Current indications for trochanteric osteotomy include improving exposure to the femoral intramedullary canal through correction of proximal femoral angular deformities, such as medial greater trochanteric overhang; improving general exposure to the acetabulum and femoral canal in complex primary and revision hip total hip arthroplasty (THA); and facilitating exposure to the anterosuperior acetabular rim and femoral neck in operative management of femoroacetabular impingement. An additional indication for trochanteric osteotomy is in the patient with recurrent dislocation following THA with well-aligned components and no evidence of mechanical impingement.

In many of these patients, the soft-tissue envelope (myo-tendinous units, hip capsule, etc) surrounding and supporting the hip is not adequately tensioned to maintain hip stability. Trochanteric osteotomy and distal advancement of the greater trochanter have been used to tighten the surrounding capsuloligamentous structures and abductor mechanism, increasing the moment arm and the force generating capacity of the abductor musculature to improve hip stability (Figures 1 and 2).

This article presents a trochanteric osteotomy, advancement, and fixation technique that has proved reliable with high union rates.

**SURGICAL TECHNIQUE Osteotomy**

The vastus lateralis ridge is initially located. The lateral aspect of the vastus lateralis origin is incised transversely, subperiosteally elevated, and
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retracted for 1-2 cm distally from the vastus ridge. The trochanteric fossa is identified. Beginning at the lateral cortex, just distal to the vastus lateralis ridge, an oscillating saw or osteotome is used to osteotomize the greater trochanter along a plane directed towards the trochanteric fossa to create an osteotomized fragment thickness of at least 1.5 cm (Figure 3A). Once the osteotomy is completed, the trochanter is elevated superiority from the lateral aspect of the proximal femur with the gluteus medius and minimus muscles attached (Figure 3B).

Trochanteric Fixation

After completion of required intra-articular procedures, the greater trochanter is grasped with a tenaculum and advanced laterally and distally along the lateral femoral shaft (Figure 4). The amount of distal advancement of the trochanter is variable and depends on the desired tension of the abductor musculature with the leg positioned in a neutral abdution–adduction position.

Advancement of the greater trochanter with the leg in an adducted position may result in insufficient abductor tension, whereas advancement with the leg abducted risks an excessively tight abductor mechanism when the leg is returned to a neutral position.

Once the appropriate distal position of the trochanteric fragment is determined, the cancellous surface of the greater trochanter is minimally sculpted to match the geometry of the lateral femoral bed onto which it will be positioned. The first of two 2.0-mm multifilament cables is passed around the femoral diaphysis in a cerclage fashion, approximately 1-2 cm distal to the lesser trochanter and distal to the previously determined position of the advanced greater trochanteric fragment. This cable is tightened and clamped onto the femur at this level with the tail ends left intact for later trochanteric fixation. A drill is used to create an appropriately sized hole in the lesser trochanter. A second 2.0-mm multifilament cable is passed through this drill hole and around the proximal femur. Great care is mandatory during cable passage to avoid soft-tissue entrapment.

The osteotomized greater trochanteric fragment is advanced distally and gently impacted onto the lateral femur and held in position with a bone tenaculum. An appropriately sized trochanteric grip (claw) fixation device is selected and positioned on the advanced greater trochanter. Due to the density and thickness of the abductor tendon insertion onto the superior aspect of the greater trochanter, a common error at this point is to place the superior aspect of the fixation grip too superiorly such that the superior prongs of the device engage only tendinous tissue rather than the superior aspect of the greater trochanter. To avoid this problem, it is wise to longitudinally incise the abductor tendon for 1 cm down to the tip of the greater trochanter where each prong of the trochanteric grip will be inserted to ensure placement of the trochanteric grip directly into the bone.

The lesser trochanteric cable is threaded through the superior tunnels of the trochanteric grip, and the free ends of the inferior cable are threaded through the inferior tunnels of the trochanteric grip. The two cables are tightened simultaneously until good cable tension is obtained (Figure 5). Hip range of motion testing is performed with both cable tensioners still in place to assure excellent stability of the advanced greater trochanter. The two cables are then locked to the trochanteric grip and the excess cable tails are cut and removed (Figure 6).

The previously elevated vastus lateralis muscle is repositioned over the distal cables and repaired to reduce cable irritation of the iliotibial band (Figure 6). Thereafter, the hip
wound is closed in a routine fashion. Weight bearing postoperatively is determined by the fixation of any prosthetic components revised during the operative procedure. Abduction exercises are strictly avoided until radiographic evidence of trochanteric union is obtained.

**DISCUSSION**

Variations of the standard trochanteric osteotomy have been described such as the trochanteric slide and extended trochanteric osteotomy. When using a trochanteric slide approach, the tendinous attachments of the gluteus muscles are left intact proximally and the tendinous origin of the vastus lateralis is left intact distally. This provides an advantage of limiting trochanteric migration should nonunion occur and creates additional trochanteric stability to enhance osseous union. This technique limits the ability to substantially advance the greater trochanter distally to improve abductor tension.

The extended trochanteric osteotomy, performed by extending the osteotomy distally into the lateral femoral diaphysis, has become the most predominant method of trochanteric osteotomy used in revision THA. Advantages of the extended trochanteric osteotomy include wide exposure to the acetabulum and femoral diaphysis and creation of increased surface area for fixation and healing of the osteotomy. In certain revision THA situations, however, an extended osteotomy may be suboptimal and other techniques should be considered. An example would be a failed acetabular component with a coexisting stable and proximally fixed femoral component. An extended trochanteric osteotomy may potentially destabilize the femoral component by compromising some or all of the proximal osseointegration.

Although the classic technique of greater trochanteric osteotomy provides multiple advantages such as excellent surgical exposure, correction of proximal femoral deformity, and enhanced soft-tissue tension of the hip, it has been associated with numerous complications including trochanteric fracture, soft-tissue irritation secondary to fixation hardware, and nonunion rates as high as 39%. Nonunion, when associated with superior trochanteric migration, has also been shown to increase the incidence of hip instability and loss of abductor power.

Prolonged rigid fixation following standard trochanteric osteotomy is therefore critical to facilitate union and limit complications.

**REFERENCES**