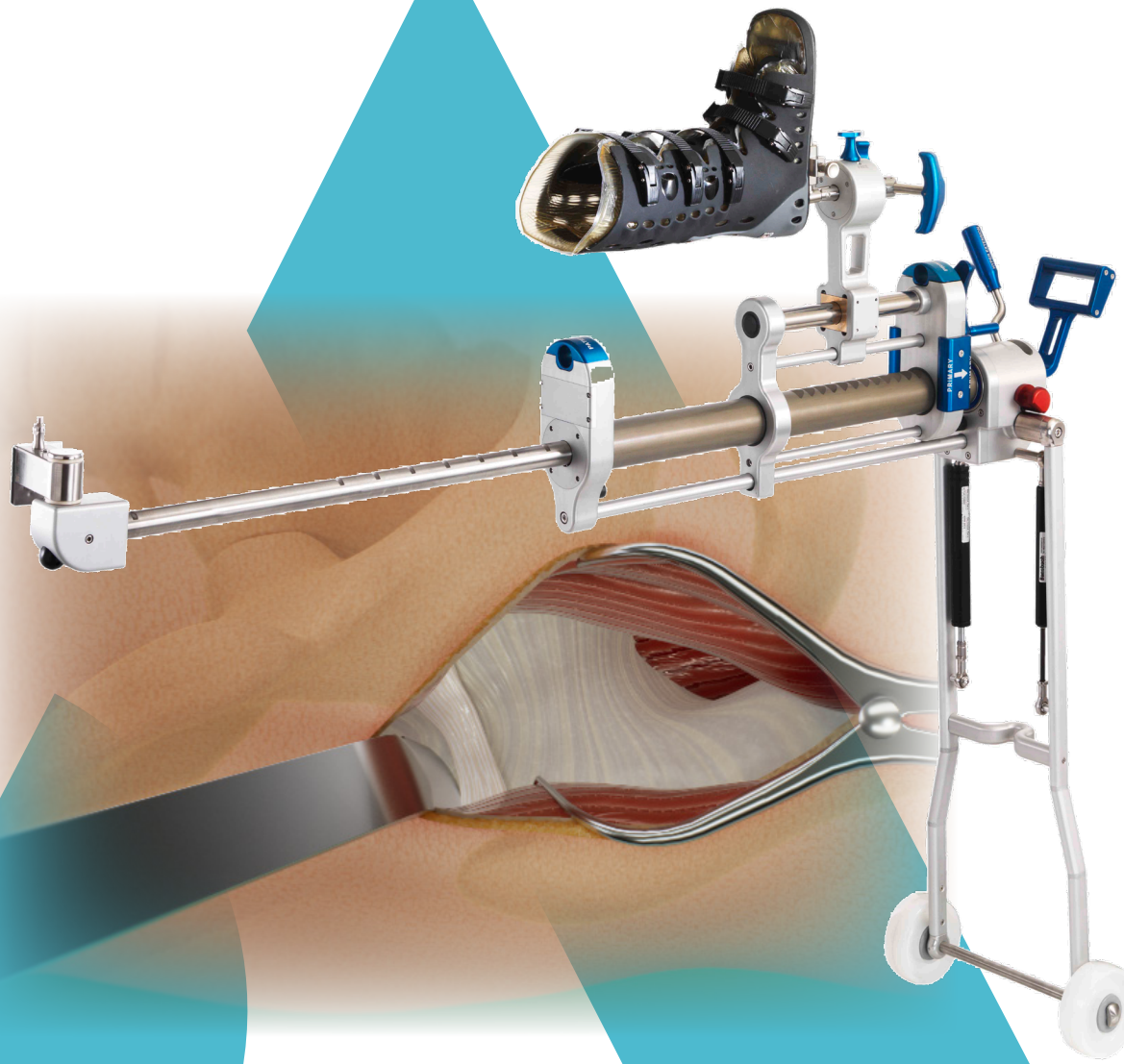
access

E.T.O.I.L.E

amplitude



Surgical Technique

Anterior Approach On Table

Summary

Introduction

Direct Anterior Approach

Direct anterior approach is one of the possible ways to access hip joint during a hip arthroplasty. It has been gaining popularity in recent years as it is a conservative approach: it is the only approach performed in both intermuscular and interneural planes (figure 1).

Anterior approach off table allows a good acetabular visibility, control of exposure and stress applied to the operated limb.

