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Double-Row Repair of Gluteus Medius and Minimus Tears with Dermal Allograft Augmentation

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ABSTRACT

Tears of the gluteus medius and/or minimus tendons are common contributors to greater trochanteric pain syndrome, which can cause debilitating lateral hip pain and severely impact quality of life. This paper presents a novel technique for gluteus tendon repair incorporating dermal allograft augmentation and a double-row repair construct. The use of a dermal allograft aims to reinforce tendon-to-bone fixation and increase mechanical strength. The double-row configuration increases the contact surface area and compression at the repair site, enhancing the healing process. This approach provides a favorable and reproducible method for both native hips and hip arthroplasty cases. This technique aims to decrease the failure rate and improve outcomes in patients with gluteal tendinopathies.

Keywords: Gluteus repair; Gluteal tendon repair; Surgical technique

INTRODUCTION

Lateral hip pain, in the native hip or after arthroplasty, has many potential causes. Greater trochanteric pain syndrome (GTPS), affecting approximately 10–25% of the population, is now recognized as an anatomically accurate term to describe generalized lateral hip pain, encompassing several etiologies, including trochanteric bursitis, gluteal tendinopathy and tears, and external snapping hip syndrome.[1] Many patients previously diagnosed with trochanteric bursitis are now recognized to have gluteus medius and/or minimus pathology.[2–7] A higher index of clinical suspicion, combined with advanced imaging modalities such as ultrasound and magnetic resonance imaging, has led to an increased clinical diagnosis of GTPS.[8] GTPS typically presents as chronic lateral hip pain and tenderness over the greater trochanter. It occurs more commonly in middle-aged women, partly due to pelvic biomechanics that increase iliotibial band tension over the trochanter.[9,10]

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Due to age, biomechanics, and anatomy, attritional tendinopathy of the abductor muscles, specifically the gluteus medius, may cause hip abduction weakness, lateral hip pain, and gait alterations.[5] The gluteus minimus and medius tendons are the primary site of gluteal tendon tears, and tears are more commonly caused by chronic degeneration than trauma.[11–13] GTPS is diagnosed clinically through a patient's history and a focused physical examination. It presents as chronic, deep, aching pain over the greater trochanter that may radiate to the lateral thigh, knee, or buttocks, and is worsened by lying on the affected side, squatting, or climbing stairs.[14] Palpation of the posterolateral greater trochanter, where the gluteus medius inserts at the posterosuperior facet, typically elicits tenderness.[14,15] A positive Ober test, resisted abduction, and a positive flexion, abduction, and external rotation test, and a Trendelenburg gait all support the diagnosis.[14] Additional maneuvers, such as the Lequesne test, pain with single-leg stance, resisted knee internal rotation at 90° of hip flexion, and a positive resisted hip abduction test, further increase diagnostic accuracy.[16,17]

Initial management of GTPS includes physical therapy, lifestyle modifications, nonsteroidal anti-inflammatory drugs administration, and peri-trochanteric cortisone injections.[18] Surgical repair is recommended for patients with full-thickness tears and persistent pain or limited function despite non-operative management.[11] In patients with advanced hip osteoarthritis or those who are poor surgical candidates, gluteus tendon repair is contraindicated.[11] However, in the population of adults with significant hip osteoarthritis paired with debilitating hip pain, a total hip arthroplasty (THA) may be a more appropriate option.[12] Surgical management of gluteal tendon tears via endoscopic and open repairs has been well described and demonstrates positive outcomes.[19,20] Recent literature supports open repair techniques in patients with more severe fatty infiltration.[13] Following open surgical repair, most patients return to their preoperative level of activity by the 2-year follow-up period.[11]

Lateral hip pain following THA has been associated with both anterior and posterior surgical approaches.[21,22] This suggests the pain is not due to the surgical approach but rather due to an underlying gluteal tendon pathology, and special care should be taken to address this at the time of THA. In addition, surgeons need to be aware of how changes in offset with THA can impact gluteal function.

The primary goal of open repair of the gluteus medius is to provide tendon-to-bone fixation. In addressing large tears, understanding the chronicity, etiology, degree of degeneration/retraction, and amount of fatty atrophy remains vital. If there is significant retraction and atrophy, tissue quality may prevent successful tendon-to-bone fixation, which may lead to higher rates of repair failure and suture pullout.[23,24] To overcome this, dermal allograft augmentation has been introduced to reinforce repairs, promote increased cellularization and neovascularization, increase mechanical strength, reduce gap formation, and enhance tendon-to-bone healing.[3,12,22,25,26] This approach addresses the limitations of single-row or non-augmented techniques by enhancing mechanical stability and improving footprint coverage.

