

# Endoscopic Gluteus Medius Repair



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**Abstract:** Endoscopic gluteus medius repair is indicated after failed conservative management for debilitating peritrochanteric hip pain. In our experience, most of these surgeries are performed on women, 45 to 75 years old. Often for undersurface high-grade partial-thickness tears and some small full-thickness tears, a single-row repair technique is performed. For larger, full-thickness tears, a double-row repair is often performed. For minimal, superficial, partial-thickness tears with a longitudinal component of tearing through the gluteus medius tendon, a side-to-side repair is performed. Short-term follow-up shows significant improvements in hip outcome score for activities of daily living and in numeric rating scale.

As advances in hip arthroscopy and imaging improve, so has treatment and diagnosis of gluteus medius tears. Surgical repair can be performed with both endoscopic and open techniques demonstrating improvement in outcomes and functional improvement.<sup>1</sup> A biomechanical comparison between double-row endoscopic repair and open repair of gluteus medius found no difference in ultimate failure load.<sup>2</sup> A recent systematic review demonstrated that both techniques improve patient-reported outcomes and reduce lateral-based hip pain.<sup>3,4</sup> Appropriate surgical repair allows the best chance at tendon-to-bone healing.

## History and Physical Examination

History such as pain lying on the affected side and exacerbation of pain with prolonged standing are suggestive of gluteus medius pathology. A patient's gait and single leg stance are also evaluated for abductor

lurch and Trendelenburg sign. Patients are placed in the lateral decubitus position with the affected hip up and examined for tenderness to palpation over the peritrochanteric region. The hip is taken through range of motion to assess for any snapping or catching of the iliotibial band (ITB). Any hip abductor weakness or pain with resisted hip abduction is noted.

Routine imaging including diagnostic pelvis and hip radiographs are used to rule out any bony pathology. Furthermore, intra-articular and extra-articular pathology are assessed with magnetic resonance imaging.

## Indications for Gluteus Medius Repair

Surgical repair is indicated after failure of conservative management, defined as recalcitrant symptoms and lack of sustained relief after 3 months of nonoperative treatment. Conservative management consists of activity modification, anti-inflammatory medications, physical therapy, and trochanteric bursal corticosteroid injections. Furthermore, endoscopic surgery is indicated for patients without significant retraction or fatty atrophy that would preclude successful endoscopic repair. Direct surgical confirmation of either a full-thickness or high-grade partial tear is required for repair.

## Surgical Technique

Surgery is performed with the patient in the supine position (Video 1). Diagnostic arthroscopy of the hip joint is not routinely performed in patients undergoing gluteus medius surgery. Our peritrochanteric endoscopy is performed using a 2-portal technique. A lateral portal is made approximately 4 cm distal to the vastus ridge. The trocar is directed under fluoroscopic guidance into the peritrochanteric space. A standard

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anterolateral portal is made under spinal needle localization. A trochanteric bursectomy is performed with a shaver and electrocautery. In patients without snapping ITB on history and examination, the camera and working instrument are placed deep by making a small hole through the ITB for instrumentation.

In patients who described catching or snapping during the history and examination, a longitudinal ITB lengthening is performed. With the camera superficial to the ITB, a spinal needle is used to localize the center of the ITB based on the vastus ridge and fluoroscopic guidance. Electrocautery is then used to longitudinally split the ITB distally to the insertion of the gluteus maximus tendon and proximally 1 to 2 cm above the greater trochanter.

