Total Knee Replacement in Lateral Arthritis Specifics and Surgical Techniques

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Surgical Approach

A lateral paramedian skin incision is made. Proximally the quadriceps tendon is identified and distally the lateral border of the patellar tendon exposed. The arthrotomy is made with a longitudinal incision of the quadriceps tendon on its lateral side leaving a small cuff of tendinous tissue attached to the vastus lateralis muscle allowing later closure. The patella is dislocated and the arthrotomy is continued distally, lateral to the patellar tendon onto the anterolateral tibial plateau. When dissecting at the level of the patellar tendon, we prefer to bring a portion of the fat pad laterally with the retinaculum. This maneuver results in additional soft tissue for use during closures and can be quite useful in cases in which a significant valgus deformity is corrected with the TKA. The lateral capsule is released close to the bone on the anterolateral border of tibial plateau. The capsule remains in continuity with the tendinous origin of the tibialis anterior muscle. The insertion of the ITB is released subperiosteally from Gerdy's tubercle with the scalpel. Because of the continuity of the ITB proximally with the tibialis anterior muscle distally, we prefer this digastric dissection (Fig. 25.1).

The lateral exposure is completed with the resection of the anterior corner of the lateral meniscus. The Trillat periosteal elevator is used to release the capsular structures from the lateral tibial plateau at the level of the joint line. In specific cases, this lateral release is continued posteriorly to Gerdy's tubercle reaching the posterior border of the lateral tibial plateau (Fig. 25.2). The popliteal tendon can thus be visualized completely (Fig. 25.3).

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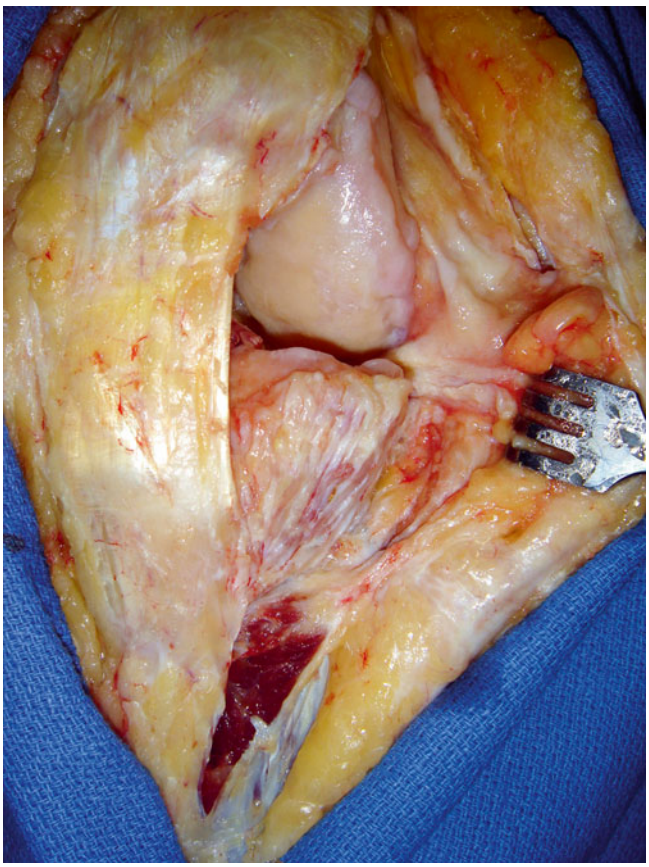

