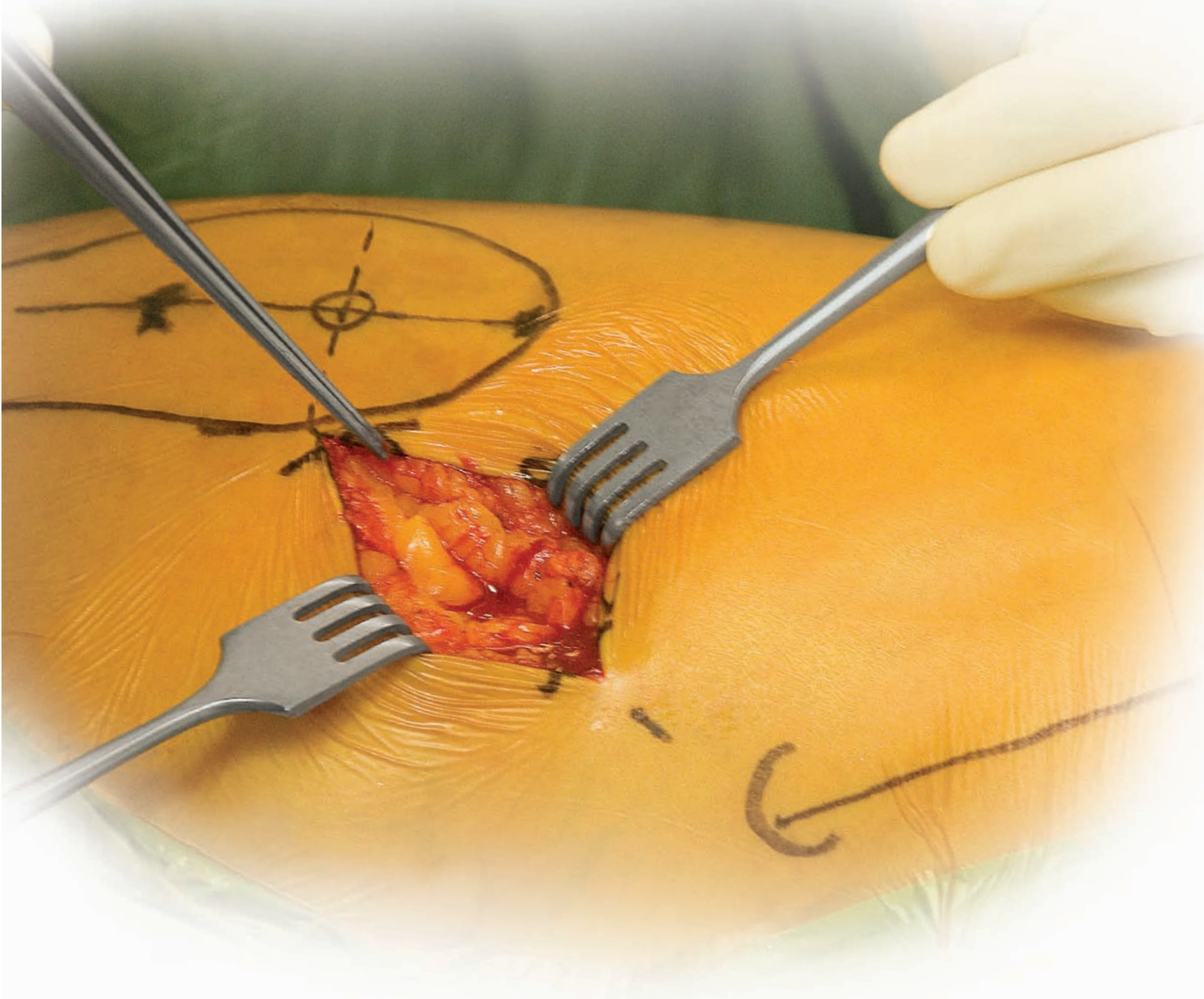
DePuy MicroHip™

Surgical Technique



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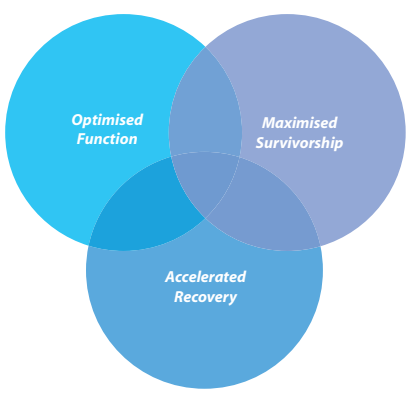


Intelligent **Surgery**

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 an anterior minimal invasive approach to the hip joint which is aligned along an internerveous plane. 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. Most of the instruments used for this procedure are standard instruments, only for reaming of the acetabulum and positioning of the cup angulated instruments are recommended.

This 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 internervous plane between the tensor muscle and the sartorious and rectus femoris muscles using a section of the approach described by Smith Petersen.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 severe nerve lesions or fractures of the greater trochanter. Preliminary results show that hospitalisation time, pain, blood loss and work incapacity can be cut approximately in half comparing with a standard lateral approach. Our surgical method is reproduceable for teaching and it suits most of the patients; however we recommend to start using MicroHip with standard patients."

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

PATIENT POSITIONING

Figure 1

This approach may be considered for all patients, except when the abductor tendons are damaged. In which case 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 ventral to the patient (Fig. 1). If the incision is too small, it is recommended to extend it towards the anterior superior iliac crest and not further ventrally to avoid the lateral femoral cutaneous nerve.[2]

