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Differentiation and therapeutic treatment of Sciatica & Piriformis Syndrome

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Learning Outcomes

- Identify the characteristics of a lower extremity peripheral neuropathy
- Differentiate between sciatica and piriformis syndrome
- Identify therapeutic treatments for sciatica and piriformis syndrome
Nerves

Peripheral nerves stretch and glide during movement

Structural pathologies can entrap and compress nerves preventing proper gliding and irritating the nerve

Irritation can cause pain, paresthesia, decreased conduction, and inflammation

Vicious cycle of neurologic entrapment, compression, and inflammation

Therapeutic treatments aim to halt this vicious cycle and allow healing to occur

Sciatic nerve

Supplied by nerve roots L4 through S3

Nerve roots exit through intervertebral foramen and converge to form the sciatic nerve, made up of a tibial portion and a common peroneal portion

It travels through the greater sciatic foramen and under the piriformis to enter the posterior compartment of the thigh

At the knee it will diverge into the tibial and common peroneal nerves

The tibial nerve supplies the plantarflexors and the common peroneal supplies the dorsiflexors and everters.
Sciatic Nerve Entrapment

Most common entrapments of the sciatic nerve include herniated disk, spinal stenosis, spondylolisthesis, and piriformis syndrome.

Entrapment and compression of the sciatic nerve can cause paresthesia, radiating pain, loss of sensation and motor function, diminished reflexes, atrophy, hypotonia, and neurogenic claudication.

Sciatica or lumbar radiculopathy is an umbrella term encompassing all of these possible symptoms. Patients may present with some or all of these symptoms.

3 million cases of sciatica a year in America, 200,000 of which are piriformis syndrome.

Intervertebral Foramen

Nerve roots exit the spinal cord through the intervertebral foramen.

The intervertebral foramen widen with the following actions: Flexion, contralateral lateral bending, and contralateral rotation.

They narrow with extension, ipsilateral flexion, and ipsilateral rotation.

Nerve roots commonly compressed through this passage.
Piriformis Muscle

External rotator of the hip

Abductor when hip is flexed past 90°

Sacrum to greater trochanter

Passes through the greater sciatic foramen with the sciatic nerve

Piriformis Syndrome

Also called pseudo sciatica

Can be due to an anatomic abnormality of the orientation of the sciatic nerve and the piriformis muscle.

May also be due to hypertrophy, spasm, trauma, and/or inflammation

Chronic, radiating pain and paresthesia that exacerbates with stooping or lifting with legs.

If prolonged, more severe symptoms of sciatica will develop affecting all the tissues the sciatic nerve innervates
Peripheral Sciatica

Caused by compression of L4 or L5 nerve roots as they exit the intervertebral foramen due to a herniated disk, spinal stenosis, or spondylolisthesis.

Pain exacerbated with lumbar extension and twisting

Pain relieved with lumbar flexion and lateral bending away from the site of injury.

Patient may present with a hunch lumbar posture and lateral pelvic shift away from the involved side to relieve their symptoms

If prolonged more severe symptoms of sciatica will develop affecting only tissues that are supplied by the involved nerve root.

Spinal Stenosis

Sciatica is commonly produced by compression of the L4 and L5 nerve roots due to narrowing of the intervertebral foramen.

Narrowing can be caused by degeneration or bulging of the intervertebral discs, facet joint degradation or hypertrophy, or formation of bone spurs.
Herniated Disc

98% of herniated disks occur at either L4-L5 or L5-S1

Most common cause of sciatica

Posterolateral annulus fibrosus is weakest therefore herniated disks usually protrudes into the lateral portion of the spinal canal compressing the nerve root before it can exit through the intervertebral canal.

Minor to moderate herniations cause unilateral sciatica.

Spondylolisthesis

Spondylolysis is a fracture of the pars interarticularis. This may result in spondylolisthesis, which is anterior slipping of the vertebral bodies resulting in compression of both the spinal cord and the spinal nerve roots.

May result in either unilateral or bilateral sciatica as well as cauda equina syndrome if severe.

The most common site of spondylolisthesis is L5 to S1

If severe, spinal “step off” deformity may be palpable
Cauda Equina Syndrome

Severe herniated discs, spinal stenosis, spondylolisthesis, and other inflammatory conditions of the spinal cord may cause cauda equina syndrome which is a medical emergency requiring surgical intervention.

Symptoms include severe back pain, bilateral sciatica, saddle anesthesia, and urinary and bowel incontinence.

Important to ask patients with severe back pain if they are experiencing bladder and/or bowel incontinence. If yes, contact a physician immediately.

Symptoms

Both piriformis syndrome & peripheral sciatica: Radiating pain, paresthesia, and neurologic claudication particularly up stairs or inclines

Piriformis syndrome: Pain & tenderness at piriformis muscle, increased pain with prolonged sitting, reduced ROM of hip joint, atrophy all muscles the sciatic nerve innervates.

Sciatica: Low back pain, reduced lumbar ROM, atrophy of the dorsiflexors
Physical Examination

Palpation
Lumbar and Hip ROM
MMT
Dermatomes
Piriformis length test
Neural tension test

Lumbar ROM

Lumbar extension, ipsilateral lateral bending, and ipsilateral rotation will exacerbate symptoms of peripheral sciatica. Anterior pelvic tilt also will exacerbate symptoms

This is because these motions cause the intervertebral foramen to narrow, compressing the nerve roots

The opposite motions will relieve symptoms of peripheral sciatica. The patient may present constantly hunched over into lumbar flexion or a lateral shift of their pelvis to reduce their pain

Lumbar flexion may exacerbate symptoms of piriformis syndrome because it is stretching the sciatic nerve

Lumbar extension will likely have no effect on piriformis syndrome
Hip ROM

Hip internal rotation will be reduced in piriformis syndrome due to the tightened piriformis muscle compressing the sciatic nerve and exacerbating symptoms.

