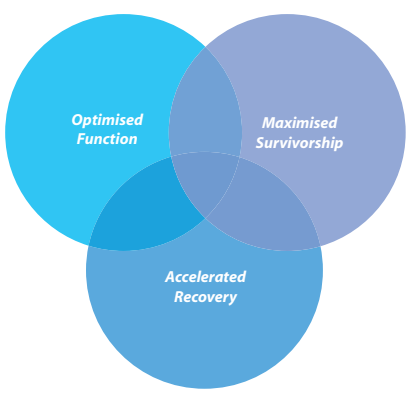
DePuy MicroHip™

Surgical Technique

DePuy
a Johnson & Johnson company



Intelligent **Surgery**

Intelligent surgery is an approach to total hip replacement that places equal importance on:

Optimising function

Maximising survivorship

Accelerating recovery

Its success is founded on leadership in the development of:

Advanced information technology

Precision in minimally invasive surgery

Professional education

"In this brochure we present the surgical technique of our anterior minimal invasive approach to the hip joint which is aligned along an internerveous plane. This makes it in our view truly minimal invasive. This technique is approached in a lateral decubitus position on a regular operation table, there is no need for a specific orthopaedic or fracture table. Traction to the leg is not applied, what makes it easy to use on a regular base. Most of the instruments used for this procedure are standard instruments only for reaming of the acetabulum and positioning of the cup specific, angulated instruments are recommended at least for obese patients.

Using an incision of not more than 6 to 8 cm, our surgical approach provides a perfect view of the acetabulum and the proximal femur including the important natural landmarks for adequate implant positioning. The approach follows the interval between the tensor muscle and the gluteus medius muscle using a section of the anterior iliofemoral approach described by Smith Peterson.[1] No tendons or muscles are cut or detached. The joint capsule is split and left in place. The hip joint is not dislocated; we perform the osteotomy of the femoral neck in situ.

To date we have performed several hundred MicroHip™ operations, and thus far we have never observed any nerve lesions or trochanter fractures. Definitive study results are not as yet available, but our experiences to date show that the method we have developed allows us to operate reliably on virtually any patient. Preliminary results show, that the most of the important factors like hospitalisation time, pain, blood loss and work incapacity can be cut in half. The MicroHip™ technique is progressively used by more and more different clinics all over the world and can be applied with success from well educated surgeons after a suitable training."

Markus C. Michel, Pierre Witschger
Head physicians, Münsingen Orthopaedic Centre, Switzerland

PATIENT POSITIONING

Figure 1

This approach may be considered for all patients, unless the abductor tendons are damaged. In which case, in a small percentage of patients, a transgluteal approach can be used to repair the damaged tendons. The posterior half of the distal part of the operating table is removed. The patient is positioned on the remaining part of the table, as close as possible to the surgeon, in a decubitus lateral position. Both knees are slightly flexed and the patient is stabilised with support to the symphysis and to the sacrum. The surgeon is positioned ventral to the patient (Fig. 1). Should one need to extend the incision proximally, do it towards the anterior superior iliac crest and not further ventrally to avoid the lateral femoral cutaneous nerve.[2]

