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Rehabilitation Protocol Following Proximal Hamstring Primary Repair

The hamstring muscle group consists of three muscles: the biceps femoris, semitendinosus and semimembranosus. All three of these muscles originate from the ischial tuberosity of the pelvis and then insert below the knee with the biceps femoris attaching on the fibula and the semimembranosus and semitendinosus attaching on the tibia (Figure 1). These muscles cross the hip and the knee, and therefore can affect both hip and knee motion. Acute hamstring strains are common in sports that involve sprinting, kicking and high-speed skilled movements.

A National Football League team published injury data for their team during pre-season training camp from 1998-2007.¹ Hamstring strains were the second most common injury, only surpassed by “knee sprains”.¹ Numerous studies have shown that hamstring strains are one of the most common injuries in sprinting sports, soccer, rugby and Australian rules football.¹⁻¹² Hamstring strains primarily occur at the proximal musculotendon junction.¹³ Proximal musculotendon strain injuries have been shown to be treated effectively with rehabilitation.^{1, 8}

Much less common, but most often much more severe, are the hamstring injuries involving complete avulsion of the hamstring complex off the ischial tuberosity. When this occurs a large amount of bleeding (hematoma) will form in the back of the thigh and the tendon will move down the thigh, retracting away from the ischial tuberosity (Figures 2 and 3). Almost all injuries occur from a slip or a fall that creates forceful hip flexion with simultaneous knee extension, many of these during sporting activities.

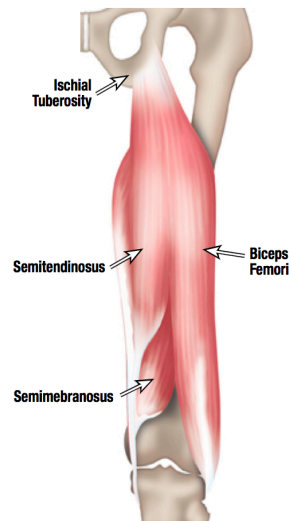
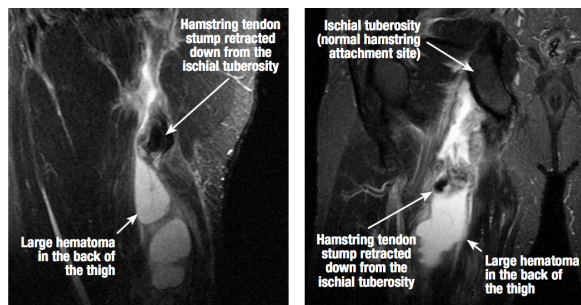


Figure 1 Normal hamstring anatomy. Three muscles (semimembranosus, semitendinosus and biceps femoris) originate from the pelvis (ischial tuberosity).

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Figures 2 and 3 MRI demonstrating a complete avulsion of the hamstring tendon from the ischial tuberosity.

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In addition to falls this injury can occur with waterskiing starts and bull riding.¹⁴⁻¹⁵ These complete avulsions result in significant or complete loss of hamstring function depending on how many of the tendons are avulsed. This can lead to poor leg control and difficulty even walking. Because of the significant structural damage and resultant disability, these injuries are often treated with open surgical repair.

The clinical indications for surgical repair are complete hamstring avulsion of all 3 tendons or significant retraction with less than 3 tendons avulsed. Outcome studies indicate that if surgery is performed shortly after injury, the outcome is superior to those whose surgery was delayed several months. Acute surgical repair is performed by suturing the torn tendons to suture anchors placed in the bone at the anatomical origin. This usually requires 2-4 suture anchors and Panacryl or Ethibond sutures (Figures 4 and 5).¹⁶⁻¹⁷ In addition to falls this injury can occur with waterskiing starts and bull riding.¹⁴⁻¹⁵ These complete avulsions result in significant or complete loss of hamstring function depending on how many of the tendons are avulsed. This can lead to poor leg control and difficulty even walking. Because of the significant structural damage and resultant disability, these injuries are often treated with open surgical repair.

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Post-operatively crutches are used to assist in walking for the first few weeks. A brace or protective device also may be used to protect the hamstring. One factor in this decision is the time of year (snow / ice), as most reported episodes of early failure are related to slipping and falling. Another factor, which is assessed during surgery, is the ease with which the torn tendon can reach its original insertion on the pelvis. If the tendon was significantly retracted there is a greater likelihood of longer post-operative protection.