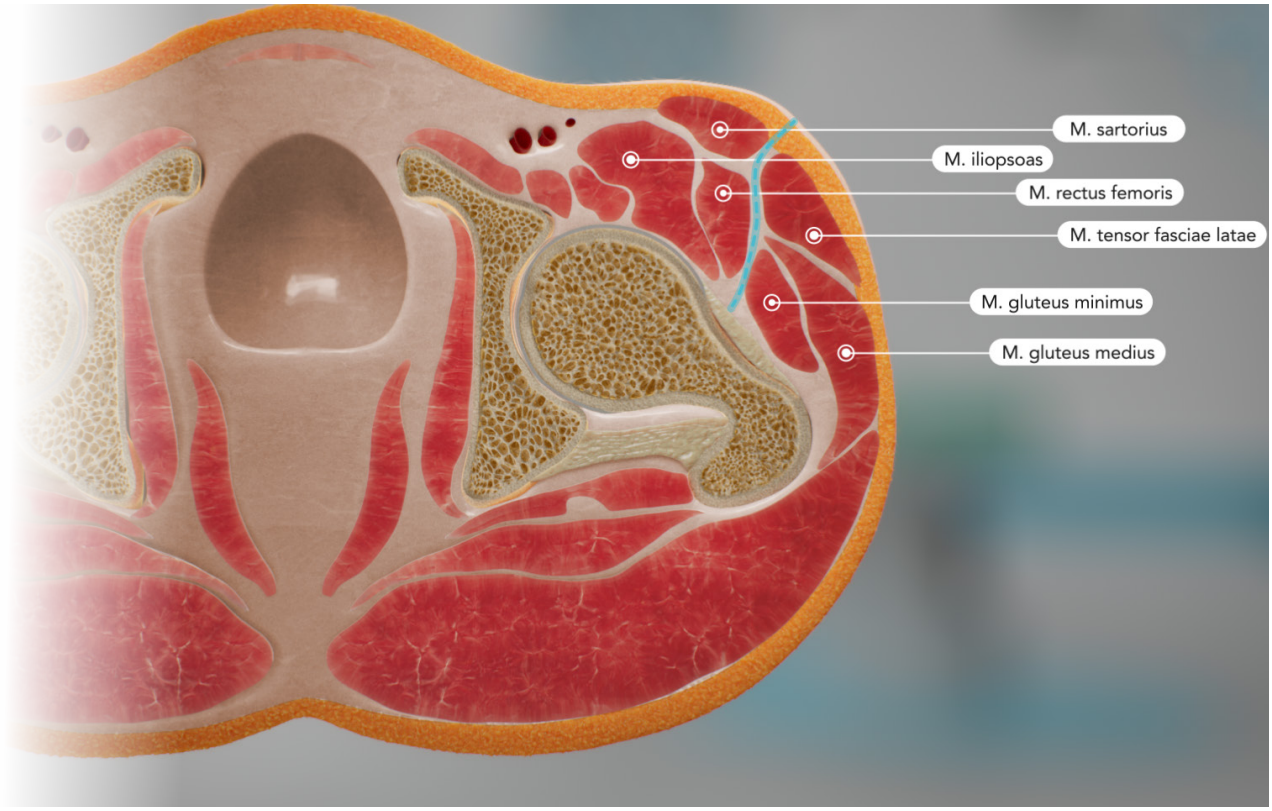


Figure 1

REMINDER

This current surgical technique is intended to present one possible technique, using E.T.O.I.L.E orthopaedic extension table. Other variations are also possible.

NOTA

Anterior approach can be performed with or without the use of an extension orthopaedic table. The surgeon is fully responsible for choosing and performing the approach and surgical technique.

E.T.O.I.L.E. Concept

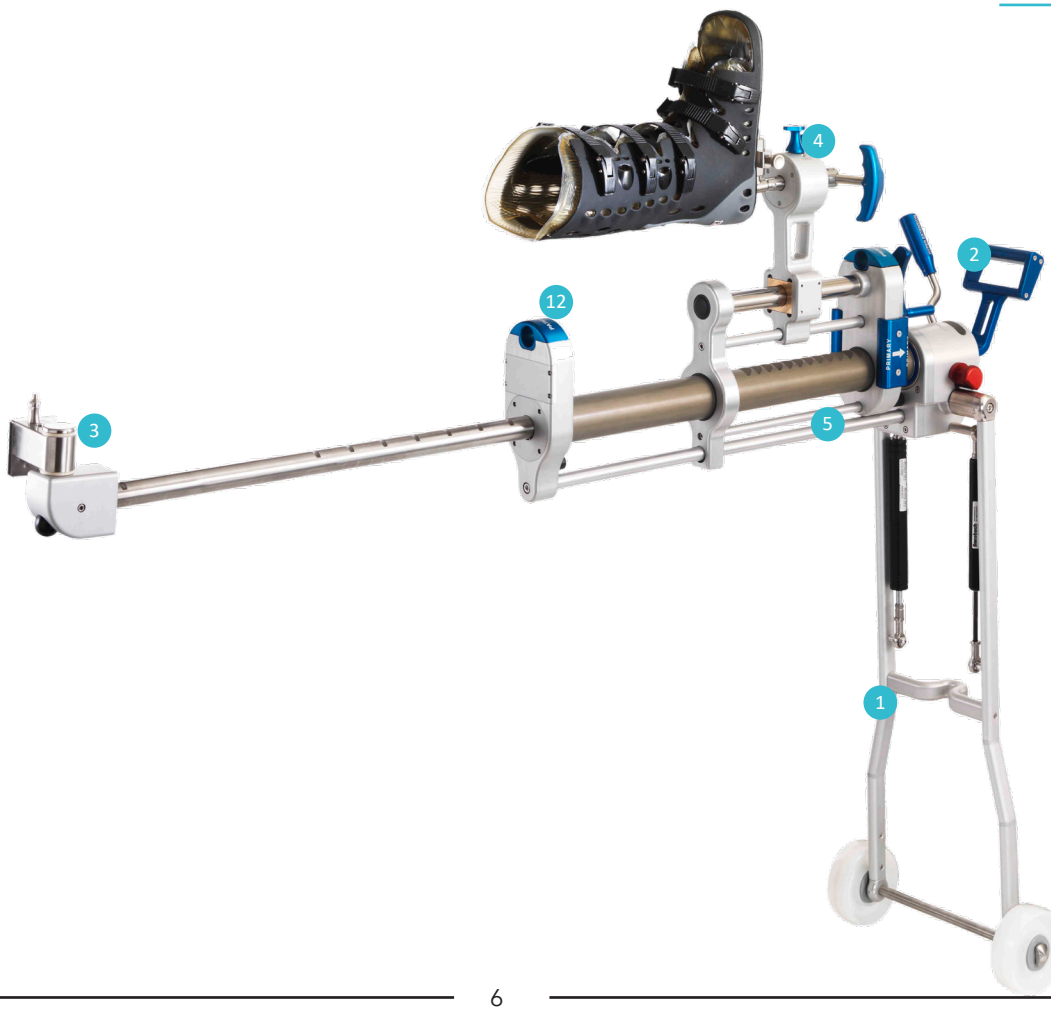
The E.T.O.I.L.E System is designed to be utilized by the surgeon as an aid for total hip arthroplasty utilizing anterior approaches.
The E.T.O.I.L.E orthopedic table extension can be connected either to the orthopedic operating table via a suitable connector or with an E.T.O.I.L.E orthopedic tabletop. The entirety of medical devices comprising the E.T.O.I.L.E system aims to enhance visibility of the surgical field during surgical interventions involving the Hueter anterior approach.
Rotational movements of the foot, traction, adduction, and hyperextension of the lower limb to be operated on can be facilitated with the E.T.O.I.L.E table extension.

