

SIGNIFICANCE OF SEDIMENTATION SIGN OF MAGNETIC RESONANCE IMAGING (MRI) IN LUMBAR CANAL STENOSIS

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Introduction

Lumbar spinal stenosis (LSS) is common sequelae of degenerative disorders of spine. Spinal canal stenosis is a narrowing in the spinal canal or neural foramina, causing compression on the spinal cord, cauda equina, or individual nerve roots, and it may be congenital or acquired. The acquired causes for Spinal canal stenosis are frequently occurring and can result from: facet osteoarthritis, ligamentum flavum hypertrophy, degenerative bulging disc, or osteophyte formation. The nerve root sedimentation (NRS) sign is a new radiological sign first reported by Barzet al..In the normal person during supine position, the nerve roots would sink posteriorly in the dural sac due to gravity. In those patients with LSS, the nerve root would not be able to sink but disperse ventrally. The NRS sign has been shown to discriminate well between patients with and without LSS and reported to be 94% sensitive and 100% specific. However, the sign is not widely used probably due to its limited reliability study. A positive sedimentation sign was defined as the absence of nerve root sedimentation in at least 1 axial MRI scan, at a level above or below, disregarding the location of the scan within the level and its proximity to the maximal stenosis .The only exception from this is the two nerve roots leaving the dural sac one segmental level below the stenosis. If there are nerve roots in the ventral part of the dural sac except for the ones exiting the dural sac, the sedimentation sign is positive .

Aim of the work

This work aimed to study the significance of the nerve root sedimentation sign in T2 axial and sagittal views of MRI lumbar spine in patients with symptomatic lumbar canal stenosis.

PATIENTS

This study is a prospective one that including 75 adult patients suffering from symptomatic and Radiological lumbar canal stenosis of varying grades or nonspecific low back pain. The patients in our study were divided into two groups according to the presence or absence of sedimentation sign. 52 patients absent sedimentation of the nerve roots (positive sedimentation sign) and 23 patients presence of sedimentation of the nerve roots (negative sedimentation sign), Table 3. All patients in our study were collected from outpatient clinic of El-Hadra University Hospital Spine Unit. All patients underwent clinical examination in the clinic and the included patients were asked for MRI of the lumbar spinal canal in centers of radiology that contain 1.5Tesla MRI machine, and they were asked for follow up again.

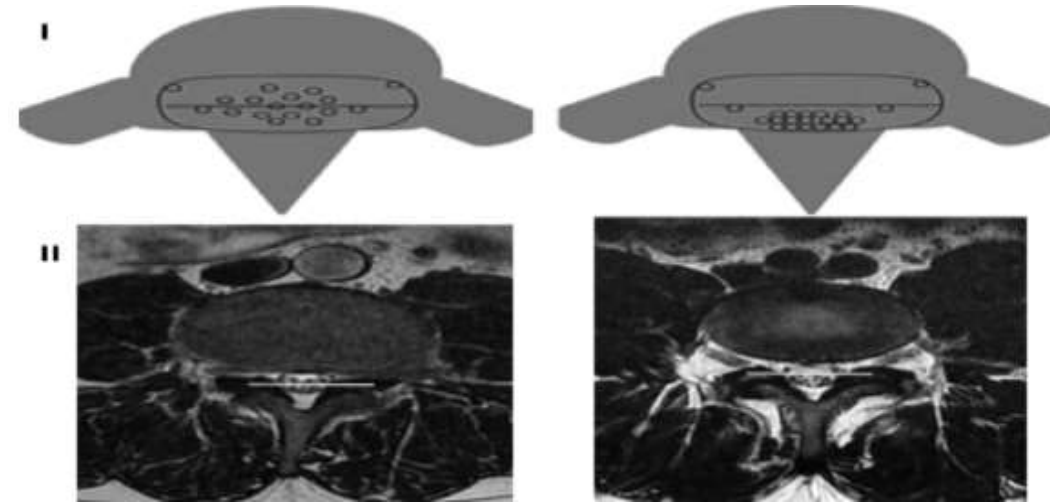


Figure (1): Illustrative method about diagnosis of sedimentation sign.