Hip flexion and adduction may also be reduced in piriformis syndrome

Hip ROM will likely be unaffected due to peripheral sciatic

A 90/90 test should be done to test for hamstring tightness caused by atrophy due to decrease nerve conduction

MMT

Weakness of the dorsiflexors suggest an L4/L5 nerve root pathology

Weakness of the plantarflexors suggests S1/S2 nerve root pathology

These could be quickly tested with heel walking and toe walking respectively

Piriformis syndrome would likely result in weakness of all the muscles the sciatic nerve innervates

Patients do not need to obtain a 5/5. We are just trying to identify differences between the involved and uninvolved limb. Therefore, testing both sides is imperative.
Dermatomes

Sensation loss at L4 & L5 for a peripheral sciatica

Loss of L4-S2 for piriformis syndrome

Physical Exam video
Neural tension test of the Sciatic nerve

Slowly stretch the sciatic nerve at each joint until symptoms or sciatica reproduce

Straight leg raise with added dorsiflexion

A reproduction of symptoms between 30-60° of hip flexion indicates sciatic nerve tension.

Slump test: Similar to SLR in seated position with spinal flexion

Symptoms consistent with hamstring tightness without paresthesia do not indicate sciatic nerve tension

Piriformis Length test

Several ways

General screen

Pace’s sign

Piriformis test
Nerve tension & Piriformis Length test video

Treatment of peripheral Sciatica

Address poor posture of forward flexion or pelvic shift

Mckenzie method, pelvic tilts, glut bridges (Progression easy to difficult)

Stretching the hamstrings to prevent excessive posterior tilt of the pelvis and reduce strain on back.

Aerobic exercise while maintaining core strength

Heat/Ice

Anti inflammatory medication (NSAIDS)
Sciatica Stretches video
Treatment of Piriformis Syndrome

Patient Education

Stretching & Massage to relax the tightened muscle

Nerve flossing to break adhesions formed by scarring due to nerve damage

Piriformis exercises

Aerobic exercise can reduce muscle spasms

Heat/Ice

Anti inflammatory medication (NSAIDS)

Piriformis Stretches video
Massage

Figure four position relaxes the external rotators

Massage must be deep to work the piriformis but should not be overly painful

Massage video
Neural flossing & stretching

Neural flossing is done by stretching the nerve on one side of the piriformis and relaxing it on the other causing the nerve to glide toward the side that is being stretched. Then the position is then reversed causing the nerve to glide in the opposite direction.

Repeating this motion will cause the nerve to glide back and forth, breaking adhesions and improving mobility of the nerve.

Progress to neural stretching once symptoms reduce, where you stretch the nerve simultaneously on both sides of the piriformis.

Neurodynamics video
Patient Education

Correct lifting techniques
Remove wallet from back pocket
Reduce prolonged sitting
Postural improvements
Sleeping techniques
Benefit of daily exercise
Weight loss

Positions of pain relief

Peripheral sciatica:
Posterior pelvic tilt achieved through hip flexion
Ipsilateral lateral bending.
Pelvic rotation away from involved side

Piriformis Syndrome:
Figure 4 in prone
Position of Pain relief video

Aerobic Exercise

After symptoms begin to improve aerobic exercise should be implemented to reduce neurogenic claudication and improve muscle tone.

Patients with peripheral sciatica may begin with a bike because it produces less impact on the spine. Progression to walking should be implemented to obtain functional goals.

Patients with piriformis syndrome should not use a bike, as the added pressure may exacerbate symptoms. Instead they should begin with walking.

Maintaining proper lumbar posture and abdominal tone during aerobic exercise should be emphasized.
Heat & Ice

Heat can be beneficial prior to exercise or massage to relax the tissues and make them more mobile.

Ice is beneficial to reduce pain that may have developed from treatment.

Placement should be on the site of the disorder.

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Summary of Differential Diagnosis

Proximal Sciatica

- 3 Million American cases a year
- Low back pain
- Sitting relieves pain
- Lumbar extension, ipsilateral lateral bending, and ipsilateral rotation exacerbates pain. Opposite motions will relieve pain.
- Decreased lumbar & hip flexion ROM
- Decreased MMT: Primarily dorsiflexion
- Loss of sensation of L4 and/or L5 dermatome

Piriformis Syndrome

- 200,000 American cases a year
- Probably no low back pain
- Prolonged sitting exacerbates pain
- Hip internal rotation will exacerbate pain. Hip external rotation will relieve pain.
- Decreased hip ROM & positive piriformis length test
- Decreased MMTs: Hip external and internal rotation & all muscles the sciatic nerve innervates
- Loss of sensation of L4-S2 dermatomes
## Similarities

Positive nerve tension test  
Neurogenic claudication  
Paresthesia  
Radiating pain

## Summary of Treatments

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<tr>
<td>Address poor posture</td>
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Example

A 85 y.o. patient is hunched over his walker and his pelvis is laterally shifted to the left. He is complaining of low back pain with radiating pain and tingling down his left leg. He has significant weakness of his left dorsiflexors. He is able to stand up straight but complains of severe pain with any lumbar extension past neutral. He both urinated and had a bowel movement today.

Does this patient likely have piriformis syndrome or peripheral sciatica?

What would be your plan of care?

Questions?

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