

Case reports

Clinical profile and rehabilitation of Left side Hamstring muscle, semitendinosus injury in a school-level rugby player in Sri Lanka: Case Report

P H R Sathara De Silva

Teaching Hospital, Jaffna, Sri Lanka

*Corresponding author: satharadesilva@gmail.com

Abstract

In rugby union, hamstring injuries are common, particularly among backs who are involved in high-speed running. Clinical management and rehabilitation of an 18-year-old school-level rugby outside centre who sustained an acute left posterior thigh injury during a practice match is described in this study. During clinical examination it was revealed swelling, ecchymosis, focal tenderness, painful hip extension and knee flexion, and an antalgic gait. MRI findings confirmed an isolated grade II proximal semitendinosus tear. The player was managed conservatively using initial protection, rest, ice, compression, and elevation, followed by a structured, progressive eight-week rehabilitation programme. Isometric and strengthening exercises, lengthening exercises, eccentric Nordic hamstring exercises, running progression, agility, proprioception, plyometrics, and rugby-specific drills were included in rehabilitation. After 8 weeks, he achieved full pain-free range of motion, normal strength, maximal sprint speed, and completed high-intensity sport-specific activities. He was successfully cleared for full-contact rugby with a phased return to play.

Keywords: Hamstring injury, semitendinosus tear, rugby, rehabilitation, return-to-play

Introduction

The hamstring is composed of three muscles in the posterior aspect of the thigh: the biceps femoris, semimembranosus, and semitendinosus. Acute hamstring injuries differentiate into two types(1). The biceps femoris is the most commonly injured muscle, accounting for 83% of all hamstring injuries, followed by the semimembranosus (12%) and the semitendinosus (5% of all hamstring injuries). The prevalence of hamstring injuries ranges from 8 to 25%, depending on the sport(1). Type 1 hamstring strains are more common and occur during high-speed running, while less common type 2 strains occur during movements leading to extensive lengthening of the hamstrings(2),(3).

Hamstring strains are one of the most common injuries in rugby union, accounting for 15% of all injuries. Rugby backs are more likely than forwards to suffer from hamstring strains(4). This case involves an 18-year-old high school outside center back who suffered a hamstring injury and the rehabilitation process before returning to play.

Case report

An 18-year-old school level rugby player, was injured during a practice match to his left lower limb posterior thigh. He had a sudden onset of severe posterior thigh pain, which stopped him running. He could only walk with pain and an antalgic gait after his injury, and the team physiotherapist assessed him on the ground. The physiotherapist had kept ice on the affected region and applied analgesic spray. But he couldn't recover from the injury, and he was taken off the ground with the support of a teammate. He didn't have a previous history of hamstring injuries. All his previous injuries were managed successfully with a conservative approach. He had performed well at his position and was hoping to continue playing rugby in the upcoming league matches.

Examination

He had an antalgic gait with limited hip flexion, a lack of hip extension. On inspection of the lower limbs, mild swelling was noted in the posterior aspect of the left thigh with localized ecchymosis around the upper half of the thigh. There was focal tenderness in the upper third of the hamstring muscles, no palpable defect was found. The hip

extension and knee flexion were painful without a deficit in the range of motion.

A sports medicine physician suspected a hamstring injury in this player following a detailed clinical evaluation and ordered an MRI scan of the left hamstring. MRI scan of the left Hamstring revealed tear of proximal semitendinosus component of left hamstring muscle with associated oedema of muscle belly down to mid thigh level. Hamstring muscle tear categorized to grade-II according to British Athletics Muscle Injury Classification (BAMIC). Semimembranosus and biceps femoris appear intact and normal during the MRI study.

Management

Following the injury, the team physiotherapist assessed him and started initial management at the ground with analgesic spray and keeping ice packs over the injured site. He had been assessed by the sports medicine physician after the match, and an elastic bandage was applied over the left thigh for the compression.

The player was instructed to apply ice for 10–15 minutes using a cold pack every 3–4 hours. He was instructed to keep the left side leg elevated and asked to use a crutcher to offload the left limb while walking.

