Extra Articular Arthroscopy
Saturday, October 15, 2011 • 9:10 – 9:55am
General Session

SubGluteal Space - Sciatic Nerve
Hal Martin, DO USA

Hamstring Repair
Carlos Guanche, MD USA

Gluteus Maximus in External Snapping Hip
Giancarlo Polesello, MD BRAZIL

Ischiofemoral Impingement
J W Thomas Byrd, MD USA

Ischiofemoral Impingement
Marc Safran, MD USA
• Anatomy of the Subgluteal Space

• Endoscopic Treatment of Sciatic Nerve Entrapment/Deep Gluteal Syndrome

• Entrapment Sites of the Sciatic Nerve

• Piriformis

• Obturator Internus

• Greater Sciatic Notch

• Vascular

• Ischiofemoral Impingement

• Ischium

• Greater Trochanter

• Lesser Trochanter

• Hamstrings

• Pudendal Nerve

• Physical Examination

• Diagnostics

References


Endoscopic Hamstring Repair and Ischial Bursectomy

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Endoscopic Hamstring Repair and Ischial Bursectomy

INTRODUCTION

Hamstring injuries are common in athletic populations and can affect all levels of athletes.\textsuperscript{3, 5, 9, 11} There is a continuum of injuries that can range from musculotendinous strains to avulsions and most are strains that occur at the musculotendinous junction.\textsuperscript{3, 5} By definition a strain is a partial or complete disruption of the musculotendinous unit.\textsuperscript{3, 4, 11} Hamstring strains can result in significant pain and time lost to sport.\textsuperscript{3, 5} Most do not require surgical intervention and resolve with a variety of modalities and rest.

Avulsions of the proximal hamstring tendons, however, can cause more significant disabilities. These typically avulse from the ischium and are much less common.\textsuperscript{2, 12, 14} The diagnosis of a complete avulsion can be difficult to make without the appropriate imaging and delay in diagnosis can complicate the management, especially when patients present chronically.\textsuperscript{5, 7, 14, 16} While treatment of the common hamstring strain is uncomplicated, treatment of proximal hamstring avulsions is controversial in the literature.\textsuperscript{5, 7, 12, 21}

Another aspect that has been poorly documented in the literature is refractory ischial bursitis secondary to partial ruptures of the hamstring origin. These injuries can be debilitating and often lead to significant limitations of activities in the population most affected by the problem, namely runners. There is limited data concerning the treatment of partial avulsions.\textsuperscript{6, 17} Cohen et al. recommends consideration of non-operative treatment for acute partial avulsions (one tendon ruptures).\textsuperscript{6} Lempainen et al., reported
on a series of 48 partial avulsion repairs, all of which failed initial non-operative treatment. The conjoint tendon of the biceps femoris and semitendinosus was involved in all of these cases. They reported good and excellent results in 88% of the cases and 41 were able to return to their previous level of sports at an average of five months.

With the recent expansion of hip arthroscopy, the natural progression has been to explore other areas that may perhaps be amenable to endoscopic or arthroscopic visualization and perhaps treatment. With that in mind, this chapter will discuss the clinical presentation, evaluation, management, and endoscopic treatment of hamstring proximal avulsion injuries and chronic partial tearing with ischial bursitis.

ANATOMY

With the exception of the short head of the biceps femoris, the hamstring complex originates from the ischial tuberosity and inserts distally below the knee on the proximal tibia. The tibial branch of the sciatic nerve innervates the semitendinosus, semimembranosus, and the long head of biceps femoris, while the short head of the biceps femoris is innervated by the peroneal branch of the sciatic nerve. The proximal hamstring complex has a strong bony attachment on the ischial tuberosity (Figure 1). Their footprint on the ischium is comprised of the semitendinosus and the long head of biceps femoris beginning as a common proximal tendon and footprint, while there is a distinct semimembranosus footprint. The semimembranosus footprint is
lateral (and anterior) to the crescent-shaped footprint of the common insertion of the semitendinosus and long head of the biceps femoris.