NOTE

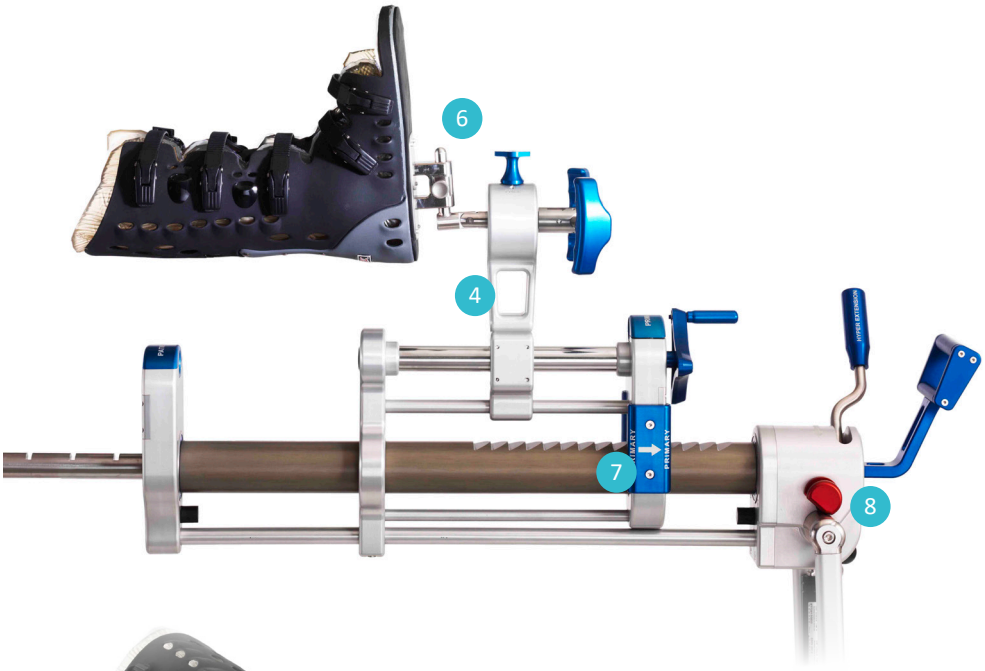
A user manual is provided with the E.T.O.I.L.E system, containing all necessary information regarding the installation, use, and maintenance of the medical devices comprising the E.T.O.I.L.E system. To ensure effective and safe utilization of this equipment, personnel must be familiar with all instructions.

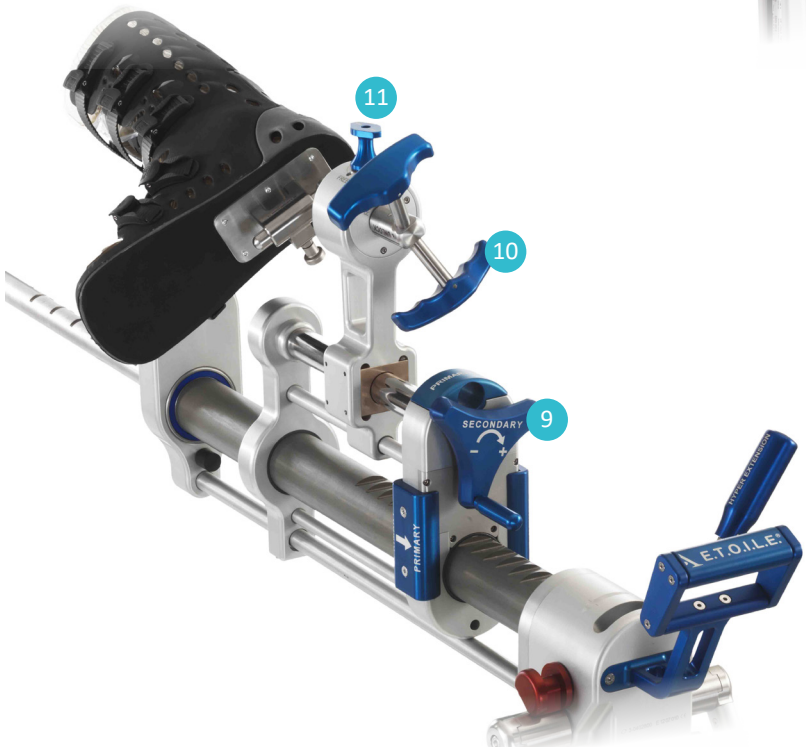
NOTE

The E.T.O.I.L.E. logo at the beginning of the sentence refers to the user manual.



E.T.O.I.L.E. Concept





Rep	Designation
1	Table extension leg
2	Extension handle
3	Connection to tabletop
4	Support Mast
5	Traction cart
6	Boot attachment

Rep	Designation
7	Primary traction
8	Safety button
9	Secondary traction handle
10	Rotation handle
11	Free rotation button
12	Leg length adjustment

1 Patient Installation and Planning

Patient selection for anterior hip surgery is based on the suregon's preferences, presence of prior incisions, obesity level, risk of dislocation and degree of deformity among others factors.

Patient is positionned supine position on the operating table.

Set the E.T.O.I.L.E. extension table as close as possible to the patient's leg length by lifting the blue handle 12 (*Figure 2*) and sliding the main shaft up to desired position. The table is in neutral position without any traction nor rotation (*Figure 3*).

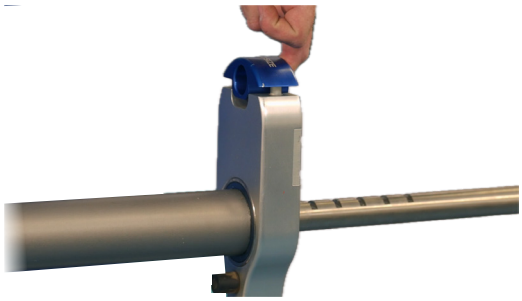


Figure 2

The patient's foot is placed in the boot, protected by a silicone pad, and subsequently, the boot is connected to the E.T.O.I.L.E. table thanks to the boot attachment 6 (*Figure 3*).
The axis tilts to ease the boot's connection.
The pubic support is positioned to stabilize the pelvis.
The posterior support wedge is placed under the upper part of the femur (*Figure 4*).

