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Retrograde osteochondral grafting for osteochondral lesion of the talus: a new technique eliminating malleolar osteotomy

Talusun osteokondral lezyonunda retrograd osteokondral greftleme: Malleol osteotomisi gerektirmeyen yeni bir teknik

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Osteokondral greftleme talustaki osteokondral lezyonların tedavisinde en etkili yöntemlerden biridir. Girişim sırasında malleol osteotomisinin gerekmesi tekniğin en önemli sorunudur. Bu yazıda, medial malleol osteotomisi yapmadan, ters yolla otojen osteokondral greftleme ile tedavi edilen bir olgu sunuldu. Kırk dokuz yaşında bir kadın hastanın talus medialinde 9 mm çaplı osteokondral lezyon saptandı. Talusa sinüs tarsi bölgesinden girilip lezyon bölgesine uzanan bir tünel, artroskopi kontrolünde açıldı. İpsilateral dizden alınan osteokondral greftin yönü değiştirilerek tünele distal ucundan sokuldu ve eklem yüzeyine kadar ilerletildi. Ameliyattan sonra yapılan bilgisayarlı tomografi incelemesinde, greftin tüneli tam olarak doldurduğu ve greft yüksekliğinin uygun olduğu görüldü. Bu yazıda, kullanılan teknik ayrıntılı olarak anlatıldı.

Anahtar sözcükler: Artroskopi; kemik transplantasyonu/yöntem; kartilaj transplantasyon; talus/patoloji/cerrahi; transplantasyon, otolog.

Osteochondral grafting is one of the most effective treatment options for osteochondral lesions of the talus. However, the necessity for a medial malleolar osteotomy is the major drawback of the technique. This report presents a case treated with retrograde osteochondral grafting that eliminated the need for a medial malleolar osteotomy. An osteochondral lesion of the medial talus was detected in a 49-year-old woman. Under arthroscopic guidance, the talus was entered from the sinus tarsi region to establish a tunnel extending to the lesion. An osteochondral graft taken from the ipsilateral knee was inserted into the distal end of the tunnel and was advanced to the joint surface. Postoperative computed tomography scans showed that the graft completely filled the tunnel and provided congruency with the articular surface. Details of this technique are described.

Key words: Arthroscopy; bone transplantation/methods; cartilage/transplantation; talus/pathology/surgery; transplantation, autologous.

Osteochondral graft transfer is an increasingly preferred technique for treatment of osteochondral lesions of the talus (OLT). Better results are obtained as compared to the previously defines methods like debridement, subchondral drilling, abrasion and microfractures.[1,2] The necessity to perform a malleolar osteotomy during transfer of the graft and problems encountered at the donor site constitute the major drawbacks. This article reports a case of osteochondral lesion of the medial talus treated by retrograde grafting and avoiding a medial malleolar osteotomy. The Retrograde Single Use OATS set, which was developed for tibial plateau grafting (Arthrex, Naples, FL, USA) was used for the purpose and the technique is described in detail.

Surgical technique

The patient is placed supine on a fluoroscopic operating table. The hip on the affected side is elevated with a cushion and a better exposure is obtained for the lateral side of the ankle. The lower extremity is placed in a position which allows ankle distraction to be performed when necessary. Ankle

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distraction may be essential to see the lesion when it is located in the posterior part of the talar dome.

Following a routine arthroscopic examination of the ankle joint, the lesion is located. The contours of the lesion can be determined when the covering cartilage is removed using a curette. Arthroscopic and radiologic findings help determine the size.

Arthroscopic retrograde drilling

Retrograde drilling is performed over a guide wire which is placed in the middle of the lesion through a medial incision for laterally located lesions and a lateral incision for medially located ones. A small joint arthroscopic drill guide is used for placing the wire in the correct position (Minivector, Smith & Nephew Dyonics, Andover, MA) (Figure 1a).

