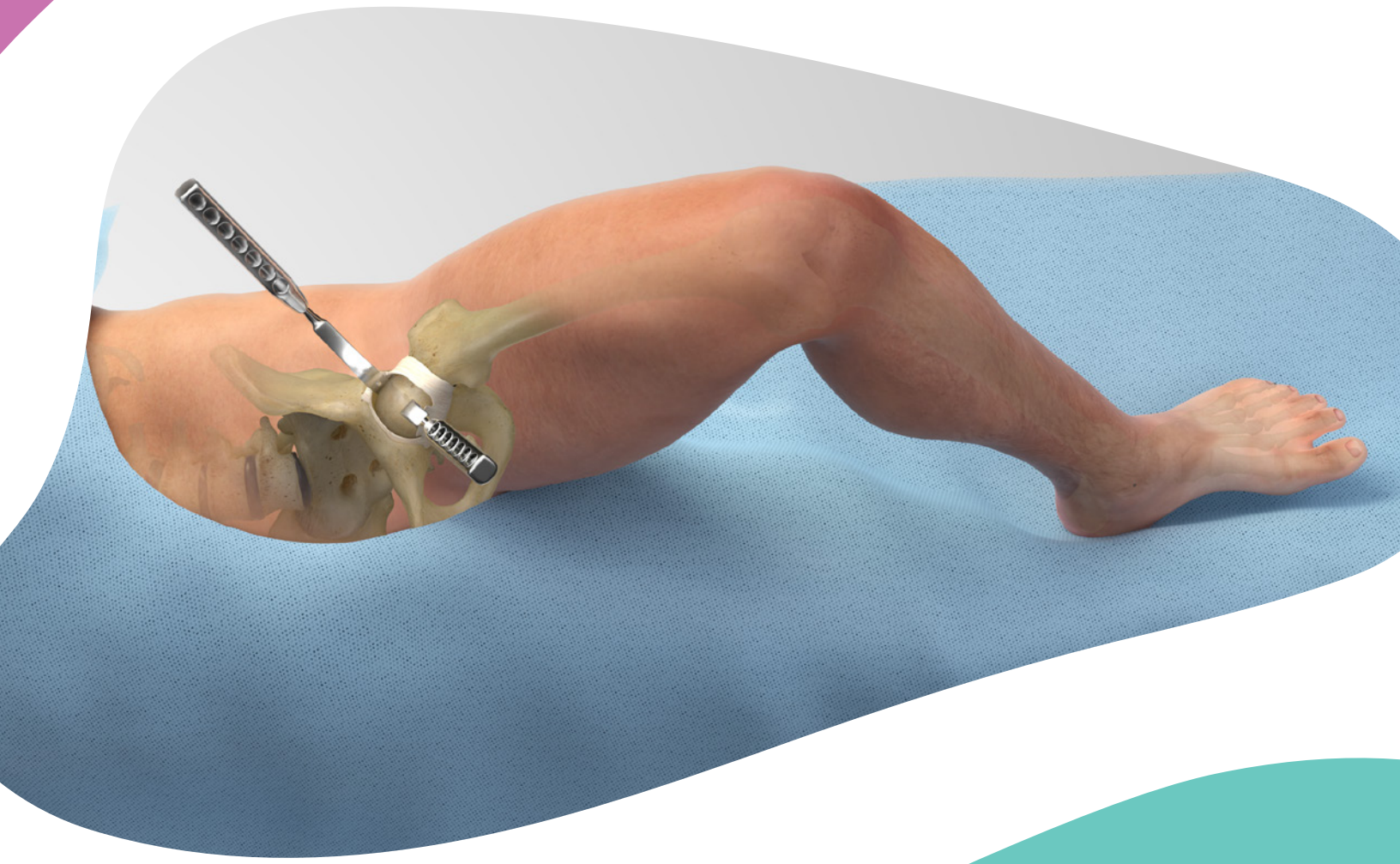
Smith+Nephew

ABLE◊

Advanced Anterior Approach

Training Guide



Johannes Plate, MD, PhD
Wake Forest Baptist Health, Bermuda Run, NC

George Babikian, MD
Brian J. McGrory, MD, MS
Maine Medical Center, Portland, ME

Jeffery Geller, MD
New York Presbyterian - Columbia University Medical Center, New York, NY

