# Intervention to improve strength, flexibility and range of motion in patient of hamstring strain- A case report.

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**Abstract**

***Background and Objective****: Hamstring strain is the common injury, which is also referred as "Pulled Hamstring". A 20 years old male Athlete was practicing for 100-meter race for his matches and got injured with his hamstring. Later on he was referred to Physiotherapy department with complaints of pain and impaired walking and also with difficulty in running. On investigations, MRI revealed partial tear of distal part of hamstring muscle.*

***Methodology****: This interventional study was done in the MGM Physiotherapy Rehabilitation and fitness Centre, Aurangabad, Maharashtra, India. A male professional athlete injured his hamstring muscle while running on the ground. The complete assessment was done when he came to physiotherapy department. Then the treatment protocol was set for the patient. The patient was given the treatment for four weeks according to the protocol and later on was re-assessed.*

***Conclusion****: Hereby, we conclude that we can use the foam roller exercises, spinal adjustive therapy and Nordic hamstring exercises to improve range of motion, flexibility, contractile strength and muscle strength.*

**Keywords**: *Hamstring strain, Foam rolling therapy, Nordic hamstring exercises and chiropractic spinal adjustive therapy.*

## Introduction

Hamstring is the large bulky muscle located at the back of thigh. The muscle is a group of three muscles i.e. Semitendinosus, Semimembranosus, Biceps femoris and mainly carry out actions of knee flexion primarily and hip extension secondarily. The semimembranosus is a flattened and membranous like structured and located on posteromedial aspect of thigh. The semitendinosus is structured as fusiform in shape and lies along with semimembranosus. Biceps femoris, the name itself suggest that it has two heads and is located posterolateral aspect of back of thigh. The hamstring is an antigravity muscle, which helps maintaining body posture. The participation of hamstring muscle is responsible for activities such as running, jumping and changing speed.

The hamstring strain is also known as "hamstring pull" which means tear of the hamstring muscle. The injured hamstring muscle suggested that, there is a misbalance in the smoothly coordinated action of quadriceps and hamstring. Unusual stress is placed on the hamstring mechanism at certain points within the range of motion that suddenly precipitates the injury. The condition is more commonly seen in athletes involved in sprinting, because the hamstring is put in a lot of stress at extreme length.

The traditional mode of treatment used for the same are RICE i.e. rest, ice, compression and elevation, exercises to improve range of motion and flexibility. But the therapist must also focus on patient's gait and balance training and functional training to return back to sports.

## Aim

We aim to improve the range of motion, flexibility and strength in the patient of hamstring strain.

## Case Report

A 20-year-old male athlete has reported to the physiotherapy department with pain and swelling present in right side of distal aspect of posterior thigh. While performing sprint drills, suddenly he felt a jerk in posterior thigh when he was increasing his speed. In initial few days he took rest and medication but there was no relief completely. So he went to orthopedic doctor, there the doctor recommended him to take few radiological investigations i.e. X-ray and MRI. X-ray revealed no changes and fractures, but the MRI scan revealed a mild tear in the hamstring, 2cm by 5cm tear in bicep femoris muscle. Then he was referred to physiotherapy department. On physical examination his MMT of hamstring muscle was grade 3. He was complaining of pain as 50 on vas at

rest and 80 on VAS at activities. The assessment also reveals stiffness and tenderness grade 1 on the distal aspect of posterior thigh and there was slight reduction in popliteal angle- knee flexion range of motion.

**Method**

This is an interventional study, done to improve the range of motion, flexibility and strength of hamstring muscle. The patient is 20-year-old male, a professional athlete player. The patient came to the physiotherapy opd following positive findings were seen. On observation, the patient was having antalgic gait due to pain. The patient was having pain with 50 on VAS at rest while 80 on VAS at activities. He was also having tenderness on the distal aspect of posterior thigh on right side. On examination, with manual muscle testing (MMT) his strength was grade 3. The range of motion of affected leg was assessed by goniometer measuring the knee flexion that was 90 degrees. The patient also underwent MRI scan which says that there is mild grade1 tear in hamstring muscle. The functional status was assessed by LEFS i.e. Lower Extremity Functional Scale.

The rehabilitation program was administrated as 60 minutes per session. The treatment protocol was set week vise with the progressions in every week. From day 0 to 1 week, the patient received treatment included cryotherapy, isometric exercises, active range of motion exercises, ultrasound, I.F.T, foam roller exercise (Figure no.1). Later on we have progressed the treatment with addition of spinal adjustive therapy in second week (Figure no. 2 and 3). In third week, we had added the Nordic hamstring exercises to strengthen the hamstring muscle with static balance training and gait training (Figure no.4). In fourth week, we added progression in the strengthening exercises, dynamic balance training and exercises for return to sports.

| Assessment | Pre intervention assessment | Post intervention assessment |
|---|---|---|
| 1. Pain | 50 on VAS at rest<br>80 on VAS during activities | No pain at rest<br>20 on VAS during activities |
| 2. Range of motion | Knee flexion: 90 degrees | Knee flexion 130 degrees |
| 3. Strength | On MMT grade 3 | On MMT grade 4+ |
| 4. LEFS questionnaire | The functional status was poor. ( Score :- 24/80) | The functional status was markedly improved.<br>( Score :- 62/80 ) |