INITIAL INCISION PLANNING

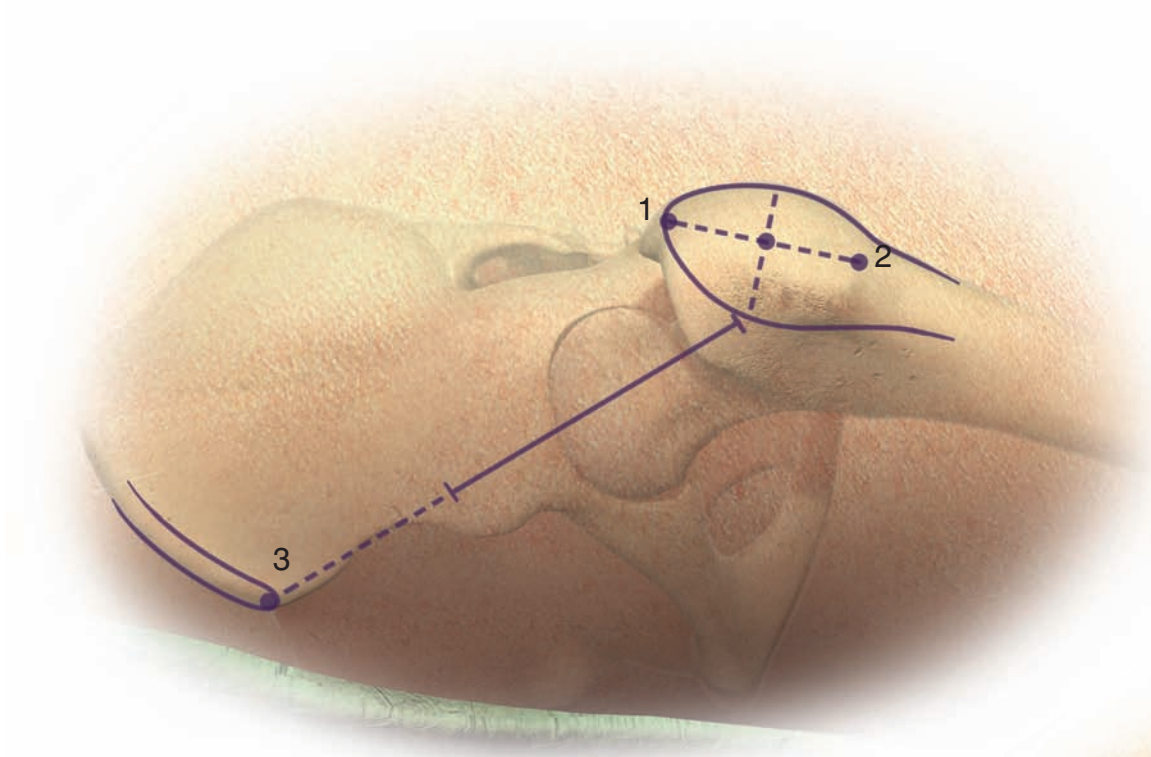


Figure 2

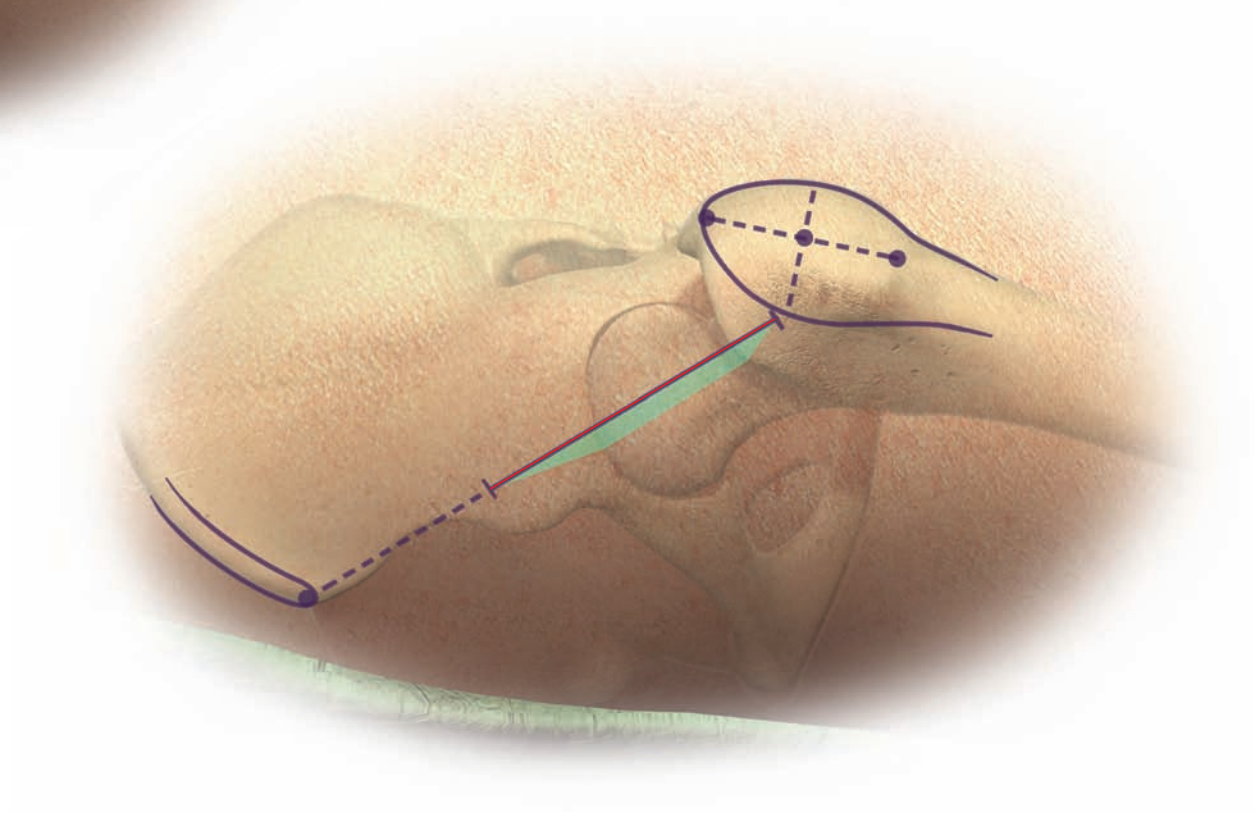


Figure 3

Three landmarks are required: the tip of the greater trochanter (1), the tuberculum innominatum (2) and the superior anterior iliac spine (3). Identify the anatomical landmarks. Draw a line from the mid point between the tip of the greater trochanter and the tuberculum innominatum to the anterior border of greater trochanter. From the boarder draw a guideline that joins the antero superior iliac spine (Fig. 2). The initial incision runs from the border of the trochanter and extends along the guideline. It will mark a plane that defines the femoral neck axis (Fig. 3).