Several documented techniques exist for repairing the tendon with dermal allograft augmentation. This paper aims to describe a reproducible, novel technique for gluteus repair with dermal allograft augmentation in both native hips and hip arthroplasty.

MATERIALS AND METHODS

After induction of general or spinal anesthesia, the patient was placed in a lateral decubitus position using a pegboard or McGuire Positioner (IMP Medical, United States of America). The lateral decubitus position is preferred due to ease of access to the bony points of fixation and direct visualization of the gluteus muscle belly and tendon.

An approximately 6–8-cm incision, based on the patient's size, was then made and centered over the greater trochanter. In comparison to a standard posterior approach to the hip, as commonly used for THA, the incision is usually slightly anterior to the mid-portion of the trochanter and not curved posteriorly. However, if the repair is being done concurrently with an arthroplasty, a standard posterior approach incision may be utilized. A Charnley-like retractor was used for enhanced visualization. Trochanteric bursal tissue was then excised with electrocautery, exposing the gluteus medius and minimus tendons (**Figure 1A and B**).

The greater trochanter was then debrided down to the bleeding bone using a rongeur or rasp. Two triple-loaded Corkscrew anchors (Arthrex, United States of America) were then placed into the tip of the greater trochanter, after creating pilot holes with an awl. The standard silver awl for this anchor is commonly found in the Arthrex shoulder repair tray, which is used for shoulder arthroscopy. They are also available as a disposable item if a shoulder repair tray is not available. Alternatively, a triple-loaded Fibertak anchor (Arthrex, United States of America) can be employed, which utilizes a disposable drill rather than an awl, for surgeons who prefer an all-suture-based anchor. Placement of the two triple-loaded anchors allowed for six horizontal mattress sutures within the repair construct (**Figure 1C**). Sutures were made using a large free needle at the myotendinous junction of the gluteus medius and minimus.

In the presence of tenuous tissue, the repair can be augmented with a dermal allograft (ArthroFLEX, United States of America). This acellular dermal allograft tissue is available in 1-, 2-, and 3-mm thickness, with the author's preference for a 2-mm thickness in gluteal repair. The dermal allograft was cut into a trapezoidal shape, with the longer side used proximally and the shorter side used distally in the repair. The size of the graft was determined based on the size of the tear, typically measuring 2.5–3.5 cm proximally and 2.0–2.5 cm distally, with a length of 3.0–4.0 cm. The 12 suture strands were passed through the dermal graft using either a free needle or a rotator cuff suture passing device (**Figure 1D**).

The sutures were then tied down into place for a total of six horizontal mattresses to the greater trochanter (**Figure 2A**). This addresses the proximal row of a double-row repair construct.

One limb of each suture was then passed through two lateral row anchors to create a cross pattern of overlapping sutures. The authors' preference is to use PEEK-tipped 4.75 mm Swivelock anchors (Arthrex, United States of America). A Backup Fixation Kit (Arthrex, United States of America) was employed, as it contains a drill, tap, and one anchor for the repair construct,

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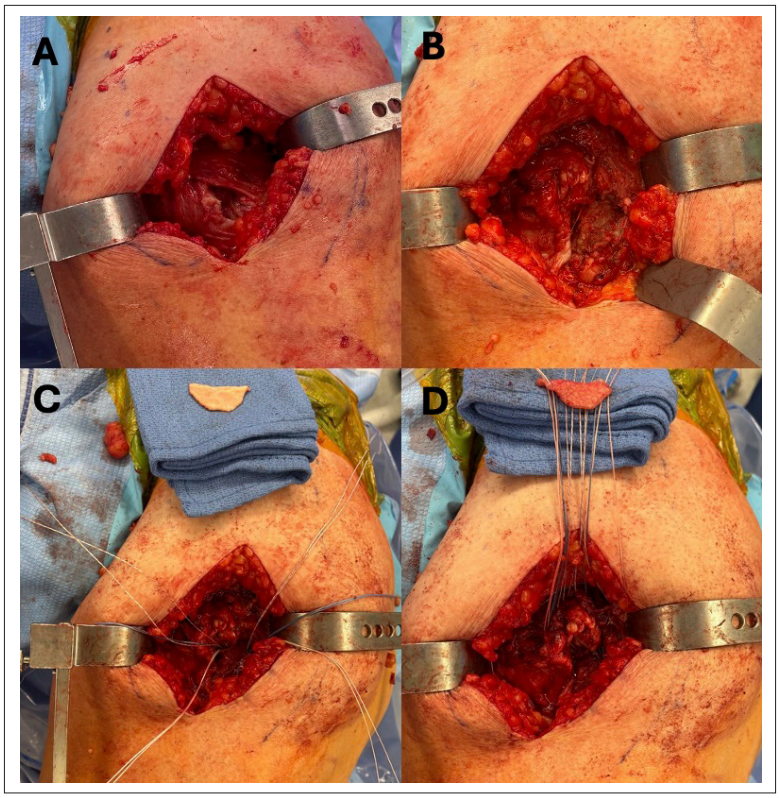