The sciatic nerve is the most important neurovascular structure of the posterior thigh. It typically lies immediately lateral to the proximal hamstring tendon complex at an average of 1.2 cm from the ischial tuberosity. Certainly, this structure needs to be carefully identified during any surgical repair. Additionally, sciatic nerve neurolysis is sometimes indicated during surgical treatment of chronic proximal avulsions. The posterior femoral cutaneous nerve, which supplies sensation to the posterior thigh, is located in the subcutaneous tissue. It begins above the ischial tuberosity and travels lateral to the ischium and into the subcutaneous tissues at the level of the buttock crease. Deep to the gluteus maximus muscle is the inferior gluteal nerve and artery, it is found at the proximal 1/3 of the structure and is approximately 5 cm, on average, above the distal tip of the ischial tuberosity. Immediately medial is the pelvic floor and the rectum. Superiorly, and slightly medial is the insertion of the sacrotuberous ligament.

**MECHANISM OF INJURY**

The typical mechanism of an acute injury is a forced hip flexion with the knee in extension, as is classically observed in waterskiing. However, the injury can result from a wide variety of sporting activities that require rapid acceleration and deceleration

Proximal hamstring avulsion injuries can be classified as acute or chronic depending on the time from injury. Injuries can be categorized as complete tendinous avulsions, partial
tendinous avulsions, apophyseal avulsions, and degenerative (tendinosis) avulsions.\textsuperscript{14} Degenerative tears of the hamstring origin are more insidious in onset and are commonly seen as an overuse injury in middle- and long-distance runners. The mechanism of injury in these patients is presumably repetitive irritation of the medial aspect of the hamstring tendon (typically along the lateral aspect of the tuberosity, where the bursa resides) ultimately causing an attritional tear of the tendon.

Symptoms of ischial bursitis include buttock pain or hip pain, and localized tenderness overlying the ischial tuberosity. Additional symptoms of chronic ischial bursitis may include tingling into the buttock that spreads down the leg. This is presumably from local inflammation and swelling in the area of the sciatic nerve. The symptoms usually worsen while sitting. Clinically, those most affected tend to sit with the painful buttock elevated off their seat.

**IMAGING**

Although, the diagnosis of a common strain is usually made by history and physical examination, plain radiographs are indicated to assure there is not a bony component to the injury. This is especially true in the skeletally immature where an ischial apophyseal avulsion is more likely. Typical radiographic views would be an anteroposterior view of the pelvis, as well as anteroposterior and lateral views of the femur. An MRI examination is indicated to assess the degree of damage and the location of the injury.\textsuperscript{2, 15, 21, 23} A hamstring strain is diagnosed via increased signal intensity on T2-weighted sequences, which represents edema and hemorrhage. Frank tears in the
musculotendinous unit can also be seen. With full thickness tears, the diagnosis is obvious with retraction of the tendon from its attachment at the ischium. Sagittal and coronal T2-weighted sequences best delineate the injury and can estimate the retraction of the hamstring tendon. In situations where there is chronic ischial bursitis and only partial tearing, a more careful analysis of the imaging studies must be undertaken. Typically, the MRI often reveals tendon degeneration, associated thickening, and surrounding soft tissue edema as well as ischial bursitis. Ultrasound examination may be alternative imaging modality for patients unable to undergo MRI, especially if there is access to an experienced technologist familiar with musculoskeletal techniques. 9, 10, 11, 15

**TREATMENT**

To date, there has been no report of endoscopic management of these injuries. After developing experience in the open management of these injuries, the author has subsequently developed an endoscopic technique that allows a safe approach to the area of damage in most of these tears. It is expected that the benefits of a more direct approach, without elevating the gluteus maximus and with the use of endoscopic magnification to protect the sciatic nerve will the management of these injuries and reduce the morbidities associated with the open approach.

**ENDOSCOPIC TECHNIQUE**

Following the induction of anesthesia, the patient is placed in the prone position, with all prominences and neurovascular structures protected. The posterior aspect of the hip is
then sterilized assuring that the leg and thigh are also so that the leg and hip can be re-positioned intraoperatively.

