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CASE REPORT

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Lumbosacral epidural lymphoma: A case report and comprehensive review of literature

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Key Clinical Message

Epidural lymphoma of the lumbosacral region is a rare condition that manifests with back pain and nonspecific neurological symptoms. Our case which was diagnosed with diffuse large B-cell lymphoma, highlights the importance of recognizing early lymphoma symptoms to enable timely treatment and improved outcomes.

Abstract

Lymphoma rarely presents in the lumbosacral epidural space. Initial presentations of lymphoma are of paramount importance in the timely diagnosis and management of the disease. We report a 42-year-old woman presented with 4 years of low back pain and progressive right lower extremity paresthesia. Lumbar MRI revealed an epidural soft tissue lesion compressing nerves at L4 to the coccyx. Laminectomy and tumor resection were performed. Pathologic findings confirmed diffuse large B-cell lymphoma. We systematically reviewed the literature on lymphomas with lumbar epidural space involvement reported since 1990. Twenty-four cases from 19 reports were identified. The mean age of lumbar epidural lymphoma cases was 39.5 ± 17.8 years, and 72% were male. The most common subtype was diffuse large B-cell lymphoma, and common presentations included back pain, lower extremity neurological deficits, and bowel/bladder dysfunction. Overall, lymphomas presenting in the spine can pose diagnostic challenges owing to nonspecific initial symptoms. Our case highlights the importance of recognizing early lymphoma symptoms to enable timely treatment and improved outcomes.

KEYWORDS

case report, epidural lymphoma, MRI, spinal tumor

1 | INTRODUCTION

The occurrence of lymphoma in the spinal epidural space is uncommon, and when it does manifest in this space, it most frequently affects the thoracic spine. Generally, epidural lymphoma (EL) can occur at any age, typically manifesting in the fifth to sixth decade of life, and is more common in men.[1] To date, there have been only a few reported cases of EL in the lumbosacral region.

Diffuse large B-cell lymphoma (DLBCL) represents an important histological subtype of lymphoma, often detected at advanced stages. Therefore, timely diagnosis and management of DLBCL is crucial for effective treatment. Here, we present a case of lumbosacral epidural DLBCL in a woman presenting with progressive lower extremity paresthesia. We contextualize this case within a systematic review of the literature on previously reported EL cases involving the lumbar epidural space since 1990.[2–19] The characteristics, treatment, and outcomes of these cases offer additional insights into this uncommon spinal tumor.

2 | CASE HISTORY/EXAMINATION

A 42-year-old female presented to our neurosurgery center with progressive numbness in her right lower limb. The patient had a history of low back pain and right lower limb radicular pain since 4 years ago, which exacerbated within the last 2 years. No other comorbidities were present. The patient experienced a slight alleviation of symptoms by administering nonsteroidal anti-inflammatory drugs. However, she had not completed her diagnostic workups for 2 years due to her financial constraints. During this period, the patient also developed urinary hesitancy and progressive right calf numbness. No evidence of neurogenic claudication was present and no B symptoms were present. Upon admission, the Glasgow coma scale (GCS) score of the patient was 15/15. The patient did not exhibit any symptoms of saddle hypoesthesia or urinary incontinence.

The examination of the lower limbs showed that both proximal and distal limb forces were 5/5. The straight leg raise and Patrick's tests yielded negative results. The examination also revealed no Babinski reflex or clonus. The proprioception was intact. Nevertheless, there was a slight decrease in knee and ankle reflexes on both sides. A systematic physical examination of other organs was normal. The initial laboratory.

3 | DIFFERENTIAL DIAGNOSIS, INVESTIGATIONS, AND TREATMENT

The patient had undergone magnetic resonance imaging (MRI) of the spine 4 years before her current admission, which showed a 1 × 4 cm sized lesion in the lumbar spinal canal (Figure 1). Although she had been advised to do a biopsy, she had not completed her diagnostic workups due to financial constraints. However, the new MRI obtained during this admission revealed that the lesion had significantly progressed within 4 years, showing an epidural lesion sized 3 × 10 cm extending from the L4 to the coccyx with involvement of the L5–S2 vertebral body (Figure 2).