INITIAL SKIN INCISION

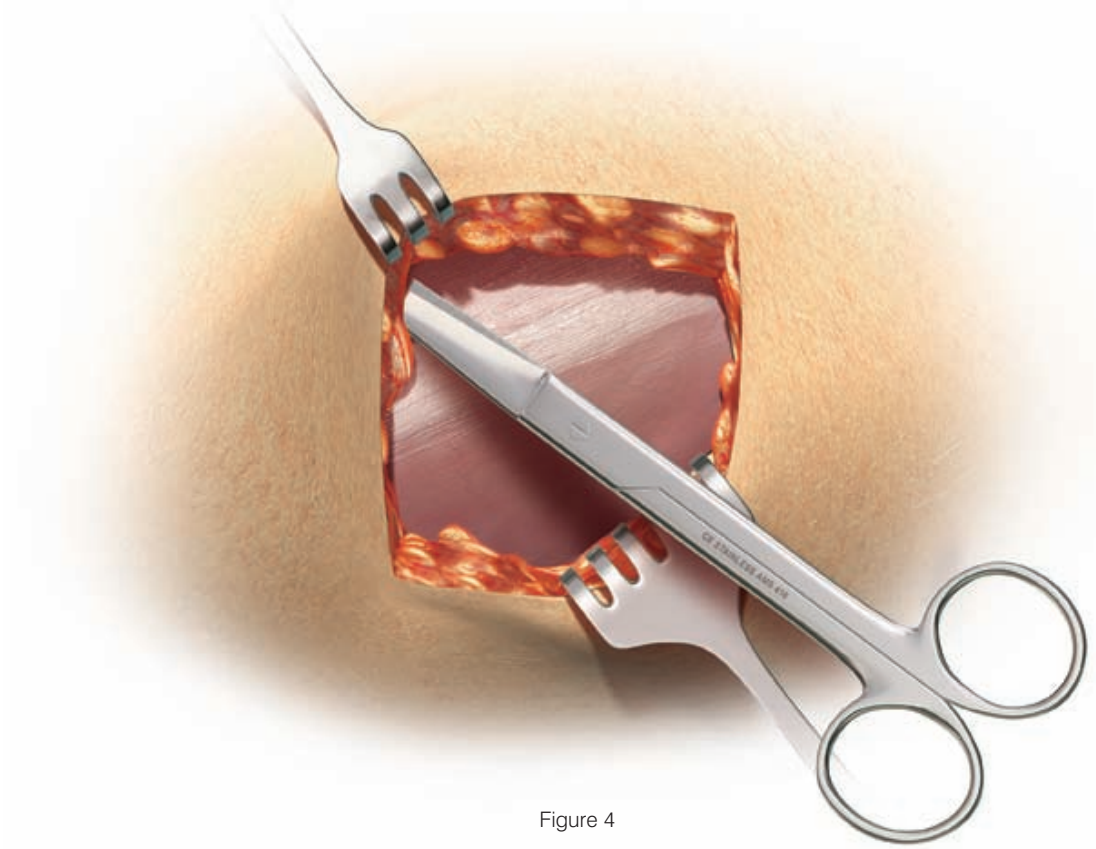


Figure 4

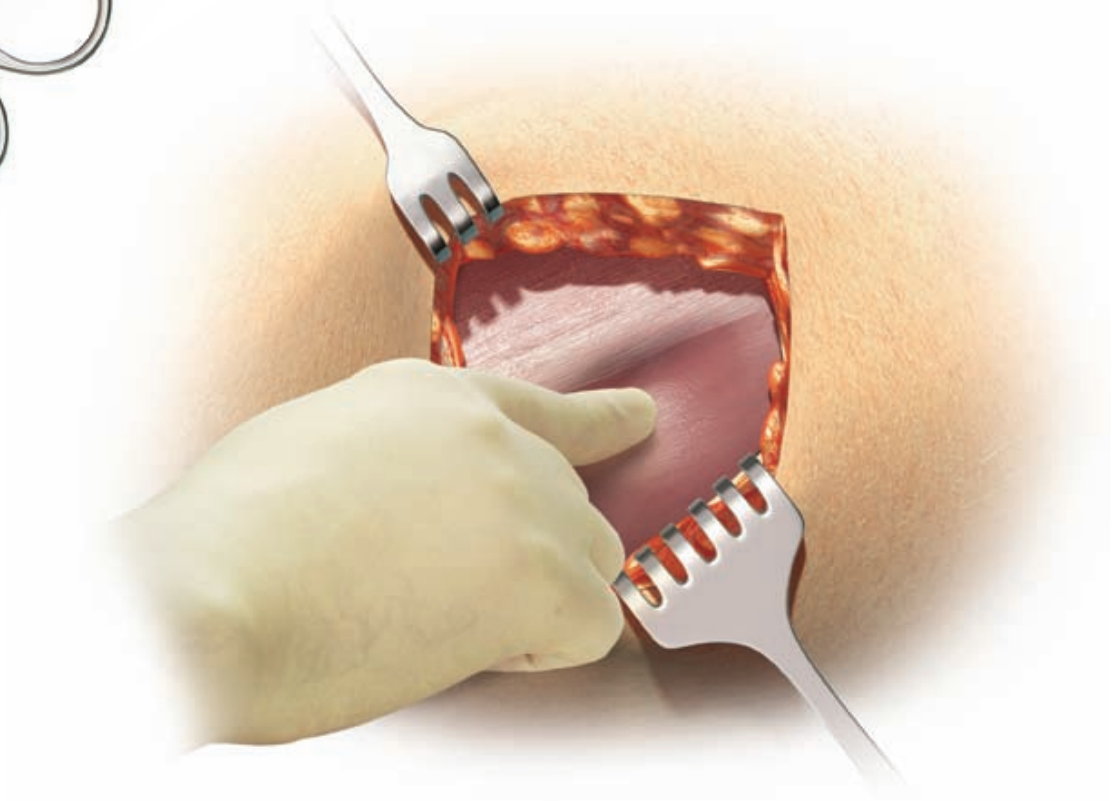


Figure 5

Make the 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 initial incision. With the fascia exposed, palpate the underlying plane between the tensor fasciae latae and the illio-tibial tractus (Fig. 5). It is here that the fascia is thick enough to allow closure at the end of the procedure.