PLANNING THE INITIAL INCISION

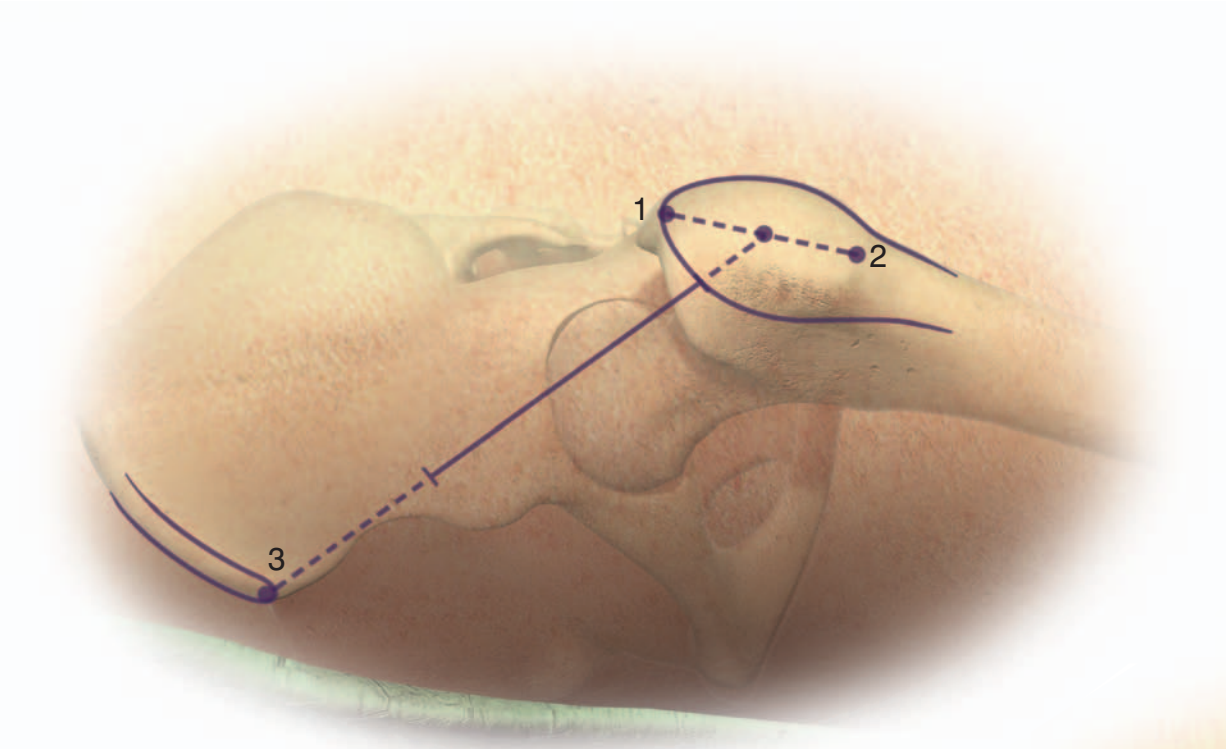


Figure 2

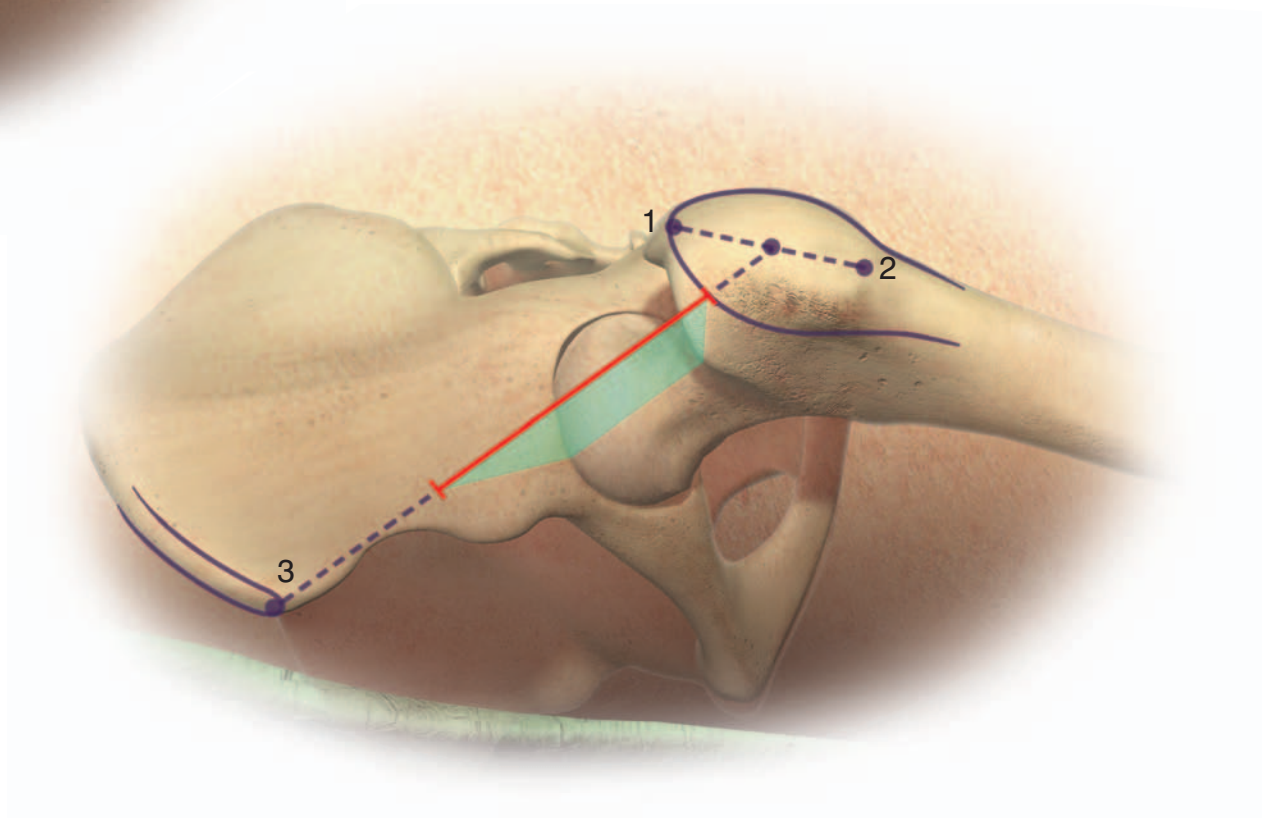


Figure 3

3 landmarks are required: the tip of the greater trochanter (1), the tuberculum innominatum (2) and the superior anterior iliac crest (3). Identify the tip of the great trochanter and the superior anterior iliac crest. Draw a line from the mid point between the tip of the greater trochanter and the tuberculum innominatum, to the antero superior iliac crest (Fig. 2). Define the initial incision - this runs from the border of the trochanter and extends approximately 6 to 8 cm along the guide line. It will mark a plane that defines the femoral neck axis (Fig. 3).

INITIAL SKIN INCISION

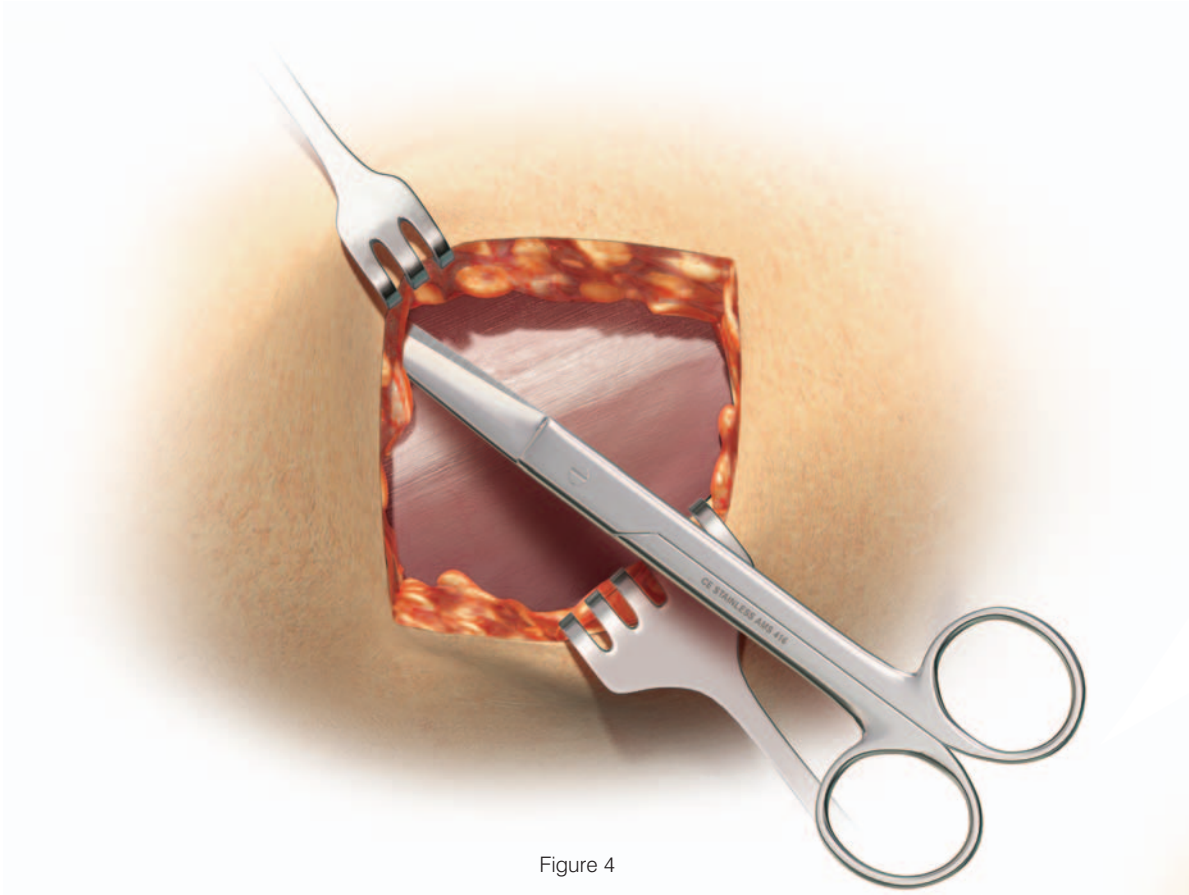


Figure 4

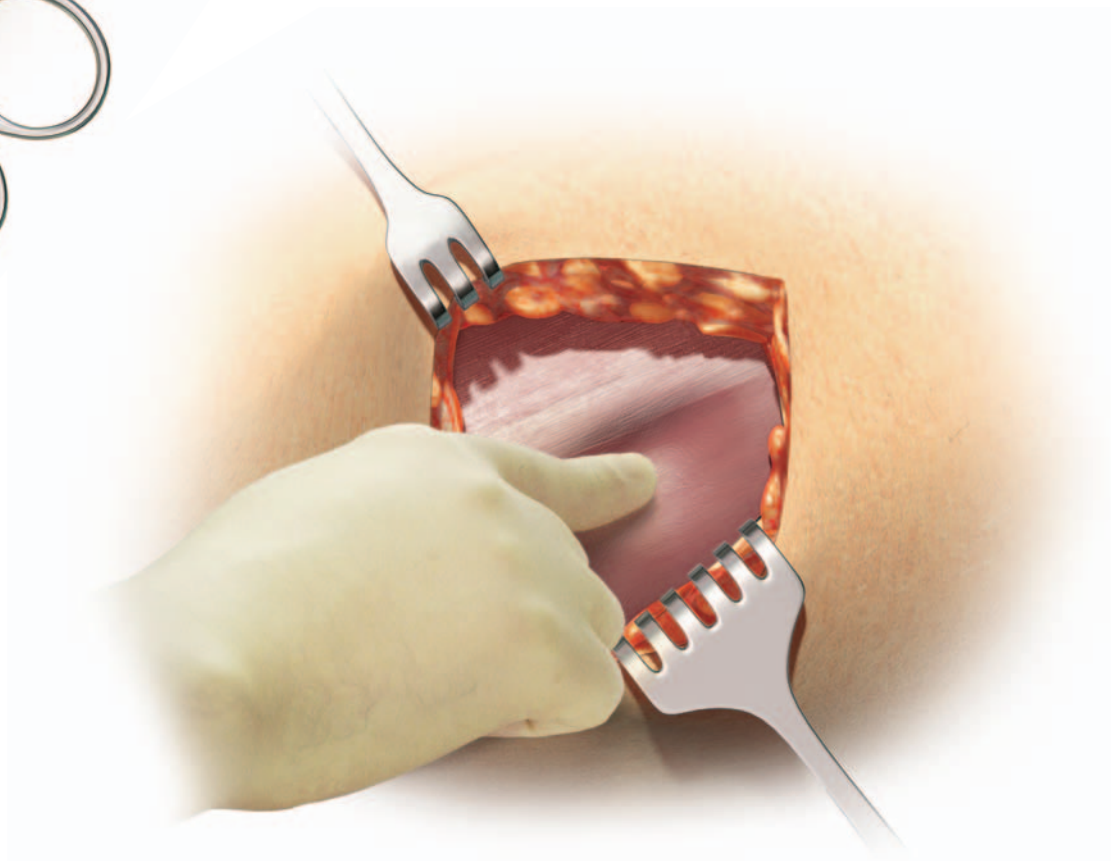


Figure 5

Make an initial skin incision and then divide the fatty layer in line with the incision. Lift the skin and undermine the fatty layer to create a mobile window sufficient to expose the capsule but not so extensive to risk necrosis of subcutaneous tissue (Fig. 4). The lateral femoral cutaneous nerve is ventral to, and well away from the exposure. With the fascia exposed, palpate the underlying plane between the tensor fascia lata and the illio tibial band (Fig. 5). It is here that the fascia is of sufficient thickness to allow closure at the end of the procedure.