Fig. 25.1 Digastric dissection of the iliotibial band

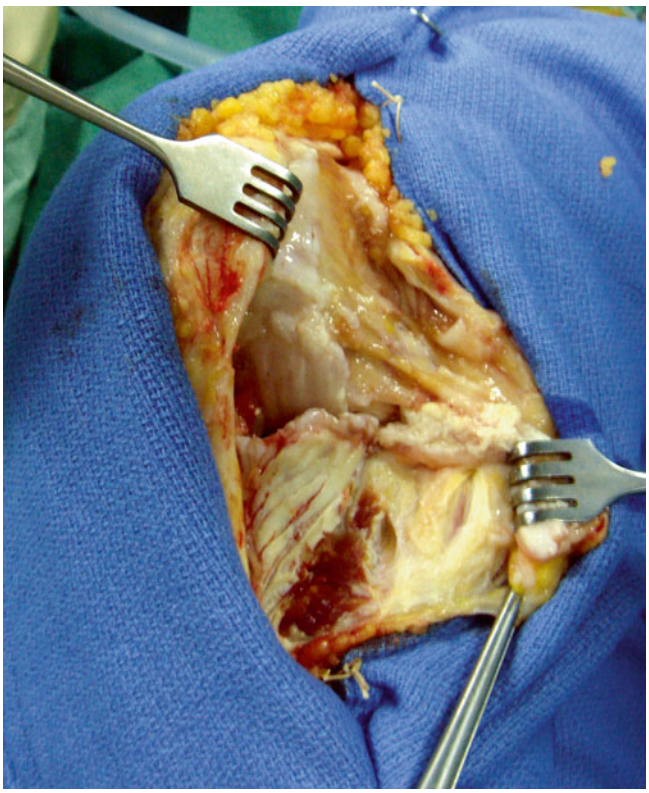

Fig. 25.2 Release of the capsular structures from the lateral tibial plateau

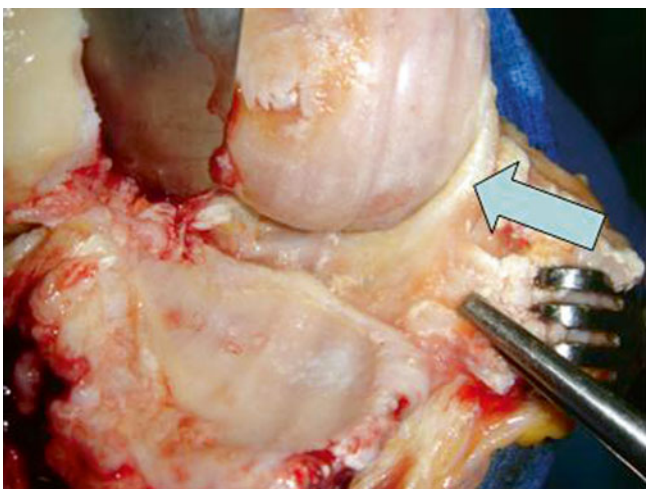

Fig. 25.3 Popliteus tendon (*arrow*)

Anterior Tibial Tuberosity Osteotomy

Dislocation of the patella is more difficult in the lateral approach than in the medial approach. When there is excessive tension on the patellar tendon and insufficient exposure of the tibial plateau, an osteotomy of the tibial tuberosity can be performed. Since this technique differs from the technique used when performing an osteotomy of the ATT for episodic patella instability, the specifics are detailed in the following paragraphs.

The osteotomy must be of a certain thickness and length in order to be in the cancellous bone and to create an area of contact sufficiently large to achieve union of the osteotomy.

However, the osteotomy must not be too thick due to the risk of fracture of the tibial epiphysis. The transition of the osteotomy into the anterior cortex distally has to be progressive and smooth. The osteotomy should not be performed distally with a transverse bone cut because this could weaken the anterior cortex of the tibia and result in a fracture (Fig. 25.4). At the end of the intervention, the osteotomy is fixed with two bicortical 4.5 mm screws. No washer is used. Another option is to use three 3.5 mm screws. The holes in the anterior cortex should be made prior to the osteotomy. It is very important that each screw is 2 mm longer than the distance to the posterior cortex, as this achieves optimal fixation. We do not use the technique using metal wires (Whiteside) or resorbable wires (Vielpeau).

Fig. 25.4 Tibial tubercle osteotomy. It must be thick and long enough

Bone Cuts

Tibial Cut

As in the varus knee, the reference for the tibial cut is the contralateral plateau. In a varus knee, the cut is made 9 mm inferior to the lateral tibial plateau, which is convex. For a valgus knee, the reference is the medial plateau, which is concave. A cut 9 mm inferior to the medial convexity would be excessive and would lower the joint line. We therefore always cut 6 mm inferior to the medial plateau. It is seldom necessary to perform recuts.