Two portals are then created, 2 cm medial and 2 cm lateral to the palpable ischial tuberosity. The lateral portal is established first. This is done using blunt dissection with a switching stick, as the gluteus maximus muscle is penetrated and the sub muscular plane is created. The switching stick serves to palpate the prominence of the tuberosity and identify the medial and lateral borders of the ischium. The medial portal is then established, taking care to palpate the medial aspect of the ischium. A 30º arthroscope is then inserted in the lateral portal and an electrocautery device is placed in the medial portal. Any remaining fibrous attachments between the ischium and the gluteus muscle are then released, taking care to stay along the central and medial portions of the ischium to avoid any damage to the sciatic nerve. The tip of the ischium and the medial aspect are delineated, the lateral aspect is then exposed with the use of a switching stick as a soft tissue dissector. With the lateral aspect identified, the dissection continues anteriorly and laterally towards the known area of the sciatic nerve. Very careful and methodical release of any soft tissue bands is then undertaken in a proximal to distal direction in order to mobilize the nerve and protect it throughout the exposure and ultimate repair of the hamstring tendon.

With the nerve identified and protected, attention is then directed once again to the area of the tendinous avulsion. The tip of the ischium is identified through palpation with the instruments. The tendinous origin is then inspected to identify any obvious tearing. In
acute tears, the area is obvious and the tendon is often retracted distally. In these cases, there is occasionally a large hematoma that needs to be evacuated. It is especially important to protect the sciatic nerve during this portion of the procedure, as it is sometimes obscured by the hematoma.

Once the area of pathology is identified (in incomplete tears), an endoscopic knife can be employed to longitudinally split the tendon along its fibers. Often, this can be identified through palpation, as there is typically softening over the area of the detachment, making the tissue ballotable against the ischium. The hamstring is then undermined and the partial tearing debrided with an oscillating shaver, as well the lateral wall of the ischium is cleared of devitalized tissue. The lateral ischium is debrided of devitalized tissue and a bleeding corticocancellous bed is prepared in preparation for the tendon repair.

An inferior portal is then created approximately 4 cm distal to the tip of the ischium and equidistant from the medial and lateral portals. This portal is employed for insertion of suture anchors, as well as suture management. A variety of suture passing devices can then be used for the repair. The principles are essentially the same as those employed in arthroscopic rotator cuff repair. Once all of the sutures are passed through the tissue of the avulsed hamstring, the sutures are tied and a solid repair of the tendon is completed. In general, one suture anchor is used per centimeter of detachment.

Postoperatively, the patient is fitted with a hinged knee brace that is fixed at 90° of flexion for four weeks in order to limit not only weight bearing, but also to restrict
excursion of the hamstring tendons and protect the repair. At four weeks, the knee is gradually extended by about 30 degrees per week in order to allow full weight bearing by six to eight weeks, while maintaining the use of crutches. Physical therapy is instituted at this point, with the initial phase focused on hip and knee range of motion. Hamstring strengthening is begun at ten to twelve weeks, predicated on full range of motion and a painless gait pattern. Full, unrestricted activity is allowed at approximately four months.

SUMMARY

The evolution of hip arthroscopy has helped generate much interest in the diagnosis and treatment of hip and pelvic injuries. As a result of the focus on intraarticular hip pathology, many additional anatomic and clinical studies have been undertaken that have advanced the treatment of previously ignored or under-treated areas. The current technique described in this chapter is one such offshoot of the improvement in the treatment of athletic hip and pelvic injuries.
REFERENCES


Lecture: Gluteus Maximus in External Snapping Hip

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I. Originally described as an MRI diagnosis by Torriani et al (9 patients; 12 hips)¹
   A. Characterized as signal abnormality of the quadratus femoris muscle.
   B. Attributed to narrowing of the ischiofemoral and quadratus femoris spaces
      1. Ischiofemoral space: Distance between lateral cortex of ischial tuberosity and medial cortex of lesser trochanter
         a) Narrows with impingement 13 +/- 5 mm
         b) Normal 23 +/- 8 mm
      2. Quadratus femoris space: Space between superolateral surface of hamstring tendons and posteromedial surface of iliopsoas tendon or lesser trochanter
         a) Narrowing 7 +/- 5 mm
         b) Normal 12 +/- 4 mm
   C. All females

II. Additional MRI features described by Tosun et al (50 patients; 70 hips)²
   A. Associated with increased coronal inclination angle (coxa valga)
   B. Cross-sectional area of hamstring origin may contribute to narrowing of quadratus femoris space
   C. Narrowing may lead to edema, inflammation, fatty infiltration of quadratus femoris
      - Conversely, fatty replacement of quadratus femoris may cause narrowing
   D. 42 females; 8 males

