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MedPeer Publisher
Abbreviated Key Title: MedPeer
ISSN : 3066-2737
homepage: https://www.medpeerpublishers.com

Dural Ectasia and Perineural/Tarlov-Type Cystic Dilatations on MRI: A Cluster of Three Cases Highlighting Diagnostic Pitfalls

DOI: 10.70780/medpeer.000QGU4

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ABSTRACT

Dural ectasia is abnormal enlargement of the dural sac and may occur with connective tissue disorders, neurocutaneous syndromes, skeletal abnormalities, or no identifiable systemic disease. Its MRI appearance may overlap with perineural/Tarlov cysts and nerve root sleeve dilatations. This case cluster presents three female patients with different MRI patterns of generalized dural sac enlargement and associated perineural/Tarlov-type cystic dilatations, emphasizing morphologic assessment, quantitative measurements, and cautious clinical correlation. Case 1 was a 26-year-old woman with clinical suspicion for a Marfan-spectrum connective tissue disorder. Lumbar MRI showed marked cystic lumbosacral dural ectasia, with dural sac diameters of 30 mm at S1 and 18.5 mm at L4, yielding an S1/L4 ratio of 1.62. Case 2 was a 43-year-old woman with neck, shoulder, low back, and lower extremity pain. MRI showed mild generalized dural sac prominence and a dominant left S1 perineural/Tarlov-type cystic dilatation measuring 34 × 22 mm, with radiological nerve root compression but normal neurological and electrophysiological findings. Case 3 was a 55-year-old woman with low back pain and minimal right quadriceps weakness. MRI showed mild dural sac prominence, with S1/L4 diameters of 14/12 mm, and a right posterolateral L4 cystic lesion causing mild adjacent nerve root compression. Generalized dural sac enlargement and perineural/Tarlov-type cystic dilatations may coexist and create diagnostic pitfalls. Structured MRI assessment should distinguish generalized dural sac enlargement from focal cystic lesions and interpret symptoms cautiously when degenerative spinal disease coexists.

KEYWORDS

Dural ectasia, Perineural cyst, Tarlov cyst, Magnetic resonance imaging, Marfan syndrome

MAIN ARTICLE

INTRODUCTİON

Dural ectasia is abnormal widening or ballooning of the dural sac, most commonly recognized in the lumbosacral region, and may occur with connective tissue disorders, neurocutaneous syndromes, skeletal abnormalities, trauma, tumors, or idiopathic conditions [1]. MRI findings include increased dural sac diameter, posterior vertebral scalloping, neural foraminal widening, anterior sacral meningocele, and nerve root sleeve dilatation; quantitative assessment may include S1/L4 dural sac diameter comparison or dural sac ratios [2,3].

Perineural cysts, commonly referred to as Tarlov cysts in the sacral region, are CSF-intensity cystic lesions related to nerve root sleeves. They may coexist with dural ectasia or mimic part of its imaging spectrum, but an isolated perineural cyst is not synonymous with generalized dural ectasia [4]. MRI is useful for evaluating dural sac morphology, perineural/root sleeve relationship, and associated degenerative or compressive findings [5].

This case cluster presents three patients with different MRI patterns of dural sac enlargement and perineural/Tarlov-type cystic dilatations, emphasizing diagnostic pitfalls, measurement limitations, and cautious clinical-radiological correlation.

CASE PRESENTATİON

Case 1

A 26-year-old woman presented with low back and dorsal pain radiating to the left calf, accompanied by left calf numbness. Symptoms had increased over 1–2 months, worsened with movement, and improved with rest. Physical examination showed lumbar paravertebral spasm, painful limitation of lumbar motion, thoracic scoliosis, increased thoracic kyphosis/lumbar lordosis, and normal neuromotor findings.

Her history included previous pectus carinatum surgery, severe myopia, positive thumb sign, and skeletal/postural abnormalities. A Marfan-spectrum connective tissue disorder was suspected, but genetic test results were unavailable. The documented revised Ghent systemic score was at least 7: pectus carinatum/history of corrective surgery (2), dural ectasia (2), scoliosis/kyphotic-postural abnormality (1), severe myopia >3 diopters (1), and positive

thumb sign (1). Previous records mentioned Marfan syndrome; however, because genetic testing and aortic root involvement were not documented, the patient was classified as suspected Marfan-spectrum connective tissue disorder rather than confirmed Marfan syndrome. Echocardiography showed no evident cardiovascular involvement.