Figure 1. Direct view of the glute medius tear of the left lower extremity in the lateral decubitus position. (A & B) A Charnley retractor was used for enhanced visualization. After placement of two corkscrew anchors, a total of six horizontal mattress strands were passed through the tissue at the myotendinous junction. (C) A dermal allograft cut specifically into the shape of the gap is presented at the top of the figure. (D) After cutting the dermal allograft into a congruent shape to match the gap in the tear, all 12 sutures were passed through the tendon with a suture passing device.

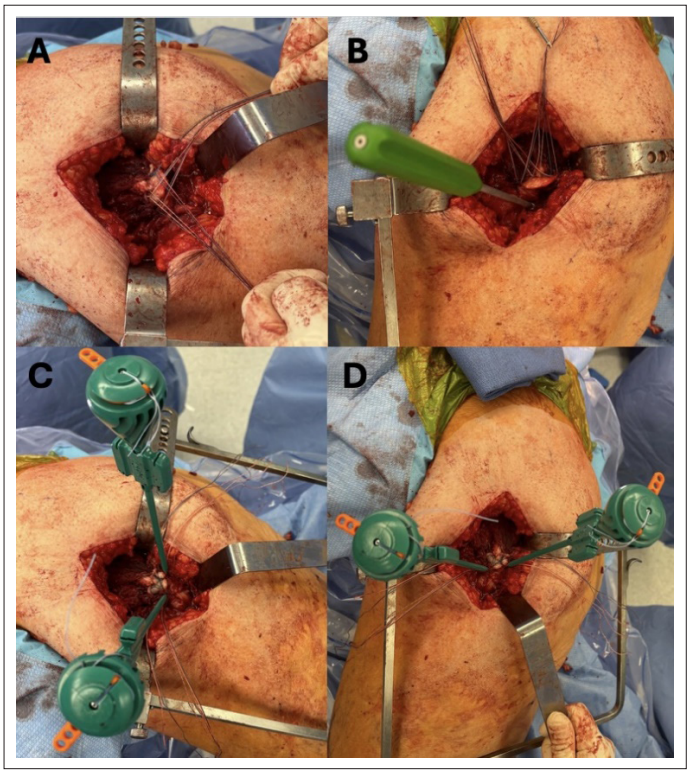

Figure 2. A total of six horizontal mattress sutures are tied in place, forming the proximal row of the double row repair construct. (A) A pilot hole was made just proximal to the vastus ridge. (B) A pilot hole was made just proximal to the vastus ridge. (C & D) Two lateral row SwiveLock anchors were then malleted into place, completing a double-row repair.

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along with one additional anchor. The drill was used to create two pilot holes, located just proximal to the vastus ridge (**Figure 2B**).

The pilot holes were then tapped before the anchors were malletted into place. Care must be taken to evenly tension and cleat all 12 sutures in the repair (**Figure 2C** and **D**). The extra sutures from the back of the anchor can also be incorporated into the construct or left in place if not needed. The hip was then taken through a range of motion, specifically rotation, to confirm the integrity of the repair (**Figure 3A**). The hip was then irrigated copiously and closed in standard fashion with absorbable suture for the fascia and skin.