CAPSULE EXPOSURE

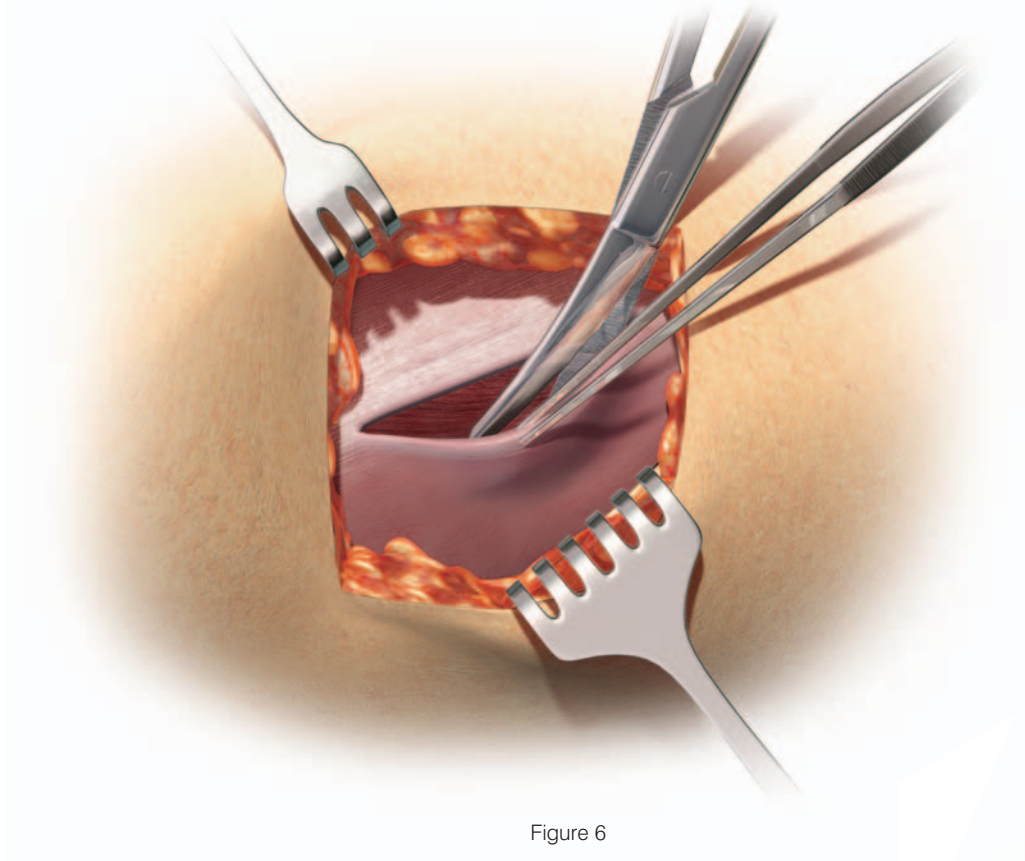


Figure 6

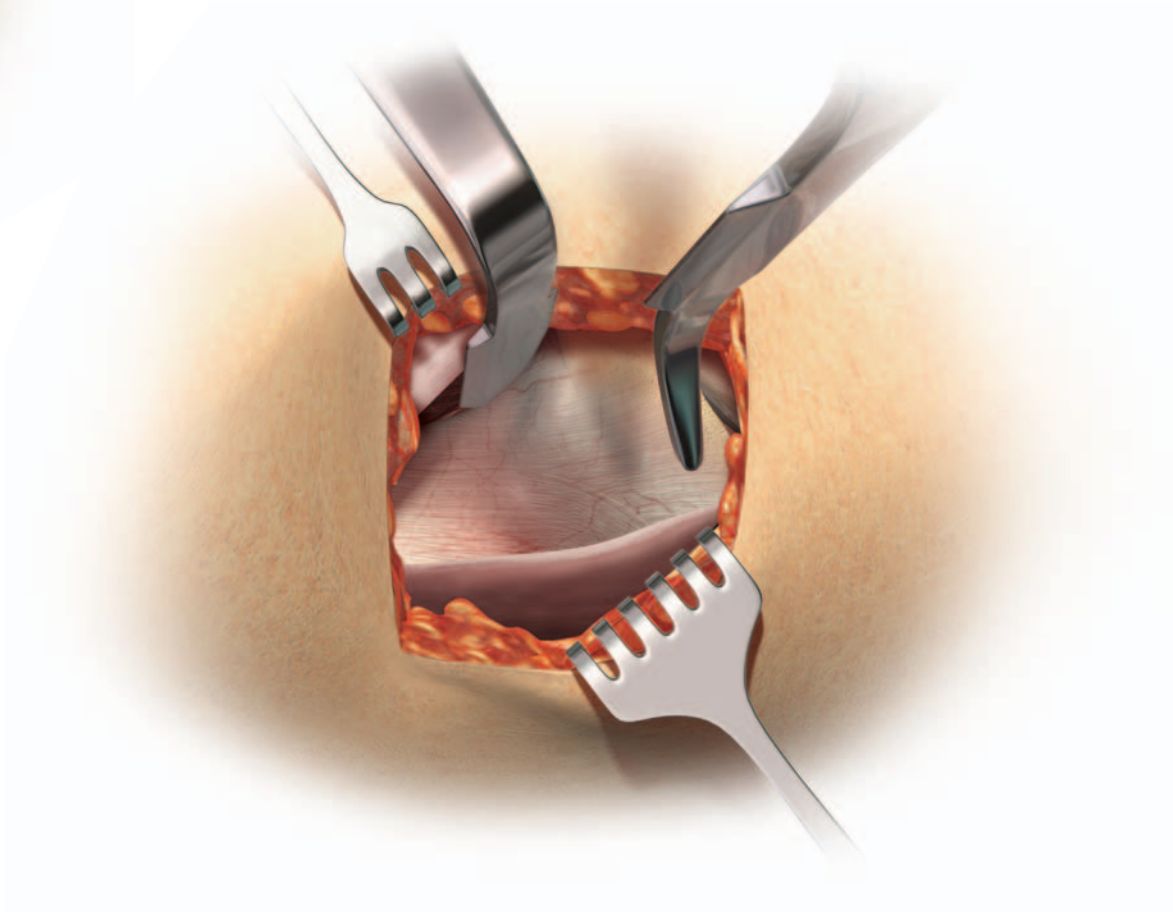


Figure 7

Incise the fascia approximately 2 - 5 mm medial to the underlying border of fascia lata, following the direction of skin incision. Use scissors and blunt dissection to separate the tensor fascia lata ventrally from the fascia, following the plane of incision down to the capsule of the femoral neck (Fig. 6). Insert a straight Hohmann retractor between the tensor fascia lata and the sartorius muscle, with the tip coming to rest on the femoral neck at the bottom of the greater trochanter. Retract the tensor laterally, together with the abductor minimus and medius muscles. Use a second retractor on the femoral calcar to retract the sartorius and rectus muscles ventrally (Fig. 7). This will expose the capsule over the femoral neck.