Lumbar MRI demonstrated marked cystic lumbosacral dural ectasia with sacral remodeling/scalloping. The dural sac measured 30 mm at S1 and 18.5 mm at L4, yielding an S1/L4 ratio of 1.62 (Figure 1). Cervical MRI showed no significant disc pathology, neural compression, or spinal cord signal abnormality. Neurosurgery did not recommend surgery. The patient was managed conservatively, remained clinically stable during a 3-year institutional record period, and had no documented surgical intervention.

Case 2

A 43-year-old woman presented with neck/right arm pain, low back/left leg pain, and bilateral shoulder pain. Examination showed painful terminal cervical motion and parascapular/suprascapular trigger points, with negative shoulder provocative tests, Spurling, compression, and distraction tests. Neurological examination and electrophysiological evaluation, including nerve conduction studies, F-wave responses, and needle electromyography, were normal. No connective tissue disorder was documented.

Cervical MRI showed multilevel degenerative disc disease with C4–5 and C5–6 central protrusions indenting the dural sac, without cord signal abnormality. Lumbar MRI showed degenerative disc changes, Schmorl nodes, mild generalized dural sac prominence, and multilevel root sleeve–related perineural/Tarlov-type cystic dilatations. The L4 dural sac AP diameter was 12.9 mm, and the widest non-cystic dural sac diameter was 17 mm at T12 (Figure 2A). S1 dural sac measurement was unreliable because a dominant left S1 perineural/Tarlov-type cystic dilatation distorted the sacral dural sac. This cyst measured approximately 34 × 22 mm and caused radiological compression of the adjacent nerve root (Figure 2B). Because neurological and electrophysiological findings were normal, this was not considered definitive symptomatic radiculopathy. The case was interpreted as an overlap/pitfall pattern rather than quantitative proof of generalized dural ectasia.

The patient was managed conservatively with symptomatic treatment and exercise recommendations. She remained clinically stable during a 2-year institutional record period, with no documented surgical intervention.

Case 3

A 55-year-old woman presented with recently worsening low back pain and minimal right quadriceps weakness. She had no known connective tissue disorder or neurocutaneous syndrome.

Lumbar MRI showed lower lumbar degenerative disc disease, including L4–5 central protrusion, and mild dural sac prominence. The dural sac measured 14 mm at S1 and 12 mm at L4, yielding an S1/L4 ratio of 1.17 (Figure 3A). This supported possible mild dural ectasia in the appropriate morphologic context but was not considered diagnostic by diameter comparison alone. A right posterolateral L4 cystic lesion measuring 19 × 15 mm caused mild compression of the adjacent right nerve root (Figure 3B). This was anatomically compatible with right L4 nerve root involvement; however, concomitant L4–5 disc protrusion limited definitive attribution of the weakness to the cystic lesion alone. Additional smaller cystic lesions were present adjacent to left L5 and posterior S1, measuring 7 mm and 9 mm, respectively.

The patient was managed conservatively as an outpatient and remained clinically stable during a 3-year institutional record period, with no documented surgical intervention.

The main clinical, radiological, and management features of the three patients are summarized in Table 1.

DİSCUSSİON

This case cluster illustrates the heterogeneous MRI spectrum of generalized dural sac enlargement and associated perineural/Tarlov-type cystic dilatations. Case 1 showed definite marked cystic lumbosacral dural ectasia, whereas Cases 2 and 3 demonstrated overlap between mild dural sac prominence and focal perineural/Tarlov-type cystic lesions. These cases highlight a practical reporting problem: focal nerve root sleeve–related cystic dilatations may coexist with, mimic, or distort generalized dural sac enlargement. Therefore, cystic lesions should be described separately from generalized dural sac measurements.

A practical quantitative approach is comparison of the dural sac diameter at S1 or below with that at L4. In the present case cluster, this ratio was used as a descriptive and supportive measurement rather than as a validated stand-alone diagnostic criterion. Its diagnostic accuracy was not assessed in this small retrospective series, and the measurement should therefore be interpreted together with overall dural sac morphology and associated imaging findings. In Case 1, the S1/L4 ratio was 1.62, supporting marked lumbosacral dural ectasia. In Case 3, the S1/L4 ratio was 1.17; this was interpreted cautiously as possible mild dural sac

enlargement in the appropriate morphologic context rather than as a stand-alone diagnostic criterion. In Case 2, S1 measurement was unreliable because a dominant left S1 perineural/Tarlov-type cystic dilatation distorted the sacral dural sac. Accordingly, Case 2 was interpreted as an overlap/pitfall case, not as quantitative proof of generalized dural ectasia.

