Alternative Treatments

The main alternatives to the transgluteal approaches for hip arthroplasty are the posterolateral approach and the direct anterior approach. Compared with the posterolateral approach, the transgluteal approaches afford equal exposure of the femur and acetabulum for proper component preparation and implantation, as well as a lower risk for postoperative dislocation. However, the potential for failed repair of the abductor muscles may increase the risk for a postoperative limp and/or a slower recovery of ambulation without walking aids. Compared with the direct anterior approach, the transgluteal approaches may be used to manage a wider variety of hip conditions while affording better exposure. However, the preservation of the posterior soft tissues with the direct anterior approach allows for a very low dislocation risk without the danger of the abductor muscle split that is common to the transgluteal approaches.

The Watson-Jones and Smith-Petersen anterior approaches are well-established alternatives to the transgluteal approaches for joint-preserving procedures, such as open reduction and internal fixation of femoral neck fractures and open irrigation of sepsis of a native hip. These alternative approaches provide sufficient joint exposure and preserve the femoral head blood supply while minimizing or avoiding splitting of the abductor muscles.

Results

Multiple studies have reported the results of the transgluteal approaches, with special attention to the excellent stability provided by the preservation of the posterior soft-tissue envelope (Table 1). One study reported on the effects of femoral head diameter and surgical approach on the risk for dislocation after 12,801 primary THAs performed via an anterolateral or posterolateral approach at one institution. When an anterolateral approach was performed, the 10-year cumulative dislocation rate was 3.1% for 28-mm femoral heads, 3.0% for 22-mm heads, and 0.6% for 32-mm heads. The risk was significantly higher when the posterolateral approach was performed: 6.9% for 22-mm femoral

<table>
<thead>
<tr>
<th>Authors (Year)</th>
<th>Number of Hips</th>
<th>Procedure or Approach</th>
<th>Mean Patient Age in Years (Range)</th>
<th>Mean Follow-up (Range)</th>
<th>Dislocation Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woo and Morrey</td>
<td>770</td>
<td>Direct lateral</td>
<td>62 (13-95)</td>
<td>3.1 yr (1-10.4 yr)</td>
<td>2.3</td>
</tr>
<tr>
<td>Frndak et al</td>
<td>50</td>
<td>Direct lateral</td>
<td>70 (NR)</td>
<td>2.8 yr (1-4 yr)</td>
<td>2</td>
</tr>
<tr>
<td>Moskal and Mann</td>
<td>421</td>
<td>Modified direct lateral: primary, 306; revision, 115</td>
<td>66 (27-95)</td>
<td>≥2 yr</td>
<td>Primary: 0 Revision: 2.6</td>
</tr>
<tr>
<td>Mulliken et al</td>
<td>712</td>
<td>Modified direct lateral</td>
<td>64.3 (19-87)</td>
<td>3.6 yr (2-6.5 yr)</td>
<td>0.3</td>
</tr>
<tr>
<td>Masonis and Bourne</td>
<td>10,245</td>
<td>Anterolateral: 826 Direct lateral: 3,438</td>
<td>N/A</td>
<td>N/A</td>
<td>Anterolateral: 2.2 Direct lateral: 0.6 Postrolateral (with repair): 2 Postrolateral (without repair): 4</td>
</tr>
<tr>
<td>Berry et al (2005)*</td>
<td>12,801</td>
<td>Anterolateral: 9,155 Postrolateral: 3,646</td>
<td>64 (12-97)</td>
<td>10.5 yr (0-31.5 yr)</td>
<td>Anterolateral: 3.1 Postrolateral: 6.9</td>
</tr>
<tr>
<td>Queen et al</td>
<td>35</td>
<td>Direct lateral: 8 Posterior: 12 Anterolateral: 15</td>
<td>Direct lateral: 58 ± 7* Posterior: 55 ± 8* Anterolateral: 55 ± 11*</td>
<td>6 wk</td>
<td>None</td>
</tr>
</tbody>
</table>

N/A = not available, NR = not reported.

* Transtrochanteric approach used in 8,246 patients. Mean patient age is based on the full cohort of 21,047 primary THAs.

b Data reported are mean ± standard deviation.

Table 1 Dislocation Rates for Total Hip Arthroplasty

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heads, 6.9% for 28-mm heads, and 3.8% for 32-mm heads. A different study reviewed 712 primary THAs performed via a modified direct lateral approach and followed for a minimum of 2 years. The risk for dislocation during the follow-up period was 0.3%; however, the authors of that study noted a moderate-to-severe limp in 10% of patients. An earlier study described a similar direct lateral approach in 50 consecutive THAs followed for a mean of 2.8 years. There was only one dislocation and seven patients with a limp at last follow-up. A comprehensive review of the literature noted a lower risk for dislocation but a higher risk for postoperative limp when comparing the transgluteal approaches with the posterolateral approach. Unlike the three previously discussed studies, which noted an increased risk for limping after transgluteal approaches, a recent study did not show any difference in the gait mechanics of patients analyzed 6 weeks after primary THA performed via a posterolateral or a transgluteal approach. These findings underscore the importance of careful soft-tissue handling and repair whenever these approaches are used.