CAPSULE INCISION

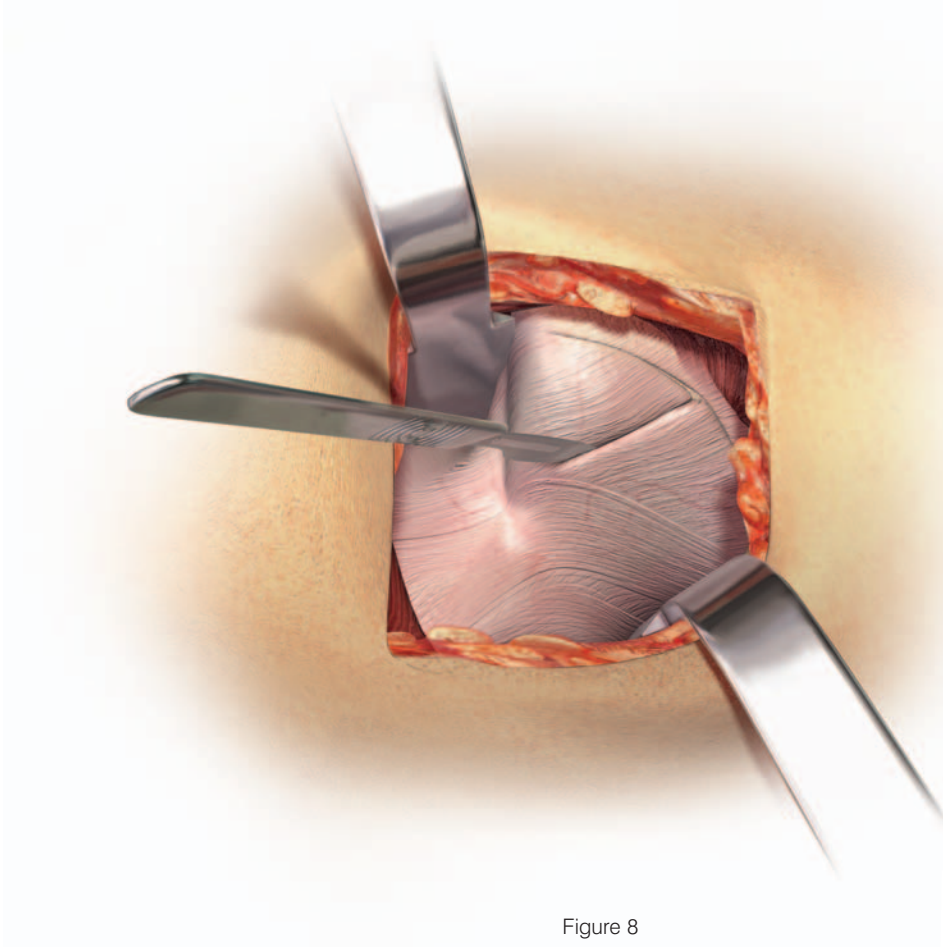


Figure 8

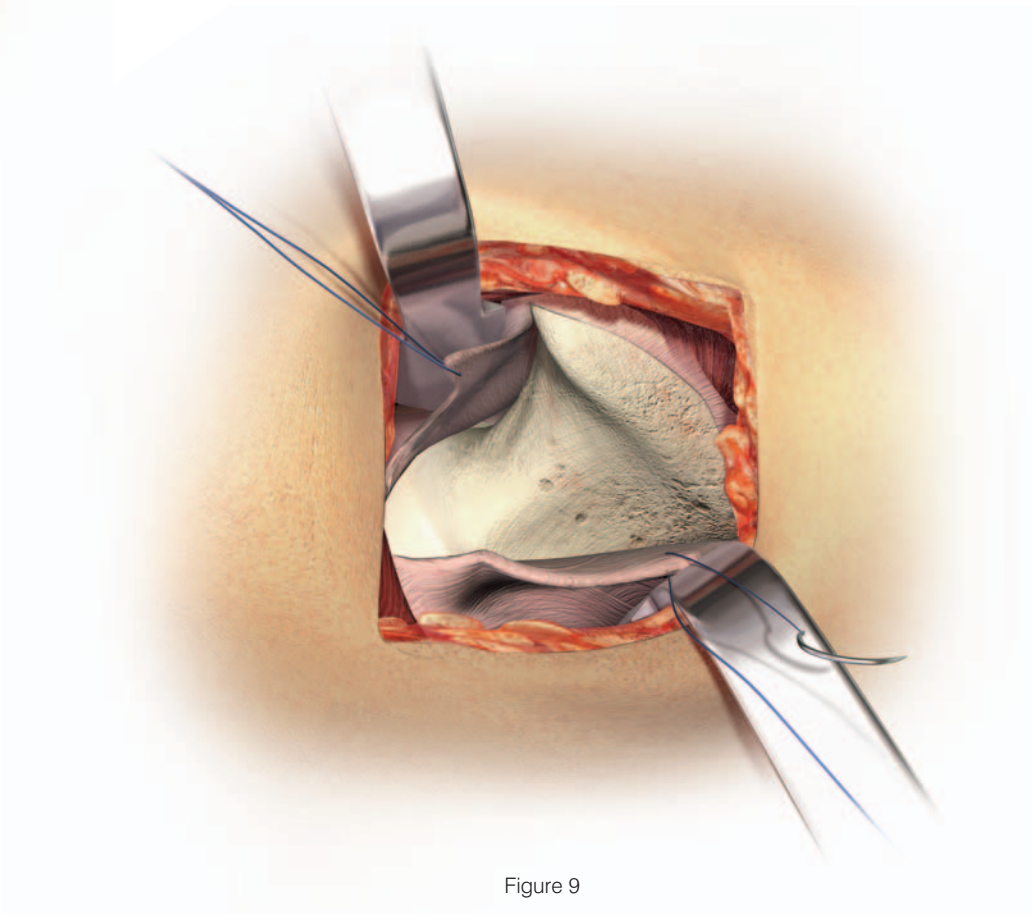


Figure 9

Make a T-shaped capsular incision: inferior to superior, and along the border of the greater trochanter (Fig. 8). Lift the capsule away from the bone, using a rasp if necessary. Suture and reflect both flaps ready for re-attachment (Fig. 9).