Diagnostic evaluation of the gluteus medius tendon is performed after the peritrochanteric bursa is removed. The gluteus medius tendon insertion is probed to evaluate softness and mobility of the tendon, indicating a partial-thickness tear, versus a full-thickness tear with a discreet flap of tissue off the insertion site. Three

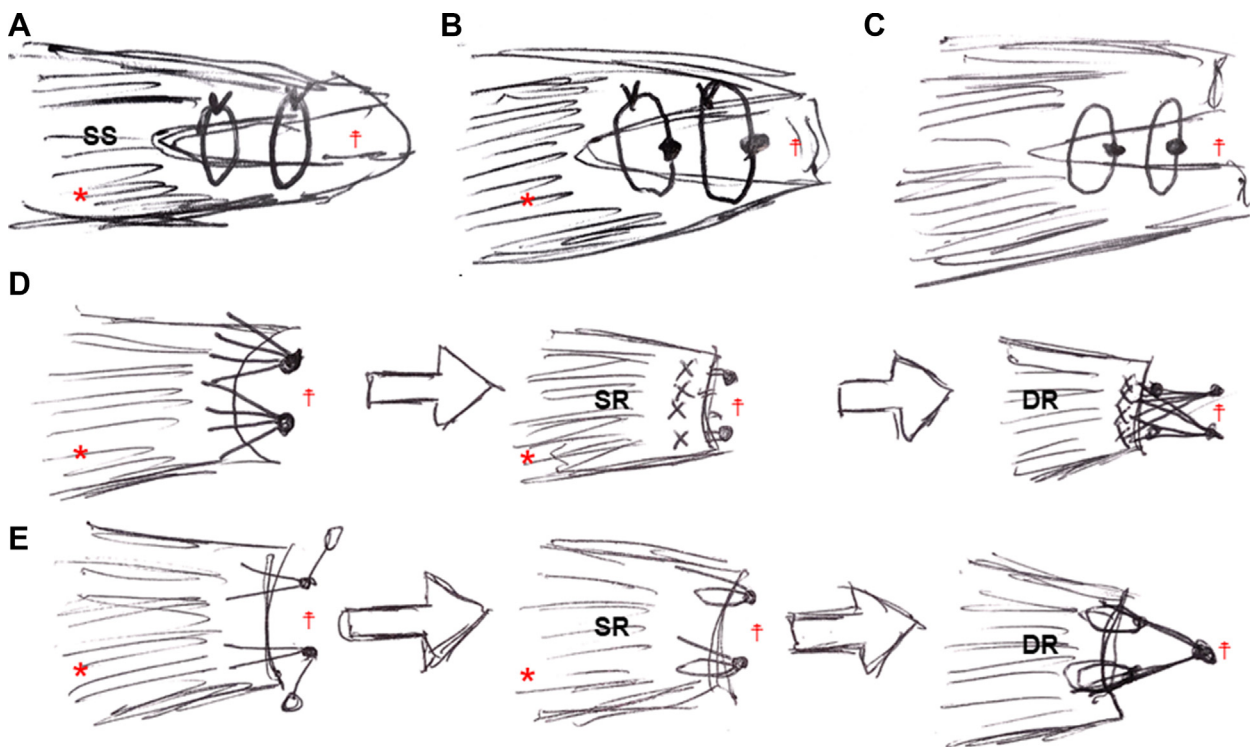
different surgical techniques are used in the repair of the gluteus medius tendon.

### Side-to-side Repair

For minimal, superficial, partial-thickness tears with a longitudinal component of tearing through the gluteus medius tendon, a side-to-side repair is performed. Using an arthroscopic passing device, a no. 2 Maxbraid suture (Zimmer Biomet, Warsaw, IN) is passed through the anterior and posterior leaflet. A standard arthroscopic knot-tying technique is then performed, closing the superficial tear. This is repeated, placing at least 2 stitches within the superficial tear (Fig 1A).