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History of ABLE◊

Patient interest in shorter recovery times and expedited rehabilitation has led to increased utilization of minimally invasive and soft tissue sparing techniques for hip surgery. The ABLE Advanced Anterior Approach utilizes the interval between the tensor fascia lata (TFL) and gluteus medius muscle and continues to gain popularity as an alternative to other anterior approaches for total hip arthroplasty (THA).[1–4]

The TFL and gluteus medius surgical interval was first mentioned by Dr. Louis Sayre in 1854 for the treatment of a sequela of septic arthritis in a 9-year old patient.[5] It is notable that the first description of the Direct Anterior (DA) interval by D. Carl Hueter was in 1883.[6] Sir Reginald Watson-Jones further developed Sayre's approach in the 1930's to the classic "Watson-Jones" approach with detachment of the abductors from the greater trochanter.[2,7] Further modifications for the management of femoral neck fractures and for total hip replacements included dissecting or detaching part of the abductors from the greater trochanter.[8,9] The approach was revolutionized by Dr. Heinz Röttinger in the early 2000s by placing the patient in the lateral decubitus position with the surgeon standing in front of the patient and utilizing the TFL and gluteus medius interval in a minimally invasive and soft tissue sparing fashion without abductor detachment.[1,2,10]

The ABLE Advanced Anterior Approach uses the TFL and gluteus medius interval and provides surgeon flexibility by allowing lateral positioning on a peg board and supine positioning on a standard table.[2–4,10–12] Lateral patient positioning provides familiar acetabular visualization and preparation for transition from a posterior approach while maintaining surgical safety and efficacy.[2,4,11,13] Surgeons who prefer supine patient positioning on a standard table may benefit from enhanced femoral visualization and exposure, possible use of fluoroscopy, and a safe surgical distance from the lateral femoral cutaneous nerve.[3,14,15] Through decades of modifications and improvements, the ABLE Advanced Anterior Approach has evolved into a flexible and safe procedure for surgeons wishing to offer a soft tissue sparing anterior approach which allows for rapid patient recovery.

ABLE◊ Approach Training Guide

Lateral approach

Lateral patient positioning

- Patient is positioned laterally on standard operating table on modified pegboard with a deflatable bean bag (Figure 1)
- Place gluteal fold 1 inch below posterior cutout of pegboard
- Place axillary roll and ensure patient arms are secured
- Place pegs anterior distal, posterior distal, anterior proximal, and posterior proximal

Surgeon tip: Remove the anterior proximal peg if patient is obese to minimize intra-abdominal pressure. A short peg is used anterior distal to allow best exposure.

- Level pelvis and deflate beanbag
- Trendelenburg the table 20º
- Abduct patient leg in leg holder for preparing

Figure 1

Lateral draping

- Prepare and drape using blue U drape, bar drape, impervious stockinette, coban and fenestrated drape
- Place loban™ laterally and medially to cover any skin

Surgeon tip: The Physician Assistant (PA) is an important part of the procedure. After preparing and draping, the PA checks the patients leg lengths and range of motion. Then, places a sterile, plastic Mayo stand cover to be used as a leg holding bag (ensure patient leg is in neutral abduction and 20º of external rotation).

Supine approach

Supine patient positioning

- Patient is positioned in a conventional supine position on a standard operating table (Figure 2)
- Place small, well padded bump under the ischial tuberosity
- Confirm that the hip joint is positioned at the break/flexion point of the OR table

Supine draping

- Sterile preparation and draping of both legs
- Legs are draped separately and not secured to table
- Contralateral leg can be draped with a sack-shaped towel/stockinette
- Prepare and drape using double U blue drape under, with blue U drape over, impervious stockinette, coban and fenestrated drape. Alternatively a bilateral knee drape can be used
- Place loban™ posterior and anterior to cover any skin

