Technical Note

Endoscopic Transfer of Gluteus Maximus and Tensor Fascia Lata for Primary Hip Abductor Deficiency

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Abstract: Complete avulsion of hip abductor muscles may cause severe gait dysfunction and pain. An open surgical procedure to transfer tendons of the gluteus maximus and the tensor fasciae latae to the greater trochanter to make up for the deficient hip abductor has been proposed. The purpose of this study was to describe an endoscopic procedure to transfer gluteus maximus and the tensor fasciae latae to the greater trochanter for hip abductor deficiency.

Trochanteric tendinobursitis has a frequency estimated at 1.8 in 1000.[1] Complete avulsion of the abductor muscles in the hip or avulsion secondary to chronic trochanteric bursitis can cause severe limping and often is accompanied by pain.[2,3] The anterior and medial fibers of the gluteus medius muscle contribute to abduction, with the tensor fasciae latae (TFL) being the main hip abductor.[4] The literature on surgical treatment is limited when there is significant gluteus muscle atrophy responsible for abductor deficiency in native hips. In the case of abductor deficiency after total hip arthroplasty, Whiteside[4] suggested an open surgical procedure to transfer the anterior portion of the gluteus maximus and the TFL to the greater trochanter (GT) to make up for the deficient hip abductors. The purpose of this study was to describe an endoscopic procedure to transfer the gluteus maximus and the TFL to the GT for hip abductor deficiency due to retracted full-thickness tears and/or complete muscular atrophy of gluteus medius and minimus muscles.

Surgical Technique

The surgical steps are listed in Table 1.

Patient Positioning and Instrumentation

The patient is placed in lateral decubitus with the hip in 20° abduction (Fig 1). The entire operated limb is included in the surgical field. Instrumentation

Table 1. Surgical Steps

- Position the patient in lateral decubitus with hip in 20° abduction. Fluoroscopic guidance not required. A fluid-management system is required to maintain constant pressure during the procedure.
- Three portals are routinely performed. Distal endoscope and 2 proximal instrument portals. Supplementary portals can be used as necessary.
- Resection of subtrochanteric bursa and create working space.
- Preparation of muscle flap:
  The TFL is split distally. Its anterior edge is released to the TFL muscle fibers and its posterior edge is released from the TFL as far proximally as the gluteus maximus muscle fibers. The gluteus maximus flap is made by dissecting the most anterior part of this muscle so as to have a pedicle flap.
- Endoscopic exploration used to confirm the presence of a completely retracted full-thickness tear of the gluteus minimus and the lateral lamina of the gluteus medius.
- Preparation of the GT footprint: resection of pathologic tissues, removal of all osteophytes, and abrasion of footprint to smooth bone.
- Use the gluteus maximus flap to fill the posterior portion of gluteus medius and the TFL flap to fill the anterior portion
- Perform double row repair using 2 suture anchors in each row.
- Verify strength of suture repair.

GT, greater trochanter; TFL, tensor fasciae latae.

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Fig 1. The right limb is shown. The patient is placed with the hip in 20° abduction. Four portals are made around the GT with 2 distal portals for the scope and 2 proximal portals for the instruments. (ASIS, anterior superior iliac spine; GT, greater trochanter.)

comprises a 30° arthroscope, an FMS Duo+ Pump (Fluid Management System; DePuy Mitek, Inc., Raynham, MA), which can control inflow and outflow to maintain a constant pressure (set at 40 mm Hg), and an electrocoagulation electrode. Fluoroscopy is not required.

Arthroscopic Portals

Four portals, 2 proximal and 2 distal, are routinely used (Fig 1), although supplementary portals may be added as required. The distal anterolateral portal is established 10 cm distal to the superior edge of the apex of the GT. The scope is placed in this distal anterolateral portal, and a proximal anterolateral portal, located 2 cm proximal to the anterior edge of the greater trochanter apex, is realized under endoscopic vision. A second proximal portal is established 3 to 4 cm posterior to the proximal one. Then, a supplementary distal portal located 2 cm proximal and 3 to 4 cm posterior to the first distal portal is placed. These 4 portals allow excellent access to the gluteus maximus and TFL flaps and facilitates suture management.