### Single-Row Repair

Often for undersurface high-grade partial-thickness tears and some small full-thickness tears, a single-row repair technique is performed. For partial-thickness tears, the diseased tendon is split with a longitudinal incision over the lateral facet. The undersurface of the tendon is then debrided with a shaver. The lateral facet



**Fig 1.** Operative technique diagrams for (A) side-to-side (SS) repair with suture only using 2 stitches, (B) single-row (SR) repair for partial tears using knotted anchors and cerclage stitch configuration and 2 anchors, (C) single-row (SR) repair for partial tears using knotless anchors and cerclage stitch configuration and two anchors, (D) the steps in a double-row (DR) repair for full-thickness tear using knotted anchor to first tie the SR repair and then placing a lateral row to complete the DR repair, and (E) the steps in a double-row (DR) repair for full-thickness tear using knotless anchor to first convert the SR repair and then placing a lateral row to complete the DR repair. In the figure, \* represents the gluteus medius tendon and † represents the greater trochanter. The image is representative of a right hip with the superior portion of the tendon on the left side of the image, distal aspect, and trochanter on the right.

is decorticated to bleeding bone using a bur. For full-thickness tears, the edge of the tendon is debrided, and the footprint is decorticated in a similar fashion.

For partial-thickness tears, 1 or 2 double-loaded suture or knotless suture anchors are placed within the footprint of the tendon on the lateral facet. Using knotted sutures, 2 horizontal mattress sutures are placed, with 1 limb of each suture being passed through the anterior and posterior leaflet. This is repeated with a second anchor if necessary. Standard arthroscopic knot-tying allows for reapproximation of the tendon to its footprint (Fig 1B).

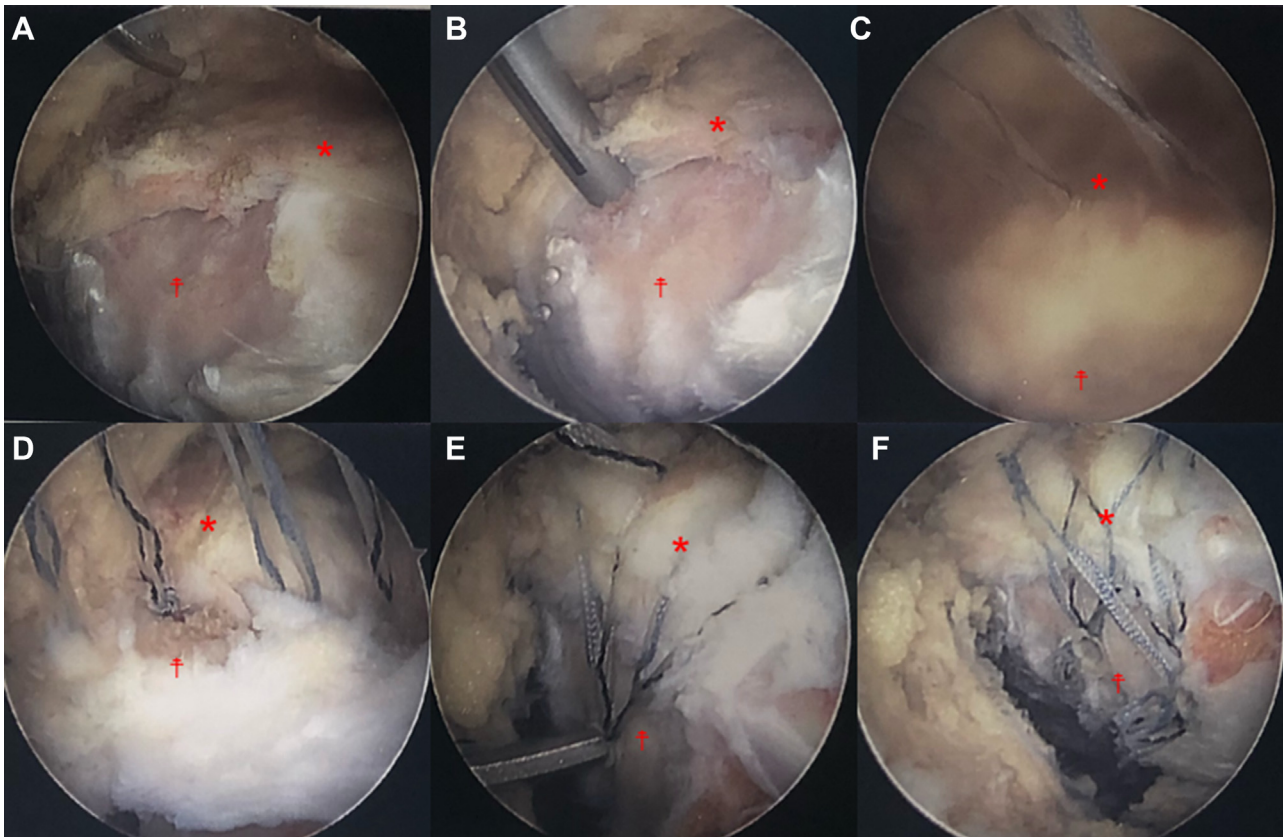
Knotless sutures began being used for the majority of cases in 2018. This is performed with the aid of an arthroscopic passing device and shuttling stitch. The repair stitch is passed through one leaflet, and then with aid of the shuttling stitch, passed through the other leaflet in the opposite direction creating a cerclage type stitch. Converting the knotless anchor demonstrates excellent reapproximation of the tendon to its footprint. This technique is repeated for a second anchor, if necessary (Fig 1C).

