

Endoscopic Transtendinous Repair for Partial-Thickness Proximal Hamstring Tendon Tears

Timothy J. Jackson, M.D., Anthony Trenga, B.A., Dror Lindner, M.D.,
Youseff El-Bitar, M.D., and Benjamin G. Domb, M.D.

Abstract: Partial tears of the proximal hamstring tendon can successfully be managed with tendon repair in cases of failed conservative management. As in partial-thickness gluteus medius repair, a transtendinous technique can be used to repair partial-thickness undersurface tears of the hamstring origin. This report details an endoscopic transtendinous approach for the treatment of partial-thickness hamstring tendon tears.

Hamstring tears are common injuries in athletes, with most injuries occurring at the myotendinous junction from combined hip flexion and knee extension. Most of these injuries can be successfully managed with conservative treatment.¹ Injuries to the tendinous insertion are less commonly reported and partial tears even less commonly.

The treatment of hamstring insertion tendon tears remains controversial, but accepted indications for partial-thickness tears are those that remain symptomatic despite conservative management.^{2,3} Good outcomes have been reported in partial-thickness hamstring insertion tears treated by open means.⁴ Endoscopic surgical techniques around the hip joint have become more common, addressing peritrochanteric disorders, deep gluteal syndrome, and hamstring tendon tears.⁵⁻⁷ Previous reports have described endoscopic hamstring

insertion repair.⁸ The focus of this report is to highlight an endoscopic transtendinous approach to partial-thickness hamstring tendon tears, similar to the endoscopic transtendinous approach described by Domb et al.⁵ used for gluteus medius repair.

Surgical Technique

The patient is positioned prone on chest rolls with the arms in 90° of abduction and all bony prominences well padded. The entire lower extremity is prepared and draped. By use of a marking pen, surface landmarks can be drawn to help orient the surgeon to relevant structures, including the ischial tuberosity, sciatic nerve, and hamstring tendons (Table 1). A posterolateral portal is made under fluoroscopic guidance to avoid injuring the sciatic nerve, which lies 1.2 cm lateral to the ischial tuberosity,⁹ and a posteromedial portal is made under direct visualization with a 70° arthroscope (Fig 1). Often, the posterolateral portal is made first as the trajectory of blinded fluoroscopy-guided instrument insertion is aimed away from the sciatic nerve from this insertion point.

After creation of the 2 portals, the 70° arthroscope is switched to the posteromedial portal, viewing laterally. By use of a curved shaver (Smith & Nephew, Andover, MA), the surgeon removes the bursa from the ischium, using tactile feedback on the ischium and fluoroscopy to confirm the location of the shaver. The sciatic nerve is then identified, by a combination of blunt dissection and use of a mechanical shaver, from medial to lateral. Identification of the nerve is the first and most important step in this procedure. The posterior cutaneous nerve of the thigh can be located superficial and slightly lateral to the sciatic nerve in the subgluteal space.

From the American Hip Institute (T.J.J., A.T., D.L., Y.E-B., B.G.D.), Chicago, Illinois; Congress Medical Associates (T.J.J.), Pasadena, California; Hinsdale Orthopedics (B.G.D.), Hinsdale, Illinois; and Loyola University Stritch School of Medicine (B.G.D.), Chicago, Illinois, U.S.A.

The authors report the following potential conflict of interest or source of funding: T.J.J., A.T., D.L., and Y.E-B. receive support from American Hip Institute (nonprofit research organization). Research intern stipend. No monies were directly related to writing or publication of this study. B.G.D. receives support from MAKO Surgical and Arthrex. Fellowship training grant and research support. Member of AANA Learning Center Committee. American Hip Institute. Monies paid to American Hip Institute, a nonprofit organization dedicated to hip preservation research and education.

Received July 18, 2013; accepted September 6, 2013.

Address correspondence to Benjamin G. Domb, M.D., American Hip Institute, 1010 Executive Ct, Ste 250, Westmont, IL 60559, U.S.A. E-mail: DrDomb@americanhipinstitute.org

*© 2014 by the Arthroscopy Association of North America
2212-6287/13497/\$36.00*

<http://dx.doi.org/10.1016/j.eats.2013.09.007>

Table 1. Pearls and Pitfalls of Transtendinous Repair of Proximal Hamstring Injuries

Pearls and Pitfalls	
Anatomic orientation	A familiarity with the location of the hamstring insertion on the posterolateral border of the ischium, as well as the close proximity of the sciatic nerve, is paramount to minimizing devastating nerve injury.
Indications	A trial of conservative treatment is warranted for partial tears. A diagnostic and therapeutic ultrasound-guided injection with cortisone can be helpful.
Patient position	The prone position requires extra precautions from all surgical team members, anesthesia, and nursing. Correct positioning and padding are required.
Portals and access	We advocate using fluoroscopy to establish portals, aiming from lateral to medial so that any plunge is toward the ischium, not the sciatic nerve. The first 2 portals are made in line with the gluteal crease in case endoscopy is aborted in favor of open repair.
Sciatic nerve	Identification and constant acknowledgment of the sciatic nerve throughout the procedure are important.
Suture management	Additional portals are necessary to manage sutures.
Tendon repair	A burr should be used to remove cortical bone to create a proper healing surface.