The drill guide is introduced from the portal on the side of the lesion and placed at the midpoint of the lesion. In order to reach the talus, a 2-3 cm long skin incision is performed over the sinus tarsi for medially located lesions and over the gap between anterior and posterior tibial tendons for laterally located lesions. The guide wire is introduced through this incision to the talus (Figure 1b). When the guide does not appear in the center of the lesion, special translation blocks may be used to introduce

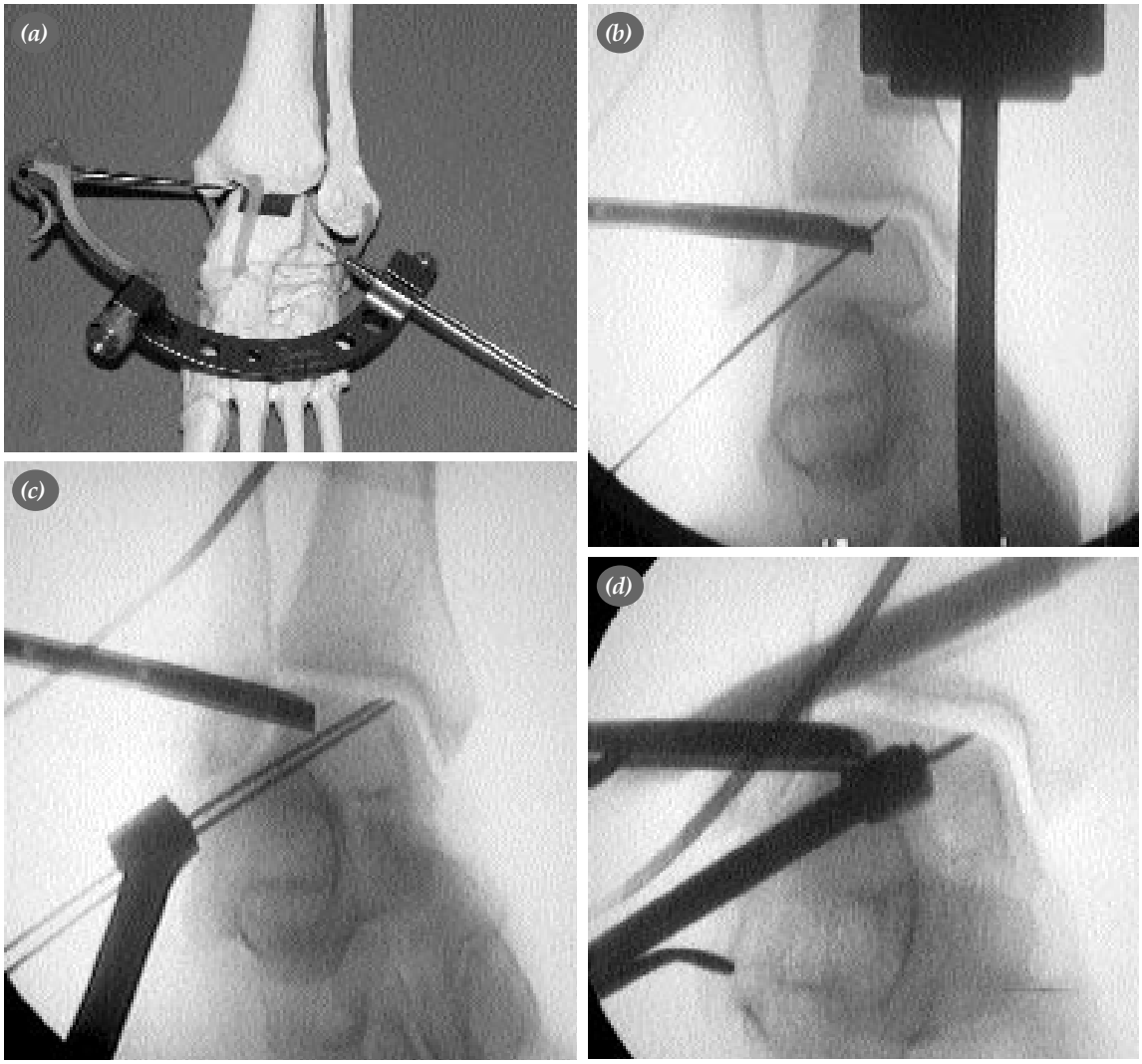

Figure 1. (a) Drill guide designed for small joints adjusted to a lesion on the medial side of the talus. **(b)** Introducing the guide wire from the lateral talus to the medial lesion, using the drill guide **(c)** Placing a second guide wire into a better position using the parallel wire block **(d)** Reaming a tunnel over the ideally positioned guidewire with a cannulated reamer.