There are several differential diagnoses for epidural masses, consisting of metastases, soft tissue sarcoma, meningioma, tuberculosis, hematoma, and hemangioma. Therefore, a definite diagnosis requires pathological investigations. Due to the progression of symptoms, the patient underwent a surgical operation. We conducted a bilateral partial hemilaminectomy at the L5 vertebral level. Intraoperative findings demonstrated that the tumor did not invade the dura mater. The tumor was partially removed for biopsy, which was described as a creamy, brownish, soft specimen. The specimen was subsequently sent for pathological analysis. The surgery lasted 90 min, and there was minimal blood loss, amounting to 200 cc. The

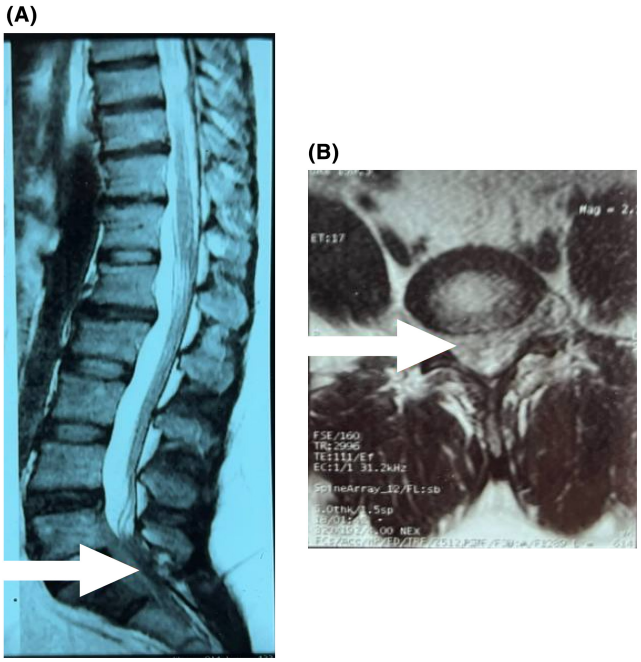

FIGURE 1 MRI images of the patient 4 years before the current admission. Sagittal T2-weighted (A) and axial T2-weighted (B) MRI demonstrates a 1 × 4 cm sized extradural lesion causing spinal nerve compression. White arrows point to the location of the mass.

microscopic investigation of the specimen showed sheets of mature and immature plasma cells without necrosis and mitotic figure (Figure 3). The immunohistochemistry report demonstrated a diffuse cluster of differentiation (CD) 20-positive reaction in tumoral cells and a positive reaction of Ki67 in 7% of tumoral cells. However, CD3 and CD138 markers were negative. The overall diagnosis according to the histopathological findings was compatible with DLBCL.

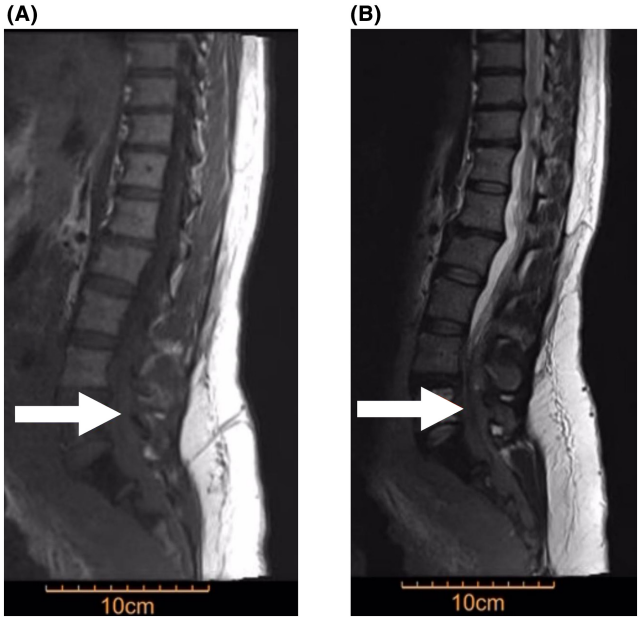

FIGURE 2 Sagittal T1-weighted (A) and T2-weighted (B) MRI demonstrate a 3 × 10 cm epidural mass lesion at L4 level to coccyx with low T1 marrow signal intensity in L5, S1, and S2, suggesting vertebral body involvement. White arrows point to the location of the mass.

The patient was discharged in stable condition with a 15/15 GCS and no new focal neurological deficits the day following the surgery and was subsequently referred to a hematologist for further assessment. Investigations for other non-spinal involvements demonstrated a normal chest and abdominopelvic computed tomography (CT) scan and a normal bone marrow aspiration/biopsy. On the other hand, the whole body bone scan demonstrated moderately increased bone activity in the right proximal femur, suggesting a metastatic lesion (Figure 4). One month after the surgery, the patient started a chemotherapy treatment consisting of CHOP (cyclophosphamide, vincristine, doxorubicin, and prednisolone) under the guidance of a hematologist. The patient received 20 sessions of radiotherapy with a dose of 3500 cGy and 5 sessions of chemotherapy every 30 days.

