

A combination of Magnetic Resonance (MR) and Computed Tomography (CT) scans has been used in the past years for diagnosis and treatment planning of different spine pathologies. MR imaging is the first choice for diagnostics as it can provide high-quality images of the soft tissue of the patient, but CT scans need to be additionally acquired in order to visualise the bony structure for surgical planning and navigation.

To obtain a more efficient workflow, different techniques were studied to obtain high-quality unimodal images of soft and bone tissue with MRI. BoneMRI is a software developed by MRGuidance B.V. for synthetic CT scan generation.

The aim of this research is to qualitatively evaluate the performance of BoneMRI for surgical planning in the spine and determine the potential value of BoneMRI compared to a specific MR sequence that is capable of visualising osseous structures.

The MR-based scans were used to plan the screws for spine surgery between vertebrae L1 and S1, and three observers evaluated the visualisation accuracy and feasibility of surgical planning with BoneMRI by filling out a questionnaire with results given on a five-point likert scale. 110 screws were placed in the lumbar and S1 vertebrae of 24 patients.

The statistical analysis performed from the questionnaire demonstrated that BoneMRI produces adequate qualitative image quality by correctly visualising the different anatomical regions of the vertebrae. BoneMRI showed to be capable to perform screw planning with confidence, was capable to visualise different spine pathologies and showed to be an added value compared to a different MR sequence for bone tissue visualisation.