Femoral Cuts

The HKS angle is always set at 5°. The proximal deformity of the femur, which is different in each patient, is NOT routinely considered in this technique. We consider our technique simple and more reproducible than the measurement of an individual HKS angle. In others words, we do not correct (in the majority of cases) the proximal extra-articular deformity intra-articularly. Transferring the individual HKS to the distal cut could result in an asymmetrical distal femoral cut and difficulties in balancing the collateral ligaments. The theory about the rotation of the femoral component is completely applicable in the case of a total knee arthroplasty in a valgus knee (cfr. chapter medial arthritis). Frequently in these cases, hypoplasia of the lateral condyle is observed. This hypoplasia can be seen very easily once the intramedullary femoral guide is positioned in 5° of valgus. Frequently, the distal cutting guide is not in contact with the lateral femoral condyle because of both wear to and also because of hypoplasia of the lateral condyle. It is in this situation that the asymmetrical distal cut is transferred to the posterior femoral cut, thereby externally rotating the femoral component.

Lateral Releases

Osteotomy of the Lateral Condyle According to Burdin

The knee is flexed at 90°. The synovial tissue covering the lateral condyle is incised and the popliteal tendon and lateral collateral ligament are identified. The osteotomy is performed with a fine oscillating saw blade. The osteotomy is approximately 1.5 cm in thickness (or in others words approximately one third of the width of the lateral condyle). In the sagittal plane, the cut is parallel to the long axis of the femur. In the coronal plane, the cut is anterior to the insertion of the LCL and popliteus tendon. The osteotomy can be completed carefully with the use of an osteotome (Figs. 25.5 and 25.6). The posterolateral structures must be released with a knife to move the bone block distally and posteriorly.

Ligament balancing in flexion and extension is performed using a spacer. If the flexion gap is tight laterally, the osteotomy will slide posteriorly (with the knee in flexion). It would slide distally (with a knee in extension) (Figs. 25.7 and 25.8), if the knee is tight in extension. With the use of the electric cautery, one can now mark the optimal position of the osteotomy for later fixation using a cortical screw diameter 4.5 with a washer.

The osteotomy at the level of the condyle has the advantage that it allows a controlled release of the lateral ligamentous structures. The osteotomy can be moved either distally or posteriorly independent from each other to address tightness in extension or in flexion. Currently, we prefer the osteotomy above the soft tissue release of the lateral collateral ligament and the popliteal tendon (Fig. 25.9). Indeed, release of the lateral structures associated with the use of a total knee arthroplasty design where the anterior cruciate ligament is not substituted could result in "retroligamentary" anterolateral laxity. This deformity is even more significant and exaggerated in cases of residual varus. However, the soft tissue releases are unable to precisely control the lengthening and the resultant lateral laxity.

Insall replaced the soft tissue release of the lateral collateral ligament and the popliteal tendon by a piecrust of the posterolateral soft tissues structures (with risk for the SPE) through a medial arthrotomy.

The postoperative instructions are slightly modified in the case of a condylar osteotomy. Toe touch weight bearing is allowed with the use of a splint during 45 days. Range of motion exercises follows the conventional rehab protocol (Figs. 25.10 and 25.11).

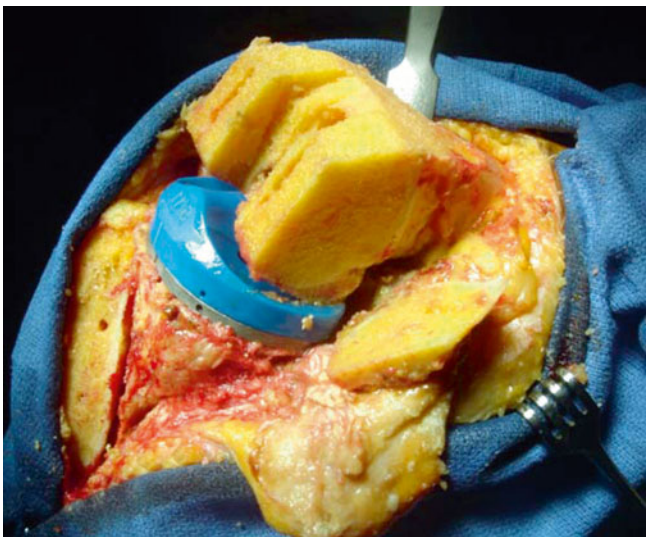

Fig. 25.5 Osteotomy of the lateral condyle (lateral view)

