

A decorative graphic on the left side of the slide consisting of overlapping geometric shapes. It includes a blue parallelogram, a light green parallelogram, and a dark grey parallelogram, all oriented diagonally.

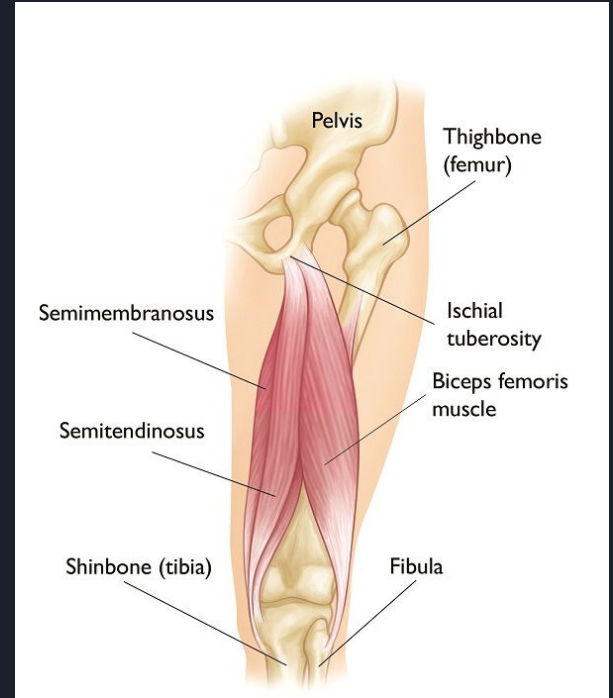
Early to intermediate rehabilitation for a Grade 2 hamstring tear

By Trystan Nunes

What is the hamstring?

- The hamstring is a group of muscles located in the back of the upper leg, which is made up of three different muscles;
- Biceps femoris
- Semimembranosus
- Semitendinosus

All these muscles contribute to knee flexion and hip extension. It is an essential muscle for day to day needs such as walking and running (Afonso J. *et al* 2021).





How the hamstring can fail.

There are a variety of factors which can contribute to a hamstring failing

Causes

- Muscle imbalance (Bing Yu et al, 2012)
- Poor warm-up (Murray et al, 2009)

Mechanisms

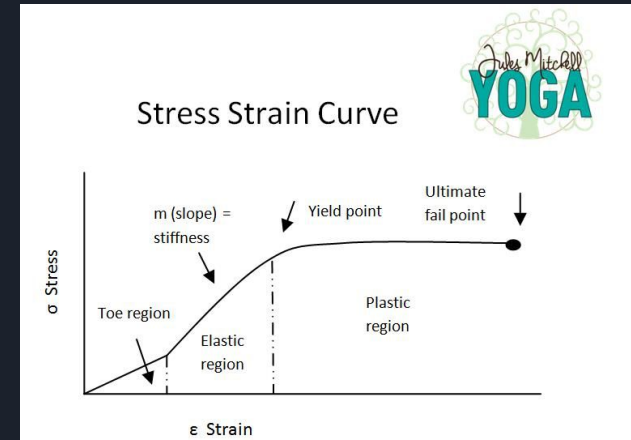
- Eccentric overload (Hibbert et al, 2008)
- High speed movements
- Fatigue

Stress strain curve

The relationship between the applied force or load and the subsequent deformation or strain on materials like muscles, tendons, or ligaments during physical activity or exercise is represented by the strain curve (Morita N. 2021).

The strain curve is made up of two main regions;

- Elastic region (V Tarigopula et al, 2008).
- Plastic region (J, Lee, et al, 2017)





Healing process of a Grade 2 hamstring tear

Healing time frame;

- 8 weeks for a Grade 2 hamstring tear
- 1-2 weeks initial rest and protection
- 2-6 weeks rehabilitation
- 6-8 weeks return to activity

(Rubin D.A 2012)



Joint arthrokinematics for a hamstring tear

The precise movements that take place within joint surfaces during typical physiological motion are referred to as joint arthrokinematics. In the case of a hamstring tear, comprehension of joint arthrokinematics principles is essential as it impacts the rehabilitation process and aids in optimising recovery.

Hip- Is a ball and socket joint. Arthrokinematic movements include rolling, gliding and sliding.

(Malloy P et al 2014)

Knee- Is a Hinge joint. Arthrokinematic movement include rolling, gliding and sliding.

(Tashman S et al 2013)



Impacts of a hamstring tear on arthrokinematics

- Decreased ROM
- Altered muscle function
- Joint compensation



What exercises can an individual do during the rest period?

Swimming is beneficial for individuals who are recovering from a grade 2 hamstring tear after the first week of initial rest;

- Low-impact exercise
- Reduced strain on hamstrings
- ROM and flexibility
- Improves circulation
- Cardiovascular fitness
- Arm predominant

(Buckthorpe M et al 2019)



Early to intermediate phase

What are we trying to achieve?

- Restoring full ROM
- Decrease pain
- Decrease swelling

During this phase of rehabilitation isometric exercises are the first movement you should do due too;

- Pain control
- Reduction of swelling
- Minimize joint movement
- Early muscle activation
- Gradual loading

Oranchuk, D.J. *et al.* (2019)



Exercises for grade 2 hamstring tear at the early to intermediate phase (isometric)

Isometric exercises

- Single leg isometric hamstring contraction in supine position (Open chain)

Under your ankles, place a towel. Engage your hamstring muscles by gently pressing your ankles onto towel without raising your legs off the ground. After holding the contraction for thirty seconds, release it.

