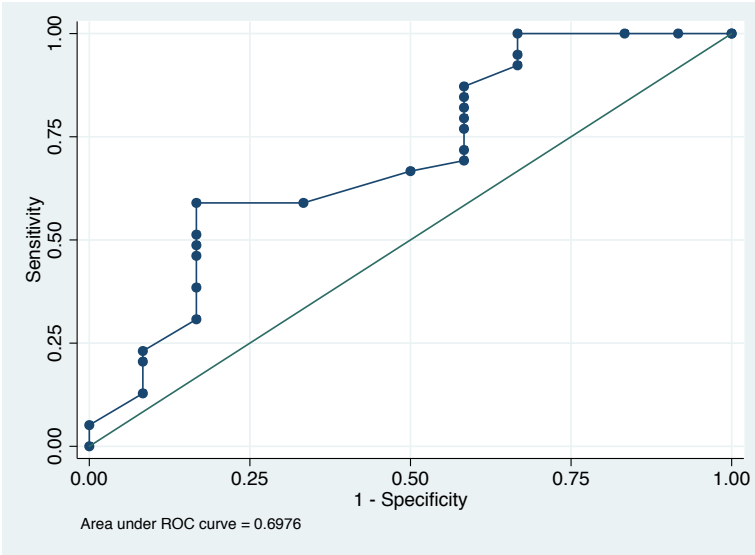
POSTER ABSTRACTS

Area under ROC curve = 0.6976

Figure 1 A)   Osteoporis
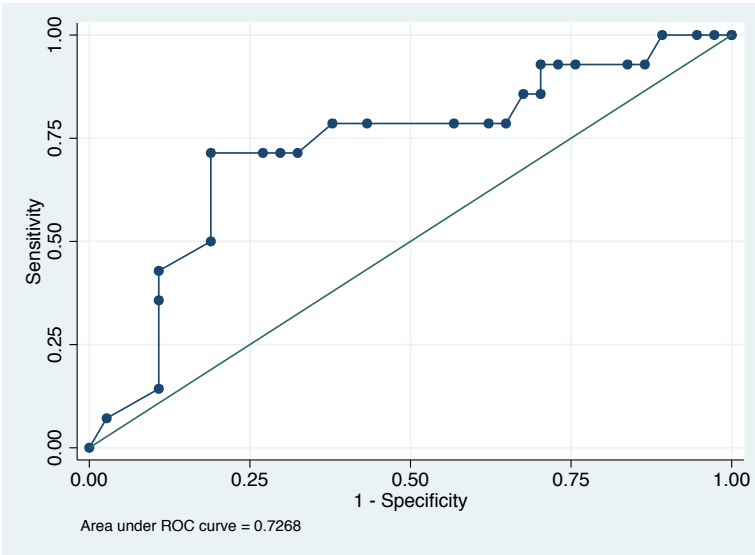
Area under ROC curve = 0.7268

Figure 1 B)   Osteopenia or Osteoporosis

Figure 1 A & B:
ROC curves shows characteristics of VAS scale as diagnostic test for
(A) osteoporosis & (B) osteopenia or osteoporosis.