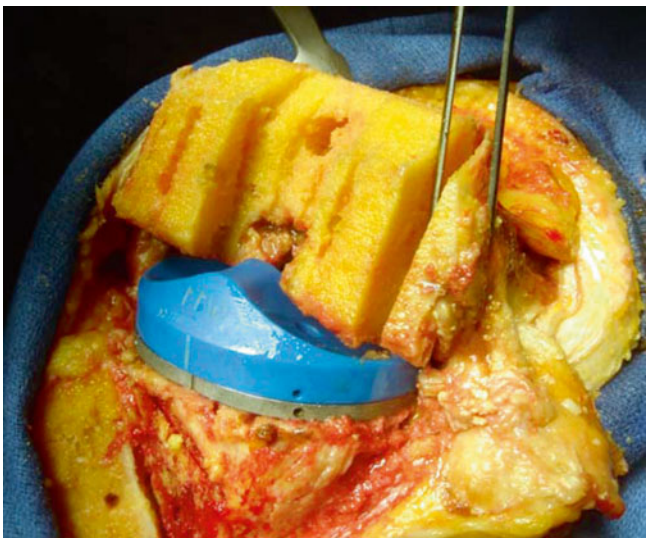

Fig. 25.6 The osteotomy is approximately 1.5 cm in thickness. Proximal insertions of the lateral collateral ligament and popliteus tendon are intact

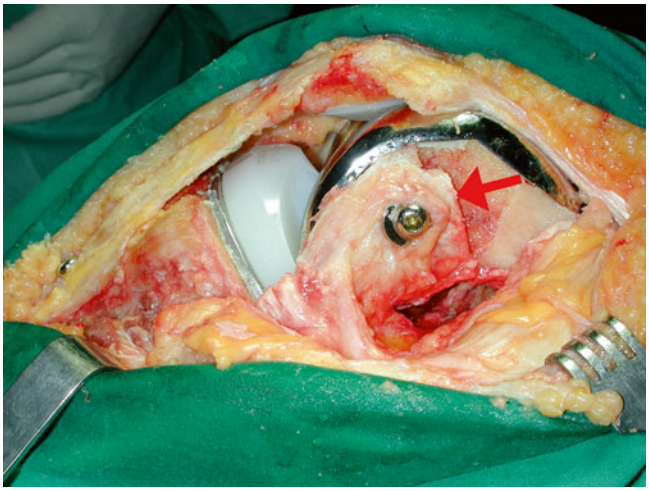

Fig. 25.7 Posterior transfer of the osteotomy

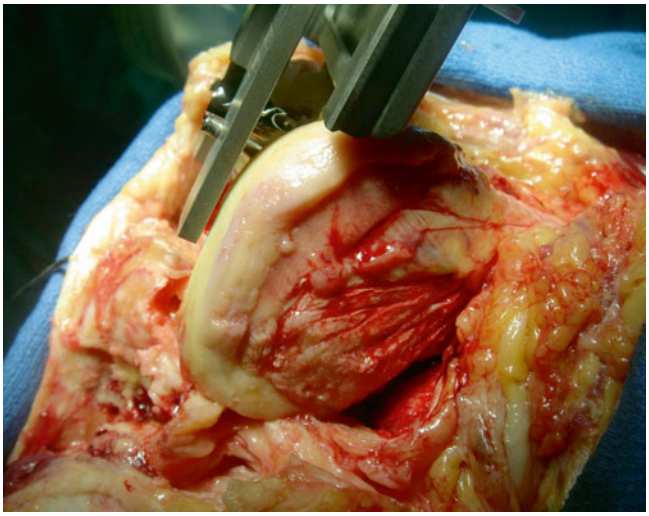

Fig. 25.9 Subperiosteal release of the lateral structures (LCL and popliteus tendon)