CAPSULE EXPOSURE

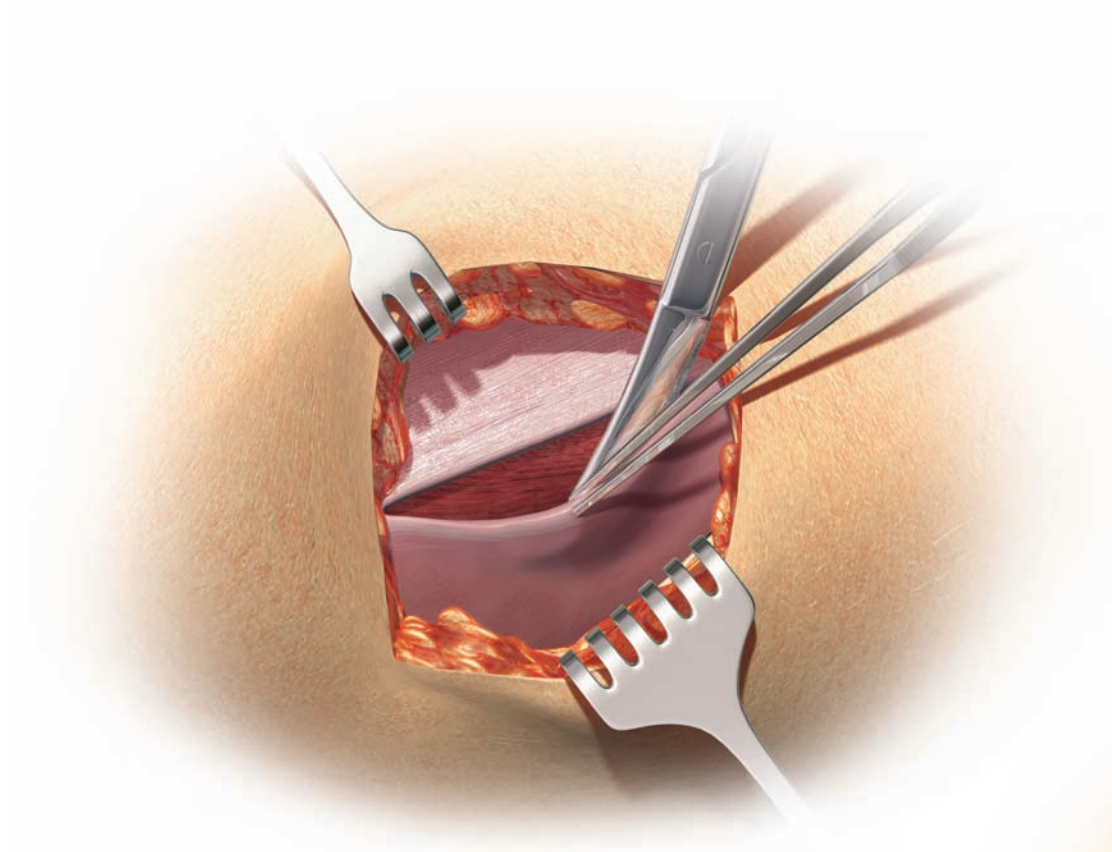


Figure 6

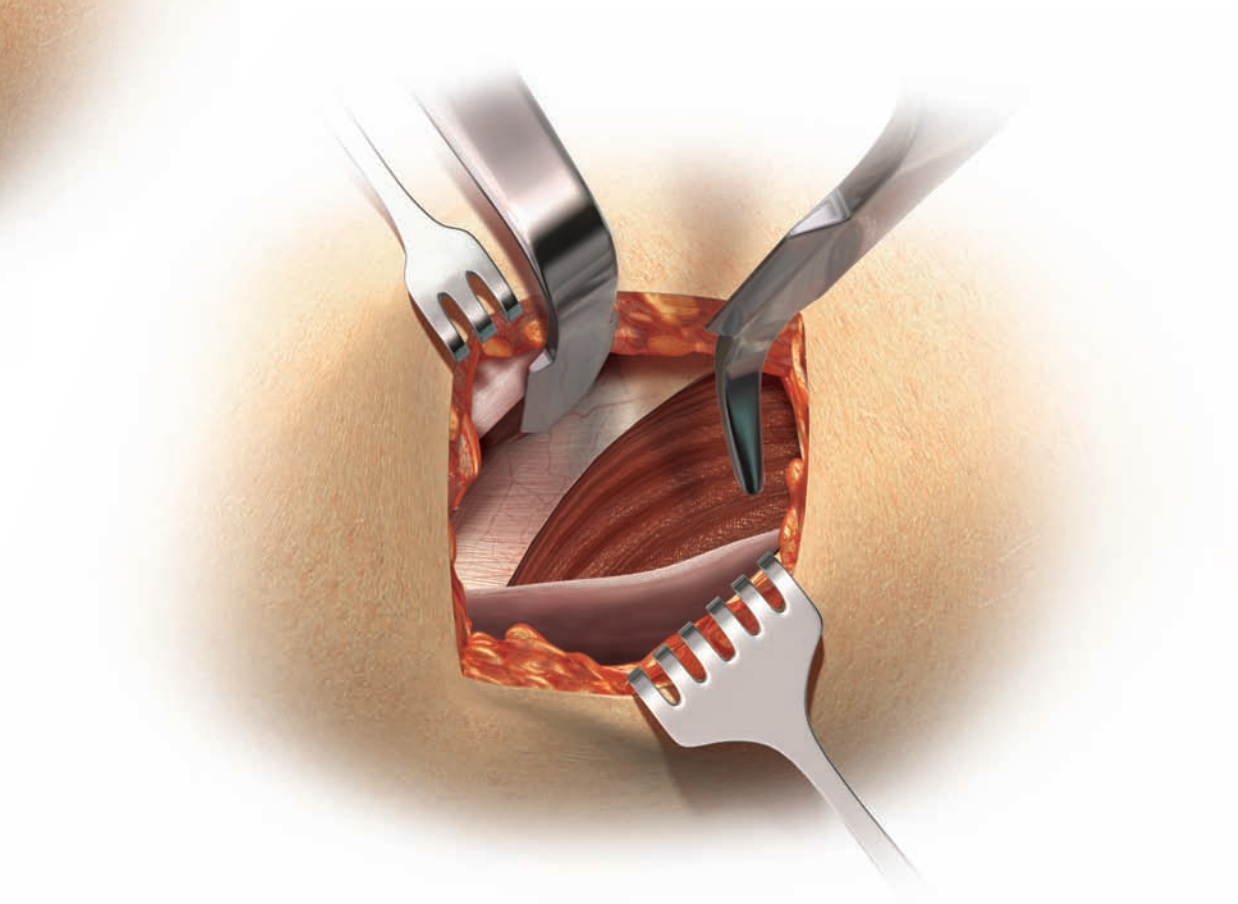


Figure 7

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

CAPSULE INCISION

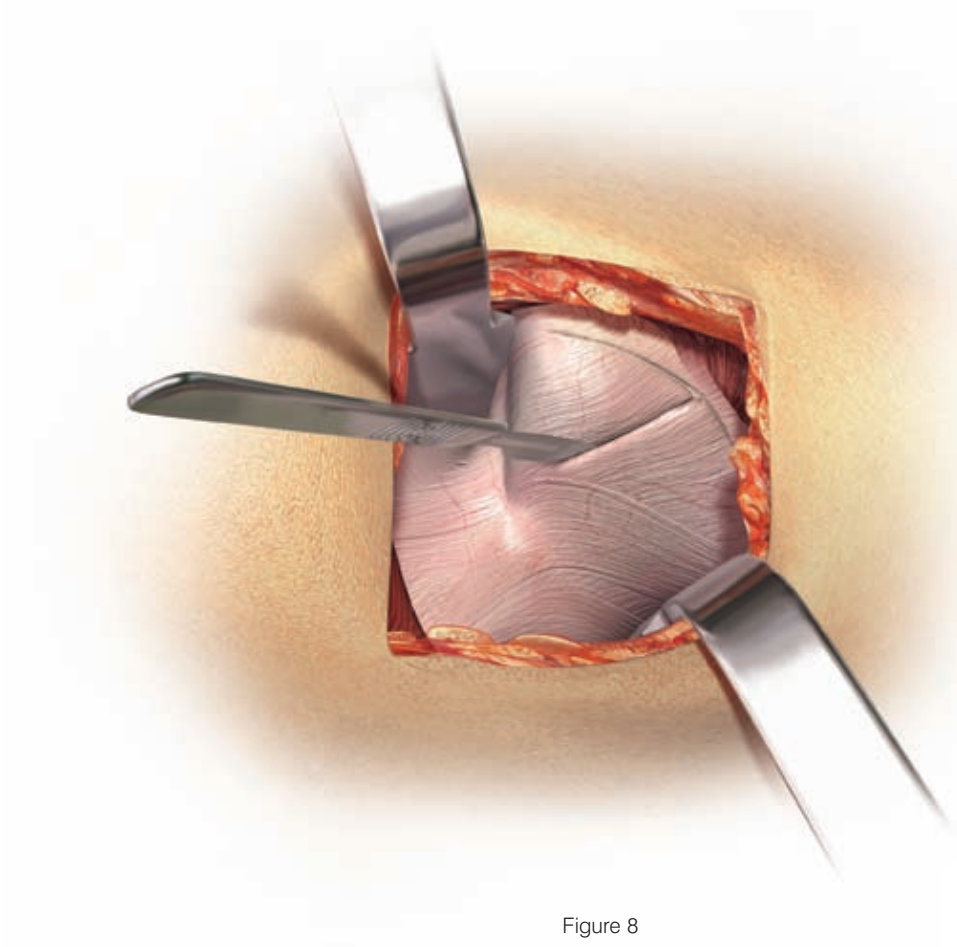


Figure 8

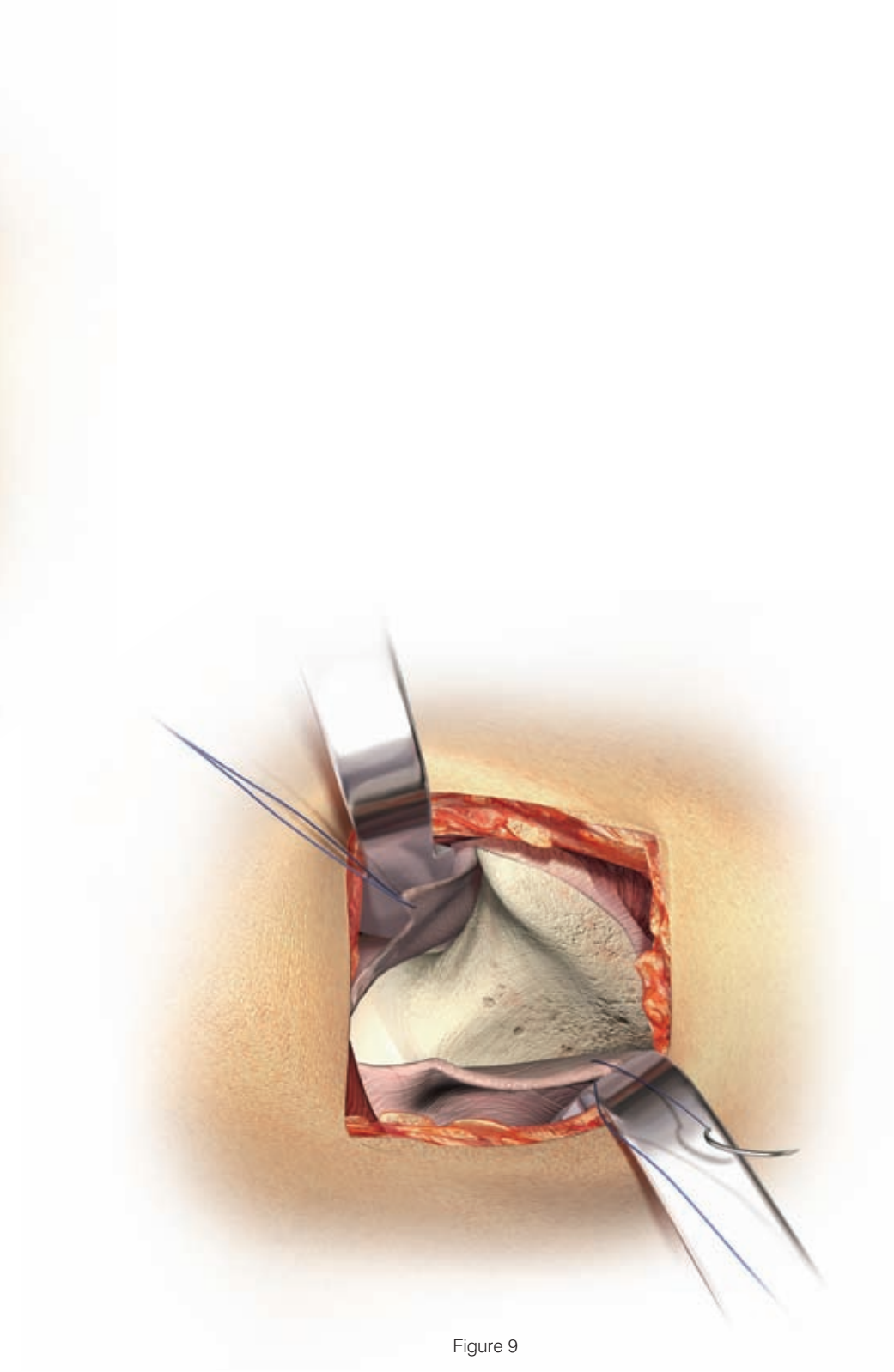


Figure 9

