Non-Anatomic All-Inside Arthroscopic Anterior Talofibular Ligament Repair with a High Position Anchor Shows Inferior Clinical Outcomes: A 3D-CT-Based Analysis in Chronic Ankle Instability Patients

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INTRODUCTION:
In chronic ankle instability (CAI), it is important to repair the anterior talofibular ligament (ATFL) at the anatomic origin site. However, there are limited reports on the clinical outcomes according to anatomical ATFL repair. The purpose of this study is to compare the clinical outcomes after arthroscopic ATFL repair, according to whether the anchor is fixed at an anatomic position.
METHODS:
We performed a retrospective review of consecutive patients who underwent arthroscopic ATFL repair for CAI and were available for a minimum of 2 years follow up. The patients were divided into three groups according to the anchor position at the distal fibula on 3-dimensional computer tomography: group A, anatomical arthroscopic ATFL repair; group S, sub-anatomical arthroscopic ATFL repair; and group N, non-anatomical arthroscopic ATFL repair. The pain (visual analogue scale [VAS]) score, foot and ankle outcome score (FAOS), and the Karlsson ankle functional score were measured as subjective outcomes. Posturographic analysis and radiologic evaluation using stress radiographs and axial view magnetic resonance imaging were performed as objective outcomes.
RESULTS:
Of 96 patients, 16 were excluded based on the exclusion criteria, and 80 were evaluated (group A, n = 24; group S, n = 42; and group N, n = 14). The mean age of the patients was 34.5 years, and the mean follow-up period was 27.4 months. A between-group comparison revealed significant differences in the FAOS, Karlsson score, and fall risk evaluated by posturography at the final follow up. Post hoc analysis revealed that group A patients showed better clinical scores in the FAOS than group N patients in all five domains (all $p < 0.017$). Patients in groups A and S showed better Karlsson score and fall risk than those in group N ($p = 0.004$ and 0.013, respectively). In terms of objective outcomes, patients in groups A and S showed better outcomes in fall risk than those in group N (both $p = 0.001$).
DISCUSSION AND CONCLUSION:
Non-anatomic ATFL repair showed inferior outcomes compared to anatomic ATFL repair. When performing arthroscopic ATFL repair, the anchor should be fixed in the anatomical position to improve prognosis.

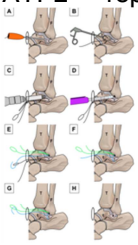

Figure 1. Illustrations of arthroscopic anterior talofibular ligament (ATFL) repair. (A) A suture passer is passed through the accessory anterolateral (acAL) portal and used to penetrate the ATFL from inferolateral to superomedial. (B) The nitinol loop wire is then passed through the suture passer and pulled out through the acAL using a retriever. (C) A drill guide is placed through the acAL portal into the anatomic ATFL origin site. (D) After the hole is drilled, the knotless anchor is inserted through the drill guide. (E) The repair suture is loaded through the nitinol wire loop, which is then pulled back. (F) The end of the repair suture runs from the acAL portal through the ligament and back to the acAL portal. (G) The repair suture is loaded through the loop of the shuttling suture, and the free end of the shuttling suture is pulled to shuttle the repair suture back into the anchor. (H) The free end of the repair suture is pulled until the desired tension is achieved. F, fibula; t, talus; T, tibia; X, remnant of the ATFL; U, repaired ATFL.

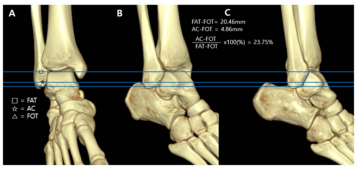

Figure 2. The position of the fibula tunnel for the knotless anchor was measured by reconstructing the 3D image after marking the location of the tunnel using the lateral view. (A) FAT, FOT, and the position of the anchor tunnel were identified on the CT scan. (B and C) The 3D-CT scan image was rotated until a true lateral view was obtained. Next, the ratio of the distance between AC and FOT, and FAT and FOT were measured. FAT: fibula anterior tubercle, FOT: fibular obscure tubercle, AC: anchor.

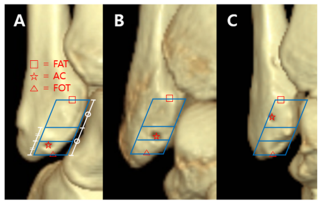

Figure 3. Groups were determined according to the anchor position between the FAT and FOT: (A) the anatomic position in the lower quadrant, <25%; (B) the subanatomic position, between 25% and 50%; (C) the nonanatomic position, >50%. AC, anchor; FAT, fibular anterior tubercle; FOT, fibular obscure tubercle.