FEMORAL NECK RESECTION

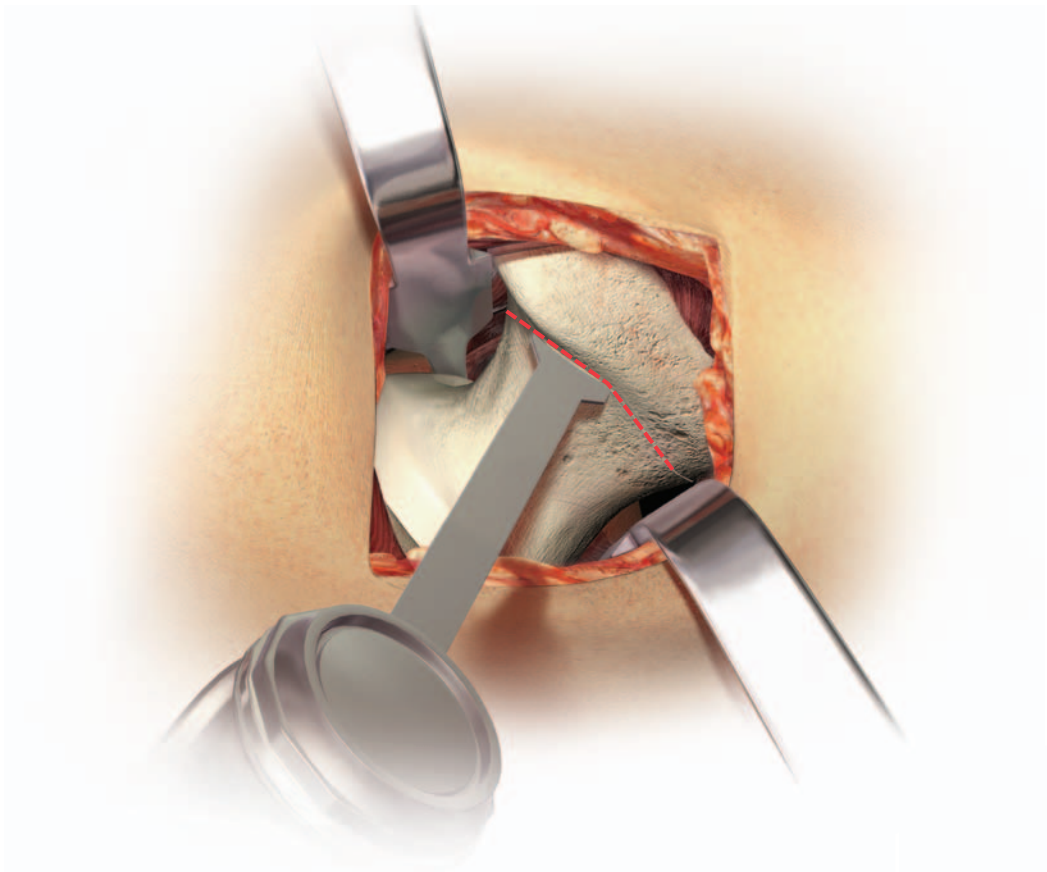


Figure 10

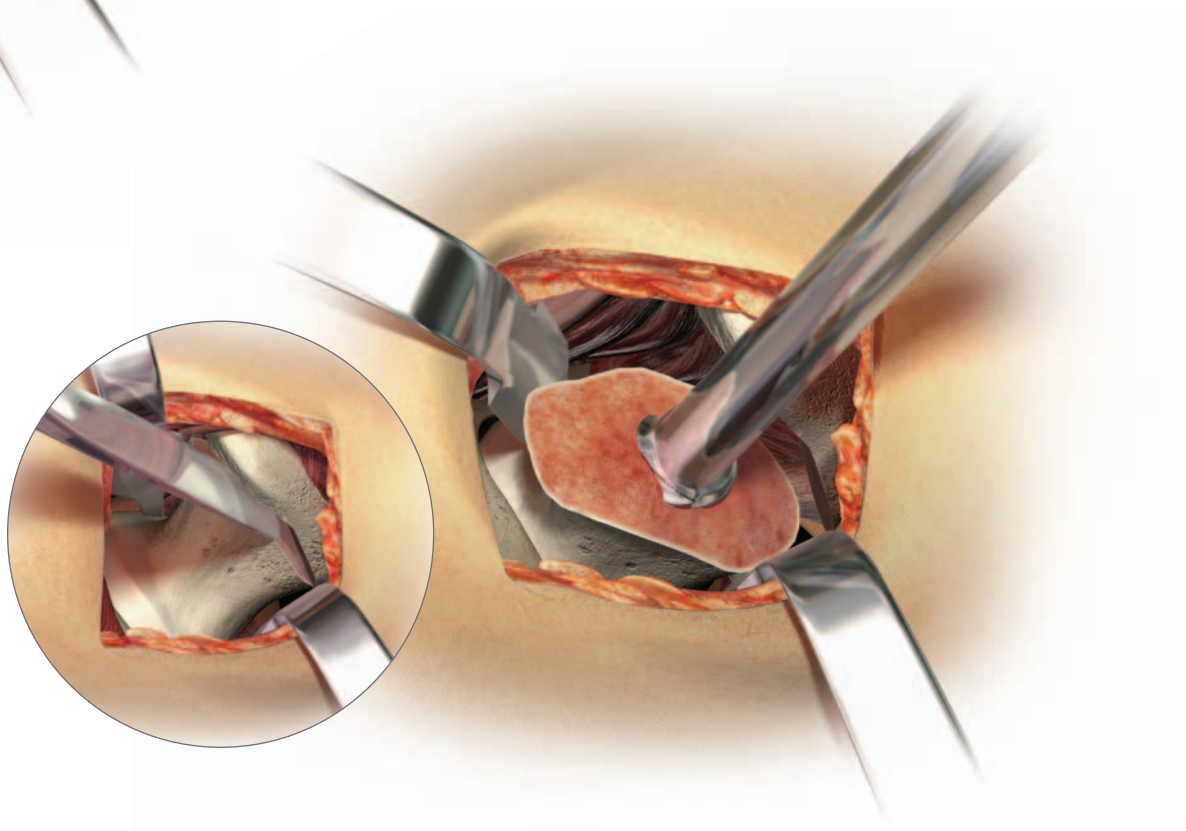


Figure 11

Use a long narrow saw blade to cut the femoral neck in 2 osteotomy lines along the capsule, without dislocating the hip (Fig. 10). After completing the osteotomy, a chisel is used to flip the femoral neck toward the front. This will allow a corkscrew to be introduced into the femoral head. Follow the central axis of the femoral neck into the head. Turn the corkscrew several times and remove the femoral head (Fig.11).

ACETABULAR PREPARATION & REAMING

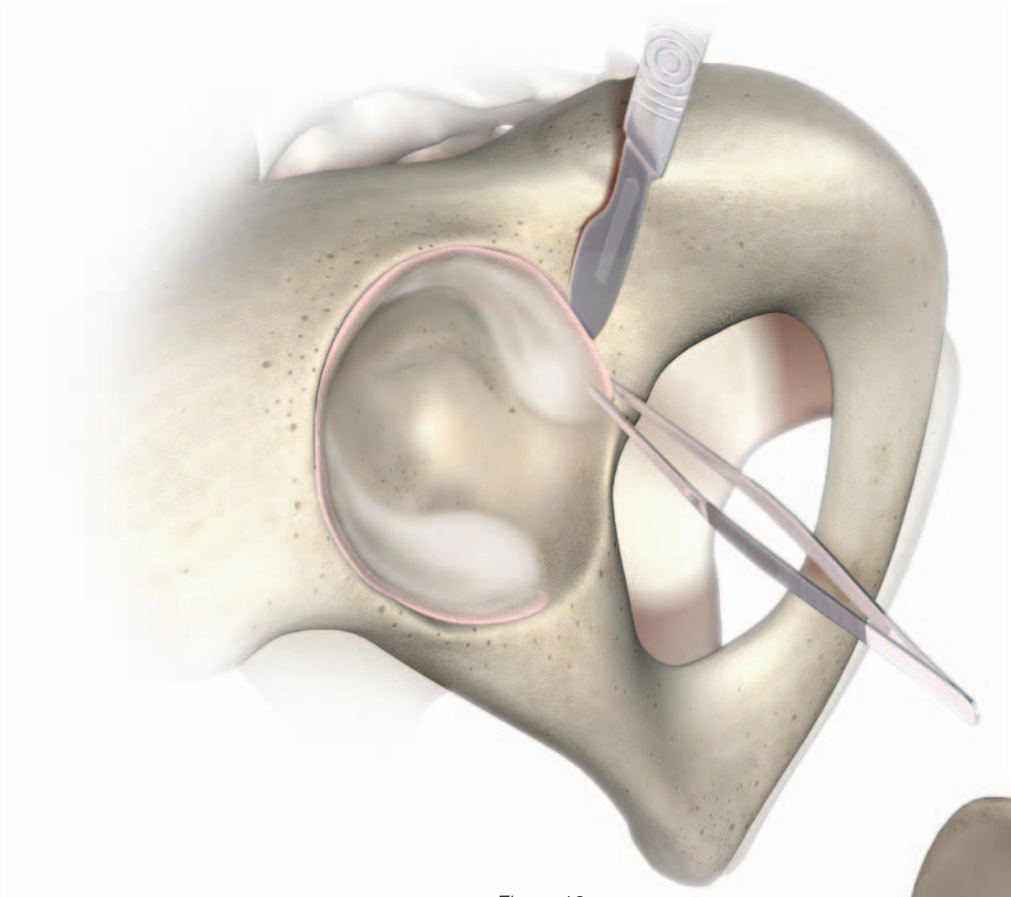


Figure 12

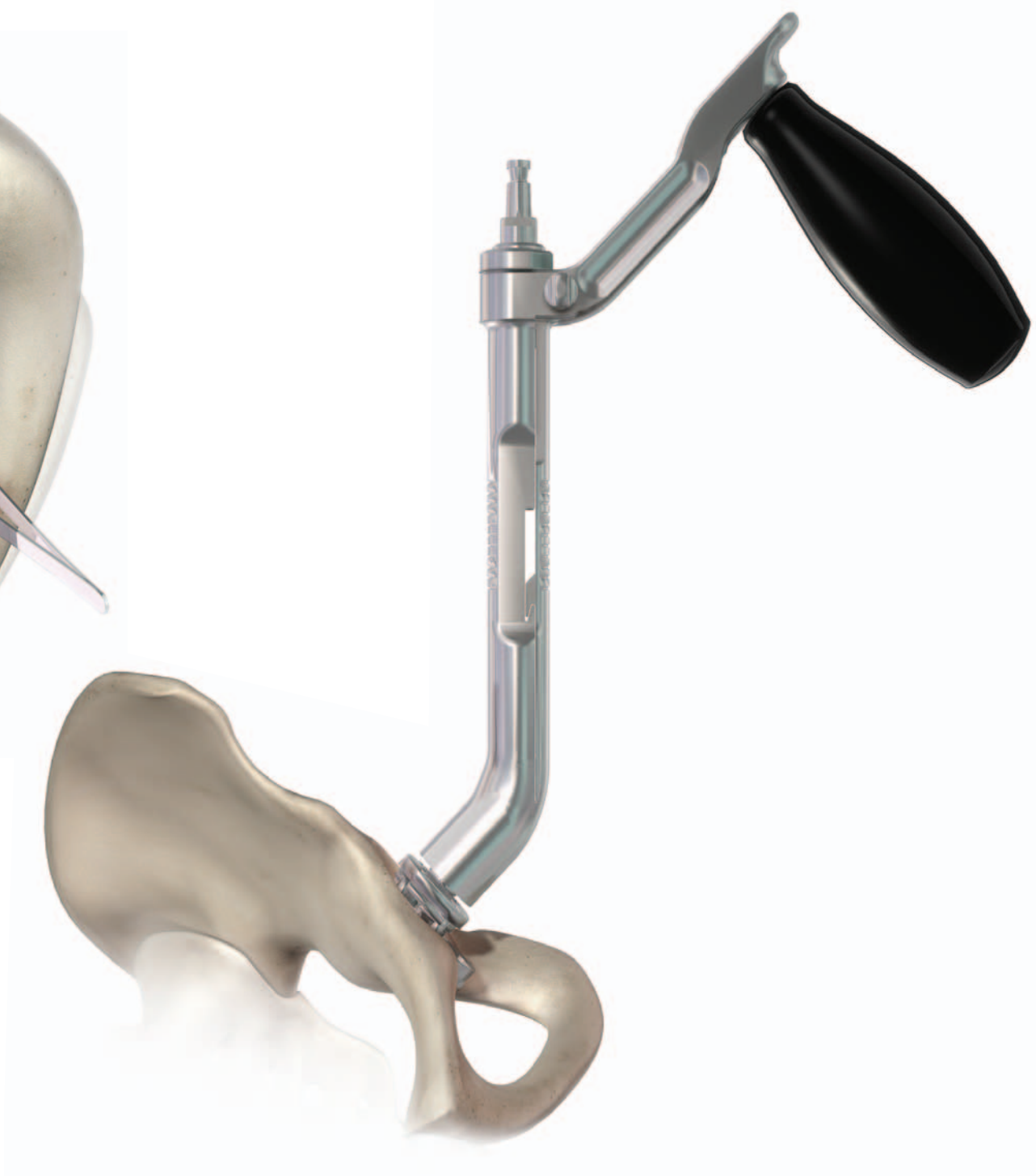


Figure 13

Once the femoral head has been resected and extracted from the wound, clean the acetabular cavity and resect any remaining labrum (Fig. 12). Place a double bent retractor beneath the femur and move the femur distally to provide good visualisation for acetabular reaming. Use the smallest reamer attached to the 45° driver introduced perpendicular to the table, using the transverse ligament as a landmark (Fig. 13). Ream 1-2 mm less than the pre-operative templated cup (depending on bone quality) to achieve the desired press-fit.