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

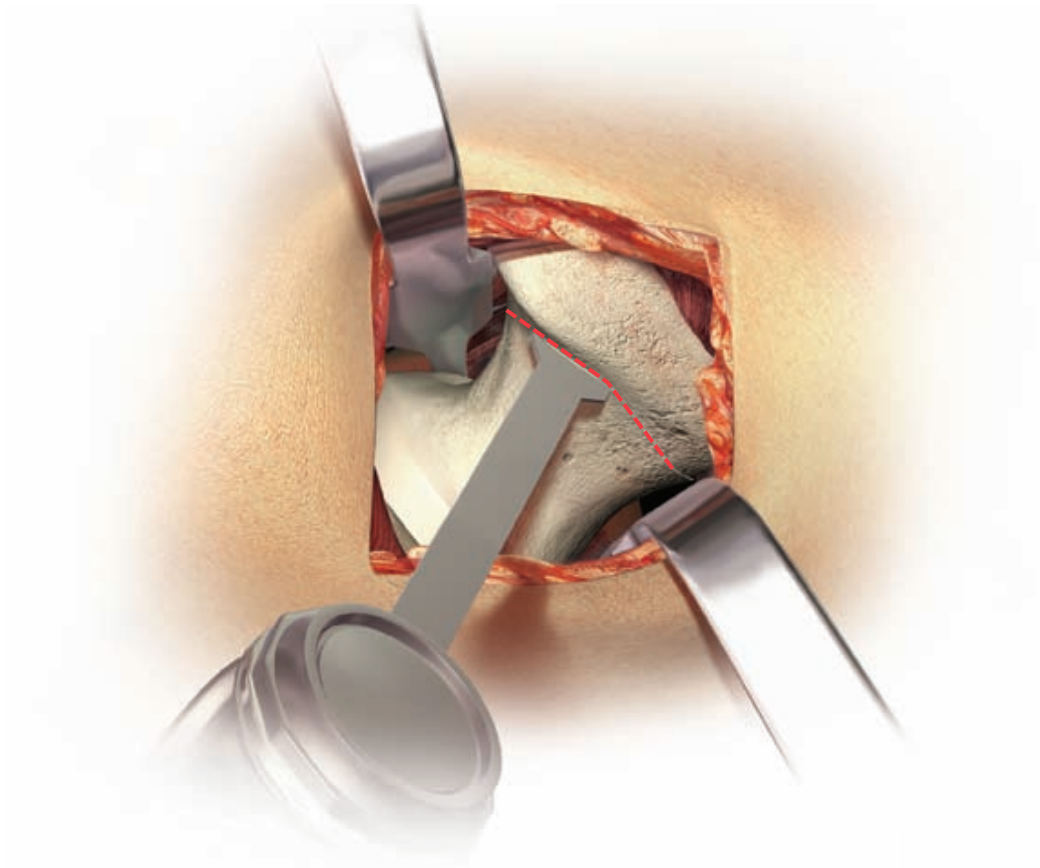


Figure 10

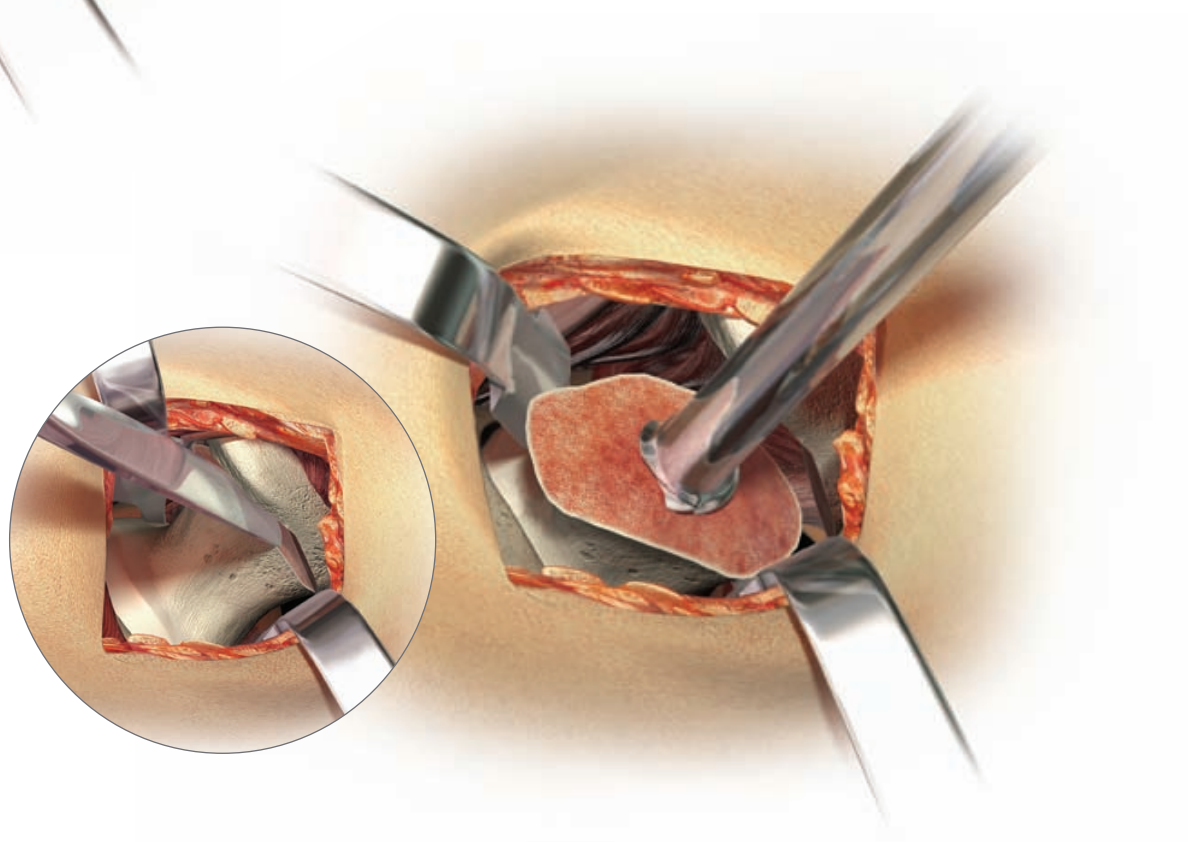


Figure 11

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. Following the central axis of the femoral neck insert the corkscrew and remove the femoral head (Fig. 11).

