Evaluation of An Automated Morphometry Software Program (SpineAnalyzer™) on VFA Images

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INTRODUCTION

Prevalent vertebral fractures are a potential marker of disease risk in osteoporosis. However, many prevalent fractures are not appreciated by the patient or radiologist. Inadequate fracture detection can lead to incorrect or delayed diagnosis which can have a significant impact on patient care. There is a need for improved systems to evaluate VFA images. The morphometry software, SpineAnalyzer (™), has been developed to accurately assess and compare vertebral body deformities. This study evaluated the SpineAnalyzer program’s capability to identify, measure and report vertebral body deformities on VFA images.

METHODS

The SpineAnalyzer™ program was used to interpret VFA images from two cohorts: 1) obese patients undergoing bariatric surgery (122 women, range of age 17.1 to 36.5 years, mean 26.5 ± 4.3 kg/m²), and 2) an elderly cohort (76 women, range of age 57 to 91.5 years, mean 72.6 ± 7.2 kg/m²). Data on VFA interpretation approached by a gold standard reader. Studies evaluating other populations are needed to conclude.

RESULTS

• Agreement was observed between the gold standard and both SpineAnalyzer™ and the clinician (kappa 0.54 and 0.50 respectively). When limiting evaluation to upper thoracic vertebral bodies, kappa was 0.54 and 0.56 for clinician.

• 71% of the cohort (range 67-76) were assessed by the gold standard reader, while 91% of the data was assessed by both interpretation approaches.

• Agreement between interpretation approaches was substantial for no fracture plus mild (grades 1-2) and moderate (grades 3-5) vertebral fractures (kappa 0.73). Agreement was fair for severe fractures (kappa 0.56). Agreement between approaches for non-deformed (no fracture) vertebral bodies was 0.86 for both approaches.

• SpineAnalyzer™ accurately identified no fractures.

• When evaluating an image as a whole, an “evaluable” vertebral body makes a vertebral body not evaluable would enhance agreement.

• Some disagreement results from differences in what is considered to be an “evaluable” vertebral body using morphometry alone.

• The “gold standard” and analysis performed by a non-radiologist physician. In this cohort, the gold standard analysis identified 53 abnormal and/or upper thoracic vertebral bodies.

• Prevalent vertebral fractures are powerful predictors of future fracture risk. Prior vertebral fracture increases fracture risk making knowledge of fracture location critical. SpineAnalyzer™ makes it possible to accurately assess and compare vertebral body deformities on VFA images.

• Since the majority of vertebral fractures (89-93) are adequately visualized for fracture identification using VFA images.

• There is need for improved systems to evaluate VFA images. The morphometry software, SpineAnalyzer™, has been developed to accurately assess and compare vertebral body deformities on VFA images.

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