The patient leg length can be adjusted if needed.

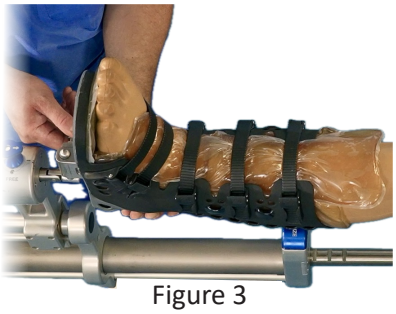


Figure 3

The operating field is covered by adhesive drapes, transparent if possible to allow a good intra-operative check.

In case of obese patients, fat that folds over the iliac crest should be retracted with adhesive tapes.

Surgical planning should be made pre-operatively with dedicated implants' templates, to determine:

- Hip centre of rotation
- Size and orientation of implants
- Level of femoral neck cut with regard to reliable anatomical landmarks

Figure 4

NOTA

For all implants, the provided templates have a 115% scale, but are also available with other scaling upon request or in digital version.

2 Incision

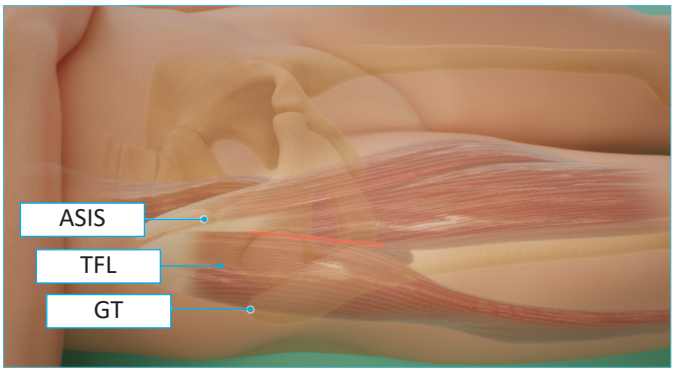


Figure 5

Skin Incision

Identify the anterior superior iliac spine (ASIS) and greater trochanter by palpation.

The incision starts two fingers laterally and below the ASIS toward the fibula head. Greater trochanter (GT) should be located at the centre.

Length of the incision should be about 6 to 10 cm, depending on the patient *(Figure 5)*.

Subcutaneous Incision

Incise the subcutaneous tissue until you see the tensor of fascia lata (TFL) aponevrosis. This step must be performed very carefully to ensure not injuring the lateral femoral cutaneous nerve. If any branche of lateral femoral nerve is visible in the subcutaneous fat, it should be retracted anteriorly.

Sharply incise aponevrosis of the TFL in the same orientation as previously made. Place the Beckmann clamp as in figure 6 to retract it laterally. Once incision is done, a blunt finger pressure will allow to identify and develop the intermuscular plane between fascia (lateral side) and rectus femoris / satorius (medial side). The anterior branch of circumflex artery is identified and cauterized.

Beckmann clamp is then repositioned to see deeper in the joint, and a Curved Hohman retractor is placed proximally, behind the femoral neck laterally, under the greater trochanter, to help avoiding any injury to femoral nerve and vessels.

Aponevrosis of rectus femoris attached to the anterior hip capsule are dissected using a scalpel.

Beckmann retractor is replaced to retract rectus femoris medially. There is then a direct view on the hip joint capsule.

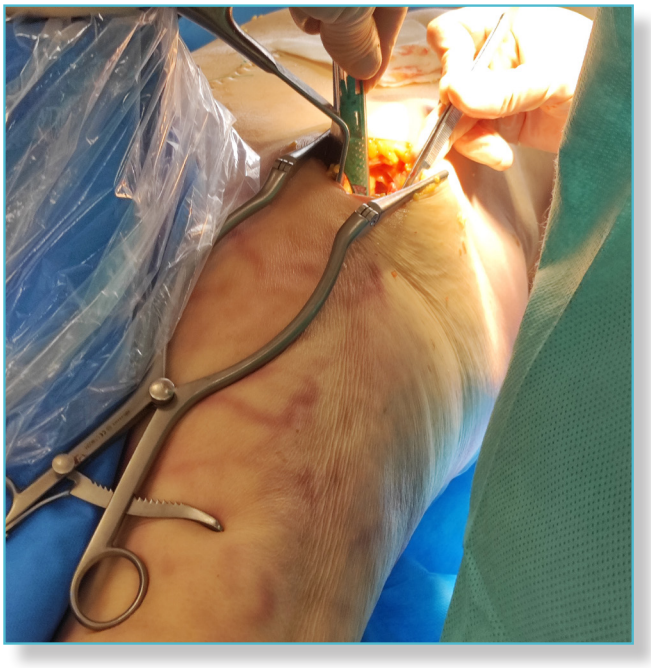


Figure 6

NOTA

Take care not to injure the crural nerve nor the vein bundles at this stage.

3 Incision (following)

Figure 7

Capsule incision

In order to have a good capsule exposure, the Hohmann retractor is repositioned deeper, and the Beckmann clamp is repositionned deeper distally. The pre-capsular fat is excised to expose the anterior joint capsule. A second Hohmann double bent retractor is placed at medial proximal aspect. A Kocher plier or a Lambotte hook can be placed to protect reflected tendon if needed.

Capsule, which is generally thick, is incised in L shape, and incision extends proximally up to the reflected tendon, which is a limit of incision for anterior capsule. This incision gives the capsule the shape of an anterior flap on which the instruments will rest. Attach the two parts on two tracting wires.

