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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. 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 the valgus both in extension and in flexion. It results frequently in an obliquity of the joint line. 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 done to correct a deformity resulting from an excessive lateral closing wedge high tibial osteotomy.

## Radiological Workout

Cf chapter surgical indications in arthritis of the knee.

The amount of correction needed to obtain a mechanical femorotibial axis of approximately  $180^\circ$  is calculated with respect to the width of the metaphyseal area of the tibia (Fig. 17.1).

The evaluation of the valgus deformity remains more difficult than the evaluation of a varus deformity.



**Fig. 17.1** Femorotibial mechanical angle of  $186^\circ$ : a correction of  $6^\circ$  is planned. This evaluation is more difficult than in case of varus deformity

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## Surgical Technique: Medial Closing Wedge High Tibial Osteotomy

### Patient Setup

The patient is placed in the supine position, and a tourniquet is used. The lower limb is covered with an extremity sheet (Fig. 17.2)

The image intensifier should be available.

The surgical approach is identical to the surgical approach for an opening wedge high tibial osteotomy. 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. 17.3).

The hamstring tendons are identified and retracted. The superficial medial collateral ligament is incised horizontally at the level of the osteotomy (Fig. 17.4). The proximal fibers of the superficial medial collateral ligament are elevated proximal and distal to the incision over distance of a couple of mm (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. The periosteal elevator is kept in place once the lateral side of the posterior tibia is reached. It will protect the posterior structures during the osteotomy.

A Farabeuf retractor is introduced underneath the patellar tendon to retract and protect it during the osteotomy.



**Fig. 17.2** Patient setup



**Fig. 17.3** Skin incision



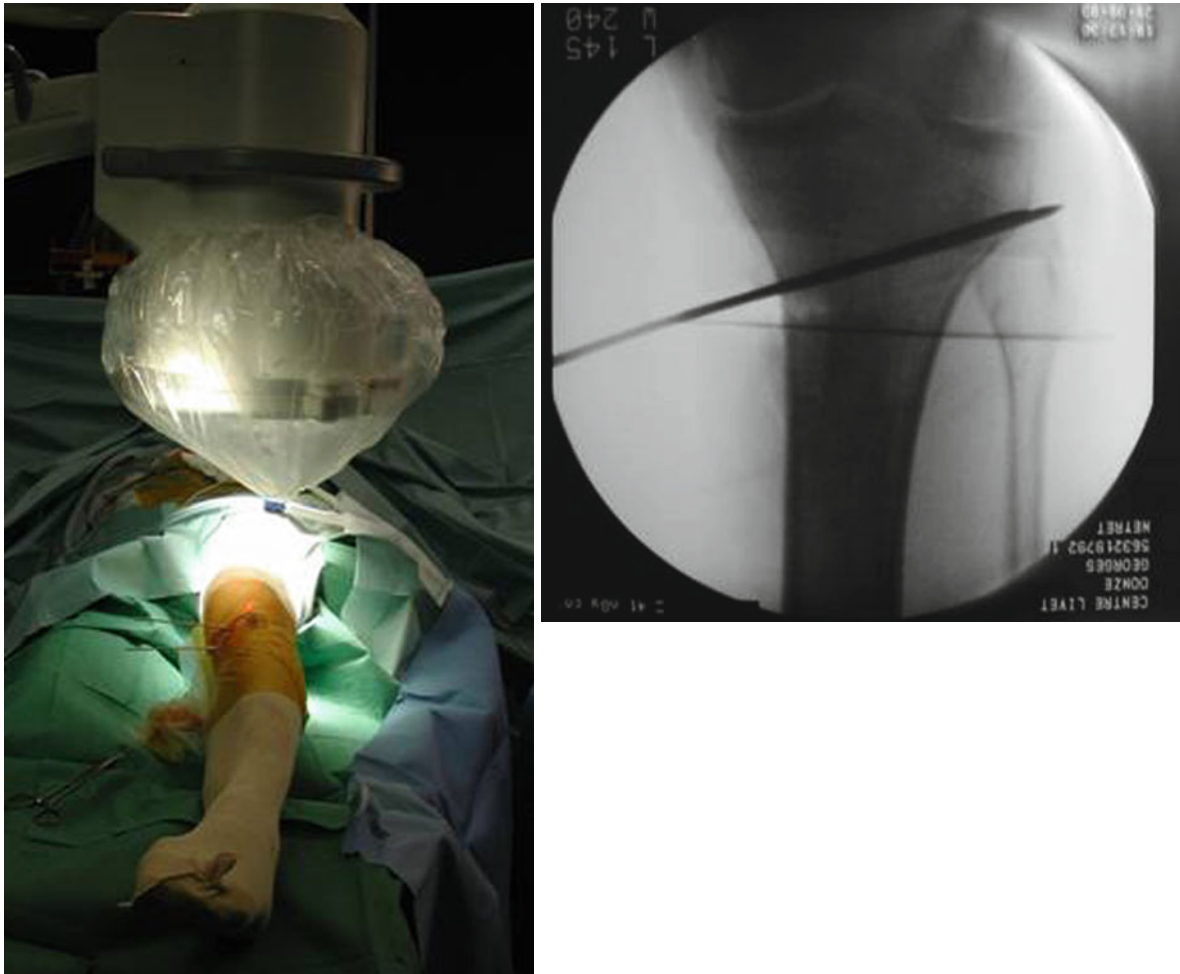
**Fig. 17.4** The superficial medial collateral ligament is incised horizontally

