

# Symptomatic Lumbar Intradural Spinal Lipoma— Case Report

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## Case report

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# Abstract

## Background

Intradural lipomas (IL) not associated with spina bifida in the lumbar region are rare and isolated cases have been reported in the literature. The current paper presents a case of a patient who suffers from intradural lipoma without spinal dysraphism in the lumbar region. We also made a brief literature review.

## Case presentation:

A 31-year-old patient suffered from back pain resistant to medication for more than a year. Few weeks prior to hospitalization, the pain irradiated to the feet associated with numbness, weakness and urinary dysfunction. Upon hospitalization, partial cauda equina syndrome was diagnosed that included radiculopathy along L<sub>4</sub>-S<sub>1</sub> nerve roots, predominantly on the left side, decreased tendon reflexes, left-sided fibular and tibial paresis. Partial urinary retention was also present. Magnetic resonance tomography demonstrated a lesion located in the dorsal intradural space at the level of L<sub>3</sub>-L<sub>4</sub> vertebra that had fat-equivalent ovoid form compressing and dislocating the components of the dural sac ventrally. Laminectomy of L<sub>3</sub> and L<sub>4</sub> vertebrae was performed. We encountered an intradural tumor formation with a yellowish colour and that was adherent to the nerve roots of cauda equina. After microsurgical dissection of the nerve roots, the tumor was partially resected. The histological examination confirmed the diagnosis of lipoma. Postoperatively, the neurological status improved significantly. The pain syndrome, motor symptoms and pelvic reservoir dysfunction were reduced.

## Conclusions

In cases with intradural lipomas, the earliest possible surgical decompression with maximal safe resection of the lesion is a therapeutic method of choice that results in significant improvement or complete recovery of the neurological deficit.

## Background

Spinal lipomas represent for 1%-4% of spinal tumors [1, 2]. Usually, they are associated with spinal dysraphism communicating with the subcutaneous tissues through a defect in the posterior vertebral elements [3]. Intradural lipomas (IL) not associated with spina bifida or skin malformations are rare, and only isolated cases have been reported in the literature [4]. The disease usually manifests during the second and third decades of life and is most commonly localized in the thoracic, followed by the cervical spine [5-7]. Lumbar localization is extremely rare [6, 7]. ILs have slow progressive growth. Generally, patients have complaints for 1-2 years until definitive diagnosis, which resemble those of myxopapillary ependimomas [8, 9].

The purpose of this publication is to present a case of a patient with intradural lipoma without evidence of spinal dysraphism in the lumbar region and to perform a brief literature review.

## Case Presentation

Thirty-one-year patient had been complaining of recurrent lumbalgia for about 12 months resistant to medication. Few weeks before the hospitalization at the Neurosurgery Clinic of St George University Hospital, the pain irradiated to the lower limbs, mainly in the left leg, with progressive weakness and numbness. Additionally, he developed difficulty with urination.

Upon admission, partial cauda equina syndrome was diagnosed that included radiculalgia (Denis Scale grade 3) with radiculopathy along L<sub>4</sub>-S<sub>1</sub> nerve roots, predominantly on the left side, decreased tendon reflexes, left-sided fibular and tibial paresis (grade 4 on the Medical Research Council Scale). Partial urinary retention was also present. Partial retention of pelvic vessels.

The magnetic resonance imaging (MRI) demonstrated a lesion located in the dorsal intradural space at the level of L<sub>3</sub>-L<sub>4</sub> vertebra that had fat-equivalent ovoid form compressing and dislocating the components of the dural sac ventrally. (Fig. 1 and Fig. 2). MRI myelography showed reduced volume of cerebrospinal fluid in the subarachnoid space of at the level between third and fourth lumbar vertebra (Fig. 2).

Laminectomy of L<sub>3</sub> and L<sub>4</sub> vertebrae was performed. Dura mater appeared to be very tense. After dural incision, we visualized an intradural tumour formation with a yellowish colour consistent with lipoma. The lesion was tightly adherent to the surrounding nerve roots which impeded the total tumour removal.