4 Femoral Neck Cut

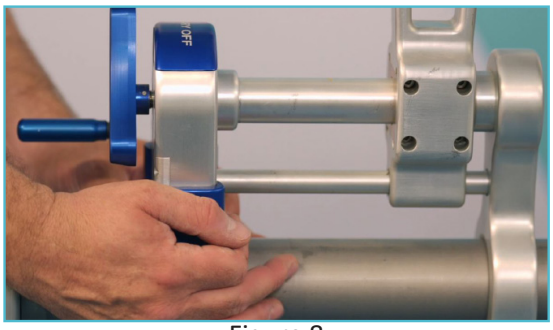


Figure 8

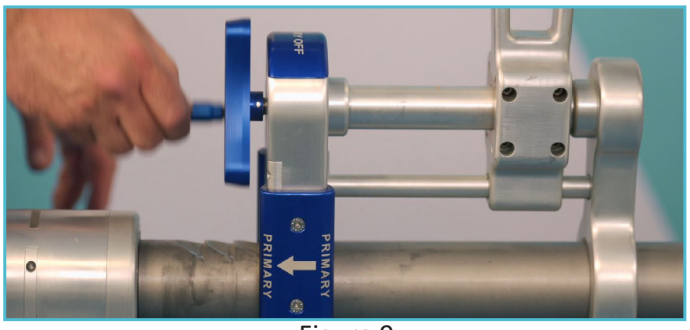


Figure 9

The level of femoral neck cut is defined during pre-operative planning step, thanks to reliable anatomical landmarks (greater trochanter, lesser trochanter, trochanteric fossa).

Perform a first capsule release around the greater trochanter, in order to expose the femoral neck.

Apply some primary traction by pulling the blue handle 7 *(Figure 8)*. Refine with the secondary traction if needed by turning the blue wheel 9 *(Figure 9)*. It is also possible to apply some external rotation to facilitate exposure by turning the wheel 10 .

Beckmann retractor stays in place, and a Hohmann double bent retractor is placed medially to the femoral neck. The proximal edge of the plate on the medial retractor will serve as a reference for the femoral cut level. Perform the osteotomy at 45° from femoral axis, with the head in situ.

Remove the retractors, then place the femoral head remover in femoral head and spin it to rupture the ligament. Extract the native femoral head It may be necessary to put 45° external rotation for head extraction.

NOTA

It is possible to perform the main cut first, and then a second separate parallel cut 5mm proximally. Remove the slice, this will leave more space to place the corkscrew.

NOTE

Special attention is paid to the complete section of the Merckel spur.

5 Acetabular Exposure

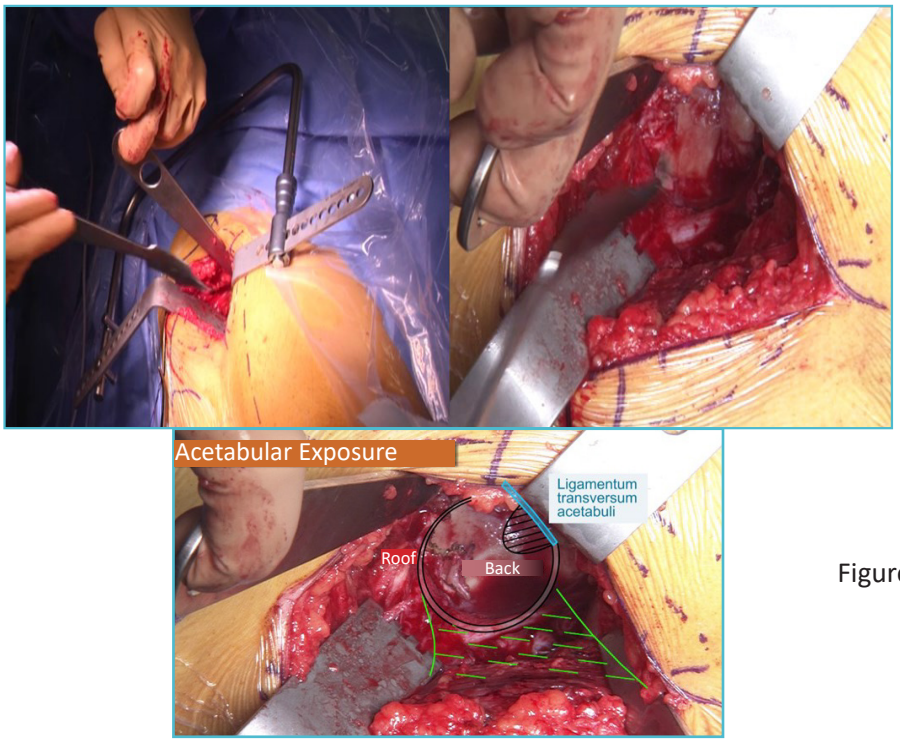


Figure 10

Apply the primary traction. Refine with the secondary traction if needed. Apply 45° external rotation for a good visibility during capsule releases.

Position the Charnley frame retractor on the 2 clapsular flaps, to keep the tensor facia lata and rectus femoris apart, beginning by the medial side of the frame with the bigger valve *(Figure 10)*. Thanks to the Lambotte hook, apply some lateral and superior traction to the femur, in order to put tension in the pelvitrochanteric muscles. Capsule releases will be performed at this stage.

Apply 90° external rotation if needed for posterior capsule releases.

Inferior capsule release:

Perform inferior capsule release with the scalpel, from femoral neck cut level to the lesser trochanter. This release is of major importance, as it will later help femur elevation.

Superior capsule release:

Superior capsule release should be made very carefully: it is complete once the fatpad between Greater Trochanter and Gluteus minimus is visible.

Put the leg in neutral position. Perform capsule releases, scalpel should be straight in proximal direction, over greater trochanter. Open the space by finger pressure.

Back to 45° external rotation, cleaning of the acetabulum is performed.

Exposure of the acetabulum allows identification of:

- The acetabular roof,
- The back wall,
- The transverse acetabular ligament,
- The posterior wall.

