



Case Report

Redundant nerve root syndrome mimicking an intradural spinal cord tumor: A case report

Satoshi Kawajiri¹, Ryu Kurokawa², Tetsuro Shingo²

¹Department of Neurosurgery, Faculty of Medical Sciences, University of Fukui, Eiheiji, Fukui, ²Department of Neurosurgery, Dokkyo University School of Medicine, Mibu, Japan

E-mail: *Satoshi Kawajiri - n703kawajiri@gmail.com; Ryu Kurokawa - ryukuro@dokkyomed.ac.jp; Tetsuro Shingo - shingo@dokkyomed.ac.jp



***Corresponding author:**

Satoshi Kawajiri,
Department of Neurosurgery,
Faculty of Medical Sciences,
University of Fukui, Eiheiji,
Fukui, Japan

n703kawajiri@gmail.com

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ABSTRACT

Background: The redundant nerve root (RNR) syndrome is a pathological condition in which the cauda equina develops into a severely flexed/tortuous spiral mass above a level of severe lumbar stenosis.

Case Description: A 70-year-old male presented with bilateral neurogenic claudication attributed to a MRI-documented intradural extramedullary lesion at the L1 level with severe adjacent level/inferior L2/3 stenosis. At surgery, intradural exploration at L1 revealed an edematous cauda equina consistent with the diagnosis of the RNR syndrome.

Conclusion: The RNR syndrome should be included among the differential diagnostic considerations when non-enhancing lesions are encountered above levels of marked lumbar stenosis.

Keywords: Differential diagnosis, Extramedullary spinal cord tumor, Lumbar canal stenosis, Redundant nerve root syndrome

INTRODUCTION

Redundant nerve root (RNR) is a pathological condition in which the cauda equina presents as a mass lesion (i.e., flexed/tortuous with a spiral deformity) best seen on T2 MR studies above the level of severe lumbar spinal canal stenosis (LCS). It was first described by Verbiest in 1954, and named the “redundant nerve root” syndrome by Cressman and Pawl in 1968.^[1,7] Here, we report a 70-year-old male who presented with a L1 hyperintense mass consistent with a RNR lesion above a L2/3 level severe stenosis.^[3,8]

CASE REPORT

A 70-year-old male presented with 4 months of neurogenic claudication, ataxia of gait, and dysuria. His examination revealed left iliopsoas weakness and bilateral anterior thigh pain in the L3 distribution. The T2- MR showed severe stenosis at the L2/3 level due to degenerative changes along with a cephalad L1 hyperintense mass that did not enhance with contrast [Figures 1a and b]. Notably, the conus was displaced ventrally/to the left and the cauda equina was difficult to identify [Figure 1c]. These preoperative images were consistent with the diagnosis of an intradural extramedullary L1 tumor.

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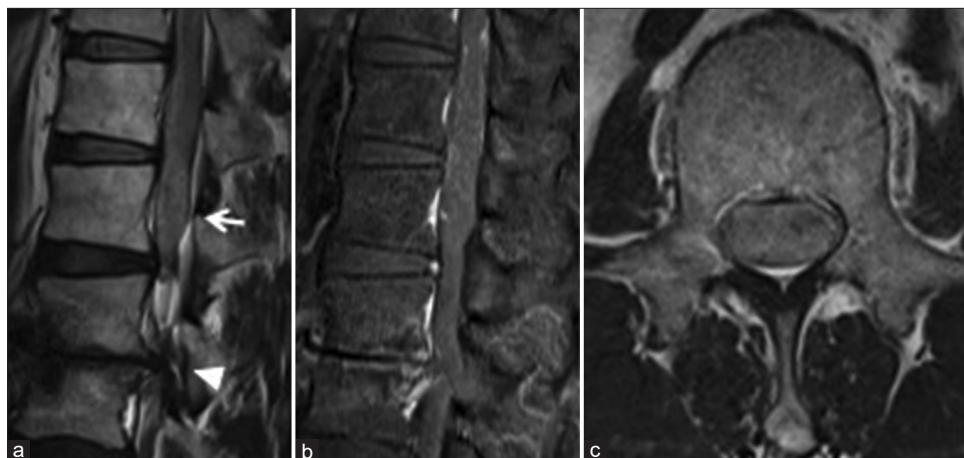


Figure 1: T2-weighted sagittal (a) and axial (c) images of the lumbar spine show a hyperintense intradural mass at L1 (arrow) and severe lumbar canal stenosis due to the degenerative change at L2/3 (arrow head). Post contrast T1-weighted sagittal image (b) shows no enhancement in the mass.