The arthroscope is introduced in line with the femur, 5 cm distal to the apex of the GT. The instruments are introduced proximally to allow positioning of suture anchors perpendicular to the lateral aspect of the GT. Needle palpation is used to locate the apex of the GT, then the fascia lata is opened 5 cm proximally and distally to this point using a VAPR radiofrequency electrode (Depuy Mitek Inc.) or an 11-blade scalpel. The subtrochanteric bursa is then resected with a shaver (4.5 mm) and a VAPR radiofrequency electrode.

Preparation (With Video Illustration)

First, a subcutaneous working space is developed by maintaining a constant pressure (set at 40 mm Hg) while controlling hemostasis step by step with the VAPR radiofrequency electrode. The TFL is split 5 cm proximally and distally toward the tip of the GT. If endoscopic exploration finds a complete, retracted full-thickness tear of the gluteus minimus and the lateral

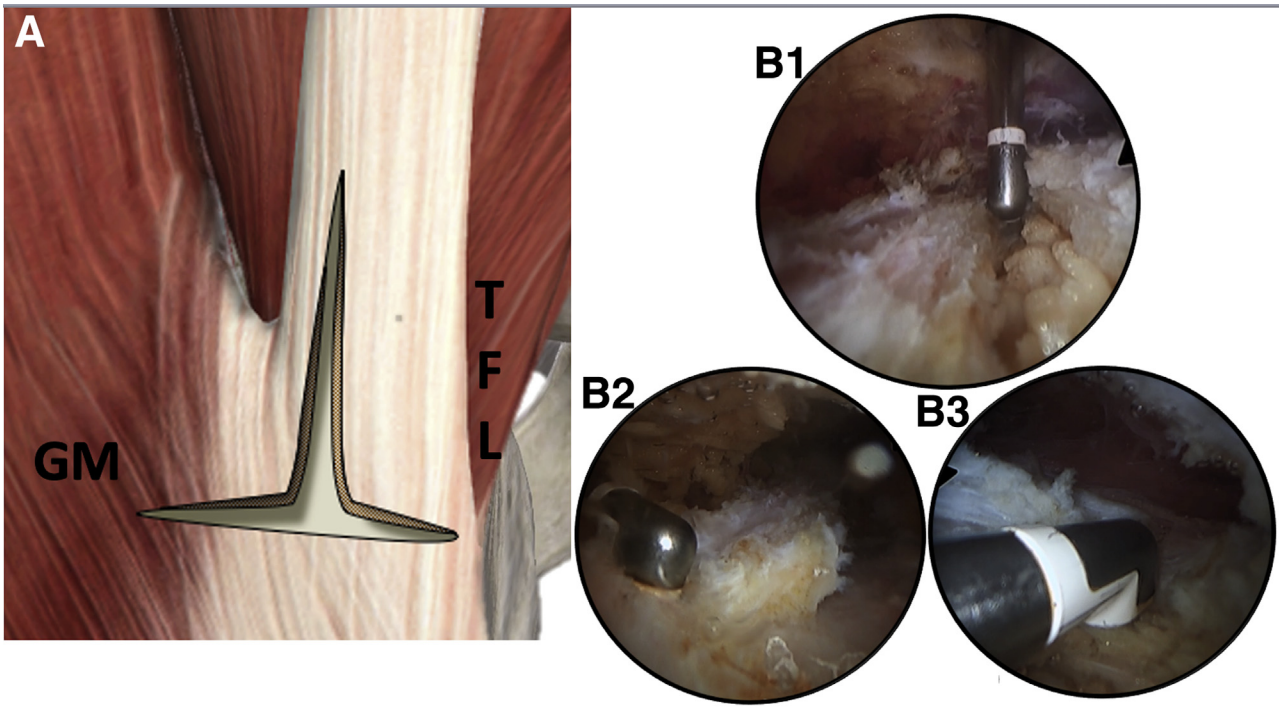

Fig 2. The right limb is shown. (A) The TFL is cut in an inverted T shape. (B1) The TFL is split distally toward the tip of the GT. The transversal split is made at the distal edge of its longitudinal split (B2) posteriorly toward the GM and (B3) anteriorly toward the TFL muscle. (GM, gluteus maximus; GT, greater trochanter; TFL, tensor fasciae latae.)