6 Acetabular Preparation

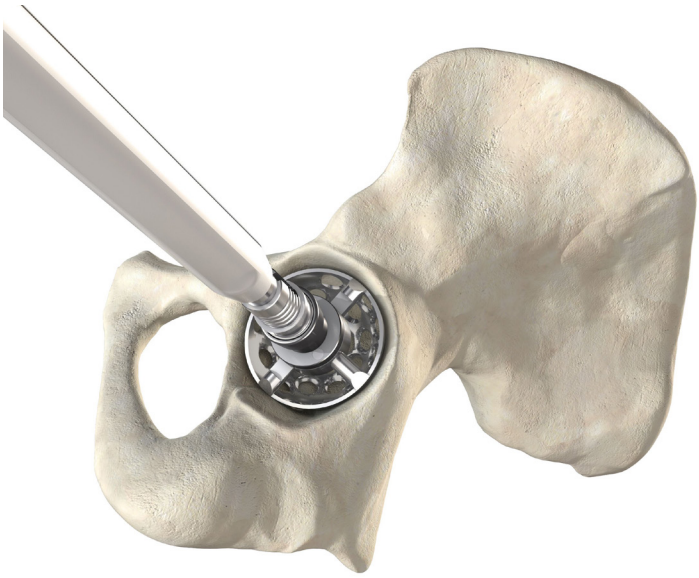


Figure 11

Keep the Charnley frame in place in order to keep good visibility.

Remove any central osteophytes using resection forceps. This step will ensure that the small reamers remain stable and do not slip anteriorly or posteriorly.

Carry out the acetabular preparation according to the recommendations of the surgical technique dedicated to the planned implant. It is recommended to use an offset reamer handle for reaming step.

With patient in supine position, for trials and impaction steps, the alignment guide should point perpendicular to the ceiling to achieve a 45° inclination.

NOTA

It is possible to use the reamer handle with the associated reamers in the conventional way, or to use a reamer handle in the disengaged position, and place/remove the reamers manually from the acetabulum.

7 Femoral Exposure

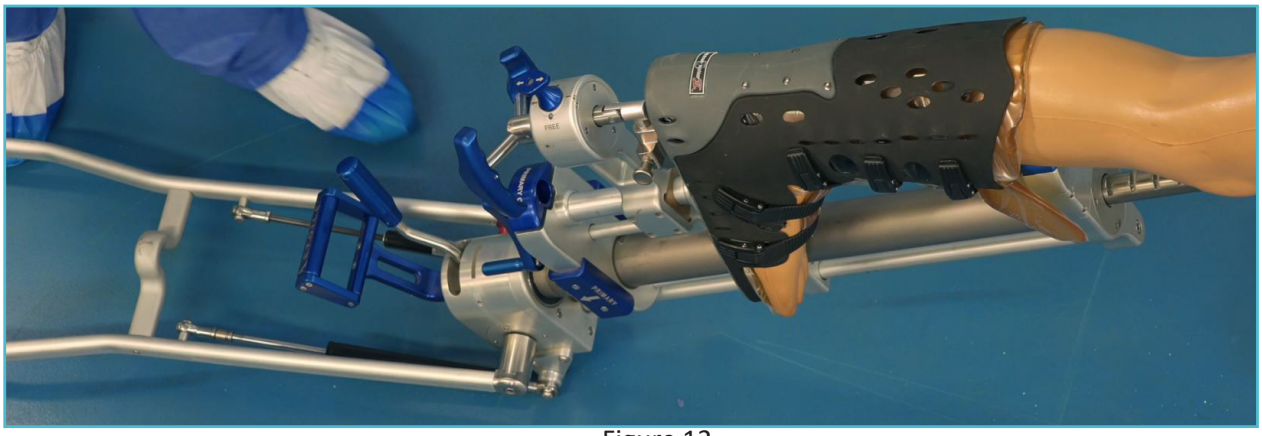


Figure 12

Ensure posterior release has been adequately performed previously.

Lower the extension table to the floor to position the patient's leg in extension *(Figure 12)*, by pressing the blue extension handle 6. Traction's table are automaticaly released once the extension handle is activated.
Lift and turn the free rotation button 11 into free mode and apply 150° to 170° rotation. This action allows the elevation of the femur.
Place the extension table in adduction, by pushing it with foot.

Place a double-pronged femoral elevator posterior to the tip of the Greater Trochanter. Progressively lift the femur, until good femoral exposure is achieved: femoral canal should be easily visible through incision. Replace the femoral elevator between Greater Trochanter and abductor muscles to protect them *(Figure 13)*. A double bent Hohmann retractor is placed medially, along the posterior wall of neck.

If lifting is complicated, posterior capsule release should be made once again, especially in the region of Piriformis fossa.

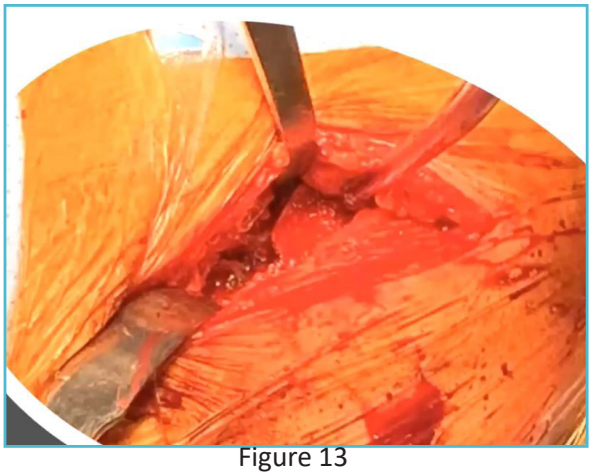


Figure 13

NOTA

Femoral canal preparation should not start until the femoral canal can't be accessible directly easily. Otherwise there is a risk of fracture of greater trochanter

8 Femoral Preparation

Figure 14

Depending on preference, the femoral canal is opened using a chisel, a curette or a starter broach (*Figure 14)*.

The femoral preparation is performed according to the surgical technique dedicated to the selected implant.

Amplitude provides different broach handles options, in order to cover all surgical approaches during broaching step. In this surgical technique, it is recommended to use either double offset broach handle, or straight anterior broach handle (with the broach axis at 40° compared to the handle axis), depending on the surgeon's preference.