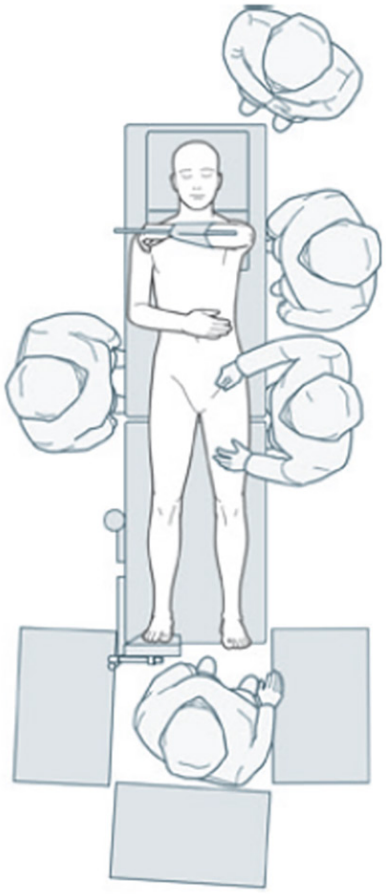

Figure 2

Incision

Lateral approach

- Map the incision to follow the front of the gluteus medius
- Make mark 1cm anterior to the anterior superior iliac spine (ASIS)
- Draw longitudinal 2 inch line from proximal trochanter parallel to the front edge of the femur at anterior 1/3 of trochanter (Figure 3)
- Connect ASIS mark to the end of this line

Surgeon tip: A 5 inch incision or greater will make the approach easier.

- Make skin incision straight to fascia without denuding the fascia

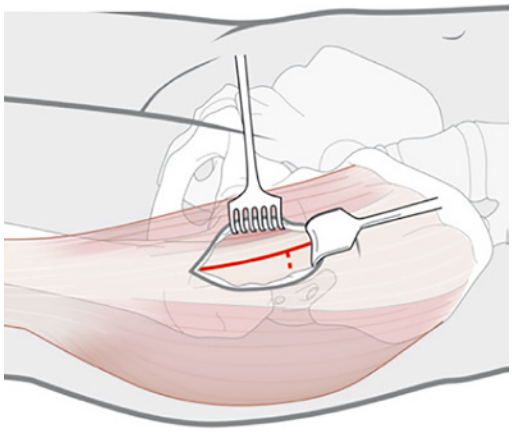

Figure 3

Supine approach

- Mark out ASIS, proximal femur and greater trochanter
- Mark a line on anterior border of femoral shaft angling slightly medial towards ASIS

Superficial layer – Dissection

- Palpate the trochanter and move finger distal to proximal for blunt dissection
- Open fascia at anterior trochanter

Surgeon tip: If muscle can be seen, the incision is likely too far anterior and is likely TFL muscle belly.

- Advance proximally watching for interval between the gluteus medius and the tensor fasciae latae (Figure 4)
- Find the interval over anterior-distal trochanter “soft spot”. This triangle is the confluence of the distal, anterior gluteus medius and the lateral aspect of the vastus intermedius

Surgeon tip: Interval can be covered with a thin layer of fascia or fat.

- Dissect along the anterior edge of the gluteus medius and the gluteus minimus
- Cauterize vessels

Surgeon tip: There should always be a leash of vessels crossing the incision are just deep to the fascia, at approximately the distal 1/3 of the incision.

- Using blunt dissection, carry the interval proximally protecting the nerve by sweeping fingers towards the TFL. (Figure 5)
- Place superior single point retractor over the superior femoral neck hip capsule and under the gluteus minimus and medius
- Place 2nd retractor into “soft spot” at the medial neck superior to the lesser trochanter (this is just proximal to the intermedius, along the medial calcar) single point retractor

Surgeon tip: If more mobility is needed, dissect between the medius and TFL proximally, and extend fascial incision distally to relax the TFL.

Surgeon tip: A more developed iliocapsularis muscle may be visible at inferior aspect of capsule. Retractor should be positioned between inferior capsule and iliocapsularis muscle.