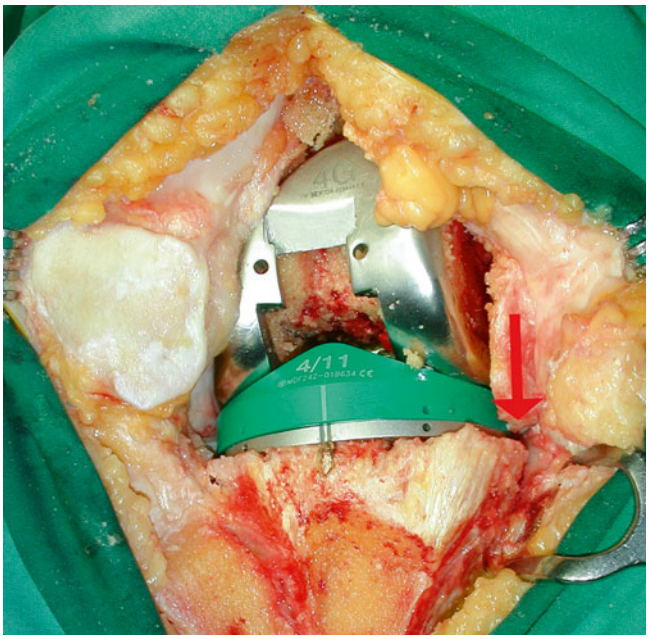

Fig. 25.8 Distal transfer of the osteotomy

Fig. 25.10 Postoperative X-ray (AP view)

Fig. 25.11 Postoperative X-ray (lateral view)

Piecrust of the ITB

The piecrust technique encompasses multiple incisions in a staggered fashion in the body of the ITB tendon. We rarely perform this technique unless an important retraction remained in extension at the end of the intervention (Fig. 25.12).

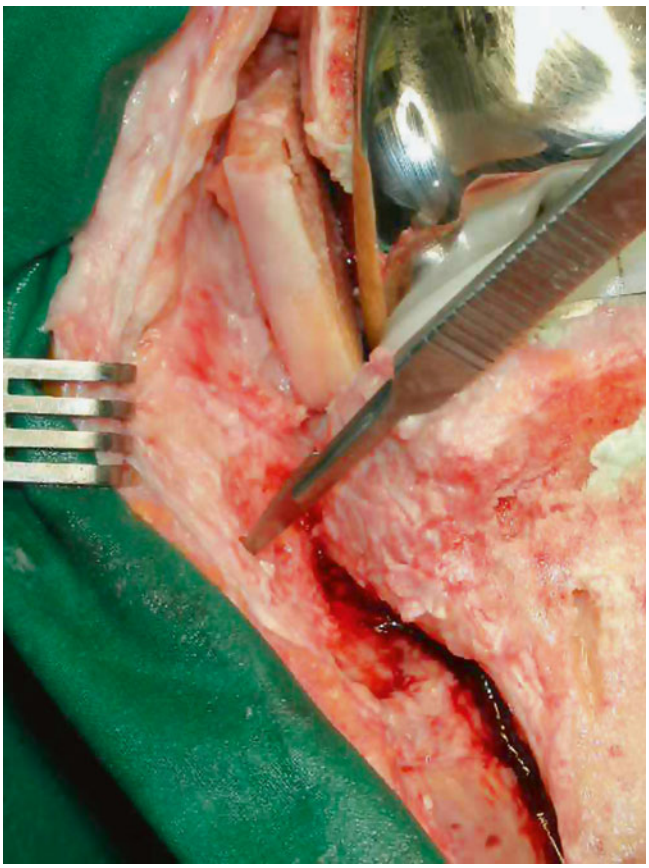

Fig. 25.12 Piecrust of the ITB: multiple incisions in a staggered fashion

Surgical Sequence

A valgus deformity of the knee is a dynamic phenomenon, which is not yet well understood. In contrast to the varus knee, the preoperative radiographic evaluation (full leg and stress X-rays) does not allow one to foresee certain difficulties that can be encountered during the surgical procedure. Frequently, one can predict if an additional soft tissue release is necessary once the tibial cut is performed. If, after releasing the capsule at the level of the joint line on the lateral tibial plateau, the flexion or extension gap remains trapezoidal, we routinely perform an osteotomy of the lateral femoral condyle.

At the end of the procedure, contracture of the IT band can be the cause of a soft tissue imbalance in extension. In this very rare situation, we perform a complementary piecrust of the IT band. Although release of the biceps tendon or osteotomy of the fibular head is discussed in the literature, we have never needed this technique to obtain correct alignment and ligamentous balance. If significant laxity is present in the elderly patient, one can use a more constrained prosthetic design. The use of the type of prosthesis, however, has to remain limited because of the potential complications associated with the use of more constraining implant. In our department, this decision has to be made prior to the intervention since we do not have this type of prosthesis permanently available in our hospital.