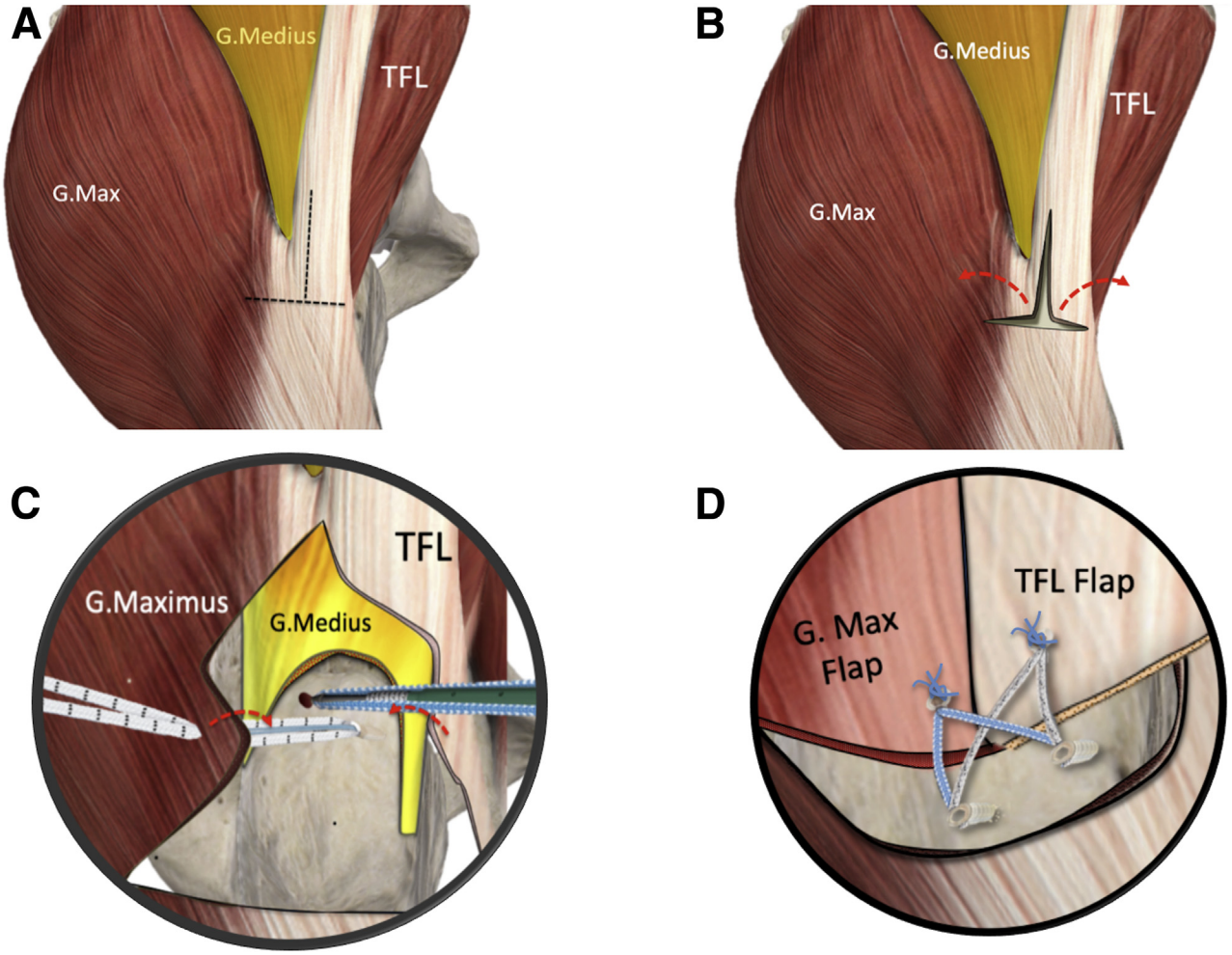

Fig 3. The right limb is shown. (A) An inverted T-shape incision is performed at the gluteus maximus tendon and TFL junction. (B) Two flaps, the gluteus flap and the TFL flap, are mobilized. (C) The TFL flap is transferred posteriorly and the gluteus flap anteriorly over the retracted gluteus medius tear and (D) sutured to the bone using the SutureBridge technique. (TFL, tensor fasciae latae.)

lamina of the gluteus medius, the TFL is cut in inverted T-shape. The anterior edge of the TFL flap is released until the TFL muscle fibers are seen. In the same manner, the posterior edge of TFL flap is released as far as possible posteriorly until the gluteus maximus muscular fibers are visible (Fig 2).