The histological examination confirmed the macroscopic diagnosis of lipoma (Fig. 3).

The postoperative period was uneventful. The neurological symptoms improved significantly. The pain syndrome was reduced to Denis grade 2, the muscle strength improved to grade 5 on the Medical Research Council Scale. The patient also reported alleviation in pelvic reservoir function.

The follow-up examination after 10 months revealed moderate pain in the lumbar region without irradiation to the legs, persistent but improved fibular paresis, restored control of urination and defecation. Postoperative MRI revealed a residual tumour at L<sub>3</sub> level (Fig. 4).

## Discussion

Lipomas are benign slow-growing tumours that cause neurological deficits due to their mass effect [5, 6]. Due to their slow growth, ILs closely adhere to the surrounding neural structures which commonly impedes total tumour removal, and the aim of surgery remains decompression [6], a fact also confirmed by our case.

There are several theories that discuss the occurrence of IL. According to the theory of 'developmental error', intradural lipomas develop from migrated fat cells during nerve tube formation through secondary neurulation [10, 11]. According to this theory, they are not real tumors, but rather congenital malformations, which explain both dorsal localization and the absence of associated dysraphism. [7] According to the "metaplastic theory", connective tissue metaplasia leads to the deposition of fat cells inside the dura [12]. The third theory is the so-called 'hamartomatous origin theory', according to which nerve fibers, dermoid cysts, parts of skeletal muscle, etc., originating in the ectoderm and mesoderm are included in the fat tissue [13]. There is also a theory according to which fat cells can arise from cells forming spinal vessels [5].

In our case, the dura mater was intact and the histological examination visualized only fat cells. The spinal MRI did not visualize the multiple IL affecting other spinal segments which excludes the last three theories. We support the first theory as Kim et al.[7].

Some authors believe that ILs are more common in men, while others found that both genders were equally affected [5, 7, 8].

In the lumbar region, large studies have not shown that any functional nerve roots traverse the lipoma. The nerve bundles were involved predominantly at the periphery of the lesion. This finding suggests the secondary entrapment of adjacent nerve roots by the lipoma [6].

## Conclusions

Spinal intradural lipomas are rare lesions that can cause slow progression of neurological deficits. The earliest possible surgical decompression without obligatory attempt for total tumour removal is a therapeutic method of choice that commonly is sufficient for partial or complete recovery of the neurological functions.

## Abbreviations

IL

Intradural lipomas; MRI:Magnetic resonance imaging

## Declarations

### Acknowledgements

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### Authors' contributions

Atanas Davarski, Georgi Apostolov

Participated in the surgery, conducted a follow-up survey of the patient. Both authors collected the imaging materials and wrote the manuscript. Authors critically participated in the manuscript revision. The author(s) read and approved the final manuscript.

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## **Availability of data and materials**

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## **Ethics approval and consent to participate**

Not applicable.

## **Consent for publication**

Written informed consent was obtained from the patients.

## **Competing interests**

The authors declare that they have no competing interests.

