In the contemporary operative technique of intramedullary (IM) nailing for the treatment of injuries of the humerus, femur, and tibia, as a standard the medullar canal is opened somewhere in the proximal part of the shaft. In selected cases, however, the patient can benefit from a retrograde introduction of IM nails.

Femoral Fractures

Since the work of Seligson [6], who introduced a retrograde nail for the treatment of supracondylar femoral fractures, it is clear that there are only very few consequences for a healthy knee joint if the joint is opened to insert a retrograde nail [7, 9] (Figs. 7.1, 7.2).

Also, so-called normal femoral nails can be inserted retrograde through the knee joint [11]. In general, the procedure takes less time than the orthograde approach because the reduction of the fractures is easier. At this time, several indications for retrograde nailing are recognized.

Indications for Retrograde Nailing

Several indications are suitable for retrograde nailing.
1. Multiple-trauma patients with femoral fractures to avoid the need to reposition the patient (Fig. 7.3).
2. A combination of a displaced acetabular fracture or a pelvic fracture component and a homolateral fracture of the femoral shaft to avoid an incision in the region of the pelvis in order not to compromise delayed repair of the pelvic or acetabular fracture.
3. Bilateral femoral fractures where the procedure can be shortened essentially because there is no need to place the patient in traction.
4. Femoral shaft fractures in patients with morbid obesity where orthograde nailing is more difficult due to the fat around the hip joint.
5. Patients with femoral shaft fractures below a prosthesis, osteosynthesis, or arthrodesis in the proximal femur or hip joint [5] and fractures proximal to a knee prosthesis [2].
6. Floating knee: a combination of homolateral femoral and tibial fractures. Osteosynthesis can be performed through one incision. Problems with the positioning of the patient with this combination of fractures [1] on the traction table are avoided (Fig. 7.5).
7. Nailing of femoral shaft fractures in children [3, 4, 8], in order not to damage the growth plate of the greater trochanter.

Operative Technique and Tips

Positioning the Patient

In most cases, a traction table is used with only the central post in position. It is not necessary to use the traction capabilities of the table.

The patient is positioned supine on the table. If there are no injuries to the pelvis a post is placed between the legs to counteract the manual traction during the reduction of the fracture. The injured leg is supported by a role or pad in order to ensure that the knee joint is flexed to about 30°–45° (Fig. 7.3).

If there is a combination with an unstable pelvic fracture, the pelvis is stabilized first with an external fixator. This fixator can be attached to the traction table.

Before the sterile part of the operation is started, the position of the image intensifier is checked to ensure that the entire femur can be seen.

Entry Point

It is not necessary to make a large incision in the skin or patella tendon.

A 1-in. vertical incision will be enough to perform the reaming and insert the nail. If the knee joint is
flexed to about 30°–45° the incision will be just distal to the apex of the patella. The patella tendon is split longitudinally to gain access to the knee.

In the adult patient, the entry point of the medullar canal is chosen with the help of the image intensifier. In AP and lateral views, the entry point should be exactly in the anatomical length axis of the femoral shaft. This point lies approximately 1 cm above the intracondylar notch (Fig. 7.4). If this spot is used, there is no interference with the fibers of the posterior cruciate ligament or with the weight-bearing cartilage of the knee joint or patellar femoral joint.

Reduction of the Fracture

It is usually very easy to obtain good reduction of the fracture by simple traction on the knee with the leg flexed at 30°–45° [12]. Sometimes external manipulations are necessary to bring the fracture elements into line. After reduction, the reamer guide is passed along the fracture and reaming is started.

The reaming procedure should be performed as is done in the orthograde procedure. Care should be taken not to damage the patellar tendon with the reamer.

Inserting the Nail

Before the operation is started, one must determine whether the available target device has the right shape for the retrograde technique. If not, distal locking must also be performed with a free-hand technique.

In some nail systems it is possible to perform the proximal and distal locking in the AP direction. At all times, care must be taken to ensure that image intensifier monitoring of the locking screw position is possible. This is easier when locking can be performed in the AP direction. While locking in the AP direction, care should be taken to avoid injury to the neurovascular system of the leg. It must be remembered that the sciatic nerve runs very close to the posterior aspect of the proximal femur.

After inserting the nail and locking, some surgeons irrigate the knee joint in order to remove drilling debris. We have never done so without adverse effects to the knee joint. In selected cases, if there is so-called back bleeding through the nail, a 24-h Redon drainage can be left in the knee.

**Fig. 7.1.** Example of a supracondylar nail

**Fig. 7.2.** Distal femur shaft fracture in a 58-year-old female patient treated with supracondylar nail. Pre- and postoperative image and image after 8 months