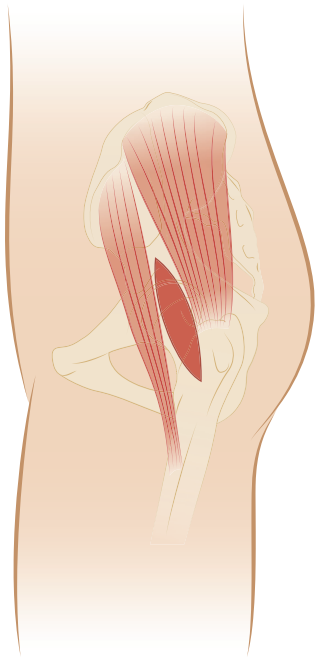

Figure 4

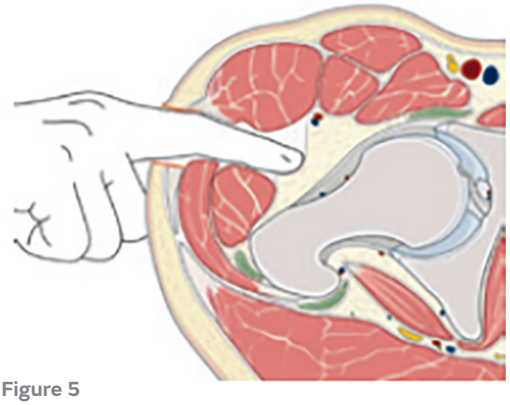

Figure 5

Capsule management

Note: Performing a capsulectomy or capsulotomy is per surgeon's preference.

Capsulotomy

- Remove the fat pad on the capsule above the intermedius to define and protect the reflected head of the rectus
- First limb is top of trochanteric saddle (where femoral neck greater intersects with greater trochanter apex of) to 1 o'clock on acetabulum – depends on left or right
- Beware the reflected head of the rectus
- Perform a Z capsulotomy beginning at the tip of trochanteric saddle and follow the neck to 10 o'clock (left hip) on acetabulum. Take care not to over cut into rectus. Leave the cuff if possible (Figure 6)
- Second limb starts from the tip of the trochanteric saddle, down the intertrochanteric line
- Place the inferior retractor inside the capsule and carry the capsulotomy towards the lesser trochanter from inside the capsule
- Continue capsulotomy along the superior acetabular rim from 1 o'clock. Depends on side
- Place retractor inside the capsule

Surgeon tip: In order to protect the reflected head of the rectus, do not allow capsular incision to go proximally beyond edge of acetabulum.

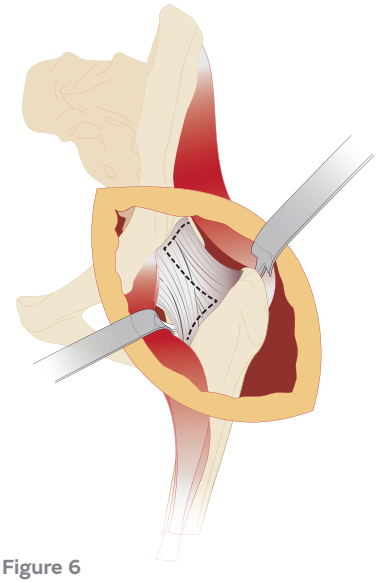

Figure 6

Capsulectomy

- Place bump under patient's knee to relax anterior musculature and capsule
- Remove fat pad overlaying capsule
- Beware of reflected head of the rectus
- Place curved retractor on anterior border of acetabulum, deep to reflected head of the rectus

Surgeon tip: Partial release of reflected head of rectus may allow easier placement of this retractor

- Excise capsule from superior femoral neck to border of acetabulum, to inferior neck, to trochanteric ridge
- Place retractors above and below femoral neck inside capsule
- A slight radial cut through remaining inferior capsule may help with removal of femoral head

Surgeon tip: Remove visible part of acetabular labrum to make femoral head removal easier.

Femoral head cut

Lateral approach

- Relax patient leg
- Place retractors on femoral head as proximal as possible
- Place retractors in order to protect the muscle (Figure 7)
- Place leg into bag at side of table, adduct the leg and place some proximally directed force. This will allow the femoral neck/shaft to move past the femoral head, into the wound, relaxing the abductors (Figure 8)

Surgeon tip: Be aware of sharp edges of saw blade during femoral neck subluxation.

- Make the femoral neck cut at acetabular edge, oblique 30 – 45º

Supine approach

- Remove bump under patient's knee
- Define the saddle
- Confirm retractor placement above and below femoral neck to protect muscles from saw
- Make femoral neck cut in the middle of femoral neck as based on pre-op template using standard oscillating saw

Surgeon tip: If neck cut is left too long, it may obstruct access to acetabulum.

