But My Back Hurts Only When I’m Standing!

Axial Loading for Spinal Canal Stenosis

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Spinal Canal Stenosis

- Progressive narrowing of the central canal, lateral recesses, and neural foramina most commonly due to degenerative disease

- In the United States, majority of individuals over 60 years old are affected
Symptoms of Lumbar Stenosis

- Most commonly presents as midline back pain aggravated by standing or walking

- Improved by leaning forward
Purpose

To review the role of axial-loading in MRI for the diagnosis of spinal canal stenosis

To learn how axial-loading in MRI can be performed during conventional supine MRI
Myelography may demonstrate worsening of spinal stenosis during extension.
Some individuals are symptomatic only in the upright position.

May be secondary to axial load exerted by bodyweight on the spine, making spinal stenosis worse in the standing position.
Effects of Axial Loading

- MRI is typically performed in the supine position with no axial load.

- Surgically treatable spinal stenosis may become hidden during supine MRI.
Axial Loading Device

- Device used to generate axial loading
- Simulates the upright standing position during conventional supine MRI
- Consists of a harness and a platform
Harness comes in several sizes to fit various body types.

Two nylon straps fasten the harness to the foot platform.
Foot Platform

Foot platform applies an adjustable tension to the harness
Patient Interview

- Identify patients who might benefit from axial-loading during MRI
Evaluation of Symptoms

- Patient may complain of pain that occurs only when standing

- Pain may be relieved by lying down

My back hurts only when I’m standing!
Evaluation of Prior MRI

- Prior MRI might show no significant spinal stenosis due to lack of axial load

- Patient may have been asymptomatic during prior MRI due to supine positioning

My back doesn’t hurt lying down. I have no pain at all!
Using the Axial Loading Device

Harness is worn like a vest

Vest is buckled in place
Using the Axial Loading Device

- The foot platform is placed at patient’s feet
- One size fits all
Using the Axial Loading Device

Harness is fastened to the foot platform with two nylon straps.
Using the Axial Loading Device

- Tension is applied to the harness by adjusting two large blue knobs

- As the two knobs are turned, the axial load increases
Axial load (in pounds) is indicated by two display gauges.

Recommended total axial load is 50% of patient’s bodyweight.
MRI with Axial Loading

- Patients usually become symptomatic due to the axial load

- Patient should be given reassurance

My back hurts! It feels as if I am standing!
MRI with Axial Loading

No Axial Load

With Axial Load

No Pain!

Ouch!
Female 41y

- Neurogenic claudication at L4-L5
- Increasing central stenosis with axial load
Male 63y

- Neurogenic claudication at L4-L5

- Increasing disc herniation and central stenosis with axial load
Female 58y

- Neurogenic Claudication at L4-L5
- Increasing synovial cyst bulge with axial load
Female 52y

- Neurogenic Claudication at L4-L5

- Increasing central stenosis with axial load
The incremental increase in diagnosis of operative spinal canal stenosis with the use of an axial-loading device is currently under investigation.

There is some evidence that management could change for some patients. (Hiwatashi, et al. AJNR 2004; 25:170-174)
Is it safe?

- FDA-approved for both CT and MRI
- If patient cannot tolerate their back pain, hip or knee flexion instantly relieves the axial load
- Large display gauge allows MRI technologist to see absence of axial load in those situations
What are other options?

- Axial Loading Device
- Upright MRI
Axial-loading during MRI can unmask operative cases of spinal canal stenosis that may otherwise appear inconsequential.

Axial-loading can be performed during conventional supine MRI.

The incremental diagnostic yield of axial loading for spinal canal stenosis is currently under investigation.
References