ACETABULAR TRIAL & IMPLANTATION

Figure 14

Figure 15

Following preparation of the acetabulum, a Pinnacle™ Trial Shell with the pre-operative templated diameter is threaded to the connector of the acetabular inserter. It is then impacted (Fig. 14). The orientation can be checked with the external alignment guide in addition to natural landmarks such as the transverse ligament. The trial shell is used to visualise the quality of the reaming and the coverage of the acetabular rim. The definitive Pinnacle™ Shell is threaded to the connector of the acetabular inserter. The fixation holes of the cup can be orientated with the inserter handle. Before the definitive Pinnacle™ shell is introduced, irrigate and clean the cavity. The shell is then impacted with the acetabular inserter (Fig. 15). Clean the face of the shell so as not to impede trial liner seating. Please refer to the Pinnacle™ Surgical technique for full details (cat. no. 9069-80-050).

LEG POSITIONING

(a) (b) (c)

Figure 16

Following acetabular preparation and implantation (a), the leg is flexed, abducted, externally rotated (b) and placed in a specific sterile wrapping (c) (Fig. 16).

FEMORAL CANAL PREPARATION

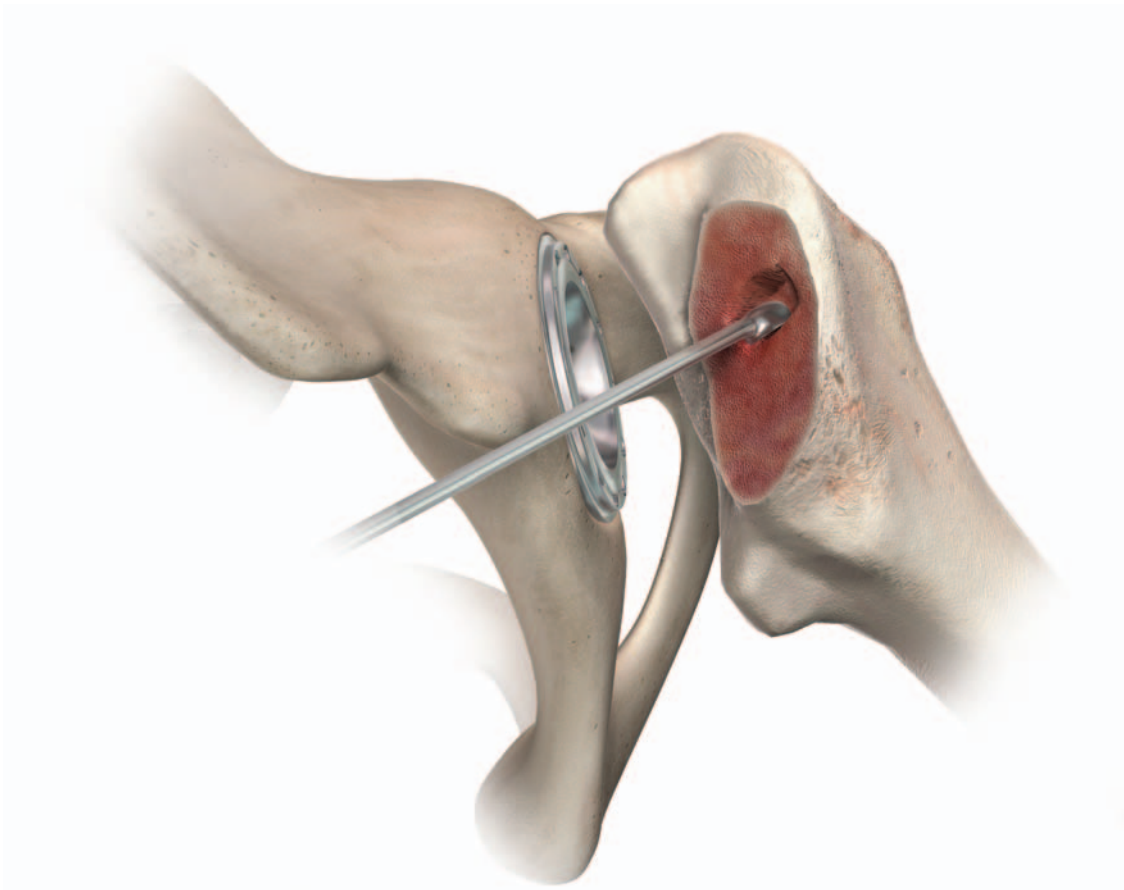


Figure 17

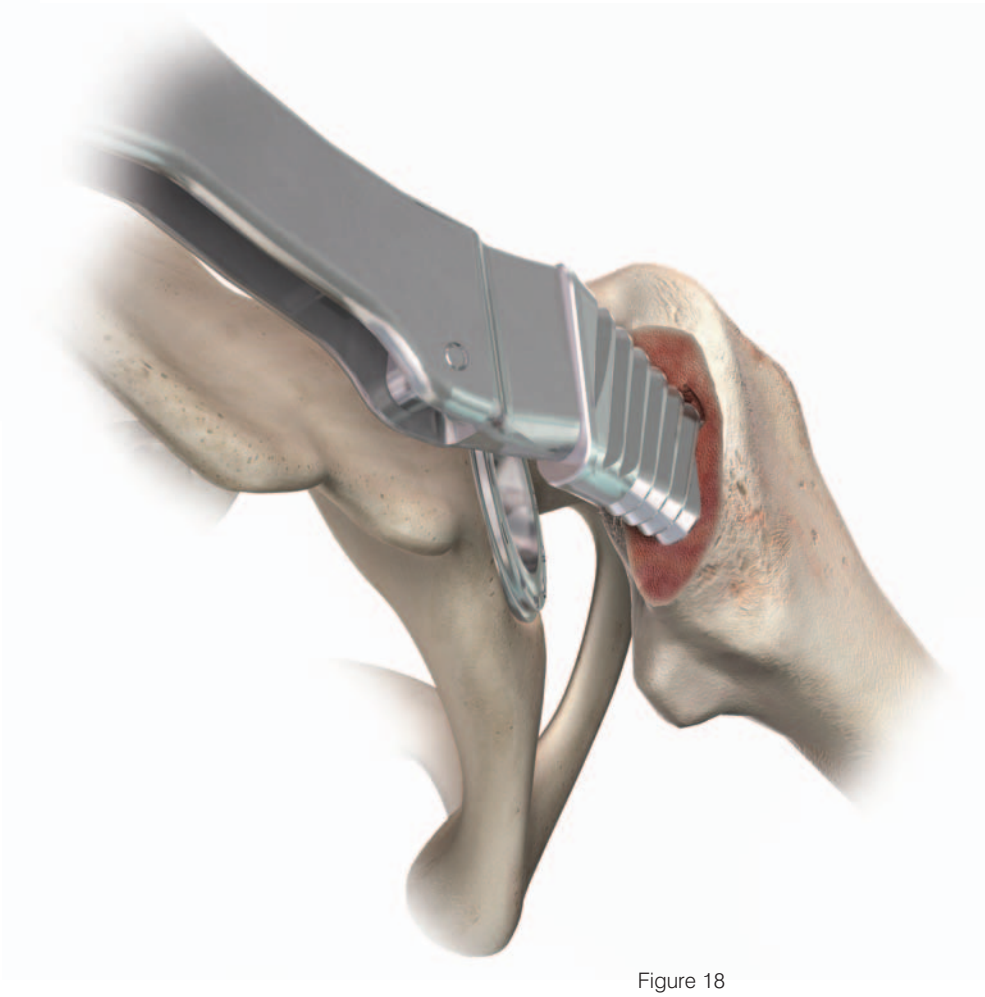


Figure 18

Use the Corail® broaches to create the adequate femoral cavity by compacting the cancellous bone. The objective is to use the smallest stem which is stable in the cancellous bone. For this reason, it is important to stop broaching as soon as the broach is axially and rotationally stable to preserve cancellous bone and encourage the osteointegration of the Corail® Stem. To avoid varus positioning, it is important to enter the femoral canal as laterally as possible with a chisel or the Corail® osteotome (Fig. 17). Begin with the smallest broach attached to the broach handle and increase the size of broach one at a time until you reach axial and rotational stability (Fig. 18). The anteversion is automatically set by the anatomy of the femur. Please refer to the Corail® Surgical technique for full details (cat. no. 9066-35-001).