## The Tibial Osteotomy

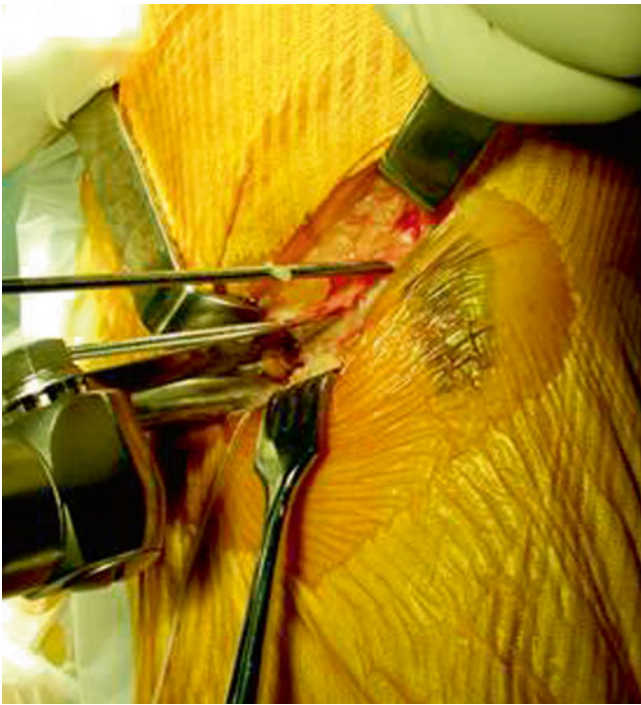
The tibial osteotomy is performed just proximal to the level of the tibial tubercle. It is almost horizontal in the coronal plan, slightly oblique and upsloped from medial to lateral. Two Kirschner wires will serve as guide pins for the proximal cut of the osteotomy. The pins are introduced medially and will emerge laterally just proximal to the tibiofibular joint. After the introduction of two guide pins, their correct position is verified using an image intensifier (Figs. 17.5 and 17.6). The proximal cut of the osteotomy is done with an oscillating saw under the two guide pins (Fig. 17.7). First the mid part of the tibial is done and then the anterior and posterior cortex; the lateral cortex should not be transected. As Henri Dejour uses to say, you should only “knock at the door.” The lateral cortex will serve as a hinge during the procedure. Subsequently, the distal cut is performed. In the sagittal plane, it should be parallel to the proximal cut, and in the frontal plan, it should converge on the lateral side. 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. Subsequently, the osteotomy will progressively close by introducing an osteotome into the osteotomy and gently further weakening the lateral hinge (Fig. 17.8). 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. 17.9 and 17.10). At the level of the knee, this rod should be in the center of the knee following correction (Fig. 17.11).