Rehabilitation

(Phasic rehabilitation summary, Table – 1)

Phase 1

The fundamental objective of the initial phase is to facilitate myofibril regeneration and minimize fibrosis. After 3 days, the pain, swelling, and ecchymosis decreased, and he could walk without pain. He was instructed to cycle on a seated exercise bike for 30 seconds, increasing the load by 25 W every minute until he reached the highest level of cycling that he could do continuously without pain. He was asked to perform a supine double-leg bridge. He was told to do 12 repetitions in three sets. He was instructed to perform front plank and side plank exercises with 12 repetitions and 3 sets. He was instructed to perform single-leg balance exercises to improve proprioception.

The second week of the rehabilitation program started with double-leg squat exercises. The team physiotherapist had evaluated him daily with a

passive straight leg raise test, a pain-free passive knee extension test, and an active knee extension test. He had kept a daily record and progressed gradually with the rehabilitation program. At the end of 2 weeks, he had achieved normal symmetrical pain-free walking, pain-free isometric contractions against submaximal resistance, a pain-free low speed jog, and had tolerated the double leg bridge and double leg squat. He was successfully progressed to 2nd phase of three rehabilitation.

Phase 2

This is the intermediate phase of the rehabilitation program. The duration of the phase is variable and based on response to therapy. The goals of this phase are to achieve pain-free hamstring flexibility, progress to full active and passive ROM, movements primarily in transverse and frontal planes to avoid over stretching, restore hamstring strength and functional ROM, and improve neuromuscular control of the trunk and pelvis as the speed increases.

The running program started with walk-and-jog cycles. By the end of the second week, he could jog moderately forward and backward without pain. He had completed a high knee with kicks drill consisting of 25 to 50 meters per lap.

The exercise program gradually progressed with increased loading. He was instructed to carry out stationary cycling as endurance exercise and normal routines of upper body and core strengthening with abdominal crunches. Bridging exercises progressed from double to single leg in the 3rd week, and single leg squat exercises were started and progressed gradually. The active range of motion and manual-resisted hamstring exercises progressed gradually during phase 2 of rehabilitation. The extender stretching exercises started in the third week.

The diver exercises were performed with 6 repetitions and 3 sets for each leg. The player was instructed to perform the exercise as a simulated dive. The glider exercise was started with the athlete positioned upright. The player was instructed to perform a gliding backward movement until the maximum end point, just before the pain is felt. The massier applied manual resistance to soft tissue mobilization around the injured upper 1/3 of the leg in the 2nd phase of the rehabilitation program. The physiotherapist assessed the player's condition daily before starting the exercise program and documented

the progress and pitfalls. At the end of phase 2, the player had achieved a pain-free moderate forward and backward jog, a pain-free prone knee flexion test, and modified bent-knee stretch tests that were negative and he was progressed to 3rd phase at the end of 4th week.

Phase 3

He had achieved full active and passive ROM without pain at the end of the second phase of the rehabilitation program. The jogging progressed to a run-jog program in the third phase of rehabilitation. Increased the volume and intensity gradually. He had performed forward and backward accelerations with increasing distance. At the end of the fifth week, he was asked to perform modified T-drills while running and started agility running drills using cones positioned in the ground. The player was asked to perform lunges with weights. Resisted hamstring curl exercises performed by machines. The player was instructed to perform slow, continuous knee flexions and extensions, only starting with a load that is acceptable and pain-free.

Eccentric Nordic hamstring exercises were introduced to the programme. He was instructed to perform 8–10 repetitions with 3 sets for drop only and 8–10 repetitions with drop and curl. The physiotherapist examined the player daily before starting activities and observed symptom-free normal concentric and eccentric strength throughout the full range of motion.

Phase 4

This is the return-to-performance phase. The goal of this phase is to grade a return to sport with subjectively minimal symptoms. During this phase, the exercises were chosen to increase the players' functional and sport-specific demands. Exercises were carried out to increase the player's functional demand at the position he was playing. Multidirectional sports-specific drills with lateral rotational and cutting movements are included in the program. The player was given a full-body strengthening exercise program. Running speeds were gradually increased during agility exercises. The plyometric exercises were done using a jumping box. Squats, lungers, and prone leg curls with weights and a yo-yo machine were gradually progressed, as were single-leg reverse deadlifts with a kettlebell in one hand. The Nordic hamstring exercises were progressed gradually by increasing

repetitions and sets. The barbell hip trust exercises were included to increase gluteal and adductor muscle strength.