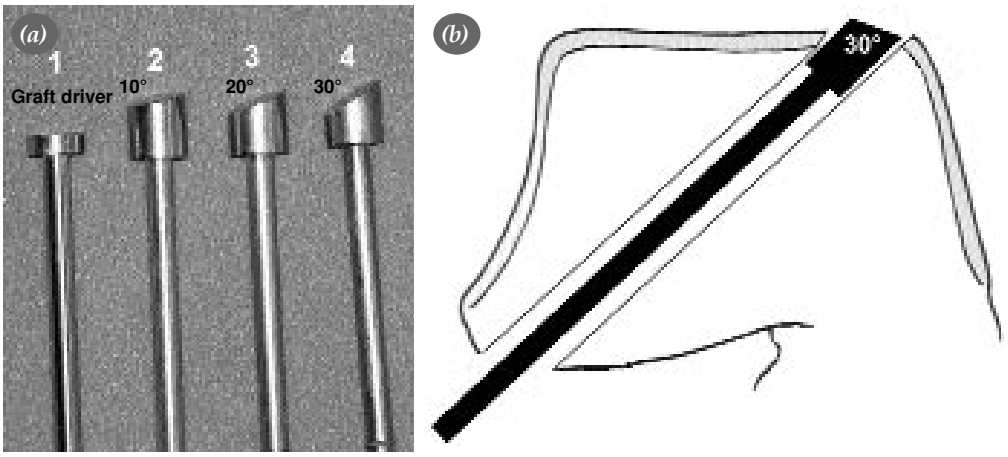

Figure 2. Employing angled-tip cylinders. **(a)** Angled-tip cylinders in the set. **(b)** Introducing the angled tip cylinder into the tunnel until the joint surface. Angle between the tunnel and joint surface is estimated by the angle of the cylinder. In the example, the graft surface should make an angle of over 30 degrees.

parallel wires to obtain the best position (Figure 1c). After identifying the optimally placed wire in terms of exit point and direction, a cannulated reamer having the same size as the lesion, is used to create a tunnel, reaching the joint (Figure 1d). Covering the intraarticular end of the guidewire with the help of a curette protects the opposing joint surface from a possible damage by the reamer. Intraarticular remnants of bone and cartilage should be removed.

Harvesting the osteochondral graft

The tunnel created through the talus forms approximately a 45 degree angle with the joint surface. The angle between the tunnel and the joint surface is estimated using the various angled-tip cylindrical rods (10, 20 or 30 degrees) which are present in the retrograde OATS set (Figure 2 a and b). These rods are introduced from the outer end of the tunnel until their angled tips reach the joint surface. At this stage, the congruency of the angled tip of the cylindrical rod with the joint surface is confirmed arthroscopically to define the correct angle.

The graft is best obtained from the lateral femoral condyl of the ipsilateral knee. The graft harvester is introduced in an angle similar to the tunnel - joint