Surgery

At surgery, a diffusely congested, swollen, and tortuous cauda equina herniated through the L1 durotomy; no accompanying cerebrospinal fluid was evident [Figure 2a]. After the filum terminale was biopsied, a Gore-Tex duraplasty was performed at L1 over the herniated cauda equina region. In addition, a partial L2/3 laminectomy was performed to decompress the adjacent stenosis.

Histology

The patient was diagnosed with the RNR syndrome as the histological examination revealed congested/edematous nerve root tissue without accompanying tumor.

Postoperative course

Within 1-week postoperatively, the patient's lower extremity symptoms improved. The 3-month follow-up MRI showed no residual mass, but a residual, somewhat clumped, cauda equina at the L1 level [Figures 2b and c].

DISCUSSION

RNR occurs in 33.8–42.3% of severe LCS cases. It is common in males in their 50s and 60s who presents with the lower extremity symptoms attributed to L3-S1 root/cauda equina compression.^[4,5] Rengachary suggested a 2-point classification system for RNR: ^[5,6] Type 1 (i.e., most common) showed a mild-to-moderate degree of nerve tortuosity without thickening, while Type 2 (i.e., rare type) involved grossly thickened nerve roots contributing to increased intradural pressure. In this patient, on the T2 preoperative MR, it was difficult to differentiate the congested/thickened cauda equina (i.e., above the marked L2/3 stenosis) from a

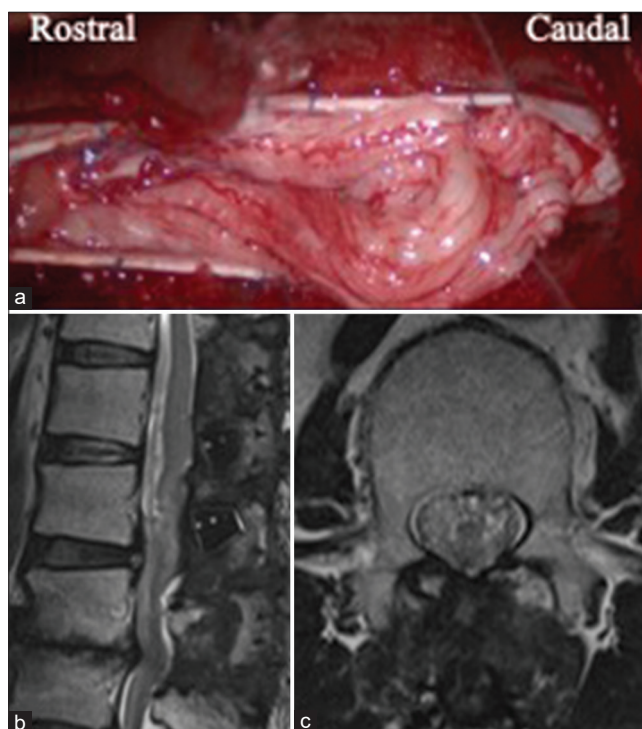


Figure 2: A still image from the operative video shows congested and swollen cauda equina herniating out from the dural opening. Duraplasty with a Gore-Tex membrane was required to close the dura (a). Postoperative T2-weighted sagittal (b) and axial (c) images of the lumbar spine show disappearance of the hyperintense mass lesion.

non-enhancing intradural lesion (i.e., Type 2) [Figure 3]. However, at surgery, a swollen cauda equina occupied the entire intradural L1 space, and extruded through the durotomy, warranting the placement of a L1 duraplasty [Figure 3]. In our literature review, we were only able to find one case similar to our own^[3] [Table 1].