ACETABULAR PREPARATION & REAMING

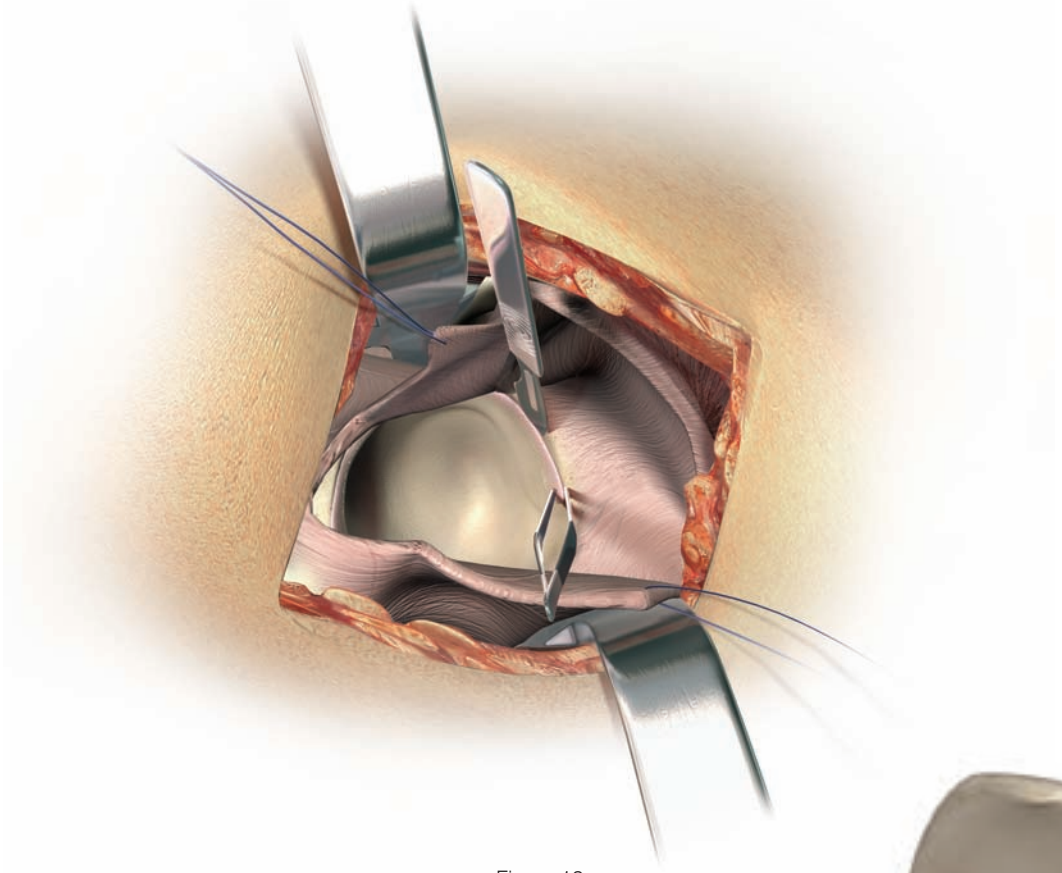


Figure 12

Figure 13

Once the femoral head has been resected and extracted from the wound, clean the acetabular cavity from any remaining soft tissue (Fig. 12). Place a double bent retractor beneath the femur and move the femur distally to provide good visualisation for acetabular reaming. The two Hohmann retractors are still positioned on the tip of the greater trochanter and on the calcar to retract the tensor fasciae latae and the rectus femoris and sartorius muscles. Use the 45˚ angled reamer driver starting with the smallest grater attached to obtain the desired acetabular surface. Use 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.

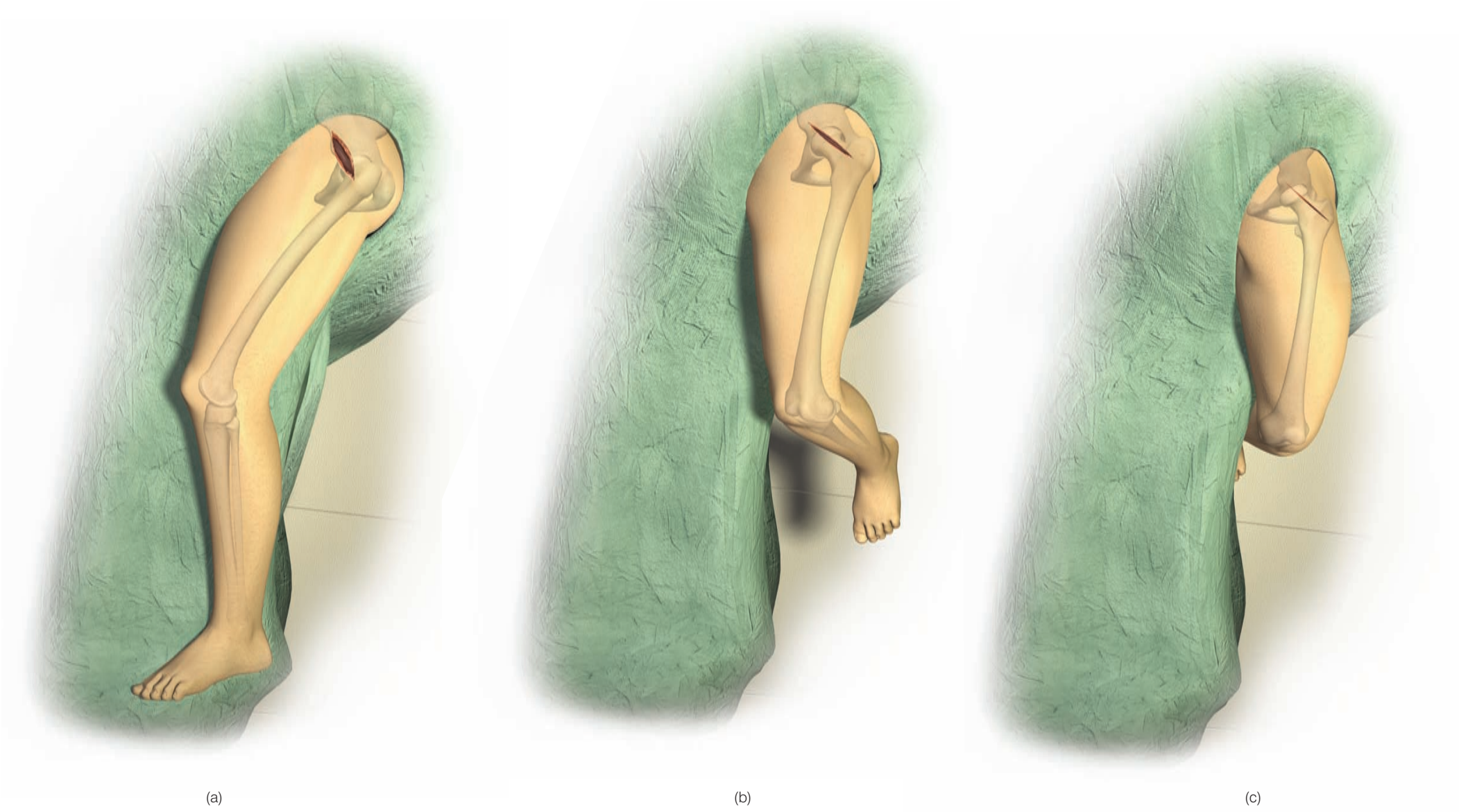
ACETABULAR TRIAL & IMPLANTATION

Figure 14

Figure 15

A Pinnacle™ Trial Shell 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 Pinnacle™ Trial Shell is used to visualise the quality of the reaming and the coverage of the acetabular rim. Once confirmed the correct size the definitive Pinnacle™ Shell is threaded to the connector of the acetabular inserter. In specific Pinnacle™ Shells the fixation holes can be orientated with the inserter handle. Before the definitive Pinnacle™ Shell is introduced, irrigate and clean the cavity. The Pinnacle™ Shell is then impacted with the acetabular inserter (Fig. 15). Clean the face of the shell so as not to impede trial liner seating. The definitive bearing is then introduced. 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