The association between dural ectasia and connective tissue disorders is clinically important. Case 1 had previous pectus carinatum surgery, skeletal/postural abnormalities, severe myopia, positive thumb sign, and a revised Ghent systemic score of at least 7 points [6]. However, genetic confirmation and aortic root involvement were not documented; therefore, the patient was classified as having suspected Marfan-spectrum connective tissue disorder rather than confirmed Marfan syndrome. In this context, the role of imaging was not to establish a definitive genetic diagnosis, but to identify dural ectasia as a systemic feature supporting connective tissue disorder-oriented clinical correlation.

A central diagnostic issue is distinguishing generalized dural ectasia from isolated perineural/Tarlov-type cystic lesions. Perineural cysts may represent part of a broader meningeal/root sleeve abnormality or may be isolated incidental findings [7]. Thus, the term "dural ectasia" should be reserved for generalized dural sac enlargement or cases with supportive associated features, while perineural cystic lesions should be reported separately with level, size, laterality, and nerve root relationship [8]. The main differential diagnosis includes isolated perineural/Tarlov cysts, meningeal diverticula, arachnoid cysts, postoperative pseudomeningocele, and cystic nerve sheath tumors. In this cluster, CSF-equivalent signal, nerve root sleeve relationship, absence of prior spinal surgery, and lack of solid enhancing components favored perineural/Tarlov-type cystic dilatations associated with dural sac enlargement rather than postoperative or neoplastic lesions.

Clinical significance is variable. Symptoms may include low back pain, radicular pain, headache, weakness, urinary symptoms, or cauda equina syndrome, but many lesions are incidental or nonspecific [9]. In Case 2, normal neurological and electrophysiological findings argued against definite symptomatic radiculopathy despite radiological nerve root compression. In Case 3, minimal right quadriceps weakness was anatomically compatible with right L4 nerve root involvement, but concomitant L4–5 disc protrusion limited definitive attribution to the cyst alone. Therefore, clinical-radiological correlation should remain cautious, especially when degenerative disease or myofascial findings coexist.

Management depends on symptoms, neurological deficit, lesion size, progression, and complications. Conservative management is generally appropriate in patients without progressive neurological deficit, while surgical or CSF-diversion procedures may be

considered in selected symptomatic cases; however, management of symptomatic perineural/Tarlov cysts remains debated [10]. In this cluster, all patients were managed conservatively, remained clinically stable during available institutional record periods, and had no documented surgical intervention.

Limitations include the small retrospective sample, non-uniform clinical documentation, unavailable genetic testing in Case 1, and lack of standardized follow-up MRI. S1-based quantitative assessment was also limited in Case 2 by dominant sacral cystic distortion.

CONCLUSİON

Generalized dural sac enlargement and perineural/Tarlov-type cystic dilatations may show overlapping MRI appearances. This small retrospective case cluster demonstrates a spectrum ranging from definite marked lumbosacral dural ectasia to borderline or mild dural sac prominence with focal cystic lesions. Based on our practical experience in these three cases, structured MRI assessment may help distinguish generalized dural sac enlargement from focal perineural/Tarlov-type cystic dilatations. Quantitative measurements may provide supportive information when feasible, but cystic distortion can limit their reliability. Reporting lesion level, size, nerve root relationship, and associated degenerative findings may contribute to greater diagnostic clarity; however, these observations should be interpreted as practical experience from a limited case cluster rather than as broadly validated diagnostic guidance.

FIGURES:

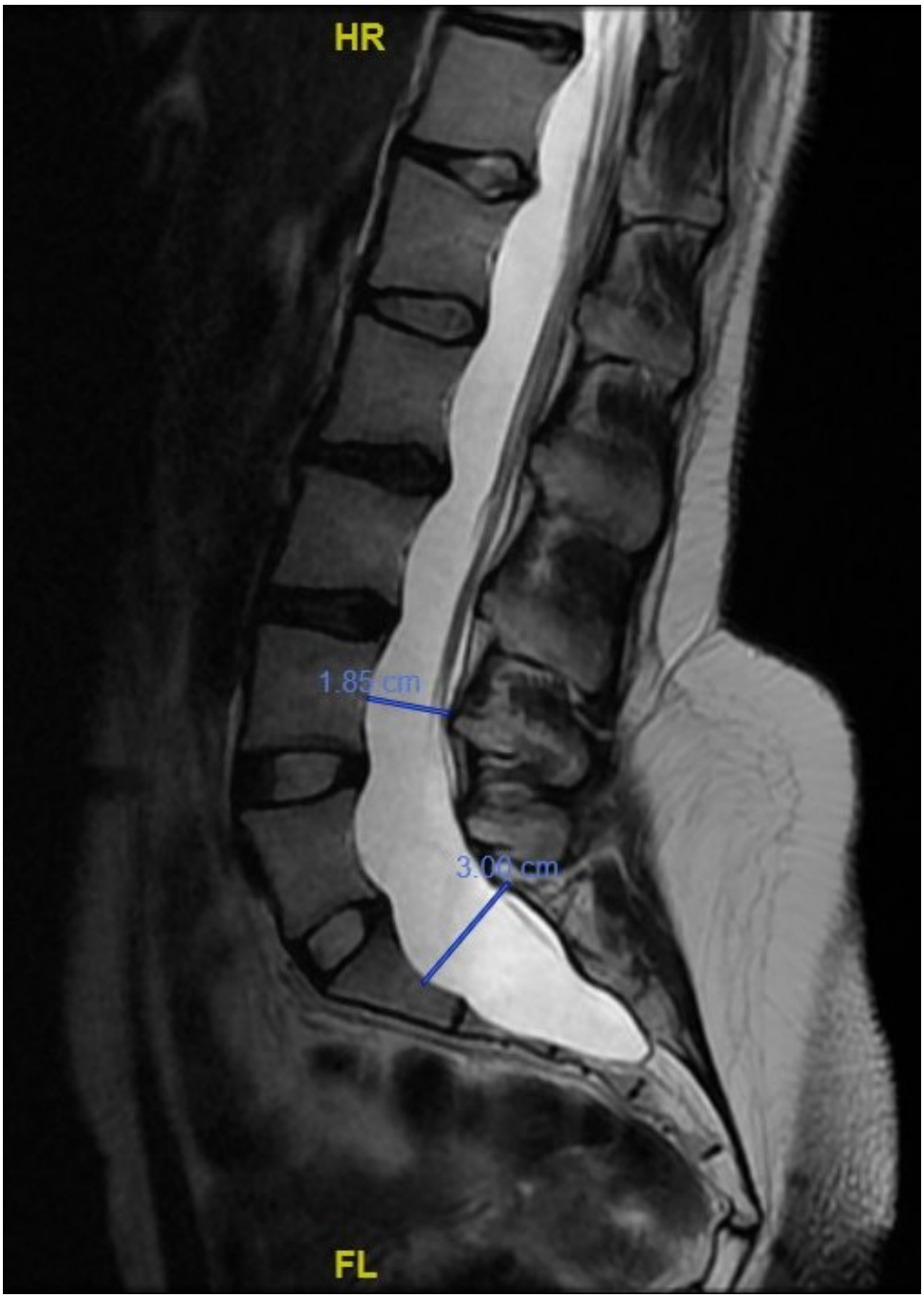

Figure 1: Sagittal T2-weighted lumbar MRI demonstrates cystic enlargement of the dural sac extending from the lower thoracic/lumbar levels toward the sacral region. The dural sac measured 30 mm at S1 and 18.5 mm at L4, with an S1/L4 ratio of 1.62.

