Original Article With Video Illustration

Influence of Muscle Fatty Degeneration on Functional Outcomes After Endoscopic Gluteus Medius Repair

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Purpose: To report the early outcomes of endoscopic repair of tears of the gluteus medius tendon and to determine whether the fatty degeneration had an influence on clinical results. **Methods:** Between October 2012 and June 2014, data were prospectively collected and retrospectively reviewed for all patients who underwent endoscopic gluteus medius repair. Patients were assessed pre- and postoperatively using the modified Harris hip score, the nonarthritic hip score, and visual analog scale for pain. The gluteus minimus and the 3 distinct parts of the gluteus medius (anterior, middle, and posterior) were assigned a grade of fatty degeneration on preoperative magnetic resonance imaging scans. **Results:** Twenty-two hips (in 20 patients) were assessed with the mean follow-up of 31.7 months (range: 24 to 47 months). There were 15 partial-thickness and 7 full-thickness tears. No patient was lost to follow-up. The mean age at the time of surgery was 66 years (range: 45 to 82 years). Of the 20 magnetic resonance imaging–assessed hips included in the study, 14 had fatty degeneration of the gluteus medius (partial-thickness tears: n = 8, full-thickness tears: n = 6). The mean gluteus medius fatty degeneration index was 1.57 (range: 0.33 to 3.33). Postoperative improvement was seen in modified Harris hip score (33.7 points vs 80.2 points, $P = .0001$), nonarthritic hip score (47.7 points vs 76.8 points, $P = .0001$), and in the visual analog scale for pain (7.2 vs 3.2, $P < .05$). Increasing preoperative fatty degeneration index of the gluteus medius correlated with decreased postoperative functional hip score values (regression coefficient, 0.5839; $P < .0001$). Tear characteristics (partial or full-thickness) did not correlate with fatty degeneration or muscular atrophy and did not affect postoperative outcomes. **Conclusions:** Endoscopic surgical repair can be an effective treatment of gluteus medius tears in the short term. Fatty degeneration of the gluteus medius and minimus has a negative impact on clinical outcomes of endoscopic gluteus medius repair. **Level of Evidence:** Level IV, therapeutic case series (no control group).

Gluteus medius and minimus tendon tears had been recognized as a major cause of recalcitrant greater trochanteric pain syndrome.[1-3] Some authors have compared gluteus medius and minimus tendon insertions on the greater trochanter (GT) with those of the rotator cuff on the humerus greater tuberosity, leading to define hip abductor tears as "rotator cuff tears of the hip."[1,4-6] Tears in the gluteus medius and minimus tendons have been recognized as an important cause of recalcitrant greater trochanteric pain syndrome. Because of the frequency of partial-thickness undersurface tears, this relatively unknown pathology is often misdiagnosed and left untreated.[7] Surgery is indicated in case of 4 associated conditions: (1) duration of symptoms greater than 6 months, (2) magnetic resonance imaging (MRI) showing a tendon tear, (3) positive ultrasound-guided infiltration test, and (4) the absence of either retraction of or an evolved fatty degeneration of the gluteus medius and minimus muscles.[5] Goutallier was the first to highlight the link between preoperative muscle fatty degeneration and poor outcomes after rotator cuff repair.[3] These findings seem to extend to the repair of the hip abductor muscles.[8,9] Endoscopic repair of partial- or full-thickness

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tear resistant to conservative treatment seems to give satisfactory results,[10] but to date, only one study has examined the influence of muscular fatty degeneration on the functional results of endoscopic repair of gluteus medius tendon tears.[8]

The purpose of our study was to report the early outcomes of endoscopic repair of partial- and full-thickness tears of the gluteus medius tendon and to determine whether the fatty degeneration had an influence on clinical results. Our main hypothesis was that endoscopic surgical repair would be an effective treatment of greater trochanteric pain syndrome associated with gluteus medius tears but that fatty degeneration severity of the gluteus minimus and medius affects clinical outcomes.

