Treatment of osteochondral defects of the talus

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Chapter 12

Clinical tip: aiming probe for a precise medial malleolar osteotomy

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Introduction

Operative exposure of medial osteochondral lesions and fractures of the talus that cannot be treated arthroscopically frequently requires a medial malleolar osteotomy.\textsuperscript{296,351,390,461} Various techniques have been described since a transverse osteotomy was introduced in 1947.\textsuperscript{13,302,309,325,366,442} The oblique osteotomy has been ascribed several advantages, including excellent exposure of the talus, preservation of the deltoid ligament, and optimal screw compression.\textsuperscript{351}

Most surgeons agree that the osteotomy should exit at the intersection between the tibial plafond and the articular facet of the medial malleolus (Figure 1).\textsuperscript{40,167,281,350,351,413} The optimal angle has been determined to be 30° in relation to the long tibial axis.\textsuperscript{313} If the osteotomy is created too medially (i.e. in the articular facet of the malleolus), exposure of the talar dome may be insufficient for adequate treatment. Furthermore, a small distal fragment may be prone to fracture when fixed at the end of the procedure. Conversely, if the osteotomy is created too laterally, it will exit in the tibial plafond. This is undesirable because the medial tibial plafond directly articulates with the medial talar dome,\textsuperscript{286} and damage to this weight-bearing area might lead to secondary osteoarthritis.\textsuperscript{143}

Precise identification of the intersection is important for an accurate osteotomy. Intraoperatively, it is particularly difficult to identify the posterior part of the intersection because of the tight operative working area and the adjacent neurovascular bundle. This report describes the use of a right-angled aiming probe to identify both the posterior and anterior parts of the intersection between the tibial plafond and medial malleolus in order to make a precise osteotomy.

Technique

The patient is placed in the supine position with a tourniquet around the thigh. A rolled-up apron is placed underneath the lateral malleolus to facilitate eversion of the foot and improve exposure of the talus.

A curvilinear skin incision is made over the medial malleolus. The anterior skin is mobilized. Using a periosteal elevator, the surgeon dissects over the anterior medial malleolus and distal tibia. A Hohmann retractor is placed over the distal tibia. Some fatty tissue is removed, and a small anterior arthrotomy exposes the anteromedial talar dome. The level of this anterior superior border of the talar dome will act as a guide to identify the level of the posterior ankle joint.

Next, the tibialis posterior tendon is identified by incising the tendon sheath. A periosteal elevator is used to bluntly dissect over the posterior distal tibia at the level of the ankle joint, approximately 0.5 cm below the anterior joint level. After placement of the Hohmann retractor posterior to the medial malleolus, the posterior capsule of the ankle joint can be visualized and incised.

A right-angled probe (Figure 2) is now used to identify the posterior intersection between the medial malleolus and tibial plafond. The surgeon carefully inserts the tip of the probe...
Aiming probe for a medial malleolar osteotomy

Figure 2. Picture of the right-angled probe. This probe, with a 5-mm tip, is normally used for arthroscopic surgery.

Figure 3. To identify the anterior (left) and posterior (right) intersections between the tibial plafond and medial malleolus, two probes can be inserted simultaneously. They are pulled 30° proximally and medially relative to the long tibial axis.

into the posteromedial joint space by sliding along the posterior aspect of the distal tibia at the intersection with the medial malleolus and gently pulls proximally and medially. The periosteum at the level of the intended osteotomy is marked with a surgical knife, sterile marker
pen, or osteotome. Next, the probe is placed in the anteromedial tibial notch and pulled in a proximal and medial direction, identifying the anterior part of the intersection. The anterior intersection is marked, and this is connected to the posterior intersection as a reference guide to the osteotomy. If available, two probes can be used simultaneously to identify the anterior and posterior intersections (Figures 3 and 4). The probes are best pulled 30° in relation to the longitudinal tibial axis in the coronal plane because this direction is perpendicular to the tibial articular surface at the intersection.413

Two Kirschner wires (K-wires), directed perpendicularly to the determined osteotomy plane, are predrilled in the medial malleolus. The screw holes are drilled and tapped, using a cannulated drill, and the K-wires are removed.

The screw holes can be placed either parallel or divergent. If the harvest of cancellous bone is indicated for the treatment of a talar osteochondral lesion or fracture, a divergent direction of the screws allows taking a bone graft of the distal tibia. This can be accomplished by creating a window in the cortex of the tibial metaphysis just proximal to the screw holes and harvesting the cancellous bone using a curette.

An oscillating saw is placed on the incised periosteeum and directed at the marked intersection of the tibial plafond and medial malleolus. The osteotomy is created up to approximately 3 to 4 mm above the articular cartilage, while two Hohmann retractors protect the adjacent soft tissue. The osteotomy is completed with the use of an osteotome. This way, the surgeon controls the osteotomy of the articular part and minimizes the risk of damaging the talar cartilage. If desired, an assistant can place an instrument in the joint or manually distract the ankle to protect the talar cartilage.

After the osteotomy has been completed, the surgeon manually retracts and everts the medial malleolus using gauze. Optionally, the distal part is temporarily transfixed by retrograde

Figure 4. Medial intraoperative view of a left ankle with a probe inserted at each part of the intersection. This figure highlights the limited intraoperative vision of the posterior intersection.
drilling of a large-diameter K-wire into the talus through one of the predrilled holes. Exposure of the talus dome is improved by forced eversion of the heel. The fibula is hereby used as a fulcrum and the talus is tilted (Figure 5). Care must be taken not to use too much force to prevent fracture of the lateral malleolus.

At the end of the procedure, the medial malleolus is reduced. Initially, large diameter K-wires are placed through the predrilled screw holes to confirm correct alignment. The diameter of the K-wire should correspond to the diameter of the predrilled hole. A Weber bone clamp can be placed for initial compression. Placement of the proximal leg of the Weber clamp is facilitated by creating a small hole in the distal tibial cortex proximal to the osteotomy using a 2.5-mm drill. We routinely use two 3.5-mm cancellous lag screws with a length of 40 or 45 mm. They are inserted into the predrilled screw holes after removal of the K-wires. The bone clamp is released, and the wound is closed.

Discussion

The use of a right-angled probe is described to facilitate identification of the optimal terminal point of the oblique medial malleolar osteotomy (i.e. the intersection between the medial malleolar articular facet and the tibial plafond). Alternatively, intraoperative fluoroscopy can be used to identify the intersection. However, disadvantages of fluoroscopy include exposure to radiation and increasing the operative time. Moreover, it is not easy to identify exactly both anterior and posterior intersection points on a 2-dimensional view. Instead, when using the aiming probe, fluoroscopy becomes unnecessary.