**Techniques**

**Setup/Exposure**
- The patient is placed in the lateral decubitus position with the entire hip and lower extremity prepared and draped to allow for free range of motion.
- This position allows the extremity to be situated over the side of the table into a sterile pocket on the abdominal side of the patient during femoral preparation.

**Instruments/Equipment/Implants Required**
- The incision is centered over the trochanter and extends in line with the femur distally.
- Proximally, the incision curves slightly posteriorly, which will facilitate femoral preparation (Figure 1).
- The subcutaneous tissues and fascia are divided in line with the skin incision.
- If necessary, hypertrophic bursal tissue is débrided to allow for direct visualization of the gluteus medius.
- The most anterior portion of the gluteus medius inserts obliquely onto the greater trochanter, and the central and posterior portions are oriented more vertically in line with the femoral shaft. Degenerative tearing of these muscles is a common finding (Figure 2).

![Illustration of a right hip shows two options for skin incision. The incision may be straight and centered over the femoral shaft (skin incision) or have a gentle proximal posterior curve to facilitate exposure of the femoral canal (alternate skin incision). (Reproduced from Lewallen DG: Primary total hip arthroplasty: Anterolateral and direct lateral approaches, in Lieberman JR, Berry DJ, eds: Advanced Reconstruction: Hip. Rosemont, IL, American Academy of Orthopaedic Surgeons, 2005, pp 11-16.)](image)

**Figure 1** Illustration of a right hip shows two options for skin incision. The incision may be straight and centered over the femoral shaft (skin incision) or have a gentle proximal posterior curve to facilitate exposure of the femoral canal (alternate skin incision). (Reproduced from Lewallen DG: Primary total hip arthroplasty: Anterolateral and direct lateral approaches, in Lieberman JR, Berry DJ, eds: Advanced Reconstruction: Hip. Rosemont, IL, American Academy of Orthopaedic Surgeons, 2005, pp 11-16.)

![Intraoperative photograph of a hip shows degenerative tearing or attenuation of the tendinous abductor insertion onto the greater trochanter.](image)

**Figure 2** Intraoperative photograph of a hip shows degenerative tearing or attenuation of the tendinous abductor insertion onto the greater trochanter.
• The fat plane between the gluteus medius and the piriformis tendon is identified with gentle palpation (Figure 3).
• A curved C-retractor is placed deep to the gluteus medius, superficial to the gluteus minimus, and superior to the piriformis tendon (Figure 4).
• An Aufranc retractor is placed at the level of the inferior femoral neck and quadratus femoris muscle.
• The gluteus minimus muscle is elevated from the hip capsule with the use of a narrow Cobb elevator, and the curved C-retractor is placed deep to the gluteus minimus and superior to the piriformis tendon (Figure 5).
• The piriformis tendon and the conjoined tendon (superior gemellus, inferior gemellus, and obturator internus) are divided as close to their insertions as possible. Each is tagged with a nonabsorbable suture of medium length for later repair (Figure 6).
• The piriformis tendon and the conjoined tendon are reflected posteriorly to protect the sciatic nerve.
• Although the superior retractor typically does not need to be adjusted, it may be necessary to divide a portion of the obturator externus at the level of the femoral neck, with subsequent repositioning of the inferior retractor just inferiorly on the femoral neck.
• A capsulotomy is performed from the posterosuperior acetabulum to the tip of the trochanter, in line with the posterior border of the abductors. The length of the capsule is preserved to facilitate later closure.
• The capsulotomy is continued inferiorly along the femoral neck, from deep to superficial, to the level of the lesser trochanter.
• When completed correctly, the capsulotomy forms a trapezoidal shape (Figure 7).
• The superior and inferior limbs of the capsule are each tagged with a nonabsorbable suture (of longer length than the sutures marking the short external rotators) for later repair.
• The quadratus femoris is not routinely taken down.

**ACETABULAR EXPOSURE**
• After the capsulotomy has been completed, the hip is gently dislocated with a combination of flexion, adduction, and internal rotation.
• The hip is brought to a position of neutral flexion-extension and 90° of internal rotation so that the femoral neck cut can be made parallel to the ground.
• The level of resection of the femoral neck is determined on the basis of careful preoperative templating and is marked intraoperatively.
• A trial prosthesis is used to determine the angle of resection.
• The femoral neck cut is completed with a saw, allowing unobstructed access to the acetabulum.
Polyethylene Liner Exchange for Acetabular Osteolysis

A cortical window or trapdoor may be made in the superior or posterior acetabulum if additional exposure to the osteolytic lesion is necessary for adequate débridement. However, if a window or trapdoor is created, the surgeon must take care to prevent acetabular component destabilization.