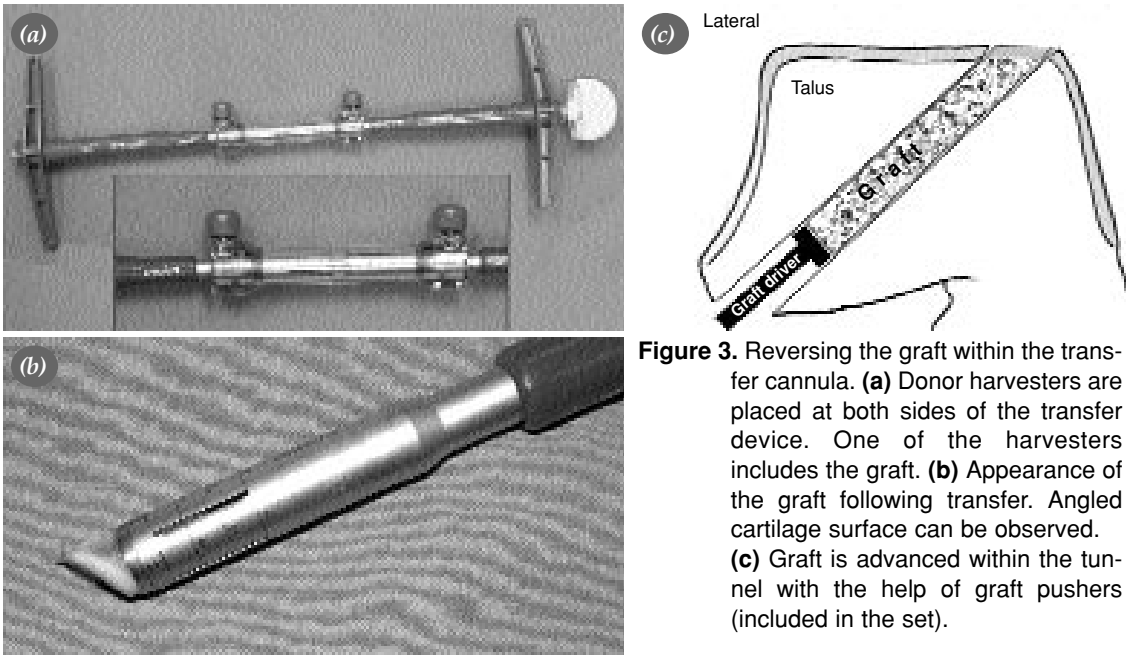

Figure 3. Reversing the graft within the transfer cannula. **(a)** Donor harvesters are placed at both sides of the transfer device. One of the harvesters includes the graft. **(b)** Appearance of the graft following transfer. Angled cartilage surface can be observed. **(c)** Graft is advanced within the tunnel with the help of graft pushers (included in the set).

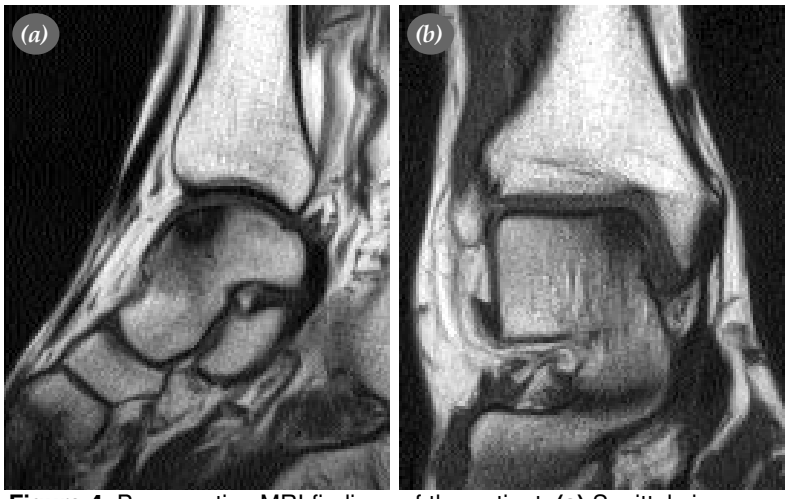

Figure 4. Preoperative MRI findings of the patient. **(a)** Sagittal view. Lesion is located anterior to the midline. **(b)** Coronal view. Lesion is adjacent to the medial shoulder.

angle. Since the tunnel is long, the longest possible graft should be harvested, and a graft of at least 2 cm in length should be used. The graft is transferred into the second donor harvester by using the transfer sleeve in the set (Figure 3a). When the transfer is completed, the angled chondral surface is visible at the free end of the donor harvester (Figure 3b).

Graft insertion into the tunnel

Inserting the graft into the tunnel requires meticulous care. Initially, the direction of the graft should be determined again with the help of cylindrical rods. The chondral surface is introduced through the outer end of the tunnel taking care to preserve the correct angle. The graft is pushed forward using the screw mechanism at the other end of the donor harvester. After the graft is completely free of the harvester, the graft driver is used to push the graft until it reaches the joint surface (Figure 3c). In the original retrograde OATS technique this pushing manouver is performed with a short absorbable screw.

