



## Effect of the Presence of Subchondral Cysts on Treatment Results of Autologous Osteochondral Graft Transfer in Osteochondral Lesions of the Talus



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### ABSTRACT

The aim of the present study was to clinically evaluate whether the presence of subchondral cysts had an effect on the treatment results of autologous osteochondral graft transfer in osteochondral lesions of the talus. Patients were enrolled in the present study according to the inclusion criteria. In the evaluation, we divided the patients into 2 groups according to presence ( $n = 13$  patients) or absence ( $n = 15$  patients) of a subchondral cyst. The mean age, body mass index, follow-up period, and lesion size in each group were measured and compared, and no statistically significant differences were found between the 2 groups ( $p > .05$ ). The clinical assessment was performed using the American Orthopaedic Foot and Ankle Society Hindfoot scoring system, visual analog scale, and International Knee Society scoring system. No statistically significant difference was found between the pre- and postoperative scores of the 2 patient groups ( $p > .05$ ). The successful results in both groups after a 2-year follow-up period have demonstrated that treatment of osteochondral lesions of the talus with osteochondral graft transfer is a safe method that can be performed independently of the presence of a subchondral cyst.

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Treatment of osteochondral lesions of the talus are challenging because of their insufficient capacity for self-repair. Microfracture, abrasion chondroplasty, curettage, drilling, and chondrocyte implantation with osteochondral grafting are among the treatment options (1–5). The choice of treatment method can be determined by the stage of the disease and size of the lesion.

Plain radiography, computed tomography, and magnetic resonance imaging (MRI) have been used to determine the stage of the disease (6–9). The 5 stages of the Bristol classification system using MRI are as follows: stage 1, cartilage lesion only; stage 2a, cartilage lesion and subchondral fracture with edema; stage 2b, cartilage lesion and subchondral fracture with no edema; stage 3, fully detached but undisplaced lesion; stage 4, fully detached and displaced lesion (Fig. 1); and stage 5, an accompanying subchondral cystic lesion (Fig. 2) (9).

The aim of our study was to compare the functional results of osteochondral graft transfer in stage 4 and 5 osteochondral lesions of the talus and investigate whether formation of the subchondral cyst

in stage 5 has an effect on the success of the osteochondral graft transfer method.

### Patients and Methods

A total of 43 patients who presented with pain in their ankles from May 2010 to March 2013 underwent osteochondral autograft transfer for the diagnosis of osteochondral lesion of the talus. The educational planning committee approved the patient follow-up protocol. The inclusion criteria for the study were a minimum postoperative follow-up period of 2 years, the presence of a unilateral and single osteochondral lesion on the medial aspect of the talar dome, stage 4 or 5 lesions using the Bristol classification system, a maximum size of 2 cm<sup>2</sup>, epiphyseal coalescence, failure of previous conservative treatment, no history of surgical intervention, and a body mass index (BMI) of <26.3 kg/m<sup>2</sup>. Fifteen patients who did not meet these criteria were excluded. The patients meeting the inclusion criteria were divided into 2 groups according to whether they had a stage 4 (group 1) or stage 5 (group 2) lesion using the Bristol classification.

Group 1 (no subchondral cyst) included 15 patients (53.5%; 6 females and 9 males), with a mean age of 32.6 (range 18 to 46) years and a follow-up period of 30.5 (range 24 to 48) months. Group 2 (subchondral cyst present) included 13 patients (46.5%; 1 female and 12 males), with a mean age of 36.7 (range 25 to 48) years and a follow-up period of 28.9 (range 24 to 43) months. No statistically significant differences were found between the 2 groups in terms of mean age ( $p = .206$ ) or follow-up period ( $p = .366$ ). The mean BMI was 23.5 (range 19.3 to 26.3) kg/m<sup>2</sup> for group 1 and 24.8 (range 19.5 to 26.2) kg/m<sup>2</sup> for group 2. Again, no statistically significant differences were observed in the mean BMI values of the 2 groups ( $p = .120$ ; Table 1).

The clinical results of the patients were evaluated using the American Orthopaedic Foot and Ankle Society (AOFAS) ankle-hindfoot scoring system and visual analog scale

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**Fig. 1.** (A) Preoperative T<sub>2</sub>-sequence sagittal magnetic resonance image of stage 4 lesion (arrow). (B) Preoperative T<sub>2</sub>-sequence coronal magnetic resonance image of stage 4 lesion (arrow). (C) Preoperative T<sub>2</sub>-sequence axial magnetic resonance image of stage 4 lesion (arrow).

(VAS) (10,11). The donor site morbidity of the patients was assessed using the International Knee Documentation Committee (IKDC) form. Data from the preoperative and postoperative periods were recorded. The data were collected by an observer (B.O.) who had not participated in the surgical interventions. Radiologic follow-up of the patients was performed using plain radiographs in the early postoperative period to evaluate the presence of union at the osteotomy site.