TRIAL REDUCTION & IMPLANTATION

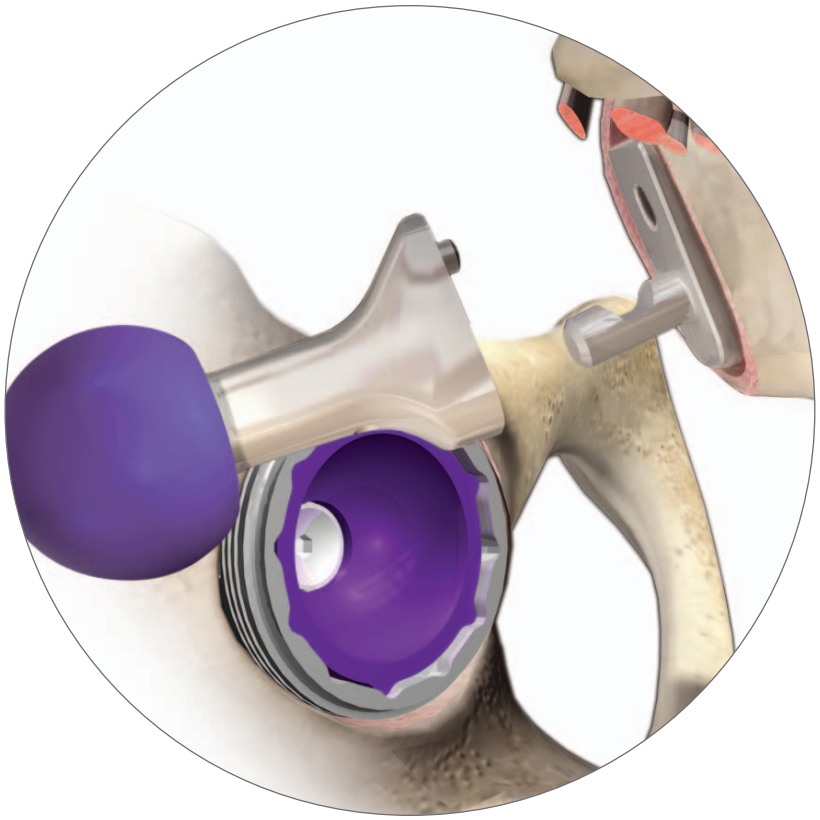


Figure 19

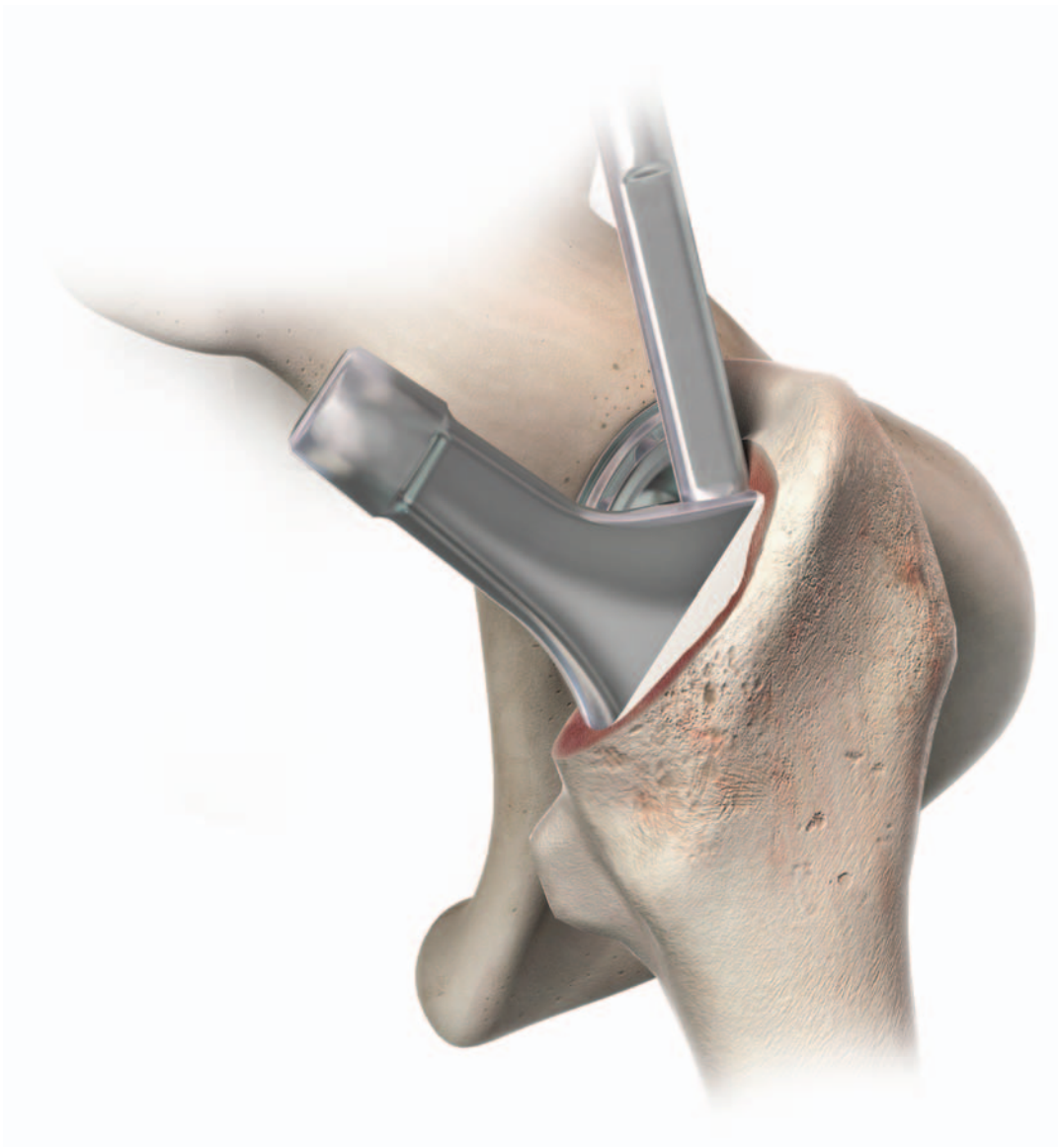


Figure 20

With the last broach in situ, attach the selected neck and femoral head trials (Fig. 19) and reduce the hip. Remove the broach, the femoral head and neck trials. Do not irrigate or dry the femoral canal. This will help to preserve the quality of the compacted cancellous bone that encourages the osteointegration of the Corail® stem. Insert the Corail® stem by hand and finish its introduction with the impactor for the last centimetres (Fig. 20). Remove the trial insert, clean the face of the shell so as not to impede definitive acetabular insert seating. Secure the fixation of the acetabular cup with screws if needed. Insert the definitive acetabular inlay. Insert the definitive femoral head on the taper of the stem and reduce the hip. Please refer to the Corail® surgical technique for full details (cat. no. 9066-35-001).