A similar construct can also be employed in the setting of hip arthroplasty, either at the time of primary surgery or in a revision setting. With a posterior approach to the hip, the gluteus medius and minimus tendons should be inspected. When a tear is encountered (**Figure 3B**), a repair is warranted (**Figure 3C**). A 2-mm-thick graft should be used and cut to the size of the defect, regardless of whether a prior THA was performed. During THA, it is recommended to complete the implantation of the prostheses before repairing the abductor muscles and to perform capsular closure thereafter. Notably, anchor placement must avoid contact with or compromise of the femoral stem.

Postoperative rehabilitation following gluteus tendon repair occurs over 3–6 months and aims to protect the repair while restoring strength, function, and mobility. Phase I (weeks 0–5) focuses on reducing pain, swelling, and inflammation and promoting wound healing. Patients maintain protected weight-bearing using a walker, crutches, or a hip abduction orthosis, as directed by the surgeon. Early interventions include gentle passive mobilization (avoiding adduction), manual therapy, and limited muscle activation. A stationary bike without resistance may be used for mobility. Progression to Phase II requires minimal pain with Phase I exercises, 90° of pain-free hip flexion, and a normalized heel-

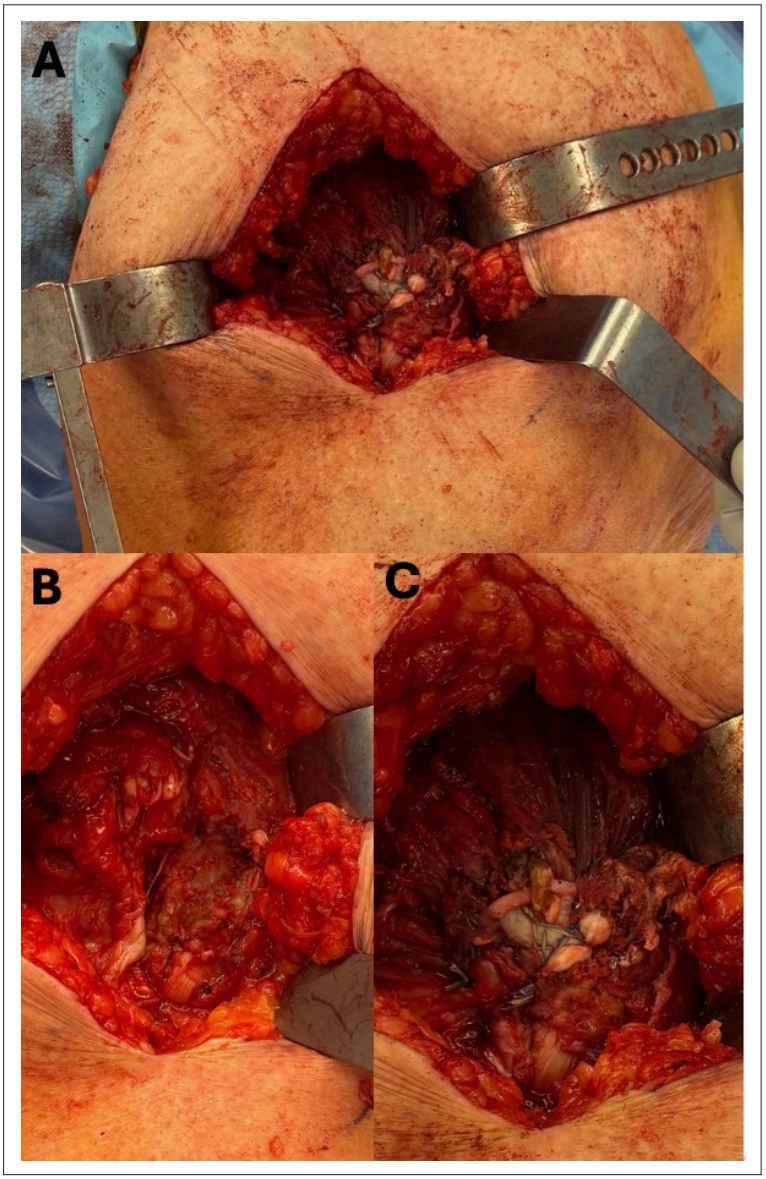

Figure 3. Double-row gluteus medius repair associated with total hip arthroplasty. (A) Completed double row repair of the gluteus medius tendon. (B) Presentation of a gluteus medius tear, seen during the initial procedure for a total hip arthroplasty. (C) Double-row repair in the setting of total hip arthroplasty.