For small, full-thickness tears, one or two double-loaded suture anchors or knotless suture anchors are placed within the footprint of the tendon on the lateral facet. Similar to a rotator cuff repair, horizontal mattress sutures are placed evenly along the tear using an arthroscopic passing device. This is repeated with a second anchor, if necessary. Standard arthroscopic knot-tying or knotless conversion reduces the tendon to its footprint (Fig 1D and E).

### Double-Row Repair

For larger, full-thickness tears, a double-row repair is often performed. A single-row repair is first performed as described above. Lateral row fixation is created by placing one or two 4.75 mm SwiveLock anchors (Arthrex, Naples, FL) in the distal aspect of the lateral facet. If 2 lateral anchors are used, the sutures are crossed to allow for greater distribution of force and compression across the tendon (Fig 1D, Fig 2).

When using a knotless suture anchor technique, the repair stitch is brought through the tendon using an arthroscopic passing device. To create a horizontal



**Fig 2.** Intraoperative images from endoscopic full-thickness gluteus medius tendon repair using a double-row technique. (A) Full-thickness gluteus medius tear. (B) Placing anchors for medial row construct. (C) Horizontal mattress-style passed sutures. (D) Medial row tied down. (E) Placing lateral row anchor, incorporating 1 suture from each pair. (F) Final double-row construct. In the figure, \* represents the gluteus medius tendon and † represents the greater trochanter. The image is representative of a left hip viewing from the lateral portal and instrumenting from an anterolateral portal and accessory lateral portal with the superior portion of the tendon on the right side of the image, distal aspect and trochanter on the left.



**Table 1.** Advantages and Disadvantages of endoscopic gluteus Medius Repair

Advantages
Minimally Invasive
Less Morbidity
Direct Visualization of Pathology and Repair within the Peritrochanteric Space
Can Also Address Intraarticular hip Pathology if Necessary
Disadvantages
Less exposure
Increased surgical difficulty compared to open
May be difficult on patients with certain body habitus
May not be best for patients with significant tendon retraction, atrophy, or poor tissue quality

mattress-type suture construct, the non-looped pull stitch is passed through the tendon as well. This allows the repair stitch to come back through the tendon, allowing for a double-row construct as described above (Fig 1E).

### Rehabilitation

All patients undergo formal physical therapy and are placed in a hip brace after surgery (X-Act ROM hip brace, DJO Global LLC, Vista, CA). The brace is worn at all times except during bathing. No active abduction and no passive adduction across the midline are allowed for 8 weeks. For repairs of partial-thickness and small full-thickness tears, patients bear weight as tolerated in the brace after surgery with crutches for 2 to 4 weeks. For repairs of larger tears, patients are partial weightbearing (about 50%) in the brace after surgery for 4 to 6 weeks with crutches. Once a patient has been off crutches for 1 full week, they are allowed to ambulate without the brace. Patients progress through specific milestones, with gradual increase to full activity by 4 months.