Stop broaching once axial and rotational stability are achieved. If the final size of broach differs significantly from planned implant size, this may mean the broach is in varus position.

8 Trials, Reduction and Closure

Figure 15

Once final cup and stem have been implanted, perform last trials in reduction to check stability, mobility and leg length (*Figure 15)*. Once settings are satisfying, implant the final head and reduce the joint.

Reduction technique:

The circulating nurse performs several actions under the surgeon's control:

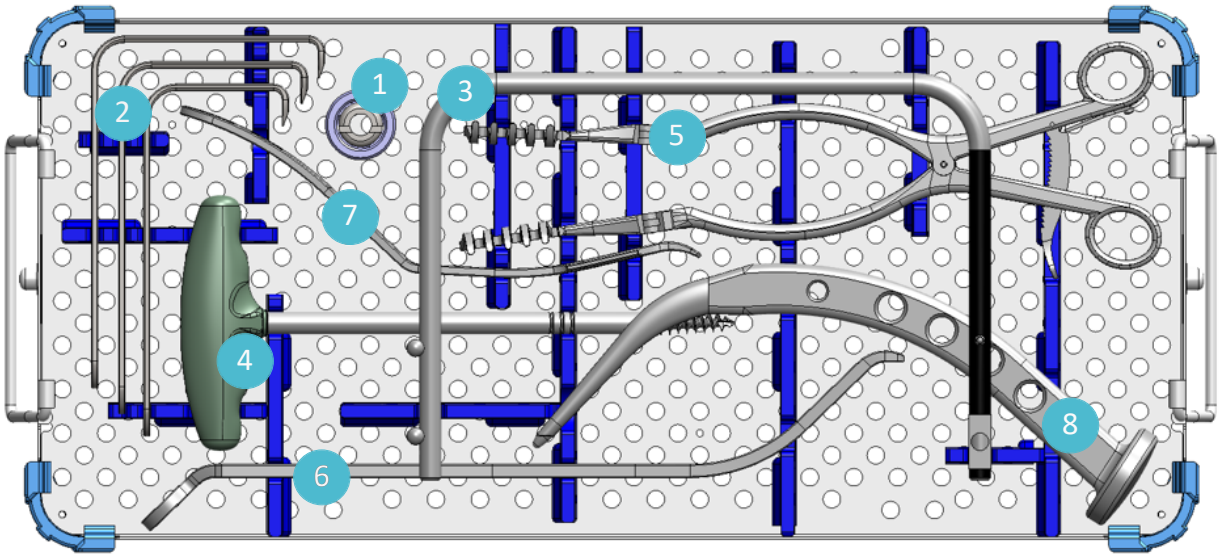
- Remove adduction.
- Gradually reduce hyperextension by lifting the leg.
- Reduce external rotation (by gently performing internal rotation maneuver associated with a maneuver by the surgeon using the head pusher on the prosthetic head).

Capsule is put back at its place and sutured according to the surgeon's habits.

Wound is closed. There is no need for suturing the muscles, they come back to their original place once all retractors are removed. Subcutaneous tissue and skin are closed, taking care not to injure lateral femoral nerve.