III. Our observations on clinical presentation
   A. Characterized by painful popping
   B. Most evident in terminal stance phase of gait
      - Internal rotation (?)
   C. Audible “grating” sensation
   D. Difficult to localize
   E. Potentially misdiagnosed as snapping iliopsoas tendon
   F. Standardization of ischiofemoral and quadratus femoris spaces difficult depending on rotational position of extremity
   G. Symptomatic cases often associated with normal space parameters
   H. Abnormality of the quadratus femoris (signal changes) often observed as incidental finding
IV. Treatment

A. Optimal strategy & algorithm unclear

B. Oral anti-inflammatory medicine

C. Activity modification
   - Active rest, avoiding provoking activities

D. Formal rehab strategy (?)
   1. Assess for provoking activities
   2. Modification guidelines
   3. Stabilization exercises
   4. Treatment modalities

D. Image-guided injections (?)
   - Diagnostic & therapeutic reliability unclear

E. Surgical intervention
   1. Widen the ischiofemoral space\(^3\)
      a) Resection of lesser trochanter
      b) Potential compromise of iliopsoas insertion
   2. Decompress quadratus femoris
      - Potential injury to medial circumflex femoral vessel
   3. Anecdotal experience only
   4. No clear surgical solution or best treatment
   5. Potential complication unclear

References


A Case of Ischiofemoral Impingement

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I will present at case of a 19 y/o sophomore (2nd year college) female field hockey player who presented with left hip pain. She had recurrent ankle instability and had Right Ankle Surgery several months prior to seeing me. She noted increasing frequency and severity of sharp left hip pain. This occurred with clunking and grinding in the hip, and included an audible, painful click. She had received an intra-articular injection with anesthetic by another physician which provided her 95% relief of her pain for a few hours. She also received a cortisone injection noting 70% relief of her pain for 3 weeks but without change in her mechanical clicking. She tried NSAIDs with moderate relief. She was sent to physical therapy which she noted provided no benefit.

On examination at presentation, she was noted to ambulate without a limp. She was able to voluntarily reproduce the snapping in left groin with a maneuver not typical for internal or external snapping hip. The snapping was palpable, and most easily performed while standing. She had full and symmetric range of motion, with flexion to 100, external rotation to 50 and internal rotation to 60 degrees. Maneuvers to cause Iliopsoas snapping in her did not reproduce her snapping. She had a positive Trendelenburg sign, positive labral stress test, and positive impingement sign. Her FABERE demonstrated 1 fist height from table to lateral geniculate line, and she had 3/3 ligamentous laxity tests. She had pain with hip hyperextension – external rotation. Her log roll test demonstrated external rotation of approximately 80 degrees.

Her radiographs demonstrated bilateral Crossing Signs, with a center edge angle of 31 on the left and 33 on the right. Her MRI demonstrated some Labral irregularity without frank tear, an alpha angle of 55 and edema of the quadratus femoris.

She was initially treated with daily physical therapy, but the symptoms progressed to having an achy pain at rest, but pain associated with the snapping that would increase to 8-9/10. She was treated with an oral prednisone taper, as well as an injection with cortisone – both gave her minimal short-term relief. The symptoms progressed to where she was unhappy with just activities of daily living. On examination, she could still reproduce the snapping, had some pain at the end range of motion and a little more strength.
A CT Scan was obtained confirming the decreased distance between the lesser trochanter and ischium. As there was also concern as to whether there may be instability as the cause of her pain and snapping, a dynamic evaluation with fluoroscopy was performed. The snapping was heard when the lesser trochanter was furthest away from the ischial tuberosity just as she was starting to move the lesser trochanter forward. She did not have any visible instability. She received another intraarticular injection which only relieved some of the achiness deep in the joint (relieved 10% of her pain).

As she was willing to try anything to get relief and be able to walk around campus pain free, we discuss the options with her: (1) Release the quadratus femoris which has the risk of Avascular necrosis and (2) Resect the lesser trochanter / release the Iliopsoas, which has the risk of hip flexion weakness and heterotopic ossification. She opted for the lesser trochanteric resection which was performed arthroscopically.

This was performed. She is now 2 years post op and can run / jog outdoors painfree for the first time in 4 years. Her MHOT (IHOT) score was 32 pre-op and 85 post op. She has 5-/5 strength of her hip flexors tested while seated, and without pain. She can still reproduce some snapping.