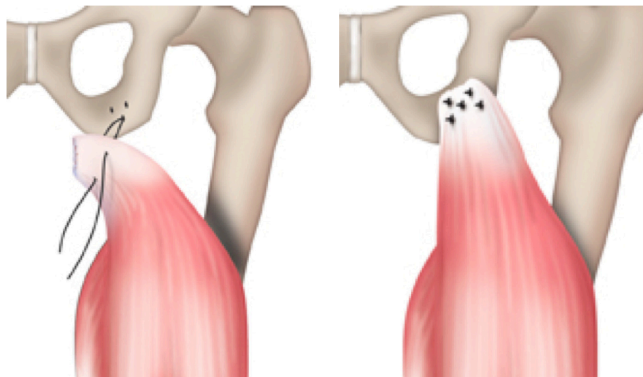


Figure 4: Sutures extending out to the torn tendon stump from anchors placed in the ischial tuberosity (pelvic bone).

Figure 5: Sutures tied off to approximate the torn tendon to the ischial tuberosity (pelvic bone).

Rehabilitation Protocol Following Proximal Hamstring Primary Repair

Phase I (Surgery to 6 weeks after surgery)

Goals	<ul style="list-style-type: none"> ○ Protection of surgical repair ○ Progress ROM by 30 degrees per week to full ROM by 8 weeks ○ Cryotherapy unit to be used 4-6 times per day for 20 minutes ○ Crutches/non-weight bearing for 4 weeks with progression to full-weight bearing
Precautions	<ul style="list-style-type: none"> ○ Non-weight bearing with crutches for 6 weeks ○ No active hamstring contraction ○ No hip flexion greater than 45 degrees ○ Knee extension limited pending intra-operative tension on the repair
Suggestions	<ul style="list-style-type: none"> ○ Cryotherapy for pain and swelling control 3-5x a day ○ Light desensitization massage to the incision and posterior hip ○ Scar massage ○ Silicon patch over incision (if open repair)

Phase II (6 weeks to 8 weeks following surgery)

Goals	<ul style="list-style-type: none"> ○ Restore normal gait ○ Pain free and normal functional ADLs
Precautions	<ul style="list-style-type: none"> ○ Monitor tenderness of surgery site ○ No hamstring flexibility or stretching exercises are to be performed during this phase. Lengthening of the repair and return of normal hamstring flexibility will be allowed to occur on its own
Range of Motion Exercises	<ul style="list-style-type: none"> ○ Increase Forward Flexion, Internal/External Rotation to full motion as tolerated
Therapeutic Exercises	<ul style="list-style-type: none"> ○ Restore normal gait pattern (emphasize good leg control with extension of knee during swing phase and heel strike) ○ Improve ADL function i.e sit->stand, stairs, etc. ○ Begin light hamstring strengthening with low loads, high reps and high frequency by performing hamstring leg curls in standing with the hip extended. Start with zero resistance then progress as tolerated 1lb at a time 2 sets/20, 4-5x a day ○ Begin total leg strengthening: heel raises, quad sets, short arc squads, general hip strengthening in side lying, single leg balance for proprioception
Other Suggestions	<ul style="list-style-type: none"> ○ Light desensitization massage to the incision and posterior hip ○ Scar massage

Rehabilitation Protocol After Arthroscopic SLAP Repair

Phase III (8 weeks to 12 weeks following surgery)

Goals	<ul style="list-style-type: none"> ○ Pain-free performance of non-impact aerobic activities ○ Unrestricted ADLs at home or work
Precautions	<ul style="list-style-type: none"> ○ Monitor hamstring flexibility and tenderness of surgery site
Therapeutic Exercises	<ul style="list-style-type: none"> ○ Begin non-impact aerobic conditioning as tolerated with any of the following: stationary bike, stairmaster, elliptical trainer, nordic track, aquatic therapy with swimming or functional activities in the water (avoid forceful, explosive, or repetitively strainful activities) ○ Continue to progress TLS as tolerated: ¼ squats, stepdowns, leg press, knee extensions, heel raises, hip abductor in standing with tubing or machine, balance and proprioceptive training ○ Progress hamstring strengthening in standing by increasing weight or initiating TheraBand ○ Patient may progress to prone positioning on a machine and then to seated leg curls (with hip flexed at 90 degrees) on a machine or with tubing

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