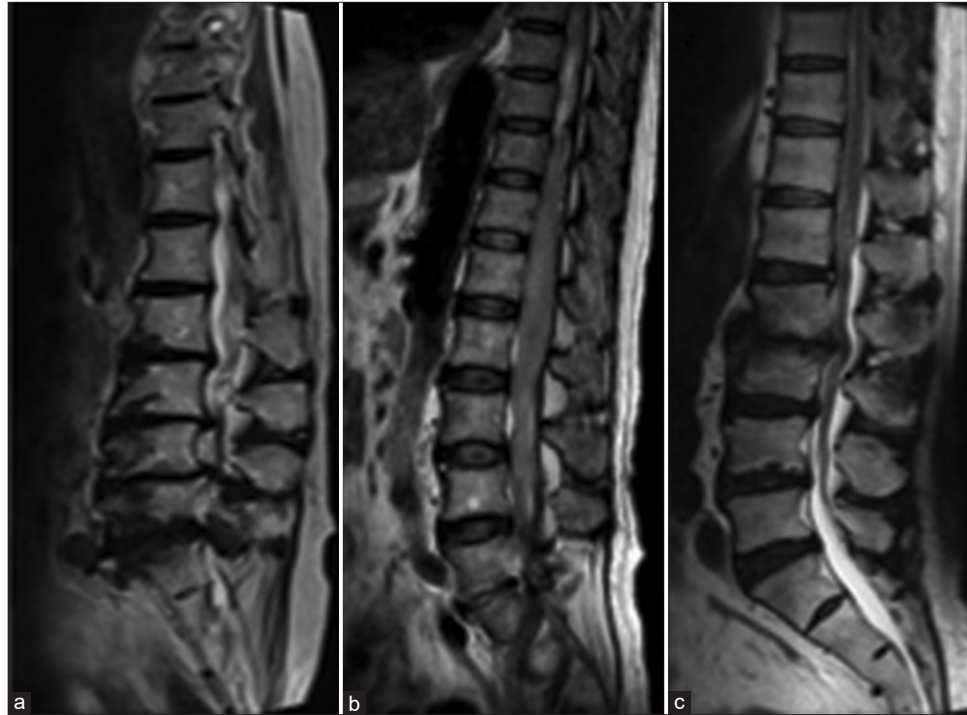


Figure 3: T2-weighted sagittal images show a typical case of redundant nerve root (RNR) (a) and a case of malignant lymphoma (b). Comparing these images, it is clear that the MR findings in this case (c) are more similar to those of spinal tumor than to those of typical RNR, although the degree of enlargement of the cauda equina is different.

Table 1: Summary of the literature on RNR mimicking intradural mass lesion.

Author and published year	Age/Sex	Symptoms (dermatome)	MR findings		Preoperative diagnosis	Postoperative outcome
			T2-weighted	Gd enhance		
Lee <i>et al.</i> , 2004 ^[3]	73/M	Bil leg pain (L5)	Hyperintense mass	Negative	Intradural extramedullary tumor	Improved
Yang <i>et al.</i> , 2013 ^[8]	58/M	Lt leg pain (L5)	Hyperintense mass	Negative	Intradural disc herniation	Improved
Our case, 2022	70/M	Bil leg pain (L3)	Hyperintense mass	Negative	Intradural extramedullary tumor	Improved

RNR: Redundant nerve root, MR: Magnetic resonance, Gd: Gadolinium, Bil: Bilateral, Lt: Left

Treatment of RNR

Yokoyama *et al.*^[9] noted that the RNR syndrome may be reversed following decompressive surgery at the level of the “mass lesion” along with decompression of the adjacent level stenosis. Further, intraoperative ultrasonography helps determine whether the adequacy of decompression,^[2] or whether an accompanying duraplasty is warranted.

CONCLUSION

RNR can sometimes be difficult to diagnose with preoperative T2 MR images alone. However, the diagnosis of RNR should be considered when there is an intradural non-enhancing mass lesion adjacent to a level of severe lumbar stenosis.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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