Instrumentation

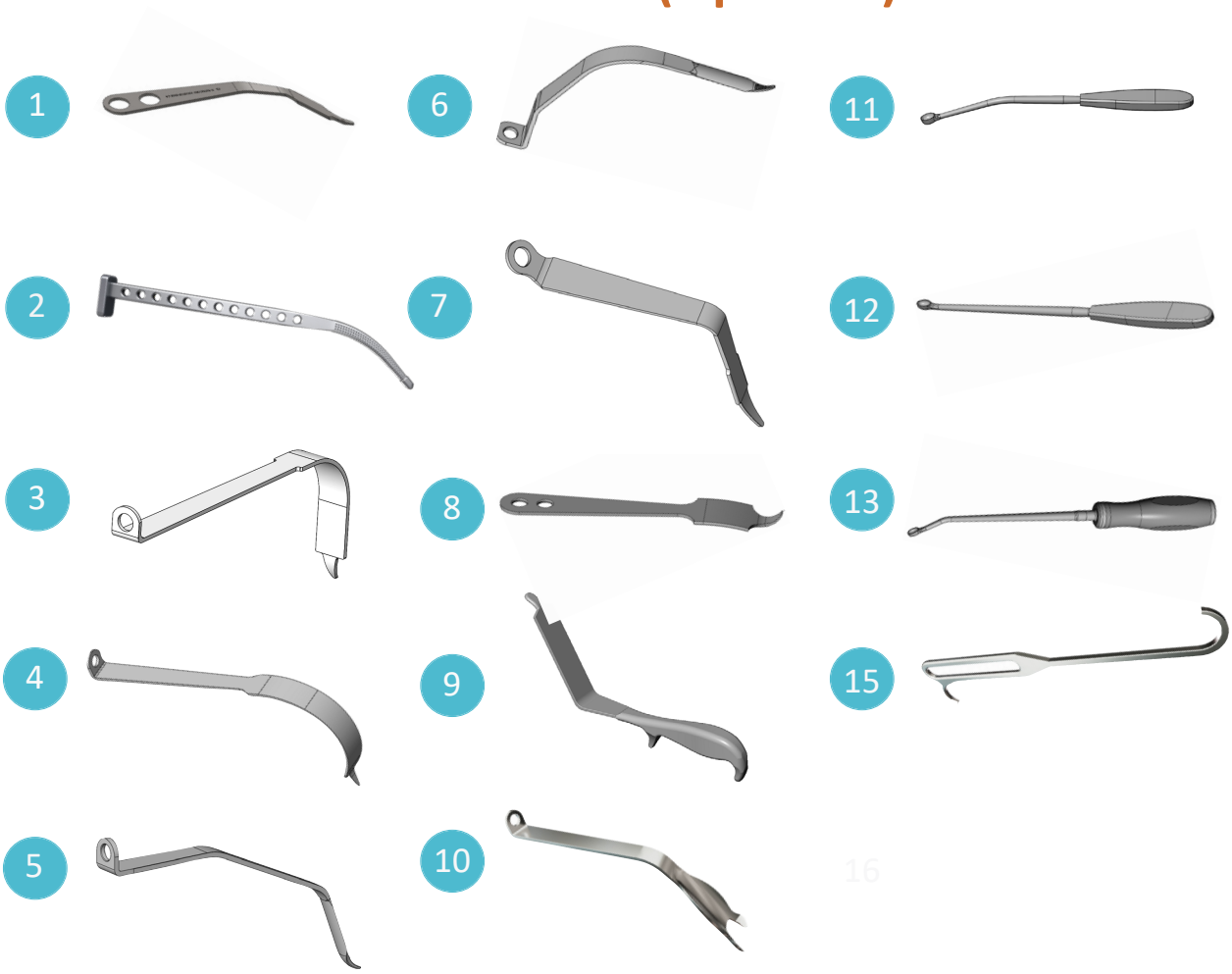
Retractors Set Access



Item	Description	Reference	Qty
1	Valve fixation ring	2-0120700	1
2	Valve length 60 for Charnley Retractor frame	2-0122906	1
2	Valve length 80 for Charnley Retractor frame	2-0122908	1
2	Valve length 100 for Charnley Retractor frame	2-0122910	1
3	Charnley Retractor frame	2-0199100	1
4	Femoral Head Remover	2-0120012	1
5	Beckmann Retractor -30 cm - 50 mm Teeth	2-0120013	1
6	Femoral Neck Elevator - Mueller Type - 330mm	2-0120011	1
7	Bent Curved Hohmann Retractor	2-0120005	1
8	Femoral Preparation Starter Broach	2-0199300	1

Instrumentation

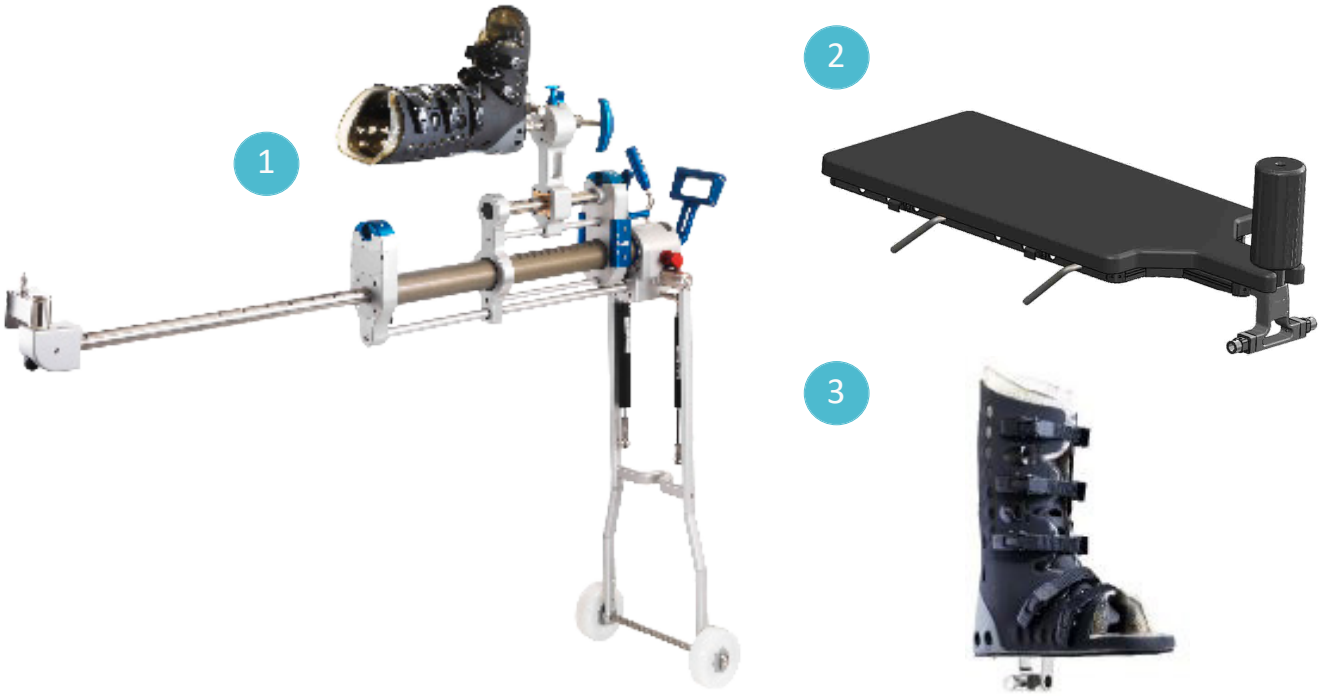
Other Retractors available (Optional)



Item	Description	Reference
1	Dual curvature Hohmann retractor	2-0199200
2	Femoral starter for anterior approach	2-0194800
3	Curved Hohmann Retractor - Cobra type - 270 mm	2-0120001
4	Curved Hohmann Retractor - Cobra type - 300 mm	2-0120002
5	Hohmann Retractor Double bent - Narrow - 270 mm	2-0120003
6	Bent Hohmann Retractor - Narrow - 210 mm	2-0120004
7	Bent Hohmann - Narrow - L Shape - 200mm	2-0120006
8	Verbrugge Muller Retractor - 240 mm	2-0120007
9	Merle d'aubigné Retractor - 90X30mm	2-0120008
10	Femoral Neck Elevator - Mueller type - 270mm	2-0120010
11	Bent Bone Curette Concave - 20°	2-0120015
12	Straight Bone Curette	2-0120016
13	Front Bone Curette	2-0120017
14	MIS retractor	2-0120018
15	Lambotte hook - 260 mm	2-0120009

Instrumentation

E.T.O.I.L.E. Table



Item	Description	Reference	Qty
1	Orthopedic table extension leg + Boot size M + Posterior support	3-0499902	1
Option:			
2	Universal platform + Pubic support + Bent rods	3-0499903	1
3	Boot size L	3-0403401	1

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