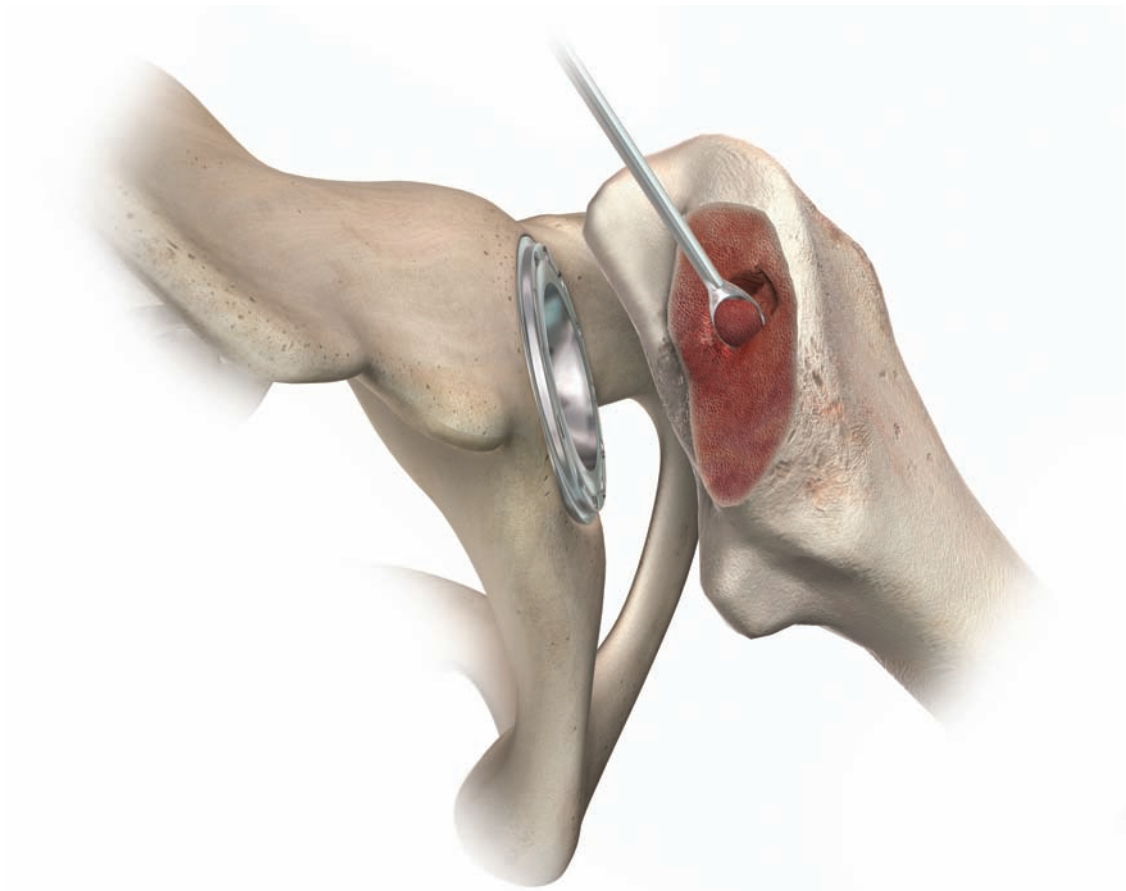


Figure 17

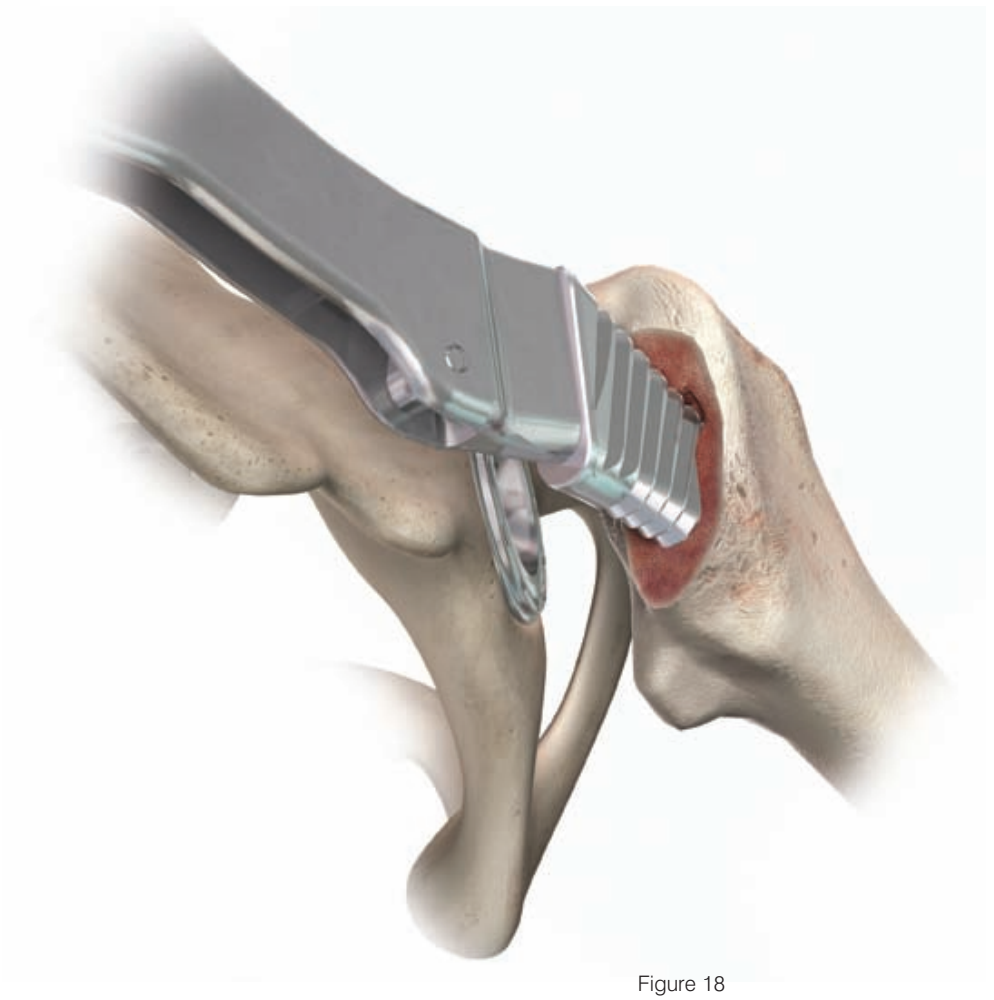


Figure 18

Use the Corail® broaches to create the adequate femoral cavity by compacting the cancellous bone. To avoid varus positioning, it is important to enter the femoral canal as lateral as possible. Use a chisel or the Corail® curette to complete this initial check (Fig. 17). Begin with the smallest broach attached to the broach handle and increase the size of broaches one at a time. Stop broaching when axial and rotational stability are achieved in order to preserve cancellous bone and encourage osteointegration (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

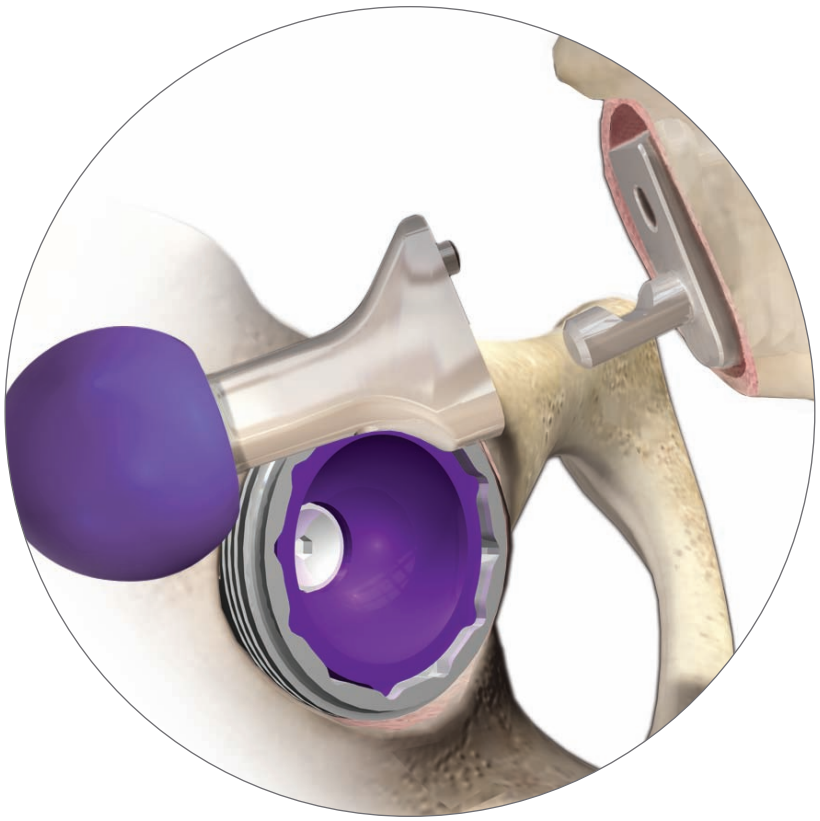


Figure 19

Figure 20

With the last broach in situ, attach the selected neck and femoral head trials (Fig. 19) and reduce the hip. When desired stability is achieved, 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 osteointegration. Insert the Corail® stem and impact it for the last centimetres until stability is achieved (Fig. 20). 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