The proprioceptive exercises were progressed with row jumping single foot, bipedal jumping on fore foot, sideways jumping in single leg and standing on wobble board with throwing and catching a ball. At the end of 7th week the player was started non-contact practices with team mates and carried out sports specific drills with kicking the rugby ball.

Return to play

Following 8 weeks of a rehabilitation program, he had achieved full range of motion compared to his uninjured leg. The active and passive straight leg raise test and active knee extension test were normal, and there were no tender points at the injured hamstring muscle. He had achieved pain-free maximal isometric contractions. He was able to perform Nordic eccentric hamstring exercises, single-leg squats with weight, lunges with weights, and single-leg bridges without discomfort. The player had achieved his maximum sprinting speed compared to previous records at the end of two months. At the end of 2 months, he could repeat maximum accelerations, high-intensity cutting, and random agility activities. He was able to execute sport-specific activities successfully, like ball kicking and bending over to gather a ground ball while running, at the end of 8 weeks of rehabilitation, and he was cleared to play full contact sports. To prevent hamstring injuries from recurring, we limited game time in the first three games to reduce fatigue and overall exposure to high-risk activities. Return to Play was phased in over several weeks to avoid a recurrence in the upcoming rugby matches.

Discussion

Hamstring muscle injuries are common in recreational and elite athletes. During the sporting season, more than 30% of athletes sustain recurring hamstring injuries. Hamstring injuries are among the most common in rugby union, accounting for up to 15% of all injuries(5).

The aetiology of hamstring strain is multifactorial; it depends on playing position, previous injuries, leg imbalance, running action, fatigue, and lack of preparation to return to play. Rugby backs are more likely than forward pack players to get hamstring strains(5).

Hamstring injuries most commonly present acutely with the sudden onset of posterior thigh pain while performing a high-risk activity like running or stretching movements. Hamstring muscle strains occur when sudden, forceful, eccentric contractions occur against resistance, like in this player.

Sprinters and rugby backs tend to injure the long head of the biceps femoris or semitendinosus during high-speed running(4). There are a wide range of potential risk factors that contribute to hamstring strains. These are an inadequate warm-up, increased training volume, muscle fatigue, ankle inflexibility, hamstring weakness, cross-pelvic posture, lumbar-pelvic weakness, poor biomechanics, previous injury, older age, and previous ankle sprains(1). In this case, the injury occurred in the second half of the game, and the player was exhausted from dehydration at the time, which may have contributed to the injury. Increased training loads may have contributed to this player's hamstring injury. He was a key player on the team at the center-back position, which involved high-speed running and ball-kicking, so he had a high-risk profile for the hamstring injury.

During the examination, the leg and hip region must be examined for ecchymosis, swelling, atrophy, and muscular defects. This player had mild swelling with ecchymosis in the left posterior thigh region. The three hamstring muscles need to be palpated from origin to insertion to find out if there is focal tenderness or muscle defects. This player had focal tender points at the upper 1/3 of the left posterior thigh but couldn't differentiate between muscles of origin. This player had pain during active and passive movements but had full range of motion at his hip and knee joints.

MRI scans are more reliable than ultrasound scans for detecting hamstring injuries. MRI scans assess the degree of tendon retraction and tendon morphology. MRI scans are useful for estimating the time to return to play since the length and cross-sectional area of the injured muscle can be measured. This player had undergone an MRI scan of the hamstring muscles, which showed an isolated proximal grade II semitendinosus muscle tear according to BAMIC grading system.

Most hamstring injuries can be managed conservatively with rest and physical therapy. Grade 3- or higher-grade proximal hamstring ruptures or high-grade distal hamstring tears may need operative

repair for favourable outcomes(6). This player had a proximal semitendinosus grade II injury and decided to be managed conservatively by a sports physician and physiotherapist. He had completed an 8-week rehabilitation program before returning to play successfully. Progression through the phases of rehabilitation must not be time-dependent. Progression through phases must be based on achieving functional and clinical criteria.

The clinical trials show that hamstring rehabilitation programs need to emphasize lengthening type (L-protocol) exercises for sprinters and jumpers. The L-protocol consists of three exercises: the extender, the diver, and the glider (7). These exercises are specifically aimed at loading the hamstrings during extensive lengthening. The extender aimed to increase flexibility, and the diver aimed to strengthen with trunk and pelvis stabilization. The glider is a specific eccentric exercise. During L-protocol, you should not provoke the pain (7).