Methods

The sedimentation sign was assessed in a random population of 75 patients as regard to the: **Age:** The age of the patients ranges from 24 to 85 years old. **Gender:** Out of 75 patients, the males were 33, and the females were 42. **AP diameter:** The AP diameter of the Lumbar canal was ranged from 8 mm to 17 mm. **Claudication:** Out of 75 patients, 54 cases had neurogenic claudication. **Low back pain (LBP):** Out of 75 patients, 57 cases had LBP. **History of medical illness:** Patients were asked about the presence of any medical history. **Sciatica:** Patients were examined for the presence of symptoms of Siatica (pain, numbness and/or weakness that radiates along the path of the siatic nerve which branches from lower back to the hips and buttocks and down each leg).**Bladder and bowel function:** The patients were asked about their control of the Bladder and bowel hobbits. **Vas for pain:** Pain in the lower back and lower extremities was monitored by using 10 points of visual analogue scale ranging from zero to ten points (zero = no pain, 10 equals severe pain), Scheme 1.-VAS was measured from 0 to 10 with zero meaning that he was completely normal and ten meaning that the patient was unable to do anything for himself.-A patient was rated 1 or 2 if he can go to work and enjoy near to their normal active life-A Patient rated 3 to 4 can wash and dress himself, was able to move up and downstairs.-A Patient rated 5 to 7 had moderate pain affecting his ability to move up and downstairs and requires assistance occasionally.-Patients rated 8 or higher if they were using a walking aid, needed help when dressing, and would not be mobile enough to manage the stairs.

Results

Table1: Statistical results for crosstab analysis for sedimentation sign and lumbar canal stenosis.

Tested parameter	Total (75)		Sedimentation Sign					P	Decision
			Positive		Negative				
Stenosis			NO.	(%)	NO.	(%)	53.087	0.000	Accept H
	NO.	(%)	52	69.3	23	30.7			
Positive	55	73.3%	51	98.1	4	17.3			
Negative	20	26.7%	1	1.9	19	82.7			

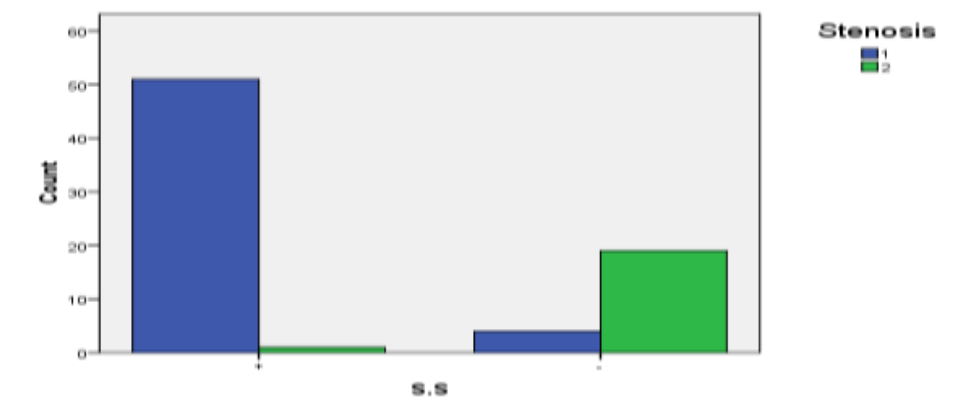


Figure 2: Comparison between positive and negative sedimentation sign according to lumbar spinal stenosis

CONCLUSION

On MRI in the supine position of patients without symptomatic and morphologic LSS, the lumbar nerve roots sediment as a result of gravity to the dorsal part of the dural sac. This sedimentation is rarely observed in patients with LSS. Therefore, in patients without prior spine surgery, the sedimentation sign, measured in addition to the AP diameter of the dural sac and the walking distance, will possibly improve the diagnosis of symptomatic LSS.

With The high sensitivity and specificity showed in our study, a positive sedimentation sign can rule in LSS, and a negative sedimentation sign can rule out LSS.