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## Figures

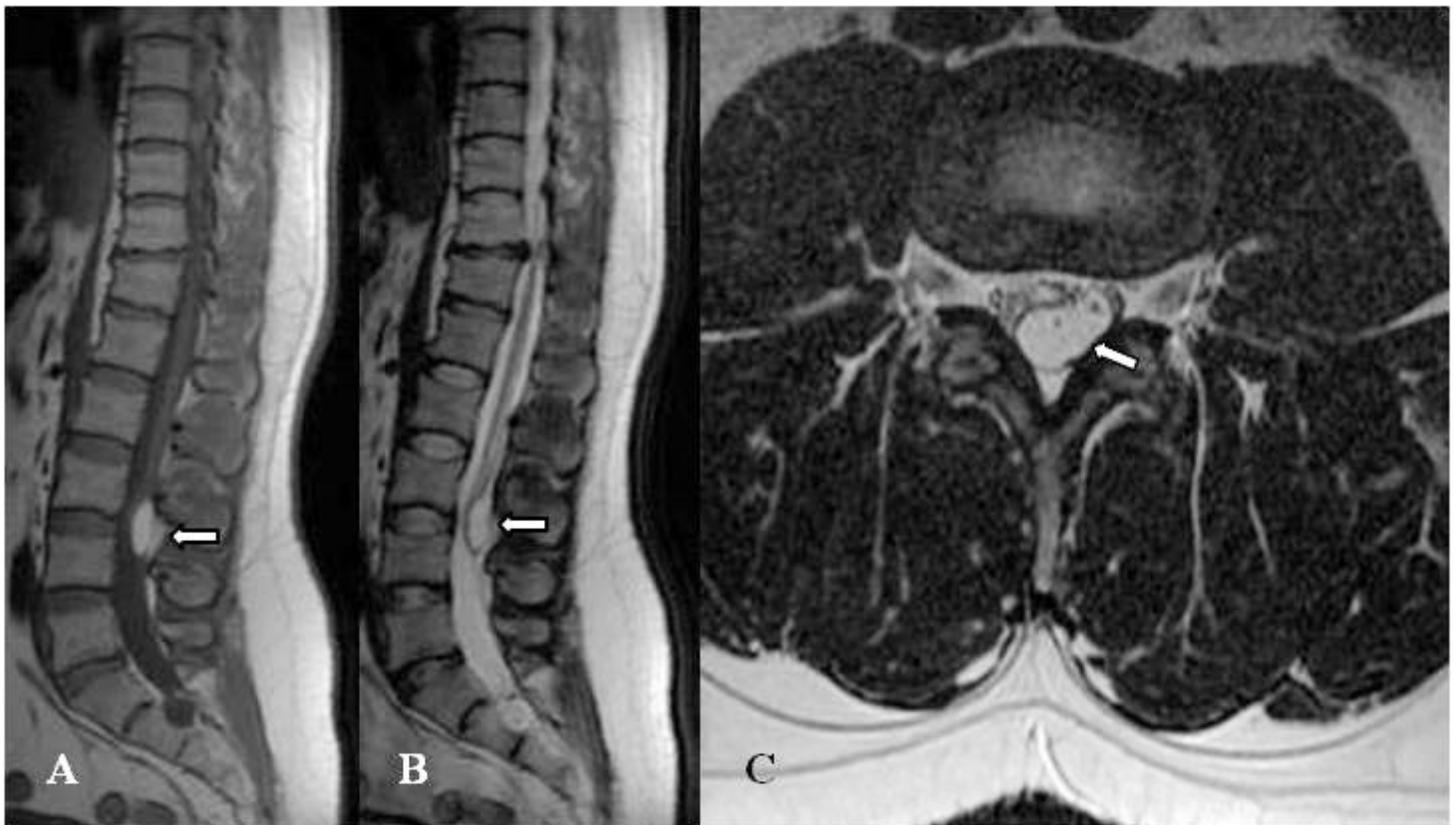
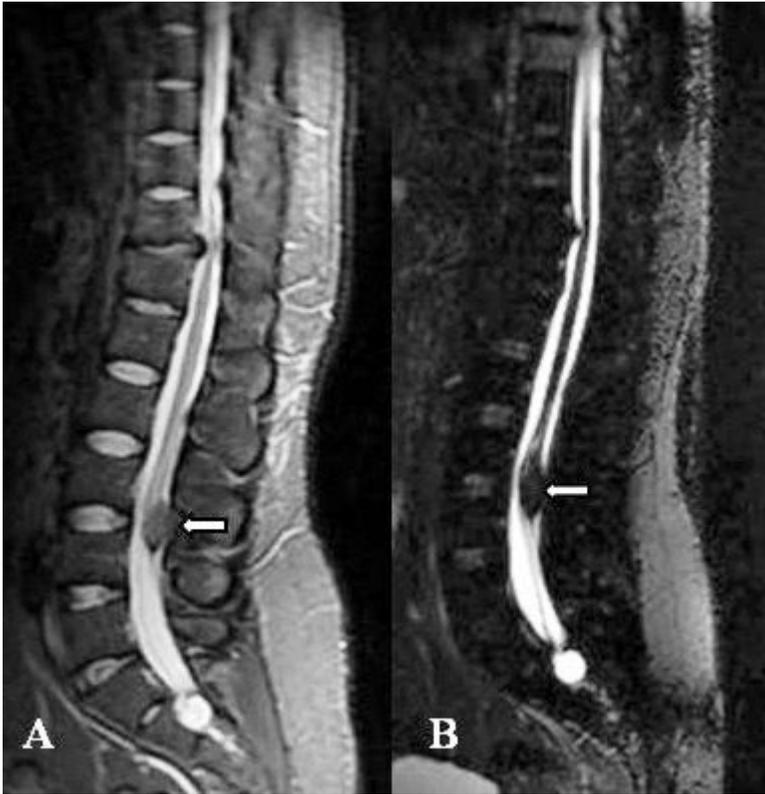