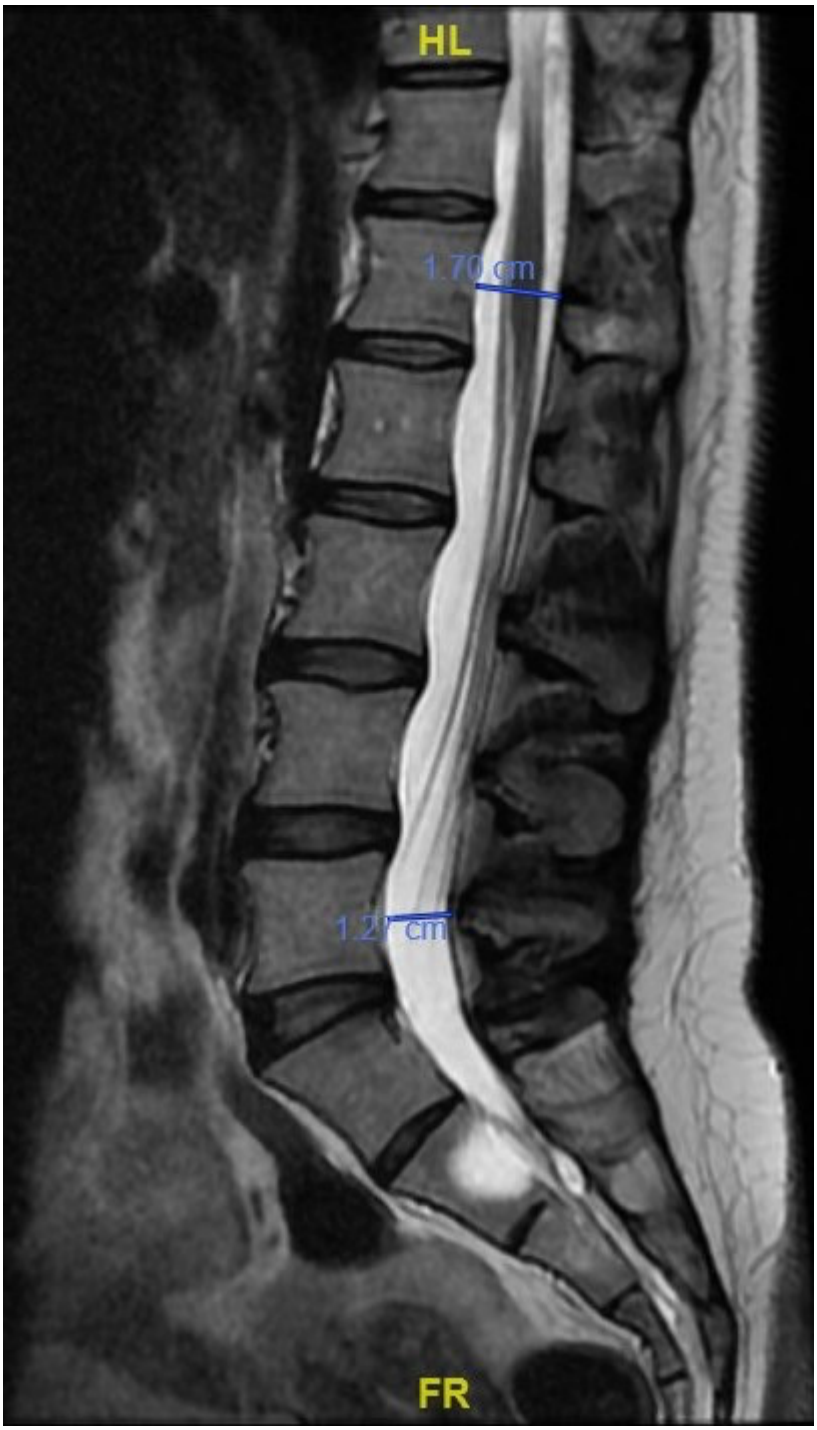

Figure 2A: Sagittal T2-weighted MRI demonstrates mild generalized dural sac prominence. The L4 dural sac measured 12.9 mm, and the widest non-cystic dural sac diameter measured 17 mm at the T12 level.

