Loss of abduction power is a common problem after total hip arthroplasty (THA) and may lead to severe limp and instability. A surgical reconstruction technique using a gluteus maximus flap transfer was developed to repair deficient abductor muscles and capsule. The gluteus maximus muscle was split as in a posterior approach to the hip, and the anterior portion of the muscle was elevated as a flap, separating it from the fascia lata and fashioning a triangular distal fascial end. The lateral surface of the greater trochanter was decorticated, and the anterior half of the gluteus maximus was sutured to the greater trochanter with multiple nonabsorbable sutures through drill holes in the bone. The distal fascial end was sutured beneath the vastus lateralis muscle with heavy absorbable sutures. The posterior portion of the gluteus maximus (approximately one-sixth of the muscle body and half the length) was passed beneath the primary flap to substitute for the gluteus minimus and capsule. The tensioning of the flap was done with the hip in 15° to 20° abduction to ensure adequate tension in the transferred muscle. The lower half of the gluteus maximus muscle and fascia lata were also closed over the greater trochanter and transferred muscle flap with the hip abducted and then closed proximally, leaving the anterior edge of the gluteus maximus flap unsutured so that the transferred muscle would be allowed to pull directly on the greater trochanter. Gradual rehabilitation included 2-handed support for 8 weeks and careful gradual abduction exercises beginning 4 weeks postoperatively.
Loss of abduction power due to chronic avulsion or inflammatory destruction of the abductor portions of the gluteus medius and gluteus minimus muscles can predispose patients to dislocation and severe limp after total hip arthroplasty (THA). The gluteus maximus muscle, if healthy and robust, can be used to fashion a flap transfer that can substitute for the deficient abductor muscles. This article describes a reconstructive surgical technique for gluteus maximus flap transfer in THA.

**Surgical Technique**

A posterior approach is used to expose the hip, splitting the gluteus maximus muscle in line with its fibers along approximately half the length of the muscle. The incision in the muscle is extended distally, splitting the fascia lata in line with its fibers and extending well below the greater trochanter.

After the procedure on the hip joint itself is completed, reconstruction of the abductor mechanism is begun.Shove the anterior portion of the gluteus maximus is exposed by deep subcutaneous dissection, and the fascia lata anterior to the gluteus maximus is split in line with its fibers from the upper portion of the muscle to a point approximately 4 cm distal to the upper attachment of the gluteus maximus muscle into the fascia. This incision connects with the fascial incision made during exposure, leaving a substantial distal fascial flap to allow its attachment to bone under the vastus lateralis muscle. The anterior half of the gluteus maximus is elevated with blunt and sharp dissection to form a triangular proximally-based flap (Figure 1). The anterior fascial edge of this flap is transected down to muscle tissue to allow the muscle fibers to be tensioned correctly. Deficiency of the posterior capsule and short external rotators is addressed with an additional posterior gluteus maximus flap. Approximately 15 mm of the distal attachment of the posterior portion of the gluteus maximus muscle into the fascia lata is elevated sharply and dissected proximally approximately one-half the length of the muscle to fashion a triangular flap that is wider proximally than distally. The sciatic nerve is nearby and must be guarded carefully throughout the procedure. A heavy nonabsorbable suture (#5 Ethibond; Ethicon, Somerville, New Jersey) is passed through the anterior capsular structures of the hip, then the suture is passed through the tip of the posterior flap in a figure-eight and out through the anterior capsule of the hip. The posterior flap is pulled across the top of the femoral neck and the suture is tied to secure the posterior flap to the anterior edge of the greater trochanter and anterior capsule of the hip. This construct is reinforced with additional absorbable sutures (#3 Vicryl; Ethicon) passed through the anterior edge of the greater trochanter and through the anterior hip capsule (Figure 2).

Next, a sharp osteotome is used to remove the lateral cortex of the greater trochanter over an area of approximately 2×3 cm to allow attachment of the anterior muscle flap directly to the femur. Multiple holes are drilled in the cortical edges of the bone. The vastus lateralis is split in line with its fibers (2 cm) and detached from its proximal attachment into the femur 15 mm anteriorly and posteriorly. Then the hip is abducted 15° and the muscle flap is sutured under moderate tension into the greater trochanter with multiple heavy sutures (#5 Ethibond), angled so as to pull the flap distally.

The triangular fascial tongue of the gluteus maximus flap is placed under the vastus lateralis and held in place with multiple heavy absorbable sutures (#3 Vicryl). The vastus lateralis is reattached to its original site with the same suture. In cases where the greater trochanter is missing, the distal fascial tongue is fashioned long enough to attach to the lateral femoral cortex distally. A single cable passed around the femur allows the fascial tongue to be passed under, folded back, and sutured to itself for attachment to bone. The vastus lateralis covers this attachment and is sutured down proximally.

Additional abductor muscle mass can be recruited by using the tensor fascia lata. After the gluteus maximus flap is at-
tached, the fascia lata is cut transversely at the distal attachment of the tensor fascia lata, then the anterior edge of the tensor is dissected from its fascial attachments and elevated with sharp and blunt dissection. The posterior edge of the tensor is released sharply from its fascial attachments one-half to two-thirds the length of the muscle, and the distal end of the muscle is attached to the gluteus maximus flap attachment with heavy absorbable sutures (#3 Vicryl). This tensor fascia lata transfer is done before the vastus lateralis is closed, and its distal attachment includes suturing under the vastus lateralis flaps.

Closure is done with the hip in 15° abduction. The posterior edge of the anterior flap is sutured snugly to the top of the posterior flap. Next, the anterior and posterior portions of the fascia lata are brought together over the top of the transferred flaps, suturing them snugly, extending proximally to form a Y shape. The anterior edge of the anterior flap is not closed so that the muscle pull is exerted directly on the greater trochanter. The upper edge of the lower half of the gluteus maximus is sutured to the posterior edge of the anterior flap, closing the posterior flap underneath. This completed muscle and fascial closure applies the upper half of the gluteus maximus to the greater trochanter to maximize its effectiveness for abducting the femur.

**Clinical Review**

Eleven patients (11 hips) had gluteus maximus flap transfer for abductor deficit after THA. Postoperative care included early partial weight bearing of 50 lbs with 2-handed support, use of an abduction pillow for 3 days while in bed, and avoidance of abduction exercises for 6 weeks postoperatively. Patients then began gradual abduction strengthening exercise and gradually increased weight bearing for another 6 weeks. All patients were encouraged to use a cane for 6 months.

Nine patients regained strong abduction against gravity with a mean follow-up of 33 months (range, 16-42 months). One patient had weak abduction with moderate limp. One patient with multiple health issues had weak abduction with a severe limp even after 6 months of physical therapy, refused additional treatment, and was lost to follow-up.

**Conclusion**

Complete loss of abduction is a common and challenging problem after THA and can cause severe limp, dislocation, and pain. A flap transfer using the anterior portion of the gluteus maximus muscle restores abductor function in a majority of cases. This procedure can be done during the primary THA or later as a secondary procedure.

**References**