After clearance of bursa tissue and identification of the nerves, attention is turned to the hamstring insertion. In partial tears in which there is no retraction and only undersurface tearing, the tendons will appear intact overlying the ischium. By use of a beaver blade, a longitudinal cut is made into the tendon down to bone to show the undersurface delamination. The location of this cut is determined by palpation of the thin, partially torn tendon attachment. In these cases the partial-thickness tears will easily lift off of the ischium (Figs 2A-2C). This separation can easily be seen on magnetic resonance imaging (Fig 3).

Video 1 shows the undersurface detachment of the hamstring tendon insertion and subsequent repair. The ischium underlying the tendons is decorticated with a 5.5-mm round burr (Smith & Nephew) to create a bony healing bed. Before repair, accessory portals are created, a superolateral portal and, if necessary, an inferolateral portal (Fig 1). The tendon is repaired with 5.5-mm metal Corkscrew anchors (Arthrex, Naples, FL). Depending on the size of the bare ischium, 2 to 3 anchors are used. By use of double-loaded suture anchors, 1 limb is placed through either side of the tendon edge with a 90° SutureLasso (Arthrex) with a shuttle technique (Fig 2). Suture management is important to work effectively and efficiently, using accessory portals for passage and storage of sutures (Fig 3). Clear, partially threaded cannulas (Arthrex) are placed in all portals. The sutures are not tied until they

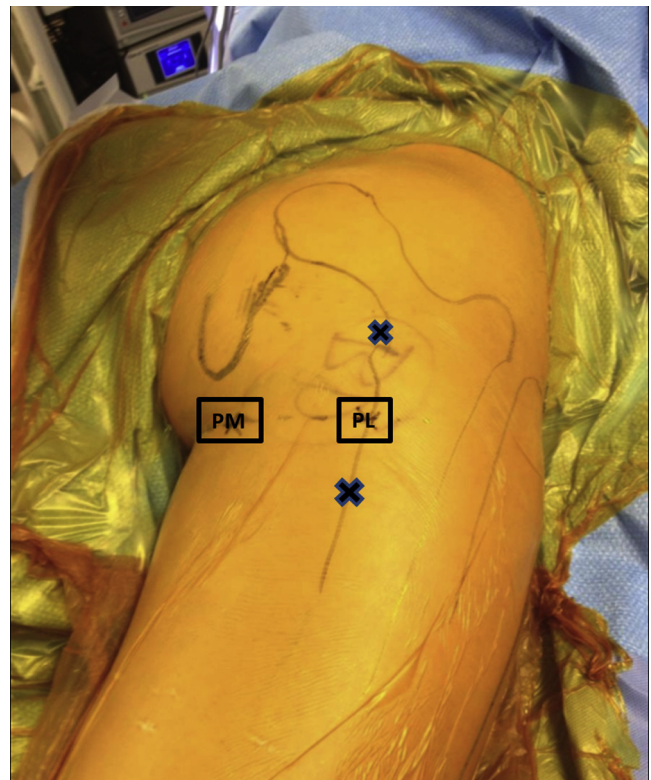


Fig 1. The patient is positioned prone with the entire right lower extremity draped free. The posteromedial (PM) and posterolateral (PL) portals are marked. Access to the ischium is obtained first through the posterolateral portal under fluoroscopic guidance. Accessory portals (X) are used for suture passage and management as necessary.

have all been passed, to aid in the passage of the sutures under the tendon edge. After all the sutures are tied, the repair is probed to ensure secure fixation. The inflow is turned off, and fluid is allowed to drain from the outflow before removal of all instruments. The portals are closed with buried resorbable sutures, and sterile dressings are securely applied.

A hip brace (X-Act ROM; Don Joy, Vista, CA) is worn with initial restriction of flexion to 30° for 2 weeks. Patients are restricted to 20 lb of partial weight bearing with crutches for 6 weeks. Passive range of motion begins at 2 weeks, with active range of motion at 4 weeks; all the while, patients are not allowed to engage in excessive hamstring stretching.