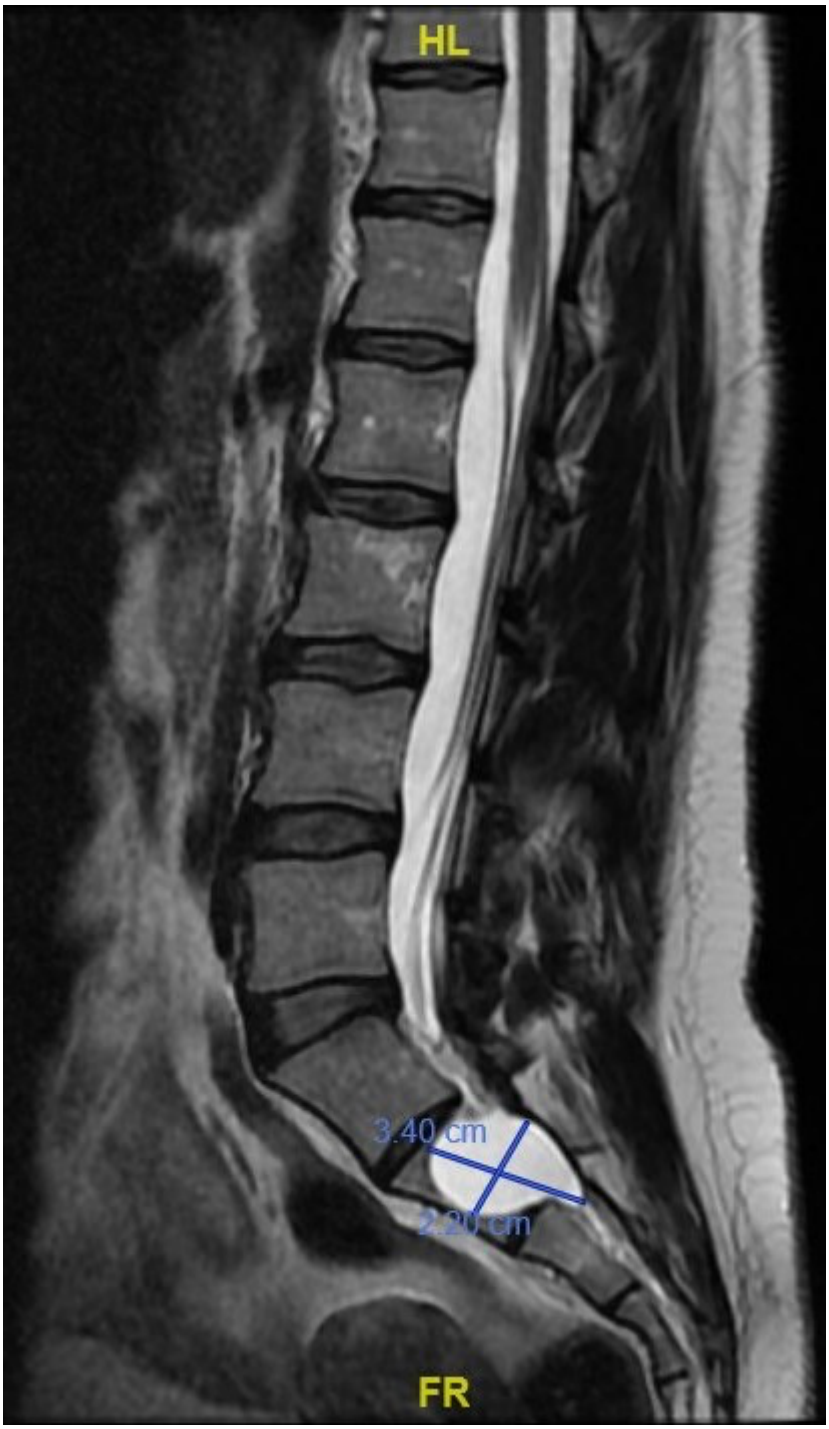

Figure 2B: Sagittal T2-weighted image shows the dominant left S1 perineural/Tarlov-type cystic dilatation measuring approximately 34 × 22 mm and compressing the adjacent nerve root. The S1 dural sac diameter could not be reliably measured because the dominant cystic component distorted the sacral anatomy.