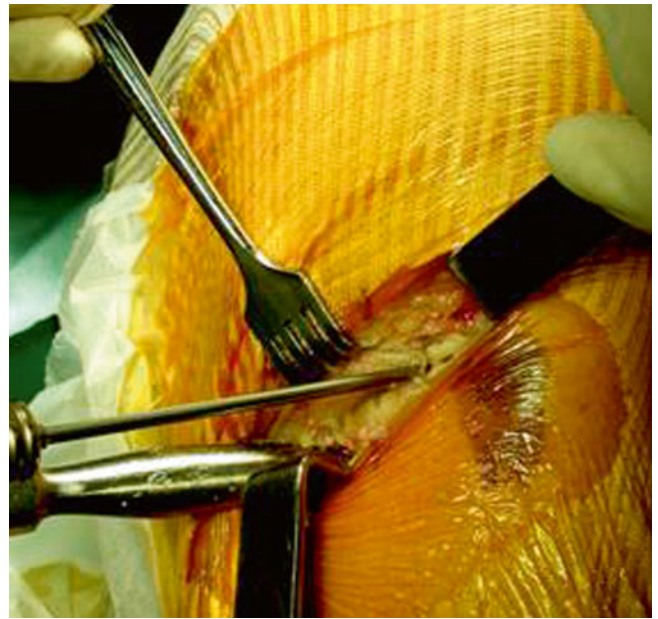
An overcorrection should be avoided. Therefore the height of the resected wedge should not be excessive. A frequent error of overcorrection is the fact that the surgeon did not consider the thickness of the saw blade when making the resection. The osteotomy is fixed using two to three Blount or Orthomed staples on the medial side (Figs. 17.12 and 17.13). The use of other fixation devices such as plate and screw fixation is of course possible, but we prefer to use less prominent types of fixation in this area of the knee. 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.



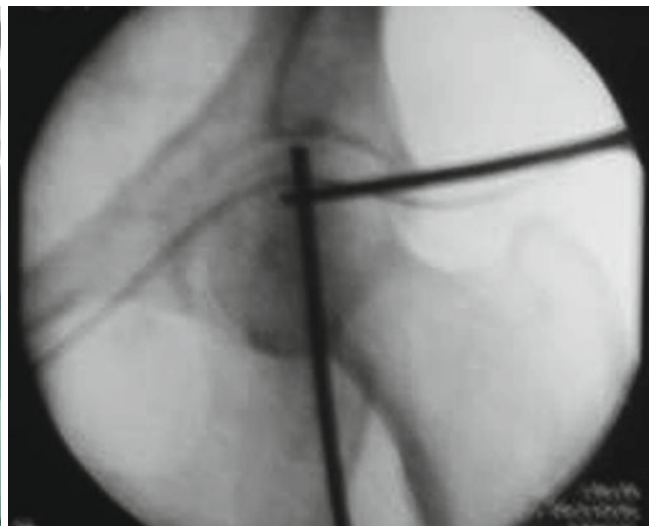
**Figs. 17.5 and 17.6** Intraoperative fluoroscopic control



**Fig. 17.7** Osteotomy with an oscillating saw under the two guide pins



**Fig. 17.8** Weakening the lateral hinge with 3.2 mm drill holes



**Figs. 17.9 and 17.10** Intraoperative evaluation of the correction using a long metal rod



**Fig. 17.11** The rod should be in the center of the knee following correction. In this case, the axis is slightly in varus



**Figs. 17.12 and 17.13** Postoperative x-rays

## 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.

## Complications

- Errors of correction: undercorrection is more frequent than overcorrection.
- Nonunion 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 of it 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 those cases, a total knee arthroplasty can be performed without any major difficulties.

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## Future Improvements

- Improvement in the calculation of the desired correction.
- Improvements in the reproducibility of the desired correction: computer-assisted surgery and navigation could result in a more precise evaluation of the mechanical femorotibial 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.