The gluteus maximus muscular flap is developed by dissecting the most anterior part of this muscle so as to have a pedicle flap. This pedicled flap is then used to fill the posterior portion of the gluteus medius while the TFL flap is used to fill the anterior portion.

The GT is then abraded using a motorized burr; all osteophytes are resected down to smooth bone and the bare area at the GT apex is also roughened to provide a bleeding bony surface to enhance tendon healing.

Both the anterior and posterior flaps are approximated in a side to side fashion and secured to the GT using the SutureBridge technique (Arthrex, Naples, FL) (Fig 3). For the proximal row, we first tapped and then placed 2 biocomposite suture anchors (Corkscrew; Arthrex) loaded with 2 sutures. The sutures of each anchor were passed in a mattress stitch configuration through the gluteus medius and TFL flap, and knots were tied. The distal row was then performed with 2 Knotless PushLock anchors (Arthrex). The first PushLock anchor was placed posteriorly to secure one suture from each tendon flap. The second PushLock anchor was placed anteriorly in the same manner to secure the 2 flaps to the roughened footprint. The strength of the repair was tested in hip adduction and rotation (Video 1).

In some cases, the endoscopic exploration finds a partially retracted full-thickness tear of the gluteus medius with a reducible insertion on the GT (Fig 4). In this case, only one flap (TFL flap in this example) is used to cover the posterior part of the GT (Video 1).

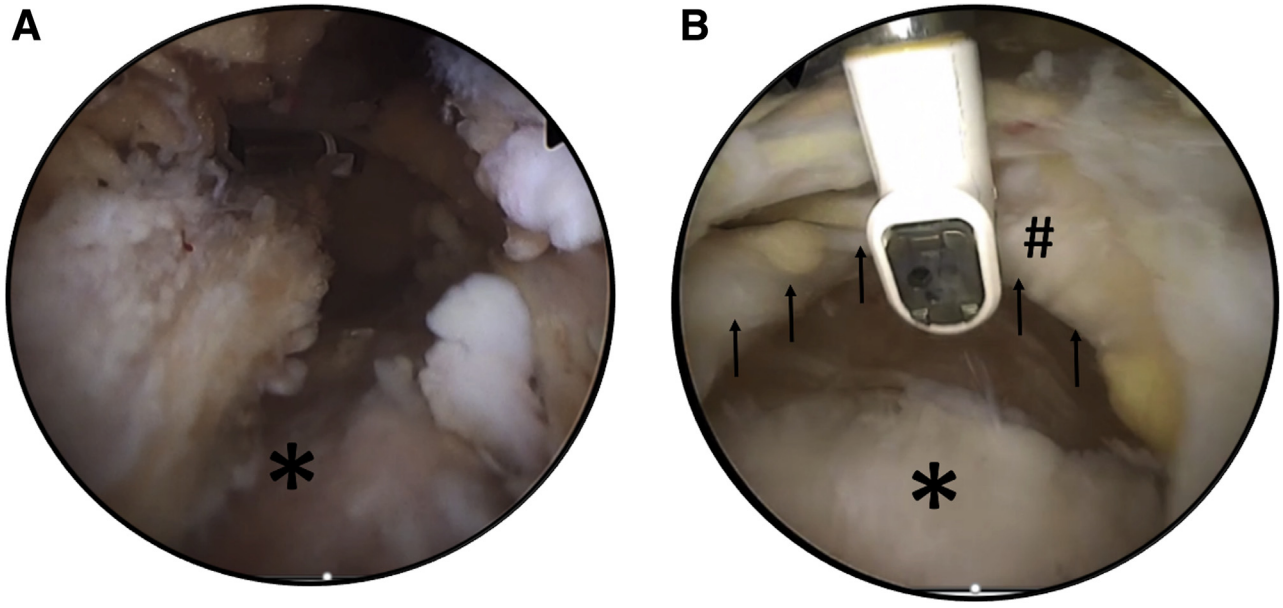

Fig 4. Right hip. (A) Full-thickness tear with completely retracted gluteus medius tendon. (B) Full-thickness tear with partially retracted gluteus medius tendon corresponding to a U-shaped tear (black arrows). *Greater Trochanter; #gluteus medius.