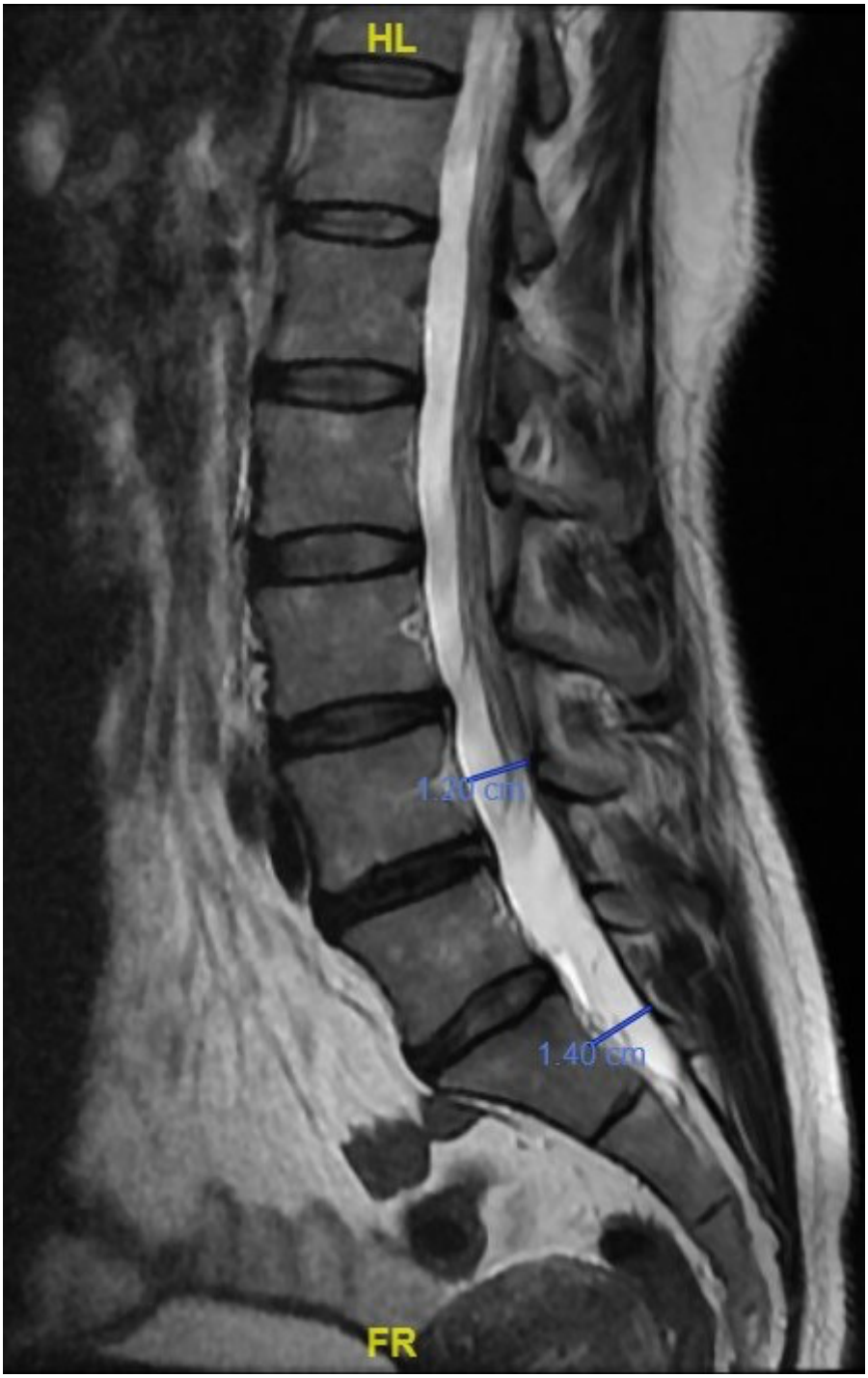

Figure 3A: Sagittal T2-weighted lumbar MRI demonstrates mild dural sac prominence, with dural sac diameters of 14 mm at S1 and 12 mm at L4.