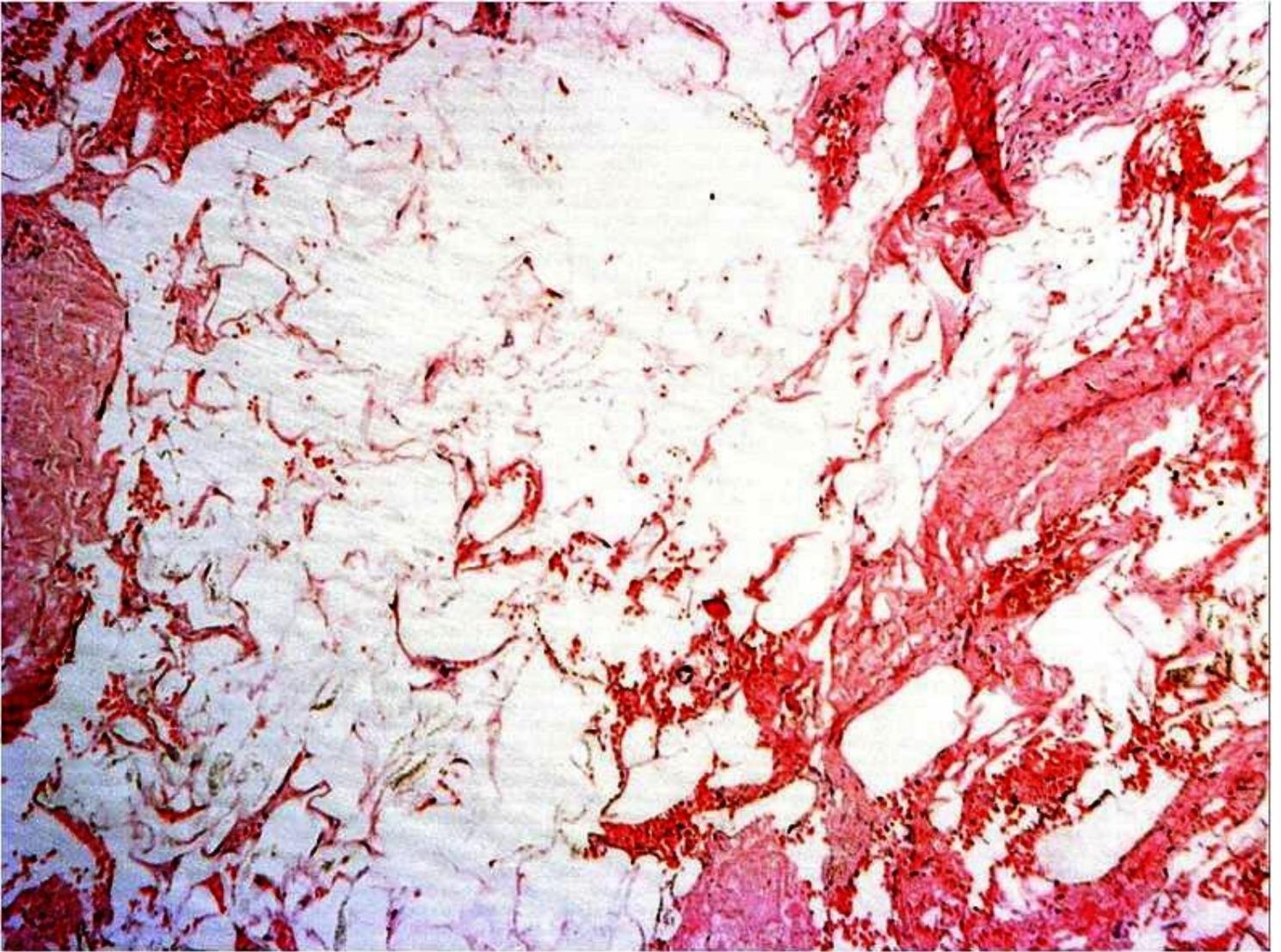
Figure 1

Lumbar T1 and T2 MRI. A and B/ Sagittal view demonstrated high-intensity lesion in T1 and T2 (arrows); C/ Axial view - dorsally located tumor formation compressing and dislocating the nerve roots of the cauda equina ventrally (arrows)



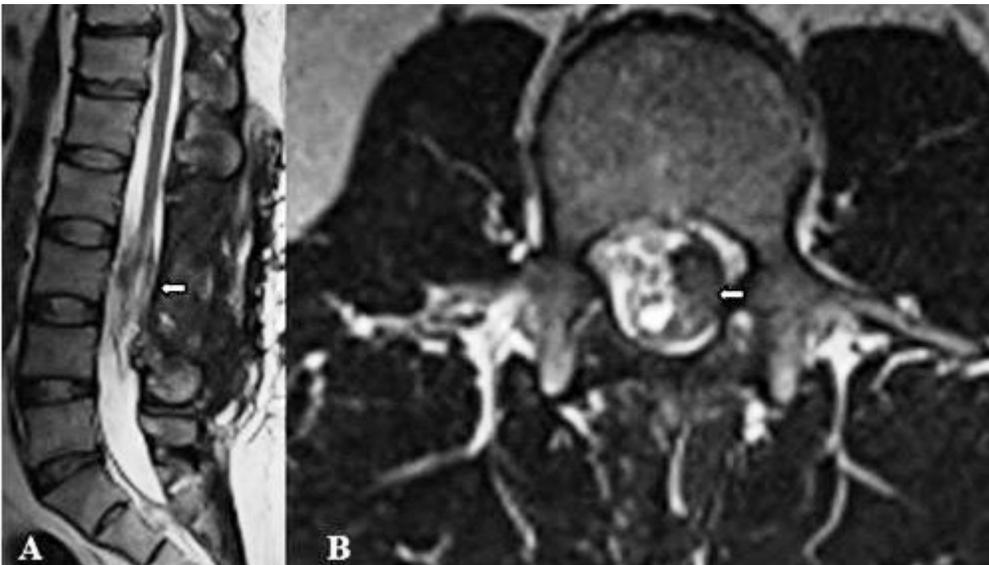
**Figure 2**

A/ Sagittal MRI T2 stir shows the fat-equivalent lesion structure (arrow); B/ Sagittal MRI myelography visualizes restriction of the volume of the CSF in the dorsal subarachnoid space at L3-4 level (arrow).



**Figure 3**

Lipoma composed of mature fat cells with a slight variation in cell size and shape (H&E, x 100)



## Figure 4

Postoperative T2 MRI. A and B/ Sagittal and axial views demonstrate partial tumour removal (arrows