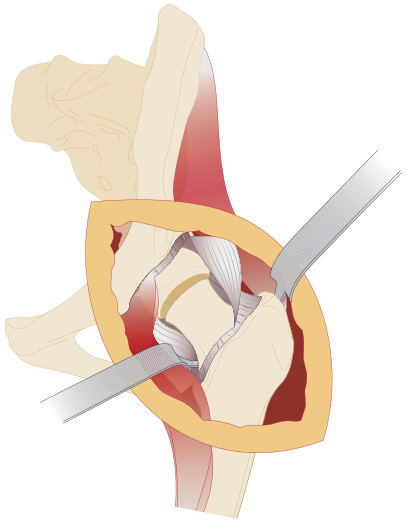

Figure 7

Figure 8

Osteotomy

Lateral approach

- Place operative leg in bag on side of table
- Place retractor behind tip of greater trochanter and above lesser trochanter (Figure 9)
- Define the saddle
- Using the inter-trochanteric line and capsule terminus as guide, and with operative leg with femur parallel to the floor and tibia perpendicular to the floor, make neck cut from the saddle to the templated point

Surgeon tip: The calcar cut will be 'square', or perpendicular to the femoral shaft long axis. This will guide the broach direction.

- Remove the neck fragment with a meniscal clamp after mobilizing with an osteotome; pull medial to lateral, as there may be lateral capsular attachment (Figure 10)
- Beware the reflected head of the rectus
- Make a capsular release along the medial side of the greater trochanter with assistant placing adduction and ER force for a traction/countertraction effect (Figure 11)
- If additional access is needed, release the piriformis fossa
- Femur will slide into wound, further relaxing the abductor muscles

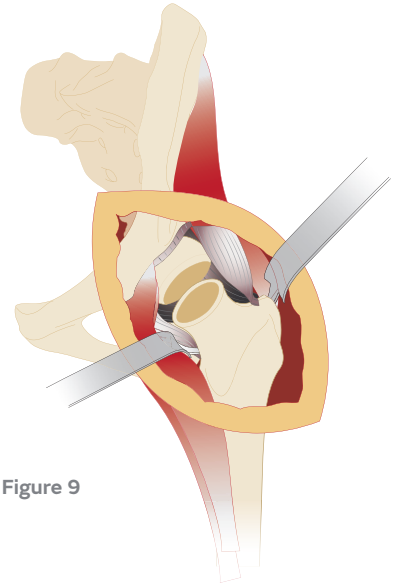

Figure 9

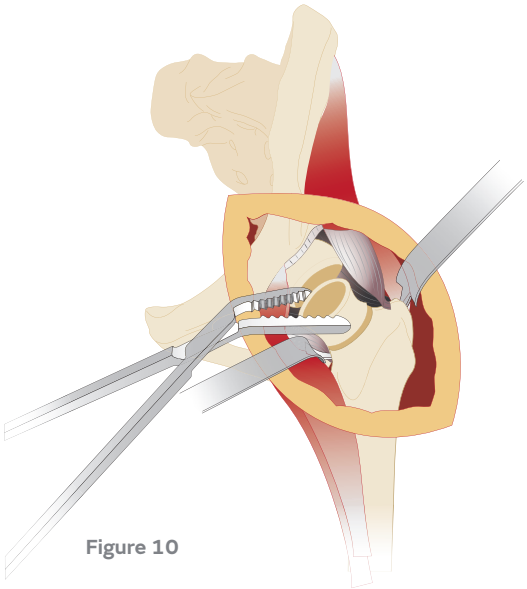

Figure 10

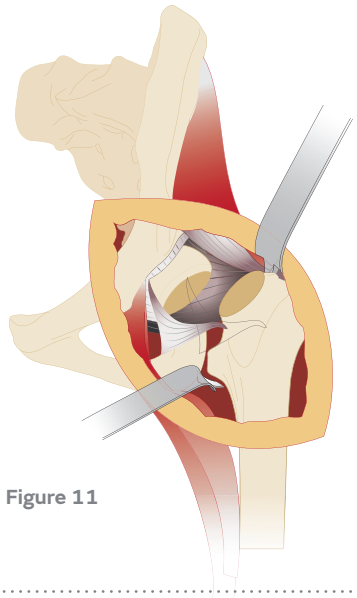

Figure 11

Femoral head removal

Lateral approach

- Place operative leg back to neutral
- Place retractor on the cut edge of femoral head and rotate with the retractor internally to roll the cut edge into the empty area in the joint space (Figure 12)
- Grasp head with meniscal clamp and remove

Surgeon tip: When removing femoral head keep flat edge of the head parallel to the acetabular rim.

Surgeon tip: If the femoral head is difficult to remove, drill parallel to the cut surface and place an awl or hold the operative leg in abduction and have PA use awl to abduct the head out. Also, the liagamentum teres can be released if needed.