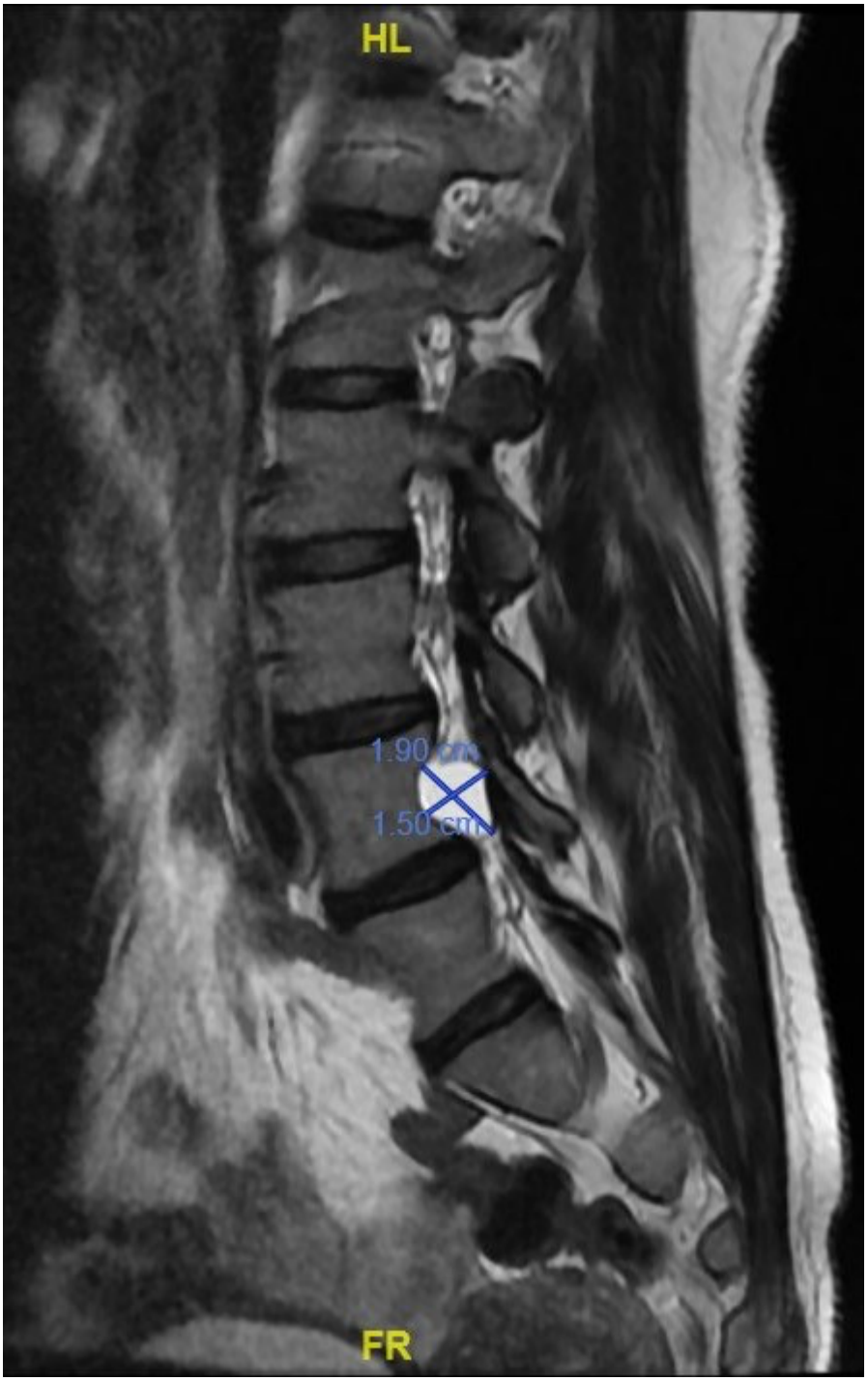

Figure 3B: Sagittal T2-weighted image shows a L4 cystic lesion measuring 19 × 15 mm, causing mild compression of the adjacent right nerve root.

TABLES :

Table 1: Summary of Clinical, Radiological, and Management Features of the Three Cases

Feature	Case 1	Case 2	Case 3
Age/Sex	26/F	43/F	55/F
Main clinical presentation	Low back/dorsal pain radiating to left calf; left calf numbness	Neck/right arm pain, shoulder pain, low back/left leg pain	Low back pain; minimal right quadriceps weakness
Relevant background	Marfan-spectrum connective tissue disorder suspected; previous pectus carinatum surgery; severe myopia >3D; positive thumb sign; normal echocardiography	No known connective tissue disorder	No known connective tissue disorder or neurocutaneous syndrome
Neurological/electrophysiological findings	Neuromotor examination normal	Neurological examination and EMG normal	Minimal right quadriceps weakness documented
Generalized dural sac enlargement	Definite marked cystic lumbosacral dural ectasia	Borderline/overlapping pattern: mild generalized dural sac prominence, but definitive quantitative dural ectasia not established because S1 assessment was limited by dominant perineural/Tarlov-type cystic dilatation	Mild dural sac prominence; possible mild dural ectasia only in the appropriate morphologic context and not definitive by diameter ratio alone
Dural sac measurements	S1: 30 mm; L4: 18.5 mm; S1/L4 ratio: 1.62	L4: 12.9 mm; widest non-cystic dural sac diameter: 17 mm at T12; S1 not reliably measurable	S1: 14 mm; L4: 12 mm; S1/L4 ratio: 1.17
Management	Neurosurgery did not recommend surgery; physical medicine and rehabilitation follow-up	Conservative/symptomatic treatment; exercise recommendation; no documented surgery	Conservative outpatient management; no documented surgery
Available institutional record period	3 years; clinically stable; no documented surgical intervention	2 years; clinically stable; no documented surgical intervention	3 years; clinically stable; no documented surgical intervention

ACKNOWLEDGEMENTS

The authors have no acknowledgements to declare and report no conflicts of interest.

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