4 | OUTCOME AND FOLLOW-UP

At the time of this case report nearly 5 months after the surgery, the patient was alive and reported a significant improvement in her neurological symptoms. The patient stated that the low back pain has significantly improved. The postoperative sensory and motor examination of lower extremities were normal, with deep tendon reflexes slightly decreased.

5 | DISCUSSION AND REVIEW OF THE LITERATURE

Lymphoma refers to neoplastic disease of lymphoid tissues divided into two main groups, Hodgkin lymphoma

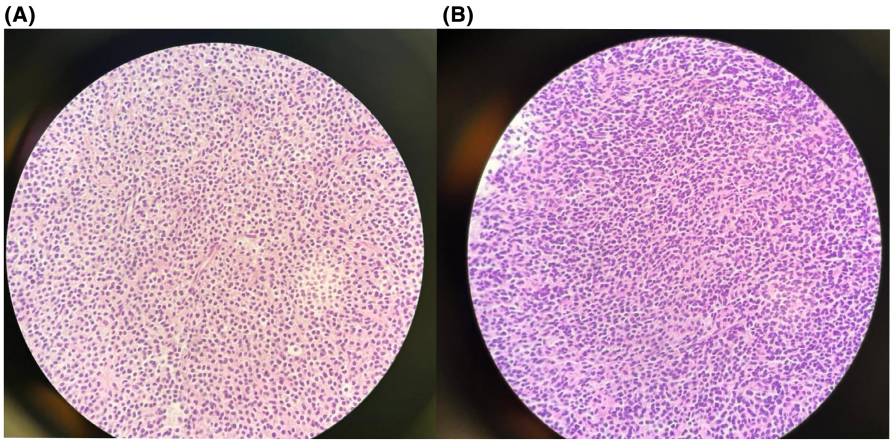

FIGURE 3 Pathologic microscopic section with H&E staining and 40× magnification shows neoplastic growth composed of sheets of medium to large sized plasmacytoid lymphoid cells with hyperchromatic nuclei, vesicular chromatin, prominent nucleoli, clear to eosinophilic cytoplasm, and low mitotic activity (A). Another section with H&E staining and 40× magnification shows neoplastic growth composed of lymphoid cells with hyperchromatic nuclei, vesicular chromatin, prominent nucleoli, and high mitotic activity (B).

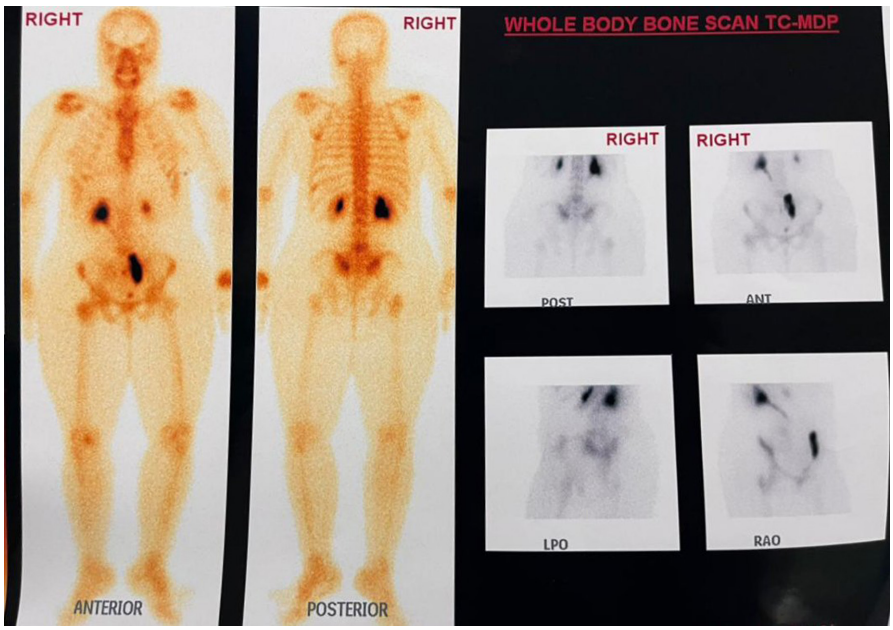

FIGURE 4 Whole body bone scan following Technetium 99 m-methyl diphosphonate (99 mTc MDP) injection showed moderately increased bone activity in the right proximal femur, suggesting a metastatic lesion.