Supine approach

- Use osteotome to rotate femoral head cut surface into view
- Use corkscrew to remove femoral head

Surgeon tip: Spin the femoral head inside the acetabulum to release the ligamentum teres.

Surgeon tip: A 'napkin ring' sliver of femoral neck may also be removed to create more space for femoral head removal.

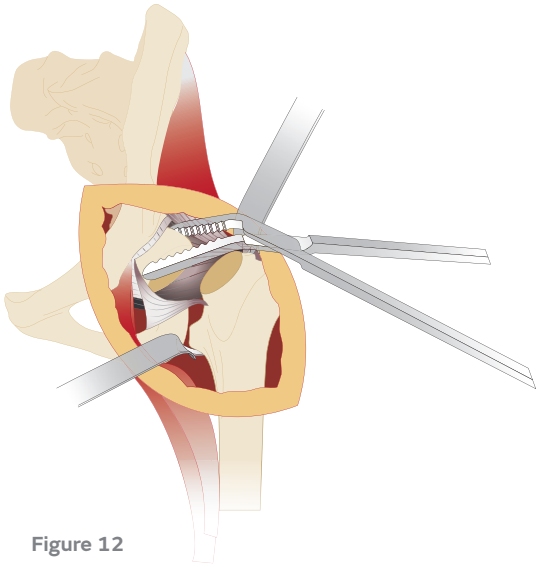

Figure 12

Acetabular preparation

Left hip

- Operative leg should be relaxed in neutral
- Place retractor at 9 o'clock, inside of the acetabulum allowing it to fall over the posterior rim; operative leg determines clock numbers (Figure 13)
- Place another retractor at 3 o'clock
- Place final retractor at 6 o'clock, gently under the transverse acetabular ligament (if necessary).
- Remove labrum, osteophytes and inferior synovium

Surgeon tip: If needed, a release of the anterior capsule on the anterior/medial neck can be made.

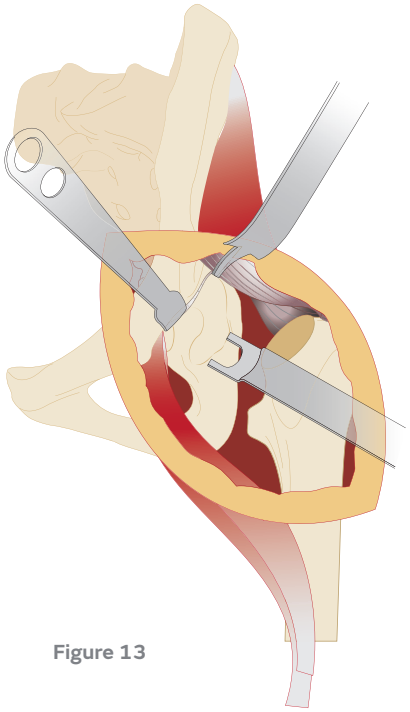

Figure 13

Acetabular reaming

- Begin reaming central portion first so as to not ream superior and then move to correct orientation

Surgeon tip: It can be helpful to abduct leg (Figure 14), to expand the interval as the reamer goes into the wound. Return leg to neutral position when reaming.

Cup insertion

- Maintain retractors anteriorly and posteriorly
- Insert cup with edge of component directed posterior and parallel to the wound
- Rotate cup parallel to the tranverse acetabular ligament and roll cup in anteverted direction and rotate to seat
- Impact cup in appropriate position and test fixation stability
- Place screws if desired

Surgeon tip: If patient has thicker soft tissue envelope, it may be helpful to adduct the leg to improve the abduction angle of the cup.

Liner insertion

- Place liner of choice and impact into place, if satisfied with cup position

Surgeon tip: Can bring fluoroscopy in to confirm cup position. Can be done during or after up insertion to confirm position before final impaction.

Figure 14

Femoral preparation

Lateral approach

- Place operative leg in bag on the side of the table with max adduction and tibia perpendicular to the floor
- Place retractor behind trochanter and under calcar (Figure 15)

Surgeon tip: If further release is needed, release along the posterior neck of the medial trochanter.