Postoperative Management

Rehabilitation is initiated immediately; however, weight-bearing is delayed for 6 weeks. No passive lateral rotation, passive adduction, active internal rotation, or active abduction is allowed for the first 6 weeks. An abduction brace is worn between rehabilitation sessions. Hip motion is limited to 90° flexion for the first 3 weeks. At 6 weeks, weight-bearing is progressively resumed, along with muscle strengthening. By 3 months, gait should return to normal, and the patient should be free of pain. In most cases, a comprehensive clinical evaluation can be performed at the 6-month postoperative examination; however, in some cases, this evaluation could be delayed to the 12-month visit if tendon inflammation is present or in cases of recurrent bursitis.

Table 2. Pearls and Pitfalls

Pearls	Pitfalls
Hemostasis using the RF frequency probe and maintaining a constant pressure	Bad view due to bleeding
Appropriate placement of portals to allow positioning of suture anchors perpendicular to lateral aspect of GT	Inappropriate placement of proximal portals increases the risk of low mechanical strength of suture anchors
Extensive dissection of muscle flaps is not required	Damage to neurovascular structures in anterior iliac crest area
No drainage required	

GT, greater trochanter; RF, radiofrequency.

Discussion

Primary deficiency of hip abductors may cause severe gait dysfunction with the Trendelenburg sign and pain. Conservative measures are unpredictably successful.[5] Simple repair of the abductor tendons can be successful,[6] but the failure rate can be high, especially in the presence of large retracted tears with advanced fatty degeneration of the gluteus medius and minimus muscles.[7] Whiteside et al.[8] compared 2 groups of patients who underwent revision total hip arthroplasty with or without a gluteus maximus flap transfer and reported that the group with a flap transfer had less pain, lower incidence of limping and Trendelenburg sign, as well as less need for a supportive device. The effectiveness of transferring the gluteus maximus anterior portion has been confirmed in a series of 11 patients with complete loss of abductor attachment.[9] Then, in both laboratory and clinical studies, Whiteside[4] demonstrated that for patients suffering from abductor deficiency after total hip replacement, the TFL and anterior portion of the gluteus maximus could be

Table 3. Advantages of an Arthroscopic Procedure in Comparison With an Open Surgical Procedure

Advantages	Disadvantages
More esthetic incisions	Cannot be combined with THA revision
Fewer infection-related complications	Learning curve
Lower neurovascular risk during flap dissection (superior gluteal nerve)	
No drainage	

THA, total hip arthroplasty.

conveniently transferred to the GT to substitute for the deficient gluteus medius muscle. This open surgical procedure was reproducible and effective in providing pain relief as well as improving function and gait in a small case series.[4,10]

It has been reported that increased preoperative fatty degeneration of the hip abductor muscles is correlated with poor outcomes after gluteus medius repair.[11] This abductor muscle fatty degeneration is not rare in older individuals.[12] We suggest performing this surgical procedure under endoscopic control in native hips, when surgical repair of the gluteus medius is not possible because of major tendon retraction and/or advanced fatty degeneration. This endoscopic surgical procedure is relatively easy and safe. Dissection of the TFL to its attachment on the anterior superior iliac spine is not required. In fact, it is not recommended to perform extensive dissection and exposure of the neurovascular structures of TFL and gluteus maximus because of the potential risk of damaging these structures. The pearls and pitfalls of the techniques are given in Table 2, and the advantages/disadvantages of the endoscopic procedure in comparison to the open procedure are highlighted in Table 3.

The objectives of this surgery are limited, and it appears unlikely to restore completely normal walking in these patients. Nevertheless, it is reasonable to expect a clear decrease in Trendelenburg limping and fatigability while walking as a result of this palliative transfer. Comparative prospective randomized studies with long-term follow-up are needed to evaluate how this procedure impacts quality of life.

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