The hamstring injury rehabilitation program should include exercises to emphasize eccentric muscle contractions with extensive lengthening. Nordic exercises are effective in increasing hamstring strength and preventing recurrent hamstring injuries. To avoid delayed onset muscle soreness (DOMS), it is critical to allow at least one day between sessions(1). This player had carried out Nordic hamstring strengthening exercises without developing DOMS. A rehabilitation program must include exercises to target muscles that assist the hip extension function with hamstrings, such as the gluteus maximus and adductor magnus muscles. The gluteus maximus muscle acts during running to control trunk flexion in the stance leg, decelerate the swing leg, and extend the hip (5).

Neuromuscular control of the lumbopelvic region needs to be improved by exercises to promote optimal function of the hamstrings during sprinting. The running progression includes volume, intensity, and running mechanics (4). The load on the hamstrings increases with faster running. This player's running program gradually increased the running speed within a session and from one session to the next. Rapid increments in running intensity were avoided during rehabilitation. Sports-specific training drills were incorporated into the running program in phase 3 of rehabilitation.

The goal of the final phase is to return to sport with subjectively minimal symptoms. During this phase, the exercises were chosen to increase the players' functional and sport-specific demands(1). Proprioception and agility drills were gradually increased in difficulty, and plyometric exercises were added to the program. This Rugby player was gradually exposed to provocative activities during training prior to returning to full-contact play. Multidirectional sports-specific exercises, including lateral rotational and cutting movements, are incorporated into the program.

Conclusion

This case demonstrates that an isolated grade II proximal semitendinosus injury in a young rugby player can be successfully managed conservatively with a structured, progressive rehabilitation programme. Early symptom management followed by gradual strengthening, eccentric loading, running progression, agility, proprioception, and sport-specific exercises facilitated recovery from injury where a safe return to full-contact rugby within eight weeks. Rehabilitation progression was guided by clinical and functional criteria rather than time alone. A phased return to play with controlled exposure during the initial matches contributed to minimize fatigue-related stress and reduce the risk of recurrent hamstring injury during those initial matches.

Acknowledgements

The authors would like to sincerely thank to the Rugby player who took part in the case study. The author would like to thank to the coaching and paramedical staff of the Rugby team for carrying out phasic rehabilitation.

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7. Proximal / Mid Hamstring Strains Rehabilitation Guideline General Guidelines / Precautions : Proximal / Mid Hamstring Strains Rehabilitation Guideline. :8–11.

Table 1

Phasic rehabilitation summary

Phase 1 – Acute	Phase 2 – Early Functional	Phase 3 – Advanced	Phase 4 – Sports-Specific & Return to Play
Goals: Pain and swelling control; restore ROM.	Goals: Restore strength, flexibility and neuromuscular control.	Goals: Develop strength, power, running and agility.	Goals: Restore full sports-specific performance and achieve safe RTP.
PRICE and cryotherapy 15–20 min after exercise.	Progressive ROM and stretching including L-protocol.	Progressive weighted strengthening and eccentric hamstring training.	Sports-specific running, maximal sprinting, cutting and pivoting.
Active ROM from day 4; gentle stretching.	Single-leg bridging, squats, lunges and resisted hamstring exercises.	Nordic hamstring exercises, weighted squats/lunges and advanced core strengthening.	Multiplanar plyometrics and high-intensity agility drills.
Heel digs, bridges, basic strengthening and core exercises.	Balance training using single-leg stance, exercise ball and wobble board.	Jog–run progression, acceleration/deceleration and advanced agility.	Rugby-specific ball gathering, running and kicking drills.
Walking and stationary cycling.	Walk–jog, forward/backward jogging and high-knee drills.	T-drills, cone drills, zig-zag and figure-of-eight running.	RTP: Full ROM, no tenderness, pain-free strength exercises, maximal sprinting, cutting and rugby-specific skills achieved.
Milestone: Pain controlled and basic function restored.	Milestone: Progressive loading tolerated without pain.	Milestone: Advanced strength, running and agility achieved.	Outcome: Cleared for return to full-contact rugby at approximately 2 months.