#### Surgical Technique

Curved longitudinal incisions were made over the medial malleolus in both patient groups. After access to the tibia, a Chevron-type osteotomy of the malleolus was performed. The talus was subsequently reached, and the size of the lesion was measured. The donor and recipient sites were prepared, and a cylindrical osteochondral graft of appropriate size was harvested from the lateral edge of the lateral femoral condyle on the same side using a harvester set and press fit into the prepared lesion site. After completing the surgical procedure on the talus, the medial malleolus was reduced and fixed perpendicular to the osteotomy line on the coronal plane using two 4-mm cannulated screws. The reduction was checked with fluoroscopy, and the skin was sutured.

#### Postoperative Follow-Up

A splint was used for 10 days postoperatively for soft tissue healing. Subsequently, the splint was removed, and the patient began ankle exercises. The presence of union on the osteotomy site was determined by the absence of pain during palpation over the site and the disappearance of the osteotomy line on plain radiographs.

#### Statistical Analysis

The Mann-Whitney *U* test was used to compare the mean age, lesion size, BMI, and follow-up period of the 2 patient groups. In addition, the same test was used to compare the pre- and postoperative data for the AOFAS, VAS, and IKDC scoring systems and to compare the scores for both groups (SPSS, version 20.0, software; SPSS Inc., Chicago, IL). The level of statistical significance was set at  $p < .05$ .

## Results

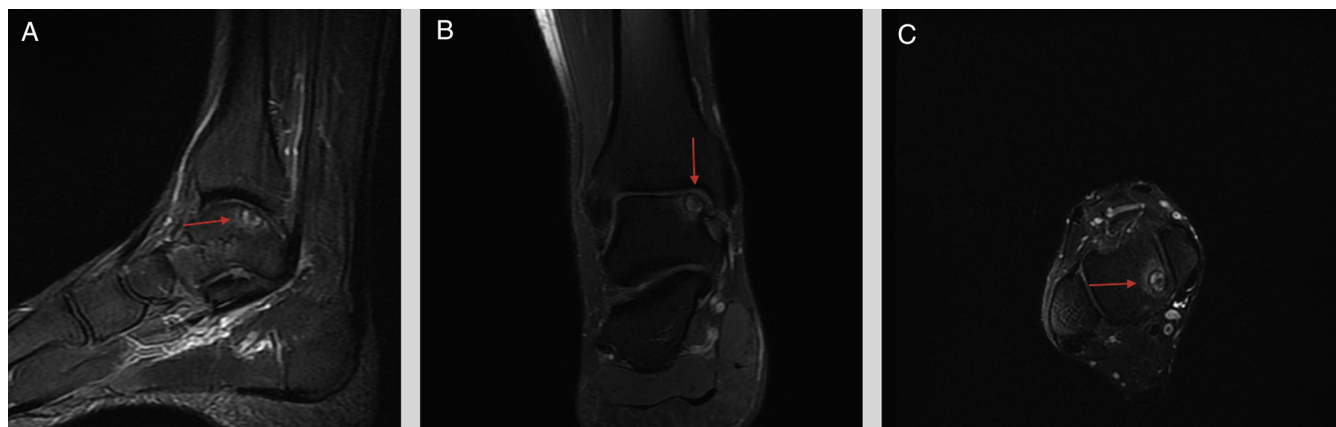
The mean preoperative AOFAS score of 55 (range 35 to 84) in group 1 increased to 88.6 (range 72 to 100) in the postoperative period. In group 2, the mean AOFAS score was 61 (range 38 to 85) preoperatively and 94 (range 74 to 100) postoperatively. The mean VAS score was 7.4 (range 5 to 9) for group 1 and 7.6 (range 5 to 9) for group 2 preoperatively and had decreased to 2.2 (range 0 to 4) and 2.3 (range 0 to 4) postoperatively, respectively. No statistically significant difference was found in the comparisons of the pre- and postoperative AOFAS and VAS scores for the 2 patient groups ( $p > .05$ ; Table 2).

Group 1 had a postoperative IKDC score of 91.4 (range 80 to 100). Group 2 had the same average value with a different range (range 65 to 100). Again, no statistically significant difference was found between the postoperative IKDC scores of the 2 groups ( $p = .922$ ; Table 2).

No intraoperative complication was observed in either patient group. No complications developed in the postoperative period, except for 1 patient in group 1, who experienced a delayed union. Although the routine plain radiographs taken 1.5 months after surgery lacked the finding of union for this patient, union was observed on the plain radiographs taken 1 month later. With the absence of pain on palpation over the osteotomy site, the latter radiographic findings was accepted as complete union.

## Discussion

Microfracture, abrasion chondroplasty, curettage, subchondral drilling, and chondrocyte implantation with osteochondral grafting



**Fig. 2.** (A) Preoperative T<sub>2</sub>-sequence sagittal magnetic resonance image of stage 5 lesion (arrow). (B) Preoperative T<sub>2</sub>-sequence coronal magnetic resonance image of stage 5 lesion (arrow). (C) Preoperative T<sub>1</sub>-sequence axial magnetic resonance image of stage 5 lesion (arrow).

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