

# Soft tissue treatment for the AFL hamstring condition



For the purpose of this article, the hamstring condition includes an overview of the mechanism of injury for hamstring strains, stiffness, soreness, restriction and so on. As soft tissue therapists, there is a tendency to deal with a large range of signs and symptoms when treating the hamstring component.

**By Stuart Hinds**

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**Legend**

DOMS: Delayed Onset Muscle

Soreness

h/s: Hamstring

+ve: positive

psis: posterior superior iliac spine

SLR: straight leg raise

ROM: Range of movement

**Objective:** To broaden the influence of soft tissue therapy in the assessment and treatment of hamstring pain and dysfunction in elite AFL players.

**Research:** Recent screening protocols by Bennell, Gabbe, Finch, Wajswelner and Orchard for predictors of hamstring injury at the elite level of Australian Football highlighted a history of hamstring injury in the previous 12 months and age as independent predictor of hamstring injury. In particular, players who reported sustaining a hamstring strain during the previous year, and players over 24 years of age, were four times more likely to experience a hamstring injury. Players with restricted ankle dorsiflexion on the lunge test were at an elevated risk of sustaining a hamstring injury.

Hamstring strains account for the most common injury within the elite realm of Australian Football League (Orchard, Seward et al 2002), with 13% of all missed playing time. The majority of hamstring injuries occurred during the three months of the playing season (March, April, May) with a decline in frequency as the season progressed. The mechanism of injury the

majority of the time occurs during running or sprinting when a player accelerated rapidly.

The hamstring condition can be classified into four categories:

- 1) Biomechanical
- 2) Referred
- 3) Local
- 4) All of the above.

- 1) Biomechanical oriented hamstring condition can be described as a biomechanical anomalies relating to the lumbopelvic/thigh/leg region creating on overloading of the muscle group. In this incidence the hamstring acts like a tensional barometer for the lumbopelvic.
- 2) Referred oriented hamstring condition is described as pain or increased tension referred from either neuromenigial, muscular structures either in the lumbar/hip regions.
- 3) Local oriented hamstring condition is described as a local pathology from either an overloading of the hamstring from DOMS, indirect overload, or direct injury from collision, past history of injury.

**Biomechanical**

A biomechanical h/s condition usually includes pelvic anomalies such as iliosacral fixations, upslips, sacral torsions, pelvic torsion etc, which are commonplace for the contact athlete.

As these anomalies are commonplace, it is important to note that treatment can be of a structural nature so interaction between those practioners who focus heavily on structural restrictions is integral.

**Common pelvic anomalies**

*Iliosacral dysfunction*

Iliosacral dysfunction includes two common

variations:

- 1) Anterior superior with internal rotation (ASIR).
  - 2) Posterior inferior with external rotation (PIEX).
- ASIR INDICATES that the ILLIUM rotates anteriorly on the sacrum, with an inflare or internal rotation tendency creating a muscular tensional change.
  - PIEX INDICATES that the ILLIUM rotates posteriorly on the sacrum, with an external rotation tendency creating a muscular tensional change.

The following is a guide to the common muscular tensional loads associated with the iliosacral anomalies.

For example, signs and symptoms of a R SIDE ASIR:

- Diffuse right posterior lumbosacral and sacroiliac pain with referral into right buttock and posterior thigh;
- Sitting usually more comfortable than standing.

### STRUCTURAL

- L iliac crest high
- R iliac crest low
- R+ VE standing flexion test (superior psis mvt on trunk flexion)
- R+ VE stork test

### MUSCULAR

- R hamstring lengthen
- R hip flexor (especially iliacus) shortened, tight and tender
- R gluteal med/min increase tone/sensitivity
- increase in trigger point referral
- R hip adductors shortened.

### Common assessment findings

R +ve Thomas test restricted rom  
SLR WILL NEED TO BE MODIFIED FOR TRUE HAMSTRING LENGTH.  
Due to shortened hip flexors will need to bring hips into flexion to counteract the increase lordosis, before performing SLR.  
Restricted R hip external rotation

### Palpation:

Increase in tone/tension trigger point activity in gluteals med/min/tfl.  
R sacrotuberous ligament is lax  
R Baer's sacroiliac point is tender

### Hamstring under tensional load

For example, signs and symptoms of a R SIDE PIEX:

- Pain usually localized to the right sacroiliac joint and ipsilateral buttock.
- Pain can be described as deep, achy, sore, tight etc.
- Pain may be referred down to the posterior thigh but not below the knee as with neurological or radicular pain.

