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Evaluation of articular cartilage injury using computed tomography with axial traction in ankle joint

Tomoyuki Nakasa, MD, Yasunari Ikuta, Masahiro Yoshikawa, MD, Yusuke Tsuyuguchi, MD, Yuki Ota, MD, Munekazu Kanemitsu, MD, Nobuo Adachi, MD

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Introduction/Purpose: Although chondral or osteochondral injuries are usually assessed by MRI, its accuracy is reportedly low because of the relatively thin cartilage layer and its close apposition to the cartilage talus and tibial plafond. The subchondral bone plays a role in cartilage metabolism, therefore the evaluation of subchondral bone is crucial for cartilage treatment. A method which enables the simultaneous evaluation of cartilage and subchondral bone is useful for the treatment of cartilage injury. The purpose of this study was to assess the feasibility of CT imaging with axial traction for the diagnosis of articular cartilage injuries.

Methods: Chondral lesion in 18 ankles of 17 patients were evaluated. These 18 ankles consisted of 11 ankles of osteochondral lesion of the talar dome (OLT), 5 ankles of osteoarthritis of ankle joints and 2 ankles of anterior impingement syndrome. Twelve males and 5 women were included, with a mean age of 33.7 years (range, 15 -70 years). An ankle distractor foot strap was placed on the ankle with 30 degrees flexion of the knee joint, and a traction force of 80N was applied during CT scanning. Gray scale CT images were allocated colors to make it easier to evaluate the cartilage layer. The international Cartilage Repair Society (ICRS) grades on CT were compared with those in arthroscopic findings.

Results: The respective sensitivity and specificity of CT imaging with traction compared to ICRS grading were 74.4%, and 96.3%. The level of agreement of the ICRS grading between CT images and arthroscopic findings showed moderate (kappa coefficient; 0.547). The diagnosis of grade 3 or 4 lesions had 80.0% sensitivity. Axial traction to CT enabled the delineation of the cartilage surface including chondral thinning, defect and cartilage separation more visible (Figure 1).

Conclusion: CT with axial traction could obtain acceptable levels of sensitivity and specificity for the evaluation of articular cartilage injuries in addition to the assessment of subchondral bone.

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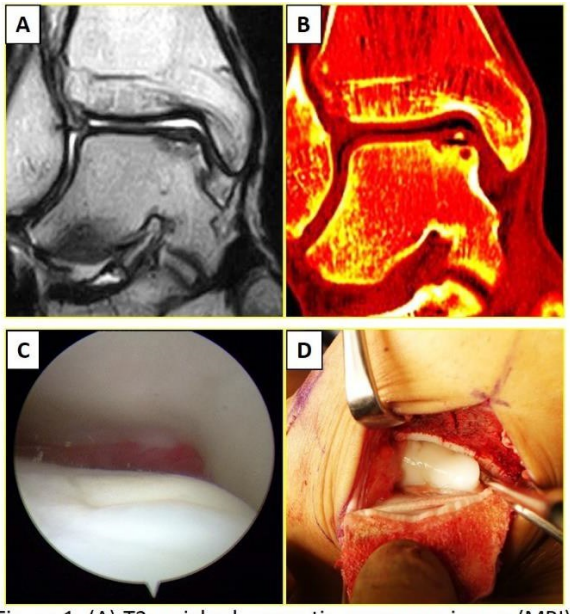


Figure 1. (A) T2 weighed magnetic resonance image (MRI). (B) Coronal CT image with traction. (C) Arthroscopic findings. (D) Gross appearance of OLT. Osteochondral fragment and space between fragment and its bed on CT was clearly visible compared to MRI, and these findings were confirmed arthroscopically and through direct visualization.

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