FINAL CLOSURE

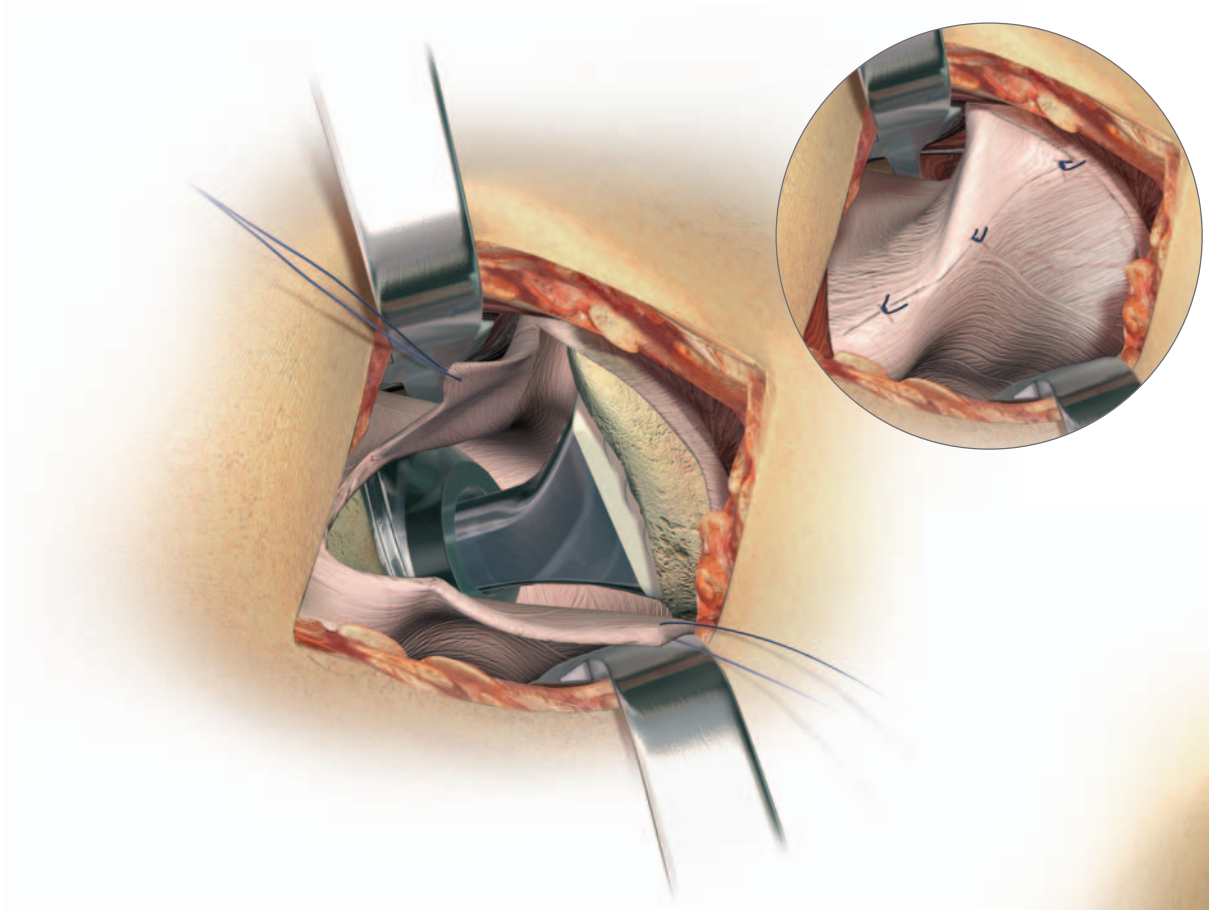


Figure 21

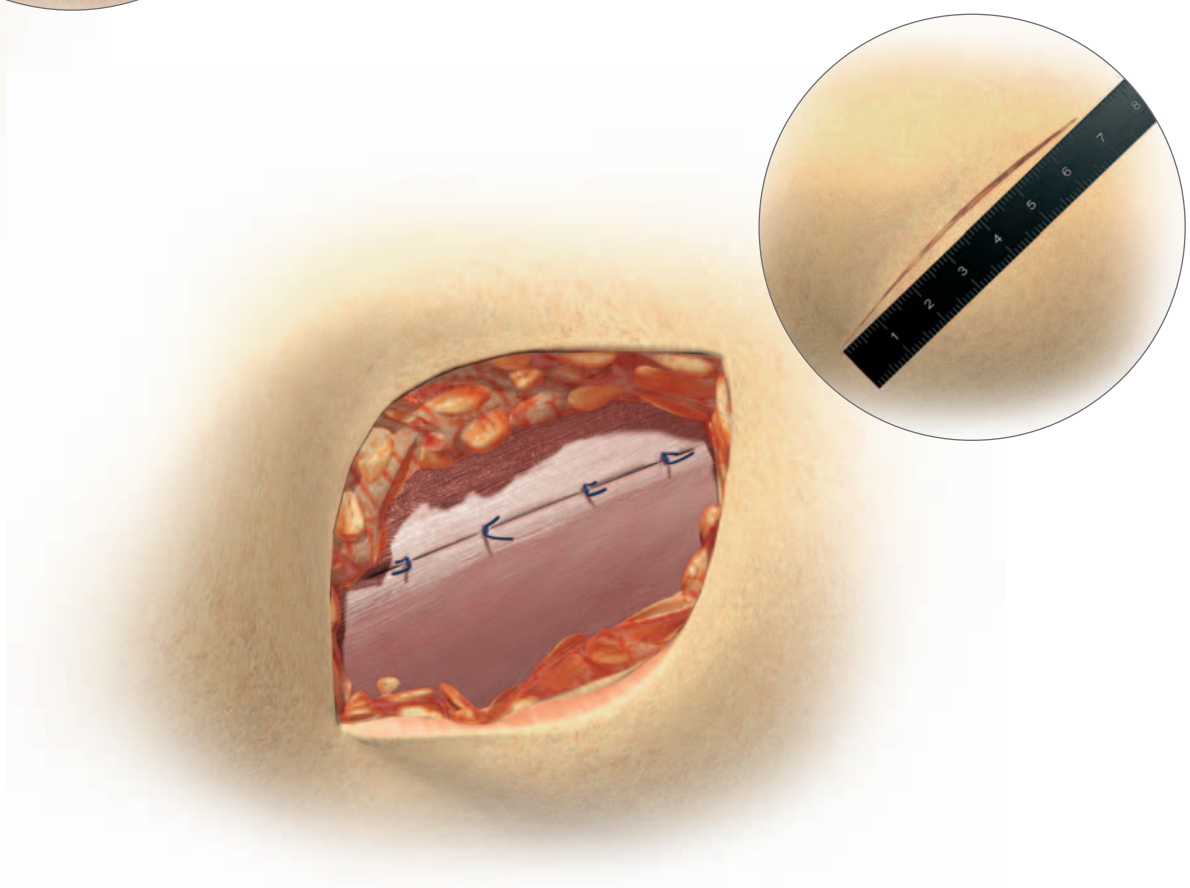


Figure 22

After repositioning, the joint capsule is closed using the initial holding sutures and a small number of extra stitches (Fig. 21). The fascia - tractus iliotibialis - is closed using several stitches (Fig.22).

SURGICAL TIPS

Markus C. Michel

Head physician, Münsingen Orthopaedic Centre, Switzerland.

- To date we have performed several hundred MicroHip™ operations, and so far we have not observed nerve lesions or trochanter fractures. Our greatest initial difficulty was the alignment of the acetabular component. Being positioned ventrally to the patient, we had to be careful to avoid too much anteversion in our cup and we find it appropriate to ream parallel to the transverse ligament.

- Calcar fissures do not as a rule pose any problem, but they can be avoided by displaying the femur correctly in order to ensure that the right entry point is chosen. We enter the femoral canal as lateral as we can and we make sure that we see the whole circumference of the proximal femur from the greater trochanter to the calcar.

- Being sure that we are located on the femoral neck after the capsule's preparation is important and we rotate the leg internally and externally to make sure that we are located correctly and not on the acetabulum.

- We also split the capsule up to the acetabular rim so that we can see the labrum and the complete acetabulum once we have removed the femoral head.

- Should we need to extend the incision proximally, we do it towards the anterior superior iliac crest and not further ventrally to avoid the lateral femoral cutaneous nerve.[2]

CONCLUSION

Markus C. Michel

Head physician, Münsingen Orthopaedic Centre, Switzerland.

“The MicroHip™ technique allows a hip joint replacement using a very short incision and without damaging the musculature. Even if we do not have any definitive study results so far, our experiences to date show that the method we have developed allows us to operate reliably on virtually any patient. However, a precondition for this is of course suitable training. The results are often so good that it can be difficult to persuade patients that it is important to carefully build up the loads exerted on the joint. Although the post-operative pain is far less, so that early full loading would be possible, the biology nevertheless remains the same, and this means that the healing of the wound and related muscle development takes time. Even in our ever more hectic world the patient should devote the necessary time to his or her new hip joint.”

DePuy MicroHip™

References:

1. Smith-Peterson, M.N.: (1949) Approach to and exposure of the hip joint for mold arthroplasty. J. Bone Joint Surg. 31A: 40

2. Grothaus MC, Holt M, Mekhail AO, Ebraheim NA, Yeasting RA. (2005) Lateral femoral cutaneous nerve: an anatomic study. Clin Orthop and Rel Res. Aug;(437):164-8.

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