Varus High Tibial Osteotomy: Medial Closing

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Introduction

The varus high tibial osteotomy is indicated in the young active patient with lateral arthritis of the knee and a moderately valgus knee with a valgus tibia. This surgical procedure results in a durable and satisfying clinical outcome up to 8–12 years if the lower limb has been corrected to neutral alignment. This procedure addresses both the valgus in extension as well as in flexion. It may result in obliquity of the joint line however. This surgery should be used as an alternative to a knee prosthesis (TKA or UKA). The surgical technique consists of a closing wedge osteotomy on the medial side of the tibia. Exceptionally, a lateral opening wedge osteotomy is an alternative option to correct a deformity resulting from an excessive lateral closing wedge high tibial osteotomy, or in selected pediatric disorders.

Radiological Workup

See chapter surgical indications in arthritis of the knee.

The amount of correction needed to obtain a mechanical femoro-tibial angle of approximately 180° is calculated with respect to the width of the metaphyseal area of the tibia (Fig. 18.1).

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Surgical Technique

Patient Set-Up

The patient is placed in the supine position, and a tourniquet is used. The lower limb is covered with an extremity sheet (Fig. 18.2). The image intensifier is positioned temporarily to ensure sufficient access to the entire limb, including the hip.

Incision

An anteromedial, slightly oblique, almost horizontal skin incision starts 1 cm proximal to the tibial tubercle and continues medially over a distance of 8 cm (Fig. 18.3).

The hamstring tendons are identified and retracted. The superficial medial collateral ligament (MCL) is incised horizontally at the level of the osteotomy (Fig. 18.4). The proximal fibers of the MCL are elevated proximal and distal to the incision over distance of a few millimeter, uncovering the area of the wedge that will be resected.

A periosteal elevator is introduced posterior to the metaphyseal area of the tibia, always staying in contact with the bone to the lateral side of the posterior tibia. The periosteal elevator may be replaced by a specific radiolucent retractor, which is smooth, flexible, and curved (Fig. 18.5). This will protect the posterior structures optimally during the osteotomy. A Farabeuf retractor is introduced underneath the patellar tendon to retract and protect it during the osteotomy.

The Tibial Osteotomy

The tibial osteotomy is performed just proximal to the level of the tibial tubercle, slightly oblique and sloped proximally

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Fig. 18.1 Femoro-tibial mechanical angle of 186°: a correction of 6° is planned

