Thoracic spine imaging: A comparison between radiography and tomosynthesis using visual grading characteristics

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Background: Conventional radiography (CR) is the most-often used modality in imaging of the thoracic spine, as primary examination as well as follow-up of known pathology. However, the ability of radiography to clearly depict thoracic vertebrae is limited, mostly due to overlying structures. Digital tomosynthesis (DTS) has in other parts of the body – most notably in chest imaging – been shown to increase conspicuity of relevant pathology where overlying structures is an issue. DTS has not yet been evaluated as an imaging modality of the thoracic spine.

Purpose: To compare the ability of CR and DTS to depict relevant structures of the thoracic vertebrae.

Materials and Methods: In this prospective visual grading study, 23 patients referred in 2014 for elective radiographic examination of the thoracic spine were examined using CR and DTS in the sagittal plane. The lateral projections of the CR and DTS images were read in random order by four radiologists evaluating the ability of the modalities to present a clear reproduction of nine specific relevant structures of vertebrae T3, T6 and T9. The data were analyzed using Visual Grading Characteristics (VGC) analysis.

Results: In terms of clear reproduction, VGC analysis revealed that there was a statistically significant difference ($p<0.05$) between CR and DTS in favor of the latter, for all evaluated structures apart from the anterior vertebral edges and lower end plates of T6 and T9. The differences were most striking in T3. No structures were evaluated as being more clearly reproduced by CR.

Conclusion: The study indicates that most vertebral structures of the thoracic spine are perceived as more clearly reproduced by DTS than by CR, suggesting that detection of pathology would be improved by the use of DTS.