Discussion

We have presented a surgical technique to repair partial hamstring insertion tears using an endoscopic transtendinous repair technique. This is similar to other transtendinous repairs such as gluteus medius and rotator cuff repair.^{5,10} Repair of partial hamstring tendon tears has been described using an open technique with good results.^{3,4} The ability to repair tendon tears around the hip by less invasive means has become possible as hip

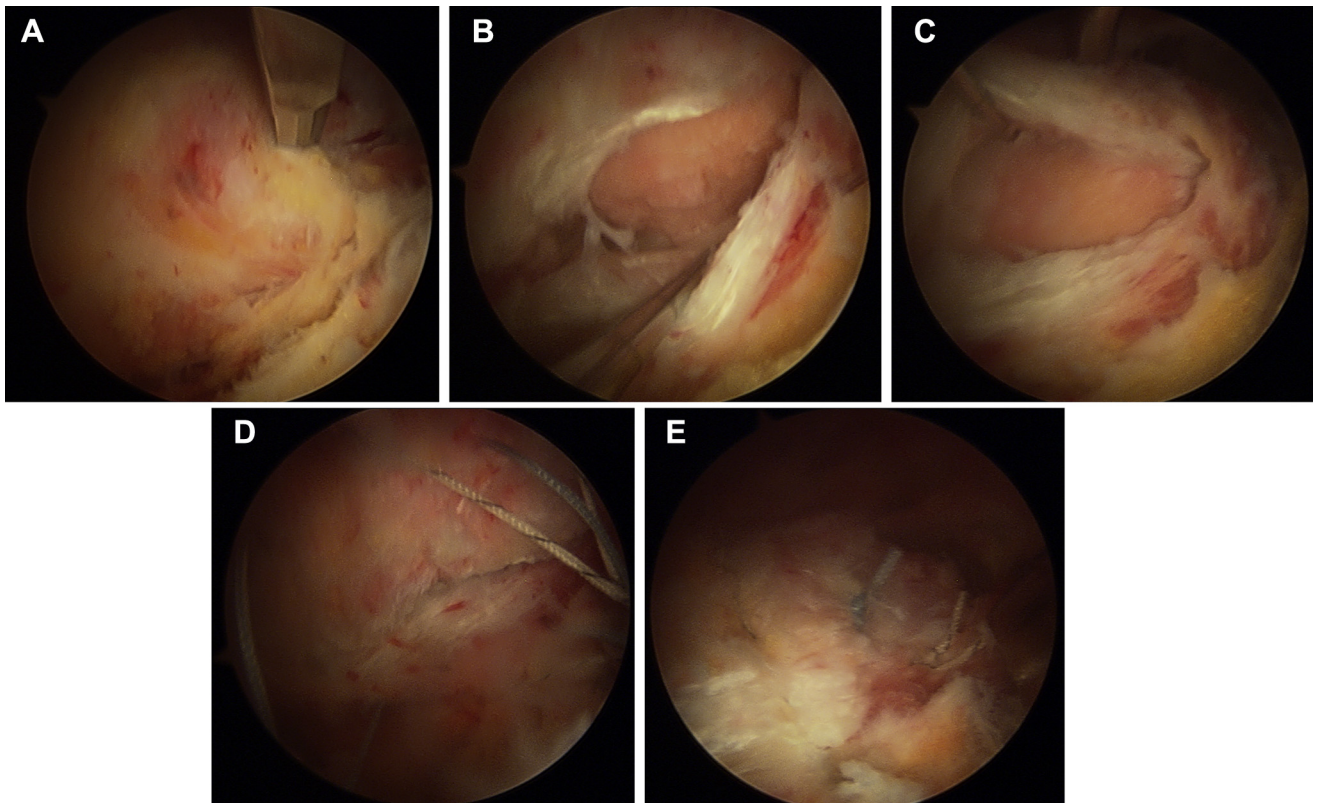


Fig 2. (A) Endoscopic photograph of right hamstring insertion, viewing from posteromedial portal with 70° arthroscope. The incision is made into the hamstring insertion with a beaver blade. (B) Elevation of lateral edge of hamstring insertion. (C) Elevation of medial edge of hamstring insertion. A burr is used to decorticate the bone underlying the free edges. (D) After passage of 2 anchors and all sutures, tension on the sutures reapproximates the free ends. (E) Final repair with secure fixation of hamstring insertion to ischial tuberosity.