(HL) and non-Hodgkin lymphoma (NHL), due to the recognition of the Reed-sternberg cell and distinct clinical and biological features.[20]

Lymphoma mainly occurs in lymph nodes; only 15%–30% of lymphomas are extranodal. The most common locations for extranodal lymphomas are gastrointestinal, orbit, respiratory, skin, musculoskeletal, thyroid, and soft tissues.[7] Epidural space is one of the rare extranodal locations that lymphoma can involve. The reported prevalence of lymphoma in the epidural space ranges from 0.1% to 3.3%.[7,15] Epidural lymphoma comprises only 0.9–6.5% of extranodal NHL.[4] The involvement of epidural space in HL is three times less than in NHL.[15] Generally, about 10% of spinal epidural masses are lymphoma, and in order of prevalence, the site of involvement includes thoracic (69%), lumbar (27%), and neck (4%).[2]

In this study, we reported a rare case of EL presenting at the L4 level to the coccyx accompanied by chronic low back pain and paresthesia. In order to better understand the clinical, epidemiological, therapeutic, and prognostic characteristics of EL, we searched for EL cases that involved lumbosacral epidural space on PubMed/Medline, Scopus, and Google Scholar databases. Accordingly, a systematic search was done in PubMed/Medline, Scopus, and Google Scholar using keywords and MeSH terms, with a combination of words including lymphoma, Hodgkin, non-Hodgkin, lumbar vertebrae and lumbar spinal cord, and appropriate AND/OR Boolean operators in December 2023. Inclusion criteria consisted of case reports and case series of lymphoma presenting in lumbosacral epidural space, which has been published since 1990. We excluded reports without a diagnosis of lymphoma or those not presenting lumbosacral region. In addition to our study, 19 studies reporting 24 patients diagnosed with EL in lumbar space were identified. Features of identified patients are presented in Table 1. In the following paragraphs, we provide a comprehensive review of the literature considering the findings from our case and previously reported cases of lumbosacral EL.

The origin of EL remains unknown. It may originate from the lymph nodes of the epidural space or paravertebral, vertebral, and retroperitoneal tissues and migrate to the epidural space through the intervertebral spaces.[21,22] EL can occur at any age, but it usually happens in the fifth to sixth decade and is more common in men. Based on the included patients in our literature review, 32% of the cases were between 40 and 60 years old and the mean age was 39.5 ± 17.8, and 72% were male. Previous reports have also stated that it seems that men are more affected by this disease.[1]

In general, EL has two phases in terms of clinical manifestations: the prodromal phase and subsequent cord compression. In the prodromal phase, patients experience low back pain radiating to the lower extremities. It may last for years, but in the second phase of the disease, neurological symptoms like paresthesia, paraplegia, constipation, or even urinary incontinence develop faster and become more prominent.[23] B-symptoms (high fever, night sweats, weight loss) can occur but usually do not happen in extranodal lymphomas, such as EL.[4,6] When there are spinal involvements, significant findings in the physical exam are weakness in the lower extremities, hyporeflexia, and sensory disturbance.[8,9]

Radiographic studies like X-rays, CT scans, and MRIs are recommended for evaluating patients with cord compression symptoms.[24] There are many differential diagnoses for epidural masses, including metastases, soft tissue sarcoma, meningioma, tuberculosis, hematoma,

TABLE 1 Clinical characteristics of lumbosacral epidural lymphoma patients reported in literature since 1990.

