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CASE REPORT

Rosai-Dorfman disease with spinal cord compression: a diagnostic challenge

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Abstract
Purpose Rosai-Dorfman disease (RDD) is an uncommon benign histiocytic proliferative disorder commonly involving the cervical lymph nodes and less frequently extranodal sites, including, rarely, the central nervous system, mainly intracranially. Spinal involvement is unusual. RDD is characterized by pathognomonic histopathological features, which are decisive in the definitive diagnosis. We present the case of a 75-year-old lady who presented with an isolated thoracic vertebral lesion. She underwent 3 CT-guided biopsies, all not confirmative for a definite diagnosis, and 2 open biopsies and debulking of the lesion.
Methods The clinical notes, operation notes, investigations and clinic letters of the patient were reviewed. A literature search was performed using PubMed, with the keywords "Rosai-Dorfman disease", "sinus histiocytosis with massive lymphadenopathy", "histiocytic proliferative disorder".
Results Only the histopathology after the last procedure was diagnostic for Rosai-Dorfman disease. The patient was treated with steroids with marked improvement in her clinical condition.
Conclusions This case demonstrates the challenge in making a diagnosis. RDD should be considered as a differential diagnosis in case of spinal lesion and non-diagnostic biopsy, especially in steroid sensitive lesions. The implications of the case are discussed.

Keywords Rosai-Dorfman disease · Sinus histiocytosis with massive lymphadenopathy · Histiocytic proliferative disorder

Introduction

Rosai-Dorfman disease (RDD), also known as sinus histiocytosis with massive lymphadenopathy, is an uncommon benign histiocytic proliferative disorder [1–11]. It is characterized by an idiopathic polyclonal hypergammaglobulinemia and a reactive process with pathognomonic histological and immunohistochemical features. [4–14] It commonly involves the cervical lymph nodes and less frequently extranodal sites, including, rarely, the central nervous system, mainly intracranially; spinal involvement is unusual [1–4, 13–16]. Isolated CNS RDD without other body involvement is hardly described [4, 13]. We present the case of a 75-year-old lady who presented with lower limbs spastic paraparesis and saddle paraesthesia secondary to an isolated thoracic vertebral lesion, which only after three negative CT-guided biopsies and two open biopsies and debulking of the lesion was diagnosed with RDD.

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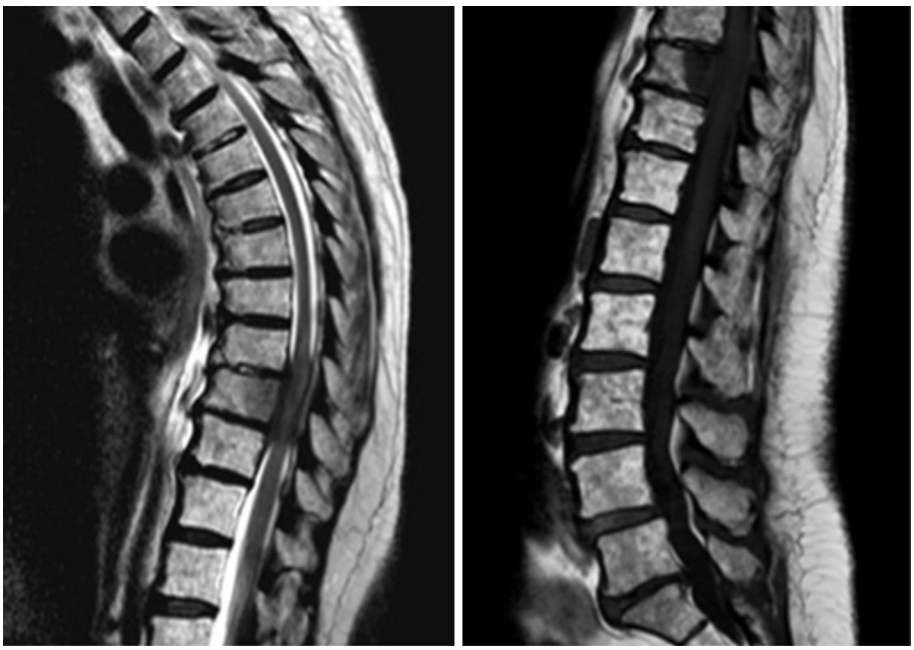

Fig. 1 Initial MRI. Sagittal images, T2 and T1, respectively, demonstrating T10 lesion narrowing the spinal canal and compressing the spinal cord