### Discussion

We have performed many endoscopic gluteus medius repairs at our center during the past decade. Advantages and disadvantages of endoscopic repair are described in Table 1. Of our primary repairs between 2012 and 2020, 86% (50/58) were female. The patients ranged from 42 to 87 years old, with a mean of 61 years. Surgical technique was single-row repair for 57% of the patients, double-row repair for 24%, side-to-side repair for 16%, and a combination of side-to-side with single-row for 3%. On average, 1.8 medial row anchors were placed, ranging from 1 to 3 anchors. For those undergoing a double-row construct, on average 1.4 lateral row anchors were placed, ranging from 1 to 2 anchors. A total of 32 patients underwent concomitant procedures, with 30/58 patients undergoing ITB lengthening and 2/58 patients undergoing ITB repair with a side-to-side technique.

**Table 2.** Pearls and Pitfalls

Pearls
No Traction Necessary, slight Abduction of the hip and Open up the Peritrochanteric Space
Use Fluoroscopic Guidance to Assess Trajectory
Limit Bleeding in Peritrochanteric Space with Cautery
Liberal Use of Passing Sutures or Accessory Portal can aid in Antegrade or Retrograde Passing of Repair Sutures
Pitfalls
Poor patient positioning or too much traction
Poor localization in any plane can lead to poor visualization
Not a true space, poor fluid management and bleeding can lead to decreased visualization
Limited instrumentation due to portal placement or body habitus

Beginning in 2016, patient-reported outcomes were captured prospectively with an electronic database (Oberd, Columbia, MO). The preliminary results are promising for our 32 patients with an average follow-up time of 28 months (range 6 to 60 months). Student *t*-tests showed significant improvements ( $P < .001$ ) in hip outcome score for activities of daily living (HOS-ADL), from  $47 \pm 15$  to  $84 \pm 14$ , and in numerical rating scale, from  $6.6 \pm 1.7$  to  $2.3 \pm 2.5$ . Our short-term improvement in HOS-ADL was very similar to the results of Hartigan et al.,<sup>5</sup> who reported a mean preoperative value of 54 and mean postoperative value of 82. Furthermore, our mean HOS-ADL exceeded the patient-acceptable symptomatic state (PASS) score of 81.<sup>6</sup> A previous study of full-thickness tears reported improvements in visual analogue scale score from 5.4 to 2.4 and in HOS-ADL from 34 to 51,<sup>7</sup> suggesting that full-thickness tear repairs will reduce pain but may struggle with function. Other studies also demonstrated improved visual analogue scale scores from 8 to 2 and from 6 to 4.<sup>8,9</sup> Although these improvements are promising, a 2-year follow-up study demonstrated that only 68% of patients returned to preoperative activity, with 23% of patients unable to return directly related to issues with the operative hip.<sup>10</sup> Kirby et al.<sup>11</sup> demonstrated improvements in outcome scores but also found a PASS rate of just 63%. Thus about 80% of patients will meet minimal clinically important difference, whereas 60% to 70% of patients achieve PASS at 2 years.<sup>6,11</sup> Pearls and pitfalls from our experience are shared in Table 2.

In conclusion, both partial- and full-thickness tears of the gluteus medius tendon occur predominantly in females in their fifth and sixth decade. Endoscopic gluteus medius tendon repair for both partial and full-thickness tears can provide significant improvement in patient reported outcomes in mid-term follow-up. Tear size, pattern, and tissue quality should dictate operative technique and anchor choice. Further studies are necessary to investigate long-term outcomes, as well as outcomes compared between endoscopic techniques.

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