Case report

49 year-old female patient referred with pain and frequent sprain injuries in her right ankle. Her complaints started two years previously after an acute ankle sprain. She encountered frequent sprain injuries, almost more than one every week. Pain had increased over the last months, limiting her walking distance. She did not have pain at night time.

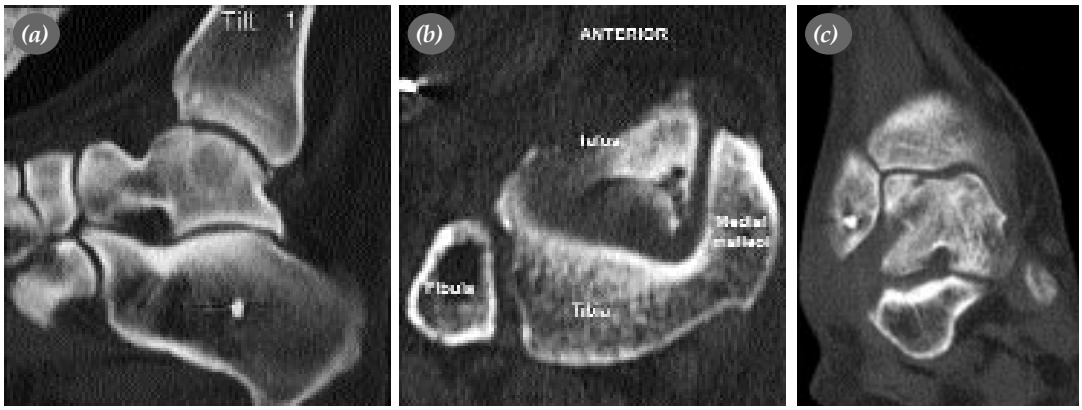

Figure 5. Postoperative CT scans. **(a)** Sagittal view demonstrating congruency of the graft with the joint surface. **(b)** Axial and **(c)** Coronal views. Graft reaches the medial border of the talus, filling most of the lesion except for a 3 – mm defect in the anterior portion.

The pain occured all around the ankle joint. Physical examination did not reveal a limitation in range of motion. There was no varus laxicity despite a mild anterior instability.

Radiographs and MRI examinations demontrated a 9 mm osteochondral lesion at the anterior half of the medial side of the talar dome, with surrounding bone marrow edema like signal changes (Figure 4 a and b). No mechanical instability could be demonstrated in stress radiographs.

Conservative management was preferred for the diagnosis of osteochondral lesion of the talus and functional instability; however, no improvement could be achieved within 4 months of treatment, after which surgery was recommended.

The above-mentioned surgical technique was performed to place a 10 mm osteochondral graft into the talus which is harvested from the ipsilateral lateral femoral condyle, using a retrograde approach, eliminating the need for a medial malleolar osteotomy. Any irregularity of the articular surface was controlled artroscopically. The calcaneofibular and anterior tibiofibular (ATFL) ligaments were reconstructed anatomically with the help of two anchors (3.5 mm CorkScrew; Arthrex, Naples, FL, USA) placed on the calcaneus and the anterior part of the distal fibular tip. The inferior extensor retinaculum was stretched over the ATFL for support. Below-knee cast was applied for the first four days after the operation since ligamentous repair was performed, after which dorsiflexion exercises of the ankle were allowed by applying a semisplint, of which the dorsal part of the ankle is left open.

Postoperative CT examination demonstrated the graft completely filling the tunnel and having the appropriate height (Figure 5a-c).

Discussion

Various techniques have been reported previously for avoiding a malleolar osteotomy during drilling osteochondral lesions of the talus. Öznur preferred to open a window through the medial malleolus to reach the talus,[3] while Assenmacher resected a section of the anteromedial aspect of the distal tibia.[4] Lee and Mercurio have proposed a retrograde approach as an alternative to the antegrade approch in 1981.[5]

Recently, Hoser has proposed the idea of retrograde osteochondral grafting, in which he reamed a tunnel over a guidewire he had introduced under CT guidance.[6] The case we have hereby presented is the first patient in the literature, who was treated with retrograde drilling for osteochondral grafting in the ankle.