Case report

A 75-year-old Afro-Caribbean lady presented with lower limb spastic paraparesis and saddle paraesthesia. Her past medical history included hypertension, bowel cancer, diabetes mellitus type 2, ischaemic heart disease, Parkinson's disease and HTLV positivity without sequelae. The MRI scan of her spine showed a T10 lesion partially within the bone, and partially within the soft tissues. It involved the posterior half of the T10 vertebral body and the pedicles, extending through the T9-10 and T10-11 intervertebral foramina and into the extradural space in a circumferential distribution, narrowing the spinal canal and compressing the spinal cord with associated signal change at T10 (Fig. 1). The patient was started on steroids and showed immediate improvement of her neurology. The decision was taken to proceed with a CT-guided biopsy to establish a tissue diagnosis. The patient underwent two CT-guided core biopsies, which failed to establish a definite diagnosis; the biopsy consisted of fibrotic and necrotic material. An up-to-date MRI revealed significant decrease in the size of the lesion and in view of the fact that both the radiological appearances and the patient's symptomatology had improved after the initiation of steroid, the diagnosis of a lymphoproliferative lesion was considered (Fig. 2). The differential diagnosis included lymphoma, an infective process like tuberculosis and spinal metastasis. Her CT chest, abdomen and pelvis were negative for neoplastic lesions and a whole-body PET showed low grade metabolically active disease confined to T10. The steroids were discontinued and a 3rd biopsy was inconclusive. The patient over the next 3 weeks started to have relapse of her neurological symptoms and an updated MRI showed increase in size of her lesion (Fig. 3). Therefore she underwent a right T10 hemi-laminectomy and open biopsy of the extradural space-occupying lesion with partial debulking. Postoperatively the patient's symptomatology resolved and from the surgical point of view her course was uneventful.

The specimen was referred to a haematopathologist, who reported it as 'patchy fibrosis and chronic inflammation features with no evidence of lymphoma'. Over the following 2 months the patient's symptoms relapsed, causing significant difficulty in walking. An MRI showed progression of the disease at the T10 area with an increase in epidural soft tissue (Fig. 4). The patient was readmitted and underwent further T10 laminectomy and debulking of the lesion. Her clinical condition continued to gradually deteriorate, with left leg weakness and subjective sensory change. The main histopathologic finding was of mixed lymphoplasmacytic infiltrate comprising C20 and C79a positive B-cells, CD3 positive T-cells and numerous CD68-positive histiocytes (Fig. 5). CD138 stained numerous plasma cells appeared to be polytypic (Fig. 2b). CD56 and cyclin D1 were negative. The diagnosis of RDD was finally made and the patient was restarted on steroids (Fig. 6).

The patient was given prednisolone 40 mg daily for 6 months, with marked improvement in her clinical condition. The prednisolone was subsequently weaned down to a daily maintenance dose of 10 mg. The patient has regularly been reviewed in clinic and the dose readjusted according with her symptoms and side effects (Fig. 7).

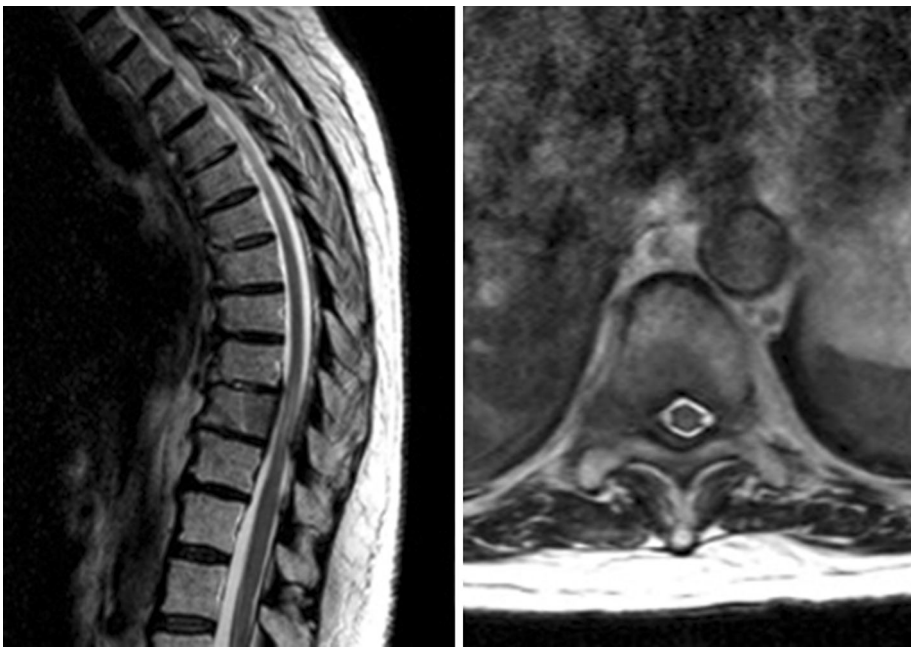

Fig. 2 MRI images: patient post steroids. Sagittal and axial T2 images, respectively, demonstrating improvement of the T10 lesion compared to the initial MRI

