Arthroscopy and the Maquet Proximal Tibial Osteotomy

Joe W. Tippett, MD

ABSTRACT: This paper describes the techniques for combining arthroscopic treatment of unicompartmental osteoarthritic knees and proximal tibial osteotomy.

Technique of Arthroscopic Osteoplasty

The operative procedure is done under general anesthesia using strict sterile technique. Thorough arthroscopic evaluation allows determination of the amount of degeneration in both compartments (Fig. 1). A judgment regarding the ability of the contralateral compartment to withstand the added stress is made. If it is determined that this compartment can withstand this stress, an arthroscopic osteoplasty is done.

The arthroscopic osteoplasty is begun by using a microtome with a 2 mm burr introduced into the joint through any standard portal (Fig. 2, 3). By flexing and extending the knee, one can gain access to all areas in the joint.

The femoral surface is perforated first by beginning in the most superior position, with the knee in extension, and the inferior aspect is reached by gradual continuous flexion.

Osteoplasty of the tibial surface is done by beginning in the most posterior aspect with the knee in flexion and extending anteriorly. Multiple drill holes 3 mm to 4 mm deep and 2 mm to 3 mm apart are placed at a slight angle rather than perpendicular (Fig. 4, 5). This is thought to increase the surface area for the new tissue to form on and to offer protection to the fibrous clot during early motion and ambulation. Adequate capillary bleeding denotes effective drilling (Fig. 6).

Once drilling has been completed, osteophytes, osteochondral fragments, and frayed hyaline cartilage is removed using the pituitary rongeur. Synovial and chondral overgrowths are effectively trimmed with the

Fig. 1: Grade IV osteal lesion of tibia and femur.

Fig. 2: Microtome 2 mm burr intraarticular.

Reprint requests: Joe W. Tippett, MD. Southeast Orthopaedic Clinic, PA, 4203 E. Southern Boulevard, San Antonio, Texas 78222.
Fig. 3: Osteoplasty being performed with 2 mm burr.

Fig. 4: Multiple drill holes 3 mm to 4 mm deep.

Fig. 5: Multiple perforations 2 mm to 3 mm apart drilled on a slant.

Fig. 6: Adequate capillary bleeding denotes effective drilling.

Fig. 7: Chondroplasty of the patella.

Fig. 8: Osteoplasty with 2 mm burr, patella viewed at 90° lateral tilt.
chondrotome. Any meniscal pathology is dealt with using standard arthroscopic techniques.

If there is a significant patellar degeneration, an arthroscopic chondroplasty or osteoplasty is performed (Fig. 7, 8). In 76% of knees such a procedure was done.

During the arthroscopic osteoplasty, it is important to irrigate extensively during and after the procedure is completed. This eliminates all loose material and reduces the possibility of infection and synovitis. Prophylactic antibiotics are used routinely immediately before and three days following operation.

**Technique of Maquet Proximal Tibial Osteotomy**

The pneumatic tourniquet is deflated, and the extremity is reprepped and redraped. A sandbag is placed beneath the hip on the same side.

Excision of a portion of the fibula is done through a small incision 5 cm distal to the proximal tip (Fig. 9). The interval between the peroneus longus and soleus is developed. Subperiosteal dissection is done around the entire fibula. Care is taken not to puncture the periosteum of the medial side to avoid injury to the peroneal vessels. A 1" section of fibula is removed by first drilling the fibula and then using a small bone cutter to complete the cut through the bone (Fig. 11, 12). Retractors around the medial side of the fibula are avoided to prevent peroneal nerve injury. This wound is packed open for later closure.

Next a 15 cm incision is made from the inferior pole of the patella to below the tibial tubercle (Fig. 13). The medial and lateral borders of the patellar tendon are identified, and an incision is made into the subpatellar fat pad. The patellar tendon is reflected 3 mm to 5 mm off its insertion. Subperiosteal dissection is performed on both sides of the tibia to both flares. This is done using a one-half inch osteotome (Fig. 14). Care is taken to avoid detaching the pes-anserine complex medially, and to avoid injuring the peroneal nerve near the posterolateral flare.

A smooth ⅛" Steinmann pin is next inserted 1 cm to ⅛
Fig. 13: 15 cm incision inferior pole of patella, 2 cm distal to tibial tubercle.

Fig. 14: Subperiosteal dissection of medial and lateral tibial flares.

Fig. 15: ¾ Steinmann pin 1 cm to 1½ cm below and parallel to the joint line.

Fig. 16: Calibrated pin guide with proper setting for degrees of correction.

Fig. 17: Second ¾ Steinmann pin placed distal to resected fibula at calculated degrees of correction.

Fig. 18: After osteotomy pins rotated until parallel achieving desired correction.
cm below and parallel to the joint line (Fig. 15). Proper positioning of the pin is determined by x-rays. After proper position has been determined, the calibrated pin guide is attached to this pin (Fig. 15).

The appropriate angle for setting this guide was determined preoperatively from a 14" x 17" weight bearing film of the extremity. Angles are determined from one line drawn from the midportion of the intercondylar notch up the femoral shaft and another line drawn from the midportion of the tibial spine down the middle of the tibial shaft. The angle formed by the crossing of these two lines plus 3° to 4° for overcorrection is used.

A second ⅜" smooth Steinmann pin is then inserted into the tibia distally by setting the pin guide at this above determined angle (Fig. 14).

The osteotomy guide is placed beneath the patellar tendon. It is positioned so that the handle parallels the proximal pin. Multiple small drill holes are made through the anterior and posterior tibial cortex using a ¼" smooth Steinmann pin. The anterior holes are connected with a small oscillating saw. The posterior holes are connected using a small thin osteotome. After the osteotomy is completed the distal tibial pin is rotated until it is parallel with the proximal pin (Fig. 18).

If the patella is significantly involved, the distal portion of the tibia is brought anteriorly to decompress the patellofemoral joint (Fig. 19). The amount of anterior tibial displacement depends on the degree of degenerative change present (Fig. 19): Grade 1—no anterior displacement, softening of cartilage and no fibrillation; Grade 2—5 mm of anterior displacement, mild fibrillation; Grade 3—1 cm of anterior displacement, fissure with fibrillation; Grade 4—1.3 cm of anterior displacement, sclerotic bone.

External Charley compression clamps are applied and tightened while correction is maintained (Fig. 20). An x-ray is obtained and any additional correction is done before final tightening of the appliance.

The tourniquet is deflated and meticulous hemostasis is done prior to wound closure. A hemovac drain is used proximally. Betadine ointment is placed around the pin sites. A bulky dressing is applied and encloses the external fixation device.

Postoperatively the patient is placed on a continuous passive motion apparatus set for 30° of flexion (Fig. 21). Flexion is increased 10° a day for two days and then increased to 100° of flexion as tolerated. This usually requires five to seven days. The drain is removed on the second postoperative day, and the patient is begun on quadriceps setting exercises and is allowed to be out of bed. Ambulation with light touch begins on the fourth postoperative day and is continued for one week. Progressive increases in the amount of weight bearing is done so that by the end of one month the patient should be fully weight bearing.

The pin tracts must be cleaned and redressed under sterile conditions to avoid infection.

At the end of six weeks the patient usually has almost a full range of motion. The Charley clamps and Steinmann pins are removed at this time, and a 14" knee immobilizer is applied. This immobilizer is to be worn when ambulating full weight bearing, but is removed for range of motion exercises that are to be done at least three times a day. Physical therapy is instituted for rehabilitation for quadriceps and hamstrings.