### STRUCTURAL

- R iliac crest high
- L iliac crest low
- R +ve standing flexion test (superior psis mvt on trunk flexion)
- R+ ve reverse stork test
- R medial malleolus is shorter than left

### MUSCULAR

- R Hamstring shortened, hypertonic and tender
- R Pirformis/Glut max shortened
- R hip flexors lengthened
- B quadratus lumborum

### Common assessment findings

Restricted R hamstring restricted rom  
Restricted R hip internal rotation  
R hip flexor/ quadratus lumborum increase trigger point activity.  
R sacrotuberous ligament is taut and tender.  
Baer's sacroiliac point tender

### Hamstring on compressional tension

These pelvic anomalies are common but are not the exception, many players may present with more congenital postural types, i.e. anterior pelvic tilts/posterior pelvic tilts. These common postural types are not be confused with unilateral iliosacral anomalies, for example, you may have a player present with a postural type of bilateral anterior pelvic tilt but also present with a unilateral R sided posterior inferior external rotation of the iliosacral.

### Provocative positions for hamstring strains:

NOTE: Posterior iliac rotations produce a shortened stride length on the affected side.

It has been documented that the position of lumbar flexion with a straight leg as happens when a player attempts to pick up the ball whilst on the run is the most

common action for hamstring injury and most provocative because it places excessive tensional load whilst the hamstring is under an eccentric contraction, thereby creating an indirect overload injury of the musculoskeletal unit.

### REFERRED

Gluteus Medius/Minimus active trigger points

- Trigger points in these two muscles can be the cause of considerable lumbar, gluteal, sacral and posterior thigh pain.
- Trigger points in the gluteus medius tend to be found along its superior attachment. Apart from pain, patients will often have restricted abduction.
- They may also be a positive Trendelenberg sign because of inhibition of this muscle's function.
- The gluteus minimus muscle has a similar anatomical configuration to the medius, but less extensive, it arises from the external surface of the iliac, also attaching to the greater trochanter, its trigger points can be seen in either the anterior or posterior portions of the muscle.
- The pain that arises is deep buttock, posterior thigh and calf pain, or in the case of the anterior trigger points, pain distribution includes the buttock, lateral thigh and leg regions.
- The significance of these muscles in the origins of sacral, buttock and leg pain is that they can mimic radicular sources of pain as well as sacro-iliac joint dysfunction. Not only can they mimic these problems, but trigger points in these muscles may be as a result of both radicular and sacro-iliac joint dysfunction
- Referred pain originally from a spinal structure can set up satellite trigger points in these muscles. As stated before, the myofascial source of pain may well outlast the primary joint dysfunction.
- However pain from facet joints may overlap that of the gluteus minimus muscle. Tension generated by trigger points in the gluteus minimus may further block movement of the SI joint, particularly when involvement of this muscle is seen with piriformis.

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### Activation

- Acute overload caused by a fall.
- Distortion of gait, SI joint dysfunction.

### Trigger point examination

Located deep to gluteus maximus, medius and tensor fasciae latae, hence it is difficult to palpate taut bands.

### Anterior trigger points

Patient lies supine with leg extended. Tensor fasciae latae is identified. Palpate deep distal A.S.I.S.

### Posterior trigger points

Patient positioned in side lying, thigh adducted and slightly flexed to identify the piriformis line. Gluteus minimus, t.ps are found above this line between its midpoint and junction of its middle and lateral thirds.

### Associated trigger points

- Seen in conjunction with piriformis, gluteus medius, vastus lateralis, peroneus longus, quadratus lumborum and gluteus maximus.
- Anterior gluteus minimus and tensor fasciae latae often develop trigger points together; vastus lateralis trigger points can develop as satellites.
- Gluteus minimus may develop as satellites to quadratus lumborum. The connection is so strong that sometimes activation of quadratus lumborum activates gluteus minimus trigger points.

### Treatment: Anterior fibres

- Extension adduction over the edge of the couch.
- For posterior fibres, the leg is held over the edge of the couch, flexed at 30 degrees, internally rotated adducted.

### Piriformis

#### Anatomy

This muscle arises from the inner surface of the sacrum and attaches to the greater trochanter of the femur.

### Referred pain

Pain is referred over lateral aspect of the buttock, down the posterior thigh and sacro-iliac joint. Neurogenic pain may accompany active trigger points and this pain can be referred into the back of the leg

and the sole of the foot.

### Function

A stabiliser of the hip and lateral rotation of the thigh in extension and neutral. At 90 degrees flexion it abducts the thigh, produces a strong rotary force on the sacrum. This would tend to displace the base of the sacrum anteriorly while the apex is displaced posteriorly.

### Symptoms

Pain and paraesthesia may be felt in the low back, buttock, groin, perineum, hip, posterior thigh, leg and foot and in the rectum. Symptoms are aggravated by flexion, adduction and rotation. Patients may complain of painful swelling in the limb and sexual dysfunction. Piriformis syndrome 6:1 in favour of females. Travell and Simon identify three components to the syndrome:

- a) Myofascial trigger point pain
- b) Nerve and vascular entrapment
- c) Dysfunction of the SI joints.