Table No.1

Figure No.1

Figure No.2

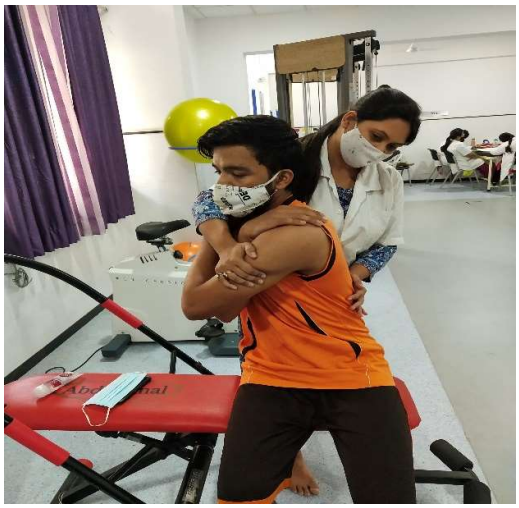

Figure No.3

Figure No.4

**Discussion**

The above intervention was to improve the flexibility and strength of the hamstring muscle. We primarily focused on improving the range of motion using active range of motion exercises and foam roller exercise. Samantha M. et al 2018, Effect of foam rolling on range of motion, Peak torque, muscle activation and the Hamstring to Quadriceps ratio, proved that there is great improvement in flexibility of hamstring muscle with the help of foam roller exercise. Later on, we pointed on increasing the contractile strength of hamstring muscle. So, we gave spinal adjustive therapy in flexion to the patient, it has been proved that there can be altered biomechanical functions due to improper posture; thus it affects not only soft tissues around lumbar spine but also tissues of lower extremity mainly hamstring muscle. Hence, correction of lumbar spine with spinal adjustive therapy can improve the contractile strength of hamstring muscle, Visumuzi D. et al, 2010 The effect of chiropractic adjustive therapy on the contractile strength of the Hamstring muscle group in the Soccer player.

To strengthen the hamstring muscle group, we have introduced Nordic hamstring exercises, it utilizes the core stability to hold the body leaned forward. It has shown marked increase in the strength, flexibility and endurance of the hamstring muscle, according to Seethal B et al, 2018, Effectiveness of Nordic hamstring exercise in improving Hamstring flexibility. In advance stage, the patient was trained with static and dynamic balance training, gait training and exercises for return to sports.

**Conclusion**

The above intervention was pivot on the foam roller therapy, spinal adjustive therapy and Nordic hamstring exercises. The above protocol was focused on improving the strength and flexibility of the hamstring muscle. The foam roller therapy was used to improve the flexibility of the hamstring muscle. Whereas the spinal adjustive therapy at the level of L4-L5 with knee flexion divulge that it improves the contractile strength of the hamstring muscle. Later on, the Nordic hamstring exercises were carried out which were used to improve the strength of hamstring muscle.

**Informed consent**

Informed consent of patient was taken.

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This study has not received any external funding.

**Author Contributions**

AP, VM conceptualized the case VM assisted in the designing and implication of the treatment AP, VM assisted documenting the case VM wrote the case report.

**Conflict of Interest**

The authors declare that there are no conflicts of interest.

**Data and materials availability**

All data associated with this study are present in the paper.

**References**


1. Ivan Z. Anatomy, physiology and biomechanics of hamstrings injury in football and effective strength and flexibility exercises for its prevention. Journal of Human Sport and Exercise. 2012;7(1):S208-17.

2. Clark BB, Jaffe D, Henn RF, Lovering RM. Evaluation and imaging of an untreated grade III hamstring tear: a case report. Clinical Orthopaedics and Related Research®. 2011 Nov;469(11):3248-52.

3. Hamilton B, Valle X, Rodas G, Til L, Grive RP, Rincon JA, Tol JL. Classification and grading of muscle injuries: a narrative review. British journal of sports medicine. 2015 Mar 1;49(5):306-.

4. Sutton G. Hamstrung by hamstring strains: a review of the literature. Journal of Orthopaedic & Sports Physical Therapy. 1984 Jan 1;5(4):184-95.

5. Dembowski SC, Westrick RB, Zylstra E, Johnson MR. Treatment of hamstring strain in a collegiate pole-vaulter integrating dry needling with an eccentric training program: a resident's case report. International journal of sports physical therapy. 2013 Jun;8(3):328.
6. Ramos GA, Arliani GG, Astur DC, Pochini AD, Ejnisman B, Cohen M. Rehabilitation of hamstring muscle injuries: a literature review. Revista brasileira de ortopedia. 2017 Feb;52(1):11-6.

7. Madoni SN, Costa PB, Coburn JW, Galpin AJ. Effects of foam rolling on range of motion, peak torque, muscle activation, and the hamstrings-to-quadriceps strength ratios. The Journal of Strength & Conditioning Research. 2018 Jul 1;32(7):1821-30.

8. Dhlamini VG, Yelverton CJ, Lawson S. *The Effect of Chiropractic Adjustive Therapy on the Contractile Strength of the Hamstring Muscle Group in Professional Soccer Players* (Doctoral dissertation, University of Johannesburg).

9. Babu SK, Paul A. Effectiveness of Nordic Hamstring Exercise in Improving Hamstring Muscle Flexibility, Strength and Endurance among Young Adults. system. 2018;3:4.

10. Scillia A, Choo A, Milman E, McInerney V, Festa A. Snapping of the proximal hamstring origin: a rare cause of coxa saltans: a case report. JBJS. 2011 Nov 2;93(21):e125.