- Bone ingrowth that is providing acetabular stability must not be disrupted.
- After débridement, the defects are filled with allograft bone, demineralized bone matrix, or bone graft substitute. Typically, defects in the anterior column and pubis are not grafted due to limited access.
- Screws may be reinserted into the acetabular component.
- A trial component is placed, and stability is assessed.
- The decision to impact or cement the new liner in place is based on intraoperative hip stability, liner availability, femoral head availability, acetabular component type, and damage to the locking mechanism or acetabular component.
- If the surgeon elects to use cement, first the inner surface of the acetabular component and the outer surface of the polyethylene liner must be adequately texturized. In addition, to facilitate cementation, the outer diameter of the polyethylene liner should be 2 mm smaller than the inner diameter of the acetabular component. A proud liner is at risk for impingement; thus, it is important to fully seat the cemented liner within the acetabular component.
- The femoral head is impacted into position on axis with the femoral neck for modular stems.
- The hip is reduced.

**Wound Closure**

- Wound closure is performed in a routine fashion.
- If the posterior approach was used, the pseudocapsular flap elevated at the outset of the procedure is repaired back to the greater trochanter.

**Postoperative Regimen**

Patients with a well-fixed, retained acetabular component are allowed to bear weight as tolerated postoperatively. The patient’s weight-bearing status should be reassessed in the setting of revision of either the femoral or the acetabular component. There is sparse evidence for the use of an abductor brace, abductor pillow, or knee immobilizer while the patient is in bed. Rigorous posterior hip precautions should be observed for at least 3 months postoperatively if a posterior approach was used.

**Avoiding Pitfalls and Complications**

Preoperative planning is essential, including radiographic evaluation of the position and fixation of the acetabular and femoral components. Osseointegration of the acetabular component, inspection of the supporting bone, and an intact locking mechanism with a good track record after head-liner exchange are prerequisites for survival after head-liner exchange. Several types of acetabular components perform poorly after polyethylene liner exchange. Ongrowth fixation surfaces such as titanium plasma spray or hydroxyapatite coating are predisposed to continued loosening and failure after revision surgery. The Acetabular Cup System (DePuy Synthes) and the Harris-Galante (Zimmer Biomet) acetabular components have locking mechanisms that are predisposed to failure after polyethylene liner exchange. The authors of this chapter recommend revising these components or considering cementing a liner into acetabular components with poor locking mechanisms.

Intraoperatively, the surgeon must restore femoral offset and equalize leg lengths if appropriate. It may be necessary to revise the acetabular component if positioning is suboptimal. Because of the risk for impingement and reduced stability, lipped acetabular liners and skirted femoral heads should not be used, if possible. Even if the acetabular component has the appearance...
Once the notch is identified and a cobra retractor placed in it, the posterior cortex can be cut with a large right-angled Kerrison rongeur to ensure the osteotomy enters the notch at the appropriate point. The osteotomy is generally performed with osteotomes, although an oscillating saw may be used. The intrapelvic structures must be protected, and in some patients exposing the inner side of the pelvis subperiosteally may be helpful.

- The osteotomy should be displaced medially enough to provide adequate coverage superior to the femoral head and neck.
- After the femoral head and acetabulum are prepared and pelvic osteotomy (if necessary) is completed, the limb is placed into 25° to 30° of flexion, 5° to 10° of adduction, and 10° of external rotation; the limb is then held in position. A padded roll can be placed under the thigh to elevate the hip approximately 10° to 15°. This elevation, combined with the normal 15° of hip flexion present with normal lordosis, should place the hip in the appropriate degree of flexion. A long, sterile goniometer can be used to compare the position of the femur to the pelvis.
- With the opposite limb draped free, the hip can be hyperflexed to remove all lumbar lordosis and assess the degree of hip flexion in the operative hip. We suggest using fluoroscopy to assess abduction and adduction. The entire pelvis must be viewed, with the field encompassing both proximal femurs.

**INTERNAL FIXATION**
- A cobra plate is then appropriately contoured. A distal bend must be made in the cobra plate so that when it is applied to the distal femur it does not abduct the hip.
- The cobra plate is then attached to the distal ilium (above the osteotomy, if one has been made) and an AO tensioner is applied to the femur distal to the plate to apply appropriate compression (Figure 5).
- The remaining cortical screws are then drilled, tapped, and inserted.
- Finally, the greater trochanter is attached over the plate with a screw and washer.
- Any residual reaming materials are then packed into the gaps between the plate and the proximal femur (Figure 6).

**WOUND CLOSURE**
- A drain is placed, and the wound is closed.

**POSTOPERATIVE REGIMEN**
The patient can begin toe-touch weight bearing as tolerated beginning the first postoperative day. An orthotic can be used for the first 6 weeks after surgery if there is any question about the stability of fixation or patient compliance with postoperative instructions. Toe-touch weight bearing is maintained for approximately 6 weeks, and then the patient is reassessed clinically and