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to-toe gait with the use of crutches or a walker. Phase II (weeks 6–10) emphasizes range of motion (while not exceeding 105° flexion or adduction past neutral), manual therapy, and strengthening. After portals have healed, pool therapy begins with chest-deep water walking and decreases the depth. Progression criteria include minimal pain with Phase II exercises, pain-free gait with crutches, hip flexion strength >60% of the contralateral side, and ≥105° of hip flexion with 20° of external rotation. Phase III focuses on endurance and conditioning, gait normalization, neuromuscular control, and symmetrical hip motion. Patients are gradually transitioned off assistive devices. A stationary bike with slight resistance, an elliptical machine without resistance, or a treadmill can be used. Discharge is based on a symmetrical range of motion, hip flexion strength >85% of the opposite side, and return to baseline cardiovascular fitness.

DISCUSSION

GTPS can be debilitating and impact quality of life. Both open and arthroscopic approaches have been used for gluteal tendon repair (**Table 1**). However, open repair offers greater visualization and reduced operative time for large or retracted tears.[27] The open technique described here provides a comprehensive approach for chronic, full-thickness gluteus medius and minimus tendon tears with poor tissue quality, applicable in both native hips and post-THA settings.

Table 1. Comparison of surgical techniques for gluteal tendon repair

Surgical approach	Graft type	Suture technique	Anchor type	No. of sutures	Weight-bearing (WB) protocol	Key notes
Open double-row, dermal allograft–augmented (presented technique)	2 mm dermal allograft, trimmed to defect size	Six horizontal mattress sutures (proximal) with a crossing distal row	Proximal: two triple-loaded anchors; distal: two Swivelock	12 strands (six mattress pairs)	Protected WB ~5–6 weeks; phased rehabilitation 0–6 months	Max footprint coverage; suitable for chronic/retracted tears; compatible with total hip arthroplasty
Open single-row repair	None typically	Simple/mattress single-row	1–2 suture anchors, single-row	4–6	Partial WB 4–6 weeks	Simpler, shorter surgery; weaker fixation; higher retear risk
Endoscopic/arthroscopic repair	Occasional allograft/bioinductive patch	Single or double mattress; limited space	1–2 anchors via portals	4–8	Partial WB 4–8 weeks	Minimally invasive; faster early recovery; technically challenging for large tears

Chronic, full-thickness, full-width tears often exhibit limited tendon motility and an increased risk of suture pull-out.[3] Dermal allograft provides structural reinforcement and enhances tendon healing.[3] In superior gluteal reconstruction, dermal allograft has shown favorable outcomes at 1 year. Browning *et al*.[24] found that a significant proportion of patients achieved the Patient Acceptable Symptomatic State for the Hip Outcome Score-Activities of Daily Living Subscale, the Sport-Specific Subscale, and the modified Harris Hip Score at 62.5, 50, and 75%, respectively.[24]

However, the technique described has limitations and risks. Open repairs are more invasive and can result in increased blood loss, although this is rare. Graft usage increases cost and operative time. Risks include trochanteric fracture from suture anchor placement and infection, although these are rarely reported in the literature.[4] Additionally, retear or incomplete symptom relief is possible.

In summary, gluteal tendon tears can cause significant pain and weakness, particularly in patients who have undergone THA. While both endoscopic and open approaches yield positive outcomes, the open double-row repair provides optimal exposure for managing large, chronic, or poor-quality tears. This technique facilitates precise tendon mobilization, allowing dermal allograft augmentation to enhance tendon-to-bone healing.

Clinical relevance

The double-row, dermal allograft-augmented repair improves tendon-bone contact, load sharing, and fixation strength, thereby promoting enhanced biological healing. This approach may be particularly beneficial in cases of chronic or poor-quality tendon tears. Future prospective studies are warranted to assess patient outcomes, retear rates, and long-term durability compared with single-row and endoscopic methods.

CONCLUSION

The double-row, dermal allograft-augmented repair improves tendon–bone contact, distributes load effectively, and strengthens fixation at the repair site. Dermal allografts enhance neovascularization and increase tensile strength, promoting better wound healing. This technique may serve as a reproducible and standardized approach for chronic, retracted, or poor-quality gluteal tendon tears.

AUTHORS' DISCLOSURE

The authors declare they have no competing interests. Northwell IRB has an exemption for lower extremity repairs; therefore, no ethics approval/clearance was needed for this study (Study no.: 22-0551-LIJ Valley Stream). All intraoperative images are fully de-identified. Written informed consent for publication was obtained from the patients.

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