As any muscle contracts, its girth increases. Anatomical variations such as a large muscle in a small greater sciatic foramen could lead to neurovascular compression. Active trigger points in the piriformis could cause displacement of the SI joint which in turn could maintain piriformis shortening. Pain due to the myofascial trigger points includes back, buttock, hip and thigh pain. This is often aggravated by sitting. Compression of the superior and inferior gluteal nerves and vessels and could cause buttock pain and in extreme cases, atrophy may develop. Pain in the region of the SI joint could be due to local dysfunction of the joint. Pressure on the sciatic nerve or on the post femoral nerve could augment thigh pain. Symptoms in the calf, foot and paraesthesia could be similarly explained. The pudendal nerve could be involved, leading to sexual dysfunction and groin pain. This syndrome may be easily confused for radiculopathy.

### Activation

Catching oneself in a fall can precipitate trigger points in this muscle. Forceful rotation with body weight on one leg. Resisting forceful medial rotation of the thigh during running, legs spread with

thighs flexed, as in obstetrical or coital positions. Perpetuation comes about through immobilisation of the sacro-iliac joint. Sitting driving for long periods of time and osteoarthritis of the hip.

### Patient examination

Test hip adduction strength in 90 degrees flexion. Piriformis stretch position test.

### Increased neural tension

### Peripheral nerve entrapments

Posterior Femoral Cutaneous Nerve: symptoms confined to posterior thigh and do not extend below the knee. The posterior femoral nerve runs adjacent to the sciatic nerve and can be compressed by piriformis.

### LOCAL

Secondary trigger points

### HAMSTRING

Innervation:

Branches from the tibial portion of the sciatic nerve, 5th lumbar and 1st two sacral nerves.

### Function

*Hip*

- Extend thigh at hip
- Decelerate the forward moving limb at terminal swing
- Semimembranosus/semitendinosus assist in internal rotation with the hip only when the hip is straight
- Long head of biceps assists in external rotation with the hip in extension.

*Knee*

- Short head of biceps femoris is a flexor at the knee.
- Semitendinosus and semimembranosus internally rotate the leg in knee flexion.
- Both heads of biceps femoris externally rotate the leg.

### Local hamstring pathologies

*Hamstring syndrome*

Sciatic nerve is constricted between two fibrotic bands of the hamstrings at the lateral proximal attachment to the ischial tuberosity.

- More obscure conditions such as snapping

syndrome of the semitendinosus tendon, semimembranosus tenosynovitis, snapping bottom or bursitis of the biceps femoris superior bursa are rare but are to be kept in mind as possible considerations.

- Trigger points in the hamstring muscles are responsible for tightening/shortening which produces a posterior tilt of the pelvis reducing normal lumbar lordosis a secondary compensatory overload to quadratus lumborum, iliopsoas, thoracic paraspinals and rectus abdominis.
- Adductor Magnus tightness of the posterior part will block full hamstring lengthening, especially the medial hamstrings.

“Hamstring tension is so often a key to low back pain of myofascial origin that even though the iliopsoas or QL seem to be primarily involved, it is wise to start treatment by releasing the hamstrings” (Travell & Simons, vol 2, pg. 331).

#### Common sites of strains

- 1) Mid belly semitendinosus
- 2) Biceps femoris
- 3) Attachment of ischial tuberosity

#### A soft tissue therapy treatment rationale for the hamstring condition

Assess and clear/correct lumbar/hip biomechanical

- Standing/sitting iliac heights.
- Standing/sitting flexion tests/stork test.
- PIEX/ASIR Innominate.
- If present correct innominate (MET muscle energy technique).

Assess and treat soft tissue component.

- See assessment findings for PIEX/ASIR for soft tissue treatment.

PIEX treatment example only

#### Common assessment findings

Restricted R hamstring restricted rom  
 Restricted R hip internal rotation  
 R hip flexor/quadratus lumborum increase trigger point activity.  
 R sacrotuberous ligament is taut and tender.  
 Baer's sacroiliac point tender

#### Muscular treatment

R hamstring shortened, hypertonic and tender

R piriformis/glut max shortened

R hip flexors lengthened

B quadratus lumborum

R gluteus minimus/tfl fascial restriction

B lower rectus abdominis/external obliques trigger point activity?

#### REASSESS TREAT, REASSESS ECT

Treatment considerations

- Lateral flexion of trunk: QL tensional vs compression symptoms.
- Flexion of trunk: lumbar, buttock, hamstring or calf complex.
- Extension: tensional vs compression symptoms
- Hip range of movement, look for adductor magnus or medial hamstring tightness on SLR.
- Piriformis (myofascial dysfunction).
- Slump test: treat restriction myofascially.
- Clear antagonist, quadriceps tension and Rom.
- Due to the prevalence of reduced dorsiflexion range of movement as one of the key predictors in hamstring injuries, assessment and treatment of the anterior and posterior compartments of the leg are worthy of consideration.

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