Author (Reference)	Country	Year	Number of reported case(s)	Mean age	Sex	Clinical features	Pathological subtype	Primary/ secondary	Treatment	Tumor extension	Survival
Our case	Iran	2023	1	42	Female	Low back pain lower limb paresthesia	DLBCL	Sec	Laminectomy RT + CT	L4-Coccyx	AWD
Konakondla[2]	USA	2020	1	35	Male	Low back pain paraparesis	DLBCL	Pr	N/D	L3-L4	N/D
Wang[3]	China	2020	1	63	Male	Low back pain lower limb paresthesia	DLBCL	Pr	Laminectomy mass resection	L2-S1	DOD in 2 months
Pandey[4]	USA	2019	2	55	2 Males	Low back pain paraparesis	DLBCL	N/D	N/D	L2/L1-L3	AWD
Markovic[5]	Croatia	2019	1	47	Female	Low back pain paraparesis epidural hematoma/ obstipation	DLBCL	N/D	Mass resection RT + CT	L1	DOD
Wang[6]	China	2016	1	23	Male	Low back pain type-B symptoms	Unspecified peripheral T cell lymphoma	Pr	Laminectomy mass resection CT + RT	L3-L5	DOD in 1 year
Mally[7]	India	2011	1	24	Male	Low back pain lower limb paresthesia paraparesis	DLBCL	Pr	Laminectomy mass resection CT + RT	L5-S2	AWD
Samadian[8]	Iran	2009	1	12	Male	Low back pain/paraparesis lower limb paresthesia	HL	Pr	Laminectomy RT + CT	L1-L3	AWOD
Székely[9]	Hungry	2008	5	34.8	3 Females, 2 Males	Low back pain/paraparesis	3 HL 2 NHL	4 sec 1 pr	RT + CT	L1-L5/ L1-L5 L2-L4 L5-S2/ T12-L1	3 DOD 2 AWOD
Kapoor[10]	India	2006	1	28	Male	Paraparesis lower limb paresthesia urinary and fecal incontinency	NHL	Pr	Laminectomy mass resection RT + CT	L3	AWOD in 9 years
Bachmeyer[11]	France	2005	1	56	Male	Low back pain lower limb paresthesia/paraparesis patellar hyporeflexia urinary and fecal incontinency	DLBCL	Pr	Laminectomy CT + RT	T11-L3	N/D
Gottschalk[12]	Germany	2004	1	49	Female	Low back pain/lower limb paresthesia epidural hematoma	DLBCL	N/D	Laminectomy	L2-L3	N/D
Cagavi[13]	Turkey	2004	1	39	Male	Low back pain	HL	Pr	Laminectomy /RT	L3 C6	AWOD

(Continues)

TABLE 1 (Continued)

Author (Reference)	Country	Year	Number of reported case(s)	Mean age	Sex	Clinical features	Pathological subtype	Primary/ secondary	Treatment	Tumor extension	Survival
Matsubara[14]	Japan	2004	1	5	Male	Leg pain/urinary incontinency deep tendon hyporeflexia lower limb paresthesia	Atypical Burkitt's lymphoma	Sec	High-dose steroids therapy/CT	T2- T3 T11/ L2- L4	AWOD in 6 months
Toprak[15]	Japan	1997	1	20	Male	Low back pain lower limbs paresthesia	HL	Sec	CT	L4-S1	AWOD in 6 months
Prestar[16]	Germany	1993	1	44	Male	Paraparesis lower limbs paresthesia	NHL	N/D	Laminectomy mass resection CT + RT	L5-S1	AWD in 3 years
Perry[1]	Japan	1993	1	55	Male	Paraparesis	HL	Sec	Laminectomy RT + CT	L1-L4	AWD in 3 months
Lyons[17]	Japan	1992	1	43	Male	Lower limbs paresthesia left thigh pain/achilles tendon hyperreflexia	DLBCL	Pr	Laminectomy mass resection/RT	L-S	AWOD in 64 months
Travlos[18]	South Africa	1991	1	80	Female	Low back pain lower limbs paresthesia/paraparesis	NHL	N/D	Laminectomy mass resection/RT	L5-S1	N/D
Barker[19]	UK	1990	1	39	Male	Low back pain lower limbs paresthesia	HL	Sec	N/D	L2-L5	N/D

Abbreviations: AWD, alive with disease; AWOD, alive without disease; C, cervical; CT, chemotherapy; DLBCL, diffuse large B cell lymphoma; DOD, died of disease; HL, Hodgkin lymphoma; L, lumbar; N/D, not defined; NHL, non-Hodgkin lymphoma; Pr, primary; RT, radiotherapy; S, sacral; Sec, secondary; T, thoracic.

and hemangioma.[25–28] Distinguishing between these diseases is challenging and requires histological and immunohistochemical analysis.

Bone involvement occurs in the advanced stages of EL. The coexisting mass in the epidural and intact spinal vertebrae structure support the diagnosis of epidural lymphoma.[1] It is important to note that in the early stages of the disease, abnormal findings may not be visible in plain radiography. Moreover, bone structures are intact in CT scans at the early stages of the disease.[4]

MRI plays an essential role in the diagnosis of spinal masses. MRI is the choice imaging method for identifying spinal epidural tumors.[28] EL appears as a space-occupying lesion between vertebrae and the spinal cord with homogenous and medium signal intensity on both T1/T2 weighted images.[9] It is challenging to differentiate EL from other metastatic cancers. Magnetic resonance spectroscopy might play a significant role in diagnosing spinal masses and staging spinal cancers.[9] Moreover, an 18F-FDG-PET/CT scan can detect any other areas of lymphoma involvement in the body, however brown fat uptake in 18F-FDG-PET/CT scan can complicate the accurate staging of lymphoma.[13,29] In the identified cases through review literature, 40% of patients had no other site of involvement (known as primary form), and 36% had other organ involvement, known as secondary form.

Definitive diagnosis of lymphoma needs histological examination and immunophenotypic data. Tissue sampling is recommended to obtain sufficient tissue for histological examination. However, if it is a known case of advanced lymphoma, where the epidural mass can be attributed to lymphoma with high certainty, a biopsy may not be necessary.[30] A transforaminal endoscopic approach has been utilized for biopsy according to previous reports.[2] Generally, an extensive systemic examination is recommended to identify possible areas of the disease that may have been missed. This examination will involve a CT scan, MRI, total body gallium scan, and cerebrospinal fluid analysis.[7,8]

An interdisciplinary team, including a hematologist, oncologist, neurosurgeon, and radiologist, is essential to manage EL.[9] Chemotherapy and radiotherapy are the main treatments for lymphoma. Moreover, intrathecal chemotherapy can benefit EL patients due to the high risk of secondary central nervous system involvement.[7,20] Corticosteroids can also be beneficial to reduce spinal cord compression.[31] In the identified cases of our literature review, the most common diagnosis was DLBCL. In the case of DLBCL, the treatment approaches include chemotherapy and radiotherapy, aligning with the treatment strategies for other NHLs. Given its high sensitivity to chemotherapy, chemotherapy remains the cornerstone of treatment. The CHOP regimen is considered the gold standard for DLBCL treatment. Additionally, localized radiotherapy is recommended, with doses ranging from 3500 to 4000 cGy for patients in the early stages of the disease, administered in 20–25 fractions over 3–4 weeks.[7,10,20] In the identified cases through literature review, a combination of radiotherapy and chemotherapy was used for the majority of patients.

Spinal cord compression can result in significant damage to the spinal cord and permanent disruption of the motor and sensory systems. Therefore, urgent surgical decompression is necessary when the patient experiences severe and disabling neurological symptoms. In most cases, this is the primary reason the patient seeks medical attention and is admitted to the hospital.[9]

HL is typically diagnosed in earlier stages compared to NHL. DLBCL, a subtype of NHL, is often detected at advanced stages, which involve extranodal sites[20] and has a poor prognosis.[20] Patients over 50 years old with paraplegia, bladder, and bowel incontinence have a worse prognosis in DLBCL. The occurrence of the disease at a young age and the combination of radiotherapy and chemotherapy lead to a better prognosis of the disease.[1,10] Previous studies reported that EL patients had a mean survival rate of 8–9 months, with fewer than 10% surviving beyond 1 year.[1] In the patients that we reviewed, 8 patients (32%) had complete remission, and 6 patients (24%) died due to the disease. The cause of death in the included patients was either metastasis or infection. Of the six patients who died, four had NHL, two had HL, and three of them had the secondary form of the disease, while two had the primary form. More studies with a larger statistical population are needed to understand better the prognosis and factors affecting the survival of patients.

6 | CONCLUSIONS

Overall, this case highlights the importance of recognizing early lymphoma symptoms to enable timely treatment and improved outcomes. Though our patient presented with vague low back pain 4 years prior to acute neurological decline, earlier suspicion of malignancy may have expedited diagnosis and preserved cord function. Our study suggests that unexplained back pain or radiculopathy should prompt evaluation for possible malignancies. A comprehensive treatment approach, including chemotherapy and radiotherapy is essential for DLBCL, considering its aggressive progression.

AUTHOR CONTRIBUTIONS

Masoud Eslami: Conceptualization; data curation; investigation. **Ali Aledavoud:** Conceptualization; investigation; writing – original draft. **Mehran Ilaghi:** Conceptualization; investigation; writing – original draft. **Vahid Tavakolian Ferdousie:** Conceptualization; investigation. **Hamed Reihani-Kermani:** Conceptualization; supervision; validation; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare that no conflict of interest present.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

This study has been conducted according to the guidelines of the ethics committee of Kerman University of Medical Sciences.

CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

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