Fig. 18.3 Skin incision

Fig. 18.2 Patient set-up

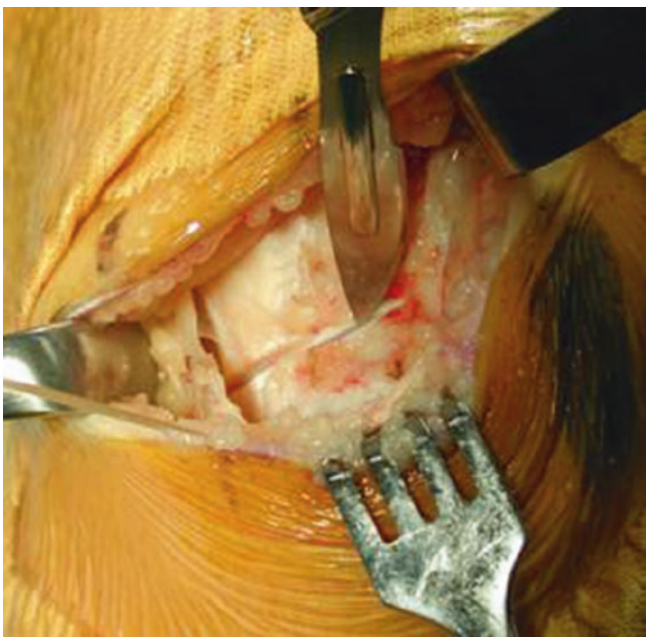

Fig. 18.4 The superficial medial collateral ligament is incised horizontally

Fig. 18.5 Specific retractor—smooth, curved, and radiolucent

Fig. 18.6 Intraoperative fluoroscopic control

Fig. 18.7 Pins are placed at the tip of the fibula laterally

from medial to lateral. Two 2.5 mm Kirschner wires will serve as guide pins for the proximal cut of the osteotomy. The pins are introduced medially and will emerge laterally just proximal to the tibiofibular joint. Their correct position is verified using an image intensifier. (Figs. 18.6 and 18.7). The proximal cut of the osteotomy is done with an oscillating saw under the two guide pins (Fig. 18.8). First the mid part of the tibia is cut, then the anterior and posterior cortex. The lateral cortex is left intact and will serve as a hinge during the procedure. As Henri Dejour used to say, you should just "knock at the door." Subsequently, the distal cut is performed. In the sagittal plane, it should be parallel to the proximal cut, and in the frontal plane, it should converge at the lateral hinge. The distance between both cuts at the level of the medial cortex has been defined during the surgical planning. The wedge is removed using a large grasper. The lateral hinge is now gently perforated with a 3.2 drill to weaken it (Fig. 18.9). Subsequently, the osteotomy will progressively close by introducing an osteotome into the osteotomy and gently further weakening the lateral