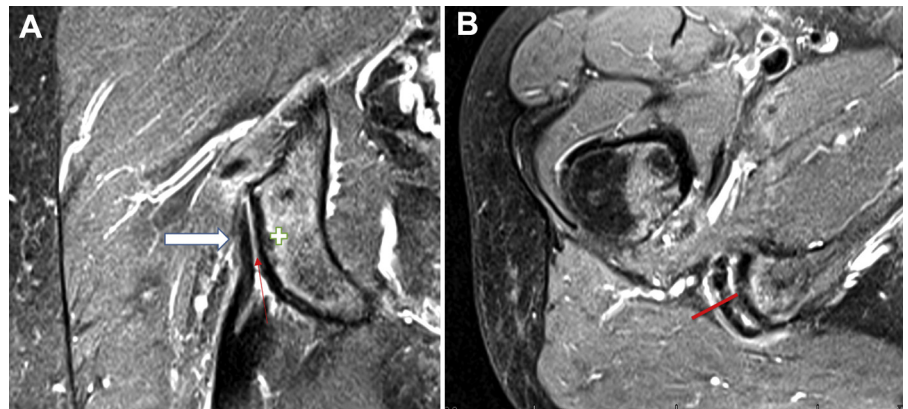
arthroscopy techniques and equipment have improved. The goal of this surgical technique is to achieve similar, if not improved, result when compared with open repair.

The advantages of an endoscopic approach are the minimally invasive nature of endoscopy that allows for smaller incisions and improved visualization. In open hamstring repair, the overlying gluteus maximus requires significant retraction and makes visualization of the hamstring insertion difficult. The endoscopic approach does not require gluteus maximus retraction and allows improved visualization of the hamstring

insertion to closely examine the nature of the tendon tear and perform precise ischial cortical burring and tendon repair.

The advantages of endoscopic repair must be weighed against the risks. This is an endoscopic procedure, so fluid extravasation is inherent and prolonged surgical times pose significant consequences. Close monitoring of soft-tissue swelling and abdominal swelling is important. If swelling becomes severe and the gluteal compartment or hamstring compartment becomes tense, the endoscopic procedure can be aborted and

Fig 3. (A) Coronal T2-weighted image with fat saturation showing the common insertion of the hamstring tendons (white arrow) into the ischial tuberosity. One should note the clear separation, noted by fluid (red arrow), between the tendons and the ischium (plus sign). (B) Axial T2-weighted image with fat saturation showing separation of hamstring from its insertion. The red line indicates the location and angle of approach for the beaver blade to make a longitudinal cut in the partial hamstring tendon tear.



repair completed with an open approach. Given the proximal, subgluteal location and prone position, intra-abdominal swelling can occur. This should be closely monitored as surgical time increases. Another major risk is damage to the sciatic nerve, which lies 1.2 cm from the lateral aspect of the ischium. This structure can be easily identified and protected throughout the course of the procedure. Failure to identify it could result in iatrogenic damage. With these significant risks in mind, this procedure should not be attempted without extensive experience in endoscopic hip surgery.

In conclusion, the described technique offers an endoscopic approach to partial hamstring tendon insertion tears that have failed conservative management. Clinical outcome studies are warranted to further analyze the efficacy of this procedure.

References

1. Prior M, Guerin M, Grimmer K. An evidence-based approach to hamstring strain injury: A systematic review of the literature. *Sports Health* 2009;1:154-164.
2. Wood DG, Packham I, Trikha SP, Linklater J. Avulsion of the proximal hamstring origin. *J Bone Joint Surg Am* 2008;90:2365-2374.
3. Aldridge SE, Heilpern GN, Carmichael JR, Sprowson AP, Wood DG. Incomplete avulsion of the proximal insertion of the hamstring: Outcome two years following surgical repair. *J Bone Joint Surg Br* 2012;94:660-662.
4. Bowman KF Jr, Cohen SB, Bradley JP. Operative management of partial-thickness tears of the proximal hamstring muscles in athletes. *Am J Sports Med* 2013;41:1363-1371.
5. Domb BG, Nasser RM, Botser IB. Partial-thickness tears of the gluteus medius: Rationale and technique for trans-tendinous endoscopic repair. *Arthroscopy* 2010;26:1697-1705.
6. Polesello GC, Queiroz MC, Domb BG, Ono NK, Honda EK. Surgical technique: Endoscopic gluteus maximus tendon release for external snapping hip syndrome. *Clin Orthop Relat Res* 2013;471:2471-2476.
7. Martin HD, Shears SA, Johnson JC, Smathers AM, Palmer IJ. The endoscopic treatment of sciatic nerve entrapment/deep gluteal syndrome. *Arthroscopy* 2011;27:172-181.
8. Domb BG, Linder D, Sharp KG, Sadik A, Gerhardt MB. Endoscopic repair of proximal hamstring avulsion. *Arthrosc Tech* 2013;2:e35-e39.
9. Miller SL, Webb GR. The proximal origin of the hamstrings and surrounding anatomy encountered during repair. Surgical technique. *J Bone Joint Surg Am* 2008;90(suppl 2, pt 1):108-116.
10. Seo YJ, Yoo YS, Kim DY, Noh KC, Shetty NS, Lee JH. Trans-tendon arthroscopic repair for partial-thickness articular side tears of the rotator cuff. *Knee Surg Sports Traumatol Arthrosc* 2011;19:1755-1759.