Methods

Patient Selection

A retrospective analysis of prospectively collected data was performed of patients who underwent hip endoscopy for greater trochanteric tendinobursitis recalcitrant to medical treatment between October 1, 2012, and June 30, 2014, by one senior surgeon (M.T.). The flow of patients is shown in Figure 1. Continuous series of 22 endoscopic gluteus medius tendon repairs with the same surgical procedure were eligible for evaluation. Inclusion criteria were hip abductor tendon repair and a minimum of 2 years' follow-up from index surgery. Exclusion criteria were ipsilateral osteoarthritis of the hip and previous hip surgery.

Preoperative diagnosis was based on clinical examination, radiograph, and MRI findings. These patients had persistent pain over the GT, symptoms compatible with hip abductors tendinobursitis, such as pain at ipsilateral unipodal weight bearing, and other positive clinical findings described by Lequesne.[11] Indications for surgery were chronic pain and disability with clinical and MRI findings compatible with abductor tendon tear associated with failure of 6 months of conservative measures that included anti-inflammatory drugs, physical therapy, and corticosteroid injections. Preoperative MRI showed 7 full-thickness tears and 15 partial tears of hip abductor tendons.

Surgical Technique

Under a general anesthesia with the patient in the lateral decubitus position, the hip was help in 20° abduction (with pillow bolters). The whole operated limb was included in the surgical field. Three portals were routinely performed (1 distal, 2 proximal), but supplementary portals could be added as required. The iliotibial band was opened in a cruciform fashion 5 cm proximally and distally to the summit of the GT, and the subtrochanteric bursa was then resected. The tendons

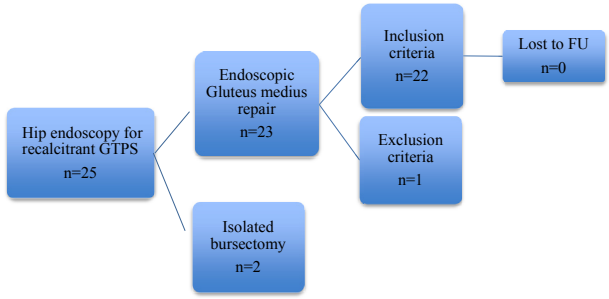

Fig 1. Patient flow through the study. (FU, follow-up; GTPS, greater trochanteric pain syndrome.)

were inspected and palpated with a palpation hook to identify lesions. The intraoperative tear patterns and the macroscopic appearance of the tendons were recorded. Pathologic tissue was removed using shaver down to the healthy tissue. In case of suspicion of a partial-thickness tear, a transtendinous approach was performed.[12] Then the GT was abraded using a motorized burr. All aggressive osteophytes had to be removed and the bald zone of GT's summit had to be reduced.[9] Side-to-side repair was performed using 1 or 2 anchors (U-shaped, with 2 to 4 sutures). In cases of full-thickness tears, double-row repair with suture bridging was used to increase the contact area of the tendon along the anatomic footprint (Fig 2). The iliotibial band was left open at the end of the procedure. No drains were required because blood loss was minimal (Video, available at www.arthroscopyjournal.org).

Postoperative Management

Rehabilitation was initiated immediately with non-weight-bearing for 6 weeks, avoiding passive lateral rotation, passive adduction, active internal rotation, and active abduction for the first 6 weeks. An abduction brace had to be worn between sessions. Hip motion was extended up to 90° flexion for the first 3 weeks. At 6 weeks, weight bearing was progressively resumed. By 6 months, gait had to be normal and painless.

Data Collection

Preoperative clinical data were registered at a clinic visit. Visual analog scale for average pain on a numeric scale from 0 to 10 (0 = no pain), 2 functional hip scores, the modified Harris hip score (MHHS),[13] the non-arthritic hip score (NAHS),[14] body mass index, and the date of early symptoms were collected. Postoperative data added a patient-rated overall satisfaction score (PROS) on a numeric scale from 1 to 10 (10 = extremely satisfied), which enquired if the patient could lie on the operated side and if the patient had forgotten the operated hip. Data were collected at a preoperative clinic visit, 1 year postoperatively, and at the last follow-up either at a clinic visit or by a phone call.