Supine approach

- Place well leg on padded mayo stand
- Drop leg off table approximately 30°
- Place operative leg in 'figure of 4' position (external rotation, adduction, extension)
- Make capsular release along medial side (inner aspect) of greater trochanter with assistant placing adduction and ER force for traction effect
- If additional access needed, release piriformis fossa
- Femur can now elevate and rotate out of wound
- Carefully place retractor behind trochanter under calcar

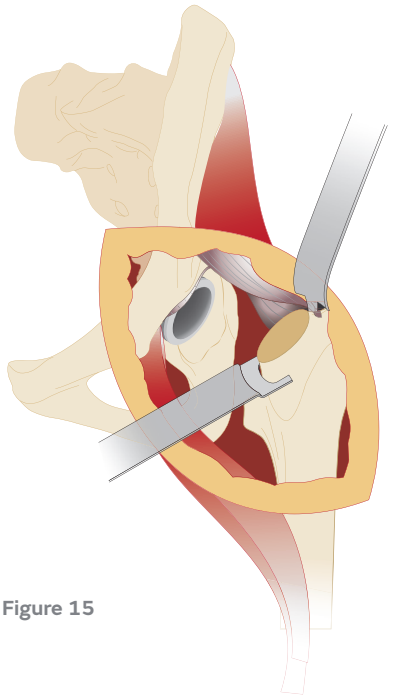

Figure 15

Femoral broaching

- Begin broaching with starter broach following the neck angle
- Take care to start in the posterior position, so as not to broach anterior bone. Make sure broach is central in the canal. Use a blunt tip 'rat tail' rasp if needed to confirm intamedullary positioning
- Sequentially broach up in size using lateral directed blows with mallet to remove lateral bone and prevent implant from going into varus.

Surgeon tip: Put light lateral pressure while broaching.

Femoral trialing

- Once desired broach size has been reached, place trial neck and femoral head
- Use trial head shorter than desired head to see if hip properly reduces

Surgeon tip: Do not force reduction as it will be difficult to get out.

- Lift femoral neck over anterior/superior acetabular edge and drop into cup. This may be done with bone hook in concert with the assistant placing leg in the neutral position while using longitudinal traction

Surgeon tip: Do not drag the femoral neck over the acetabular edge as it can injure the reflected head of the rectus and can fracture the femur with rotation of the broach.

Stability testing

Lateral approach

- Test range of motion and stability by performing a shuck test
- Once desired broach and head and neck length are decided, dislocate with the bone hook
- Assistant will place longitudinal traction and a small amount of flexion
- Remove trial components

Supine approach

- Flatten table and take contralateral leg off mayo stand
- Test range of motion and stability
- Line up legs/feet and check clinical leg lengths
- Bring in fluoroscopy to check size of broach and leg lengths. If satisfied, gently dislocate hip with manual longitudinal traction and lateralizing force with external rotation
- Drop leg off the table and place well leg back on mayo stand
- Remove all trial components

Stem implantation

- Place desired femoral implant and impact
- Double check calcar for any sign of fracture and treat with cerclage cable, if necessary

Trial reduction

Lateral approach

- Place trial head back on stem and lift head into acetabulum by having assistant place longitudinal traction and internal rotation
- Once proper stability is achieved, dislocate using the bone hook and have assistant pull traction on the operative leg
- Return operative leg to the bag on side of table and place retractor under the calcar

Surgeon tip: Sometimes a small amount of flexion is needed to clear the anterior capsular sleeve.

Supine approach

- Once proper stability is achieved, dislocate again
- Drop the leg off the table again
- Replace retractors and place final head

Final head insertion

Lateral approach

- Place femoral head onto stem and impact with force until it is seated
- Reduce by using the bone hook and lifting the hip into the acetabulum

Supine approach

- Reduce the hip back into the acetabulum
- Level the table and view final fluoroscopy images to confirm final implant position and sizing

Evaluate muscle

- Evaluate the medius, underside of medius and minimus, TFL, and debride any injured muscle to prevent HO

Closure

Lateral approach

- Close capsule using a 0 Vicryl, one to two stitches in each corner of the 'Z' capsulotomy
- Infiltrate capusle and subcutaneous tissue with 6- cc 1/4% bupivicaine with epinephrine and place drain
- Close subchondryl layer with 2-0 Vicryl
- Skin staples for final closure

Supine approach

- Close fascia with running barbed suture #2
- Infiltrate soft tissues with local anaesthetic
- Close subcutaneous skin layer with running barbed #0 suture
- Close skin with #3.0 monofilament suture

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