- Isometric hamstring bridge (closed chain)

With your feet flat on the ground and your knees bent, lie on your back. Using your glutes and core, raise your hips towards the ceiling. Squeeze your hamstrings while maintaining the bridge position without shifting your hips. After holding for thirty seconds, bring your hips back down (Malliaropoulos, N. *et al.* 2015).

All to be done at moderate pressure for 30 seconds and repeat it further 2 times (3 in total). With the aim of improving range of movement as that is what your first aim should be.



Progression and regression

Isometric hamstring contraction in supine position

Progression- Single leg isometric contraction with bosu ball

Regression- Both leg isometric contraction with nothing underneath legs

Isometric hamstring bridge

Progression- Elevated hamstring bridge

Regression- Partial range hamstring bridge



Concentric and proprioceptive exercises for the early to intermediate phase of rehabilitation.

For a number of reasons, isometric exercises are usually followed in the recovery process by concentric and proprioceptive activities. Every stage of rehabilitation has a distinct role, and the aims of fostering recovery and regaining functional abilities are in line with the evolution from isometrics to concentric and proprioception activities.

Why do we progress from isometric to concentric exercises?

(Kassel G 2022)



Concentric exercises for a Grade 2 hamstring tear

Concentric exercises

- Lying leg curl (open chain)

Lying in prone position adjust pad so it is just underneath heels, engage your hamstrings and bring them as close to your glutes as possible. Do not bring the weight back down let another individual bring the weight back as it can lead to injury as the focus is the concentric part of the movement.

- Smith machine hip thrust (closed chain)

Make sure the bench is sturdy and won't slide before placing it perpendicular to the bar. Place your shoulder blades on the bench and place a folded yoga mat or pad on your hip. With your knees at a 90-degree angle, place your feet hip-width apart. Press through your heels to propel your body towards the ceiling while using your core, hamstrings, and glutes. Let somebody else hold the weight at the top while you come back down as the focus is only on the concentric part of the movement.

3 sets for 8-12 reps (Wilik M et al 2019).



Progression and regression

Lying leg curl

Progression- Single legged leg curl.

Regression- Lower resistance whether that would be lowering resistance or having no resistance.

Smith machine hip thrust

Progression- Bosu ball under feet

Regression- Bodyweight/ Partial range of movement/ Assisted hip thrust



Eccentric exercises for a Grade 2 hamstring tear for the early to intermediate phase of recovery.

Any movement that lengthens a muscle while simultaneously contracting it is referred to as an eccentric contraction. increases muscle size and strength more effectively than traditional concentric exercises because muscle development and growth occur best when the muscle is extended. The negative movement produces more force during an eccentric contraction even though it consumes less energy and oxygen than a concentric contraction. This helps your client lose weight quicker by increasing their metabolism, which might be advantageous if they have put on weight during the time they have rested.

Why do we progress from concentric to eccentric?

(Bury T et al 2019)



Eccentric exercises for a Grade 2 hamstring tear

Eccentric exercises

- RDL barbell (closed chain)

Place your feet hip-width apart and your toes pointing forward or slightly outward while standing. Maintain a tight grasp on the barbell while extending your arms fully. Keep your shoulders back and your chest up, and for stability, engage your core to maintain a neutral spine. Bend your knees slightly and hinge at the hips to begin the exercise. Throughout the exercise, make sure your knees are locked and bent. Drop the weight once you've reached the bottom because now all that's important is the eccentric motion and the muscle's stretching.

- Eccentric hamstring curl (open chain)

Client lying in prone position, bend knees to 90 degrees and push down the individual leg till the knee is fully extended, whilst asking the client to resist your downward force. Only resist during the eccentric part of the movement and let the individual bring back their leg.

3 sets for 8-12 reps (Wilik M et al 2019).



Progression and regression

Romanian deadlift (RDL)

Progression- Single Legged

Regression- Lower weight or eliminate all resistance

Eccentric hamstring curl

Progression- Increase the amount of resistance added to the downward force

Regression- Lower the amount of resistance/ Dont go to full ROM.



How to prevent deconditioning

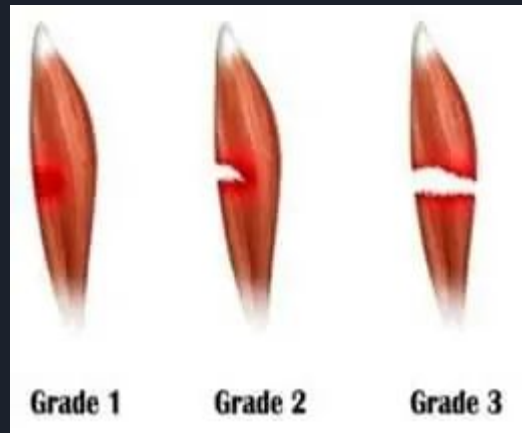
- Early rehabilitation
- Range of movement exercises
- Strengthening exercises
- Progressive loading
- Cardiovascular fitness
- Monitor pain
- Regular assessment

(Tim T et al 2012)

Surgical methods

A grade 2 hamstring tear does not usually require any surgical interventions.

Grade 3 hamstring tear may require surgery.



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