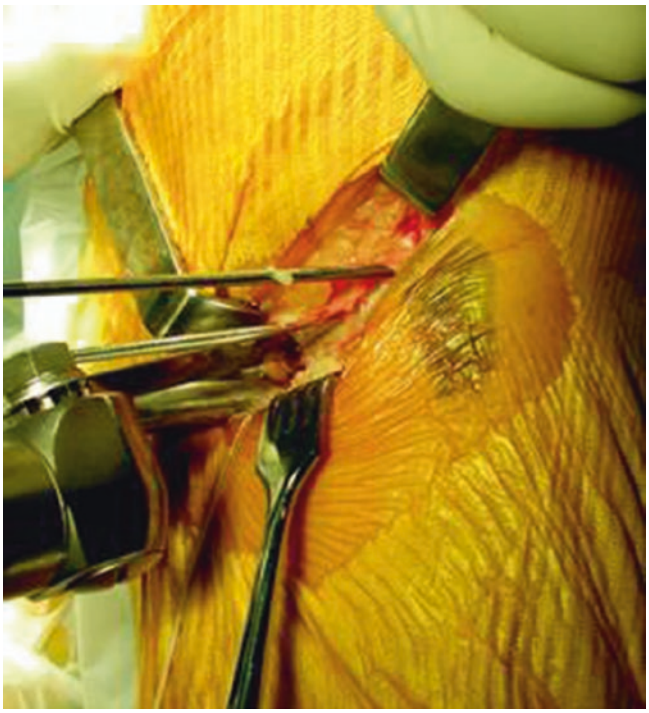

Fig. 18.8 Osteotomy with an oscillating saw under the two guide pins

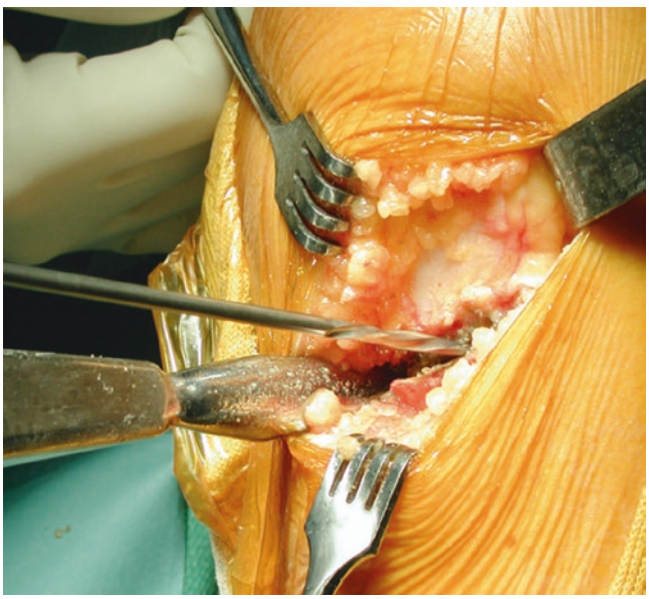

Fig. 18.9 Weakening the lateral hinge with 3.2 mm drill holes

Fig. 18.10 Intraoperative evaluation of the correction using a long metal rod

hinge. An intraoperative evaluation of the correction is mandatory. A long metal rod is placed from directly over the middle of the femoral head to the middle of the ankle joint (Figs. 18.10 and 18.11). At the level of the knee, this rod should be in the center of the knee following correction (Fig. 18.12).

An overcorrection should be avoided. Therefore, the height of the resected wedge should not be excessive. A frequent error of overcorrection is the fact that the surgeon did not consider the thickness of the saw blade when making the resection. The osteotomy is fixed using two to three Blount or Orthomed staples on the medial side (Figs. 18.13 and 18.14). Use of other fixation devices such as a locked plate (Tomofix, customized, etc.) are of course possible but are more prominent. The pes anserinus is closed over the staples. A drain is positioned in proximity to the osteotomy and the skin is closed using interrupted sutures.

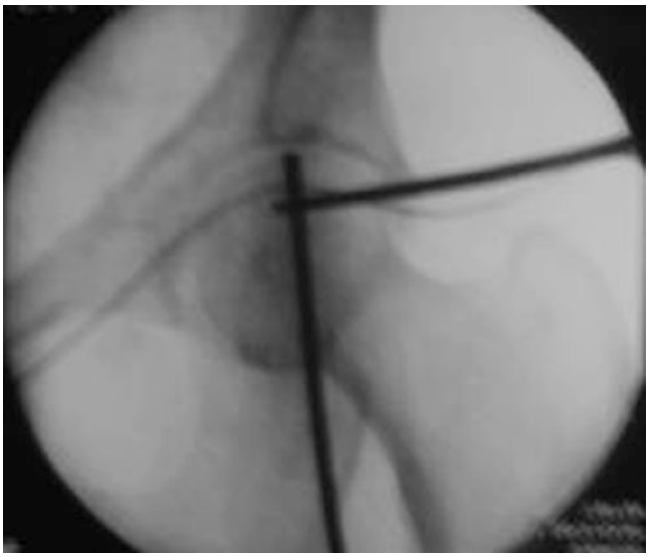

Fig 18.11 Intraoperative evaluation of the correction using a long metal rod

Fig. 18.12 The rod should be in the center of the knee following correction. In this case, the axis is varus

Fig. 18.13 Postoperative X-ray AP

Postoperative Guidelines

The patient should receive information on the postoperative guidelines prior to the surgery.

These postoperative guidelines are identical to those for an opening wedge osteotomy, but must be adjusted to the type of fixation and resulting stability.

Complications

- Errors of correction: Overcorrection is more frequent than under correction.
- Non-union and fixation failures are rare.
- Delayed union can be observed in case of an imperfect fit between the osteotomy cuts.
- The osteosynthesis material can cause pain or discomfort. Removal is in many cases sufficient for pain relief.
- The clinical outcome of a medial closing wedge high tibial osteotomy can decline after approximately 7–20 years. In most cases, a total knee arthroplasty can be performed without any major difficulties.

Fig. 18.14 Postoperative X-ray lateral

Future Improvements

- Improvement in the calculation of the desired correction—the "target."
- Improvements in the reproducibility of the desired correction: computer-assisted surgery and navigation could result in a more precise evaluation of the mechanical femoro-tibial axis.
- Improvement in the fixation of the osteotomy allowing earlier weight bearing.
- Applications of specific growth factors or other biologic agents to improve early consolidation.