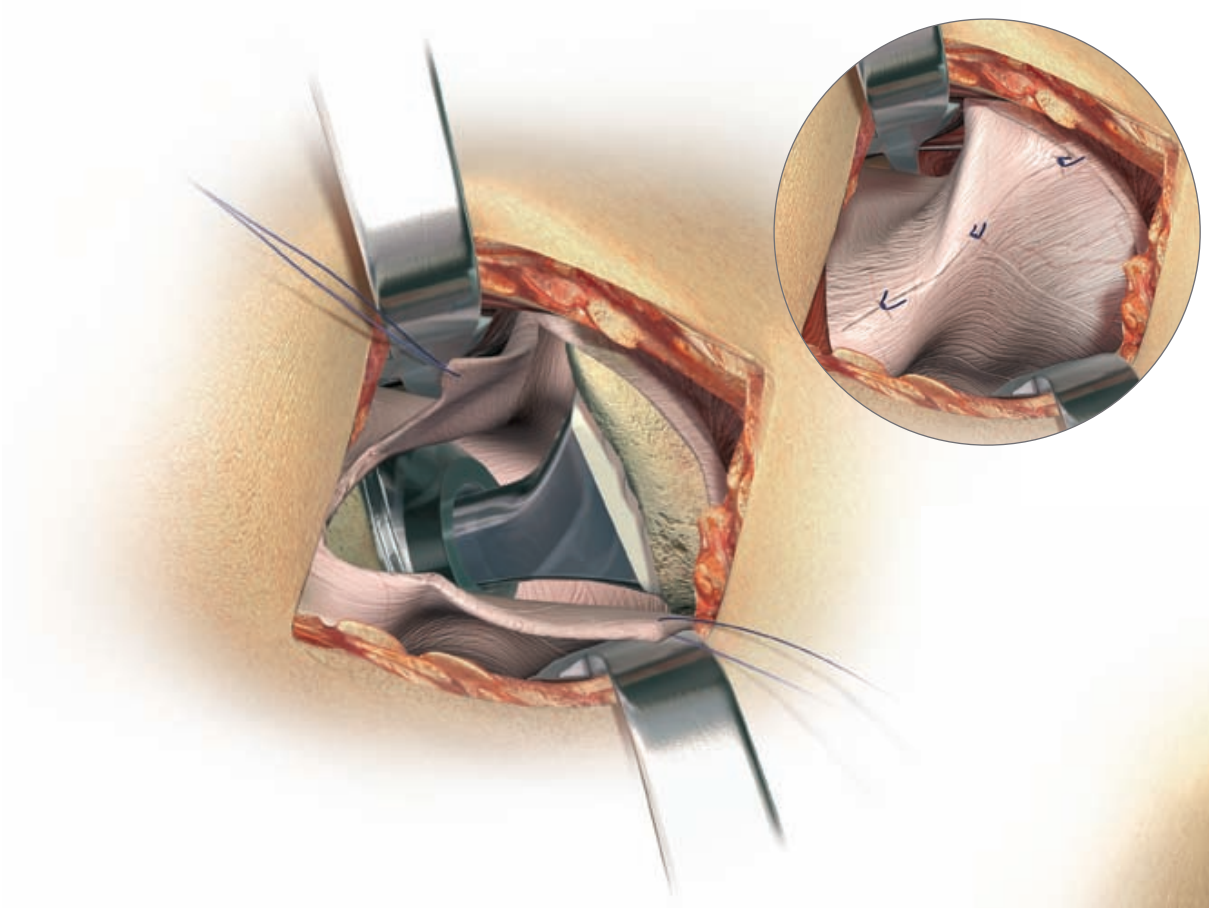


Figure 21

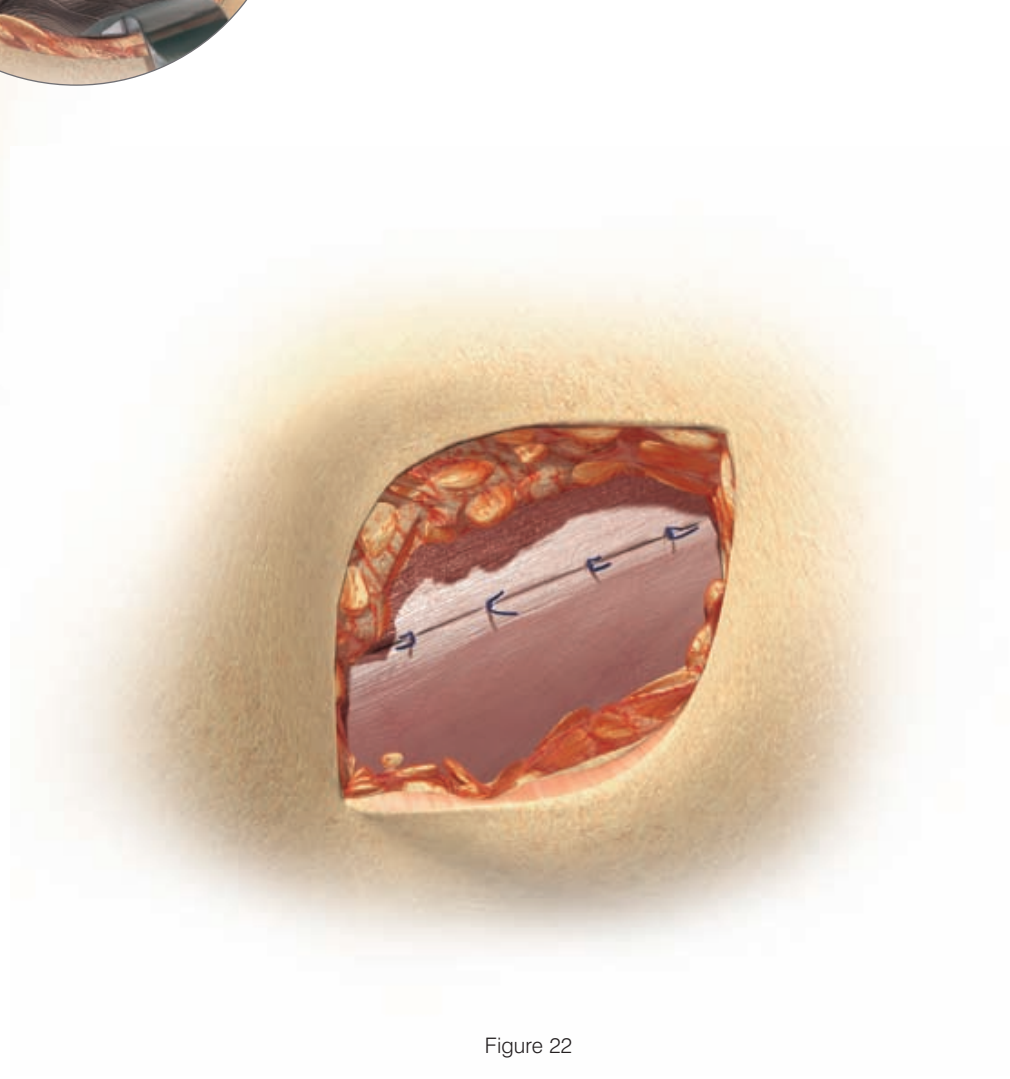


Figure 22

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

FROM Ttemplating TO POST OP

Markus C. Michel

Head physician, Münsingen Orthopaedic Centre, Switzerland.

Our greatest initial difficulty was 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 ream parallel to the transverse ligament.

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]

MICROHIP TECHNIQUE
(ANATOMICAL PERSPECTIVE)

Vishy Mahadevan PhD FRCS

Professor of Surgical Anatomy, Royal College of Surgeons of England, United Kingdom.

“From the perspective of a surgical anatomist, the operative approach employed for the MicroHip technique is a commendable one, and its notable advantages over other, conventional anterior/antero-lateral approaches may be summarised as follows:

- The location of the skin incision in the MicroHip technique is such that neither the lateral femoral cutaneous nerve nor the ascending branch of the lateral circumflex artery are at significant risk of injury.

- The surgical approach exploits an ‘internervous’ (interneural) interval to reach the capsule of the hip joint; thereby avoiding, in particular, the risk of jeopardising the nerve supply of the hip abductors. Furthermore, as there is no division of muscle involved in this approach (the approach being not only internervous, but also ‘intermuscular’) there is a significant reduction in post-operative pain and stiffness. This makes for greater patient compliance during post-operative physiotherapy.

- The position of the initial incision and the trajectory of the deeper dissection allow for a convenient and uncomplicated capsulotomy, and a generous exposure of the femoral neck and head, prior to implant insertion.”

DePuy MicroHip™

References:

1. Smith-Petersen MN.(1949) Approach to and Exposures of the Hip Joint for Mold Arthroplasty. J. Bone Jt. Surg. Am.; 31A: 40-46.

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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