In our technique, the drill guide was introduced arthroscopically, contrary to the CT guidance suggested by Hoser. The most challenging step in the technique was introduction of the guidewire from the inferolateral part of the talus to the superomedially located correct position. The drill guide we have used was specially designed for the ankle, with a second hinge in the center. Standard drill guides developed for use in cruciate ligament surgery are troublesome to be used in the ankle. We also believe that the drill guide designed for small joints needs revision, i.e. the intraarticular part of the guide wire should be shaped according to the surface of the talar dome.

Following correct positioning of the guidewire, the preceding steps are similar to the standard grafting procedure. Care should be taken to parallel the angled tip of the graft with the joint surface. Special cylinders having tip angles of 40 and 50

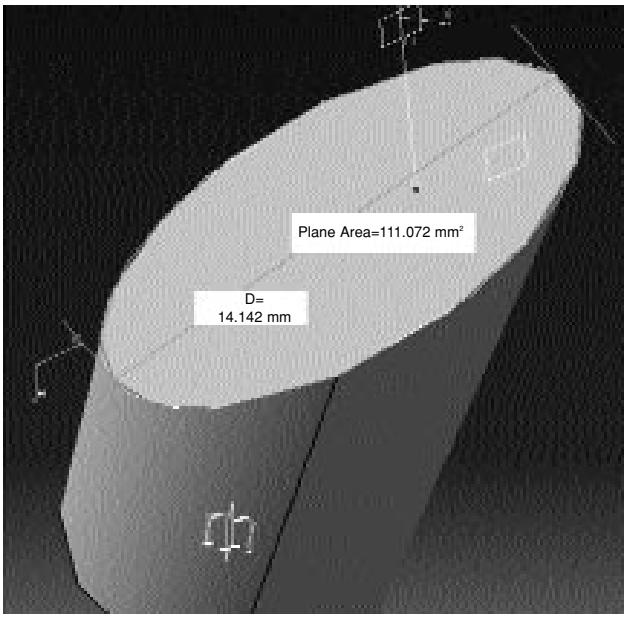

Figure 6. A graft harvested at a 45 degree angle has a surface area of 1,11 cm2 and a long diameter of 1,44cm.

degrees should be designed for talar grafting. The angle between the guide wire and the talar surface should be identical to that of the cartilage surface.

There are some limitations to the proposed technique: The size of the lesion should be appropriate to be covered with a single graft. Multiple grafts cannot be placed adjacently with this technique. A 10 mm graft tunnel reamed through a 45 degree angle has a mediolateral width of 14 mm at the joint surface (Figure 6). While determining the tunnel width, this increase should be considered and a tunnel width of approximately 70% of the mediolateral diameter of the lesion should be prepared. Moreover, deep lesions may not be adequately grafted since the tunnel is angled. During preparation of the tunnel, penetrating the medial or lateral walls of the talus may help to solve this problem.

One major advantage of the technique which needs recognition is that it is almost the unique method for grafting centrally located lesions of the talar dome.

References

1. Verhagen RA, Struijs PA, Bossuyt PM, van Dijk CN. Systematic review of treatment strategies for osteochondral defects of the talar dome. Foot Ankle Clin 2003;8:233-42, viii-ix.
2. Giannini S, Vannini F. Operative treatment of osteochondral lesions of the talar dome: current concepts review. Foot Ankle Int 2004;25:168-75.
3. Oznur A. Medial malleolar window approach for osteochondral lesions of the talus. Foot Ankle Int 2001;22:841-2.
4. Assenmacher JA, Kelikian AS, Gottlob C, Kodros S. Arthroscopically assisted autologous osteochondral transplantation for osteochondral lesions of the talar dome: an MRI and clinical follow-up study. Foot Ankle Int 2001;22: 544-51.
5. Lee CK, Mercurio C. Operative treatment of osteochondritis dissecans in situ by retrograde drilling and cancellous bone graft: a preliminary report. Clin Orthop Relat Res 1981;(158): 129-6.
6. Hoser C, Bichler O, Bale R, Rosenberger R, Rieger M, Kovacs P, et al. A computer assisted surgical technique for retrograde autologous osteochondral grafting in talar osteochondritis dissecans (OCD): a cadaveric study. Knee Surg Sports Traumatol Arthrosc 2004;12:65-71.