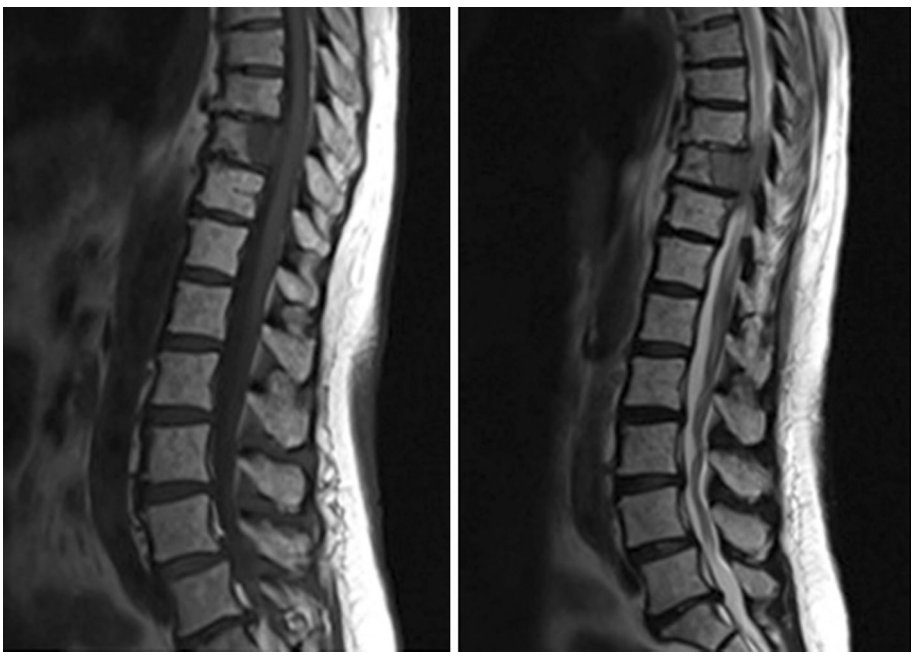

Fig. 3 MRI images: patient off steroids. Sagittal images, T1 and T2, respectively, demonstrating progression of the T10 lesion, which appears more extensive than on the previous MRI, but less extensive than on the initial MRI

Discussion

This case is unique from several aspects. The age and sex of the patient are unusual for RDD, which occurs more often in children and young adults with a slight male sex predilection. The presentation in this patient is exceptional. In fact RDD commonly involves the lymph nodes and clinically presents as painless cervical lymphadenopathy with other constitutional symptoms such as fever, malaise, weight loss and raised inflammatory markers [3, 13, 14]. Extranodal involvement is seen in 43 % of cases, mostly in the skin, orbits, paranasal sinuses, upper respiratory system, testes, bones and endocrine glands [3, 13, 14]. Central nervous system involvement is observed in less than 5 %, mainly intracranial; spinal involvement is even less frequent [1–4, 13, 15, 16]. Isolated CNS RDD is extremely rare and only a few cases have been described in the literature [4, 13].

The natural history and progression of RDD varies from complete and spontaneous remission to persistence of the

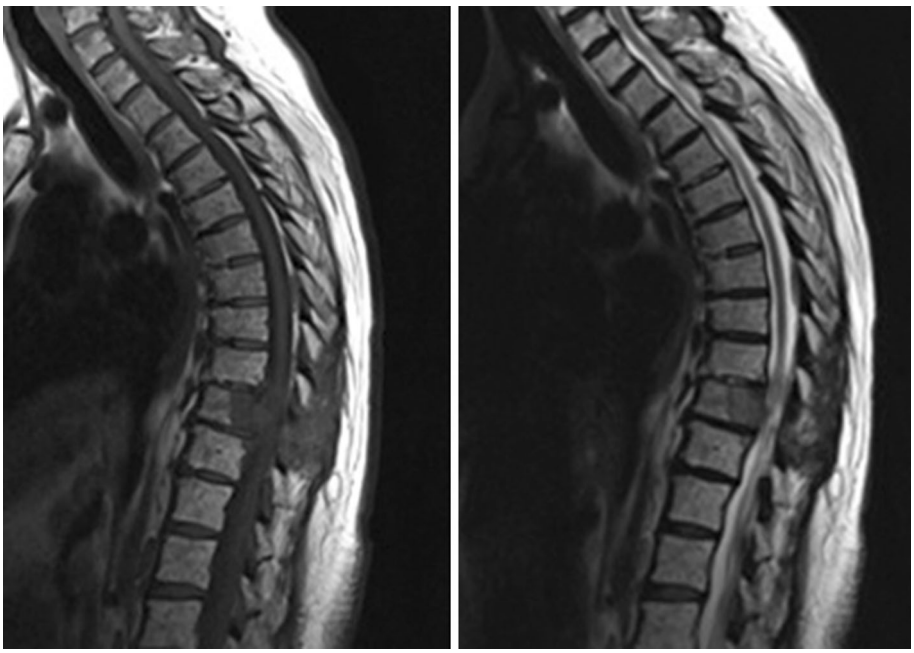

Fig. 4 MRI images: before the second operation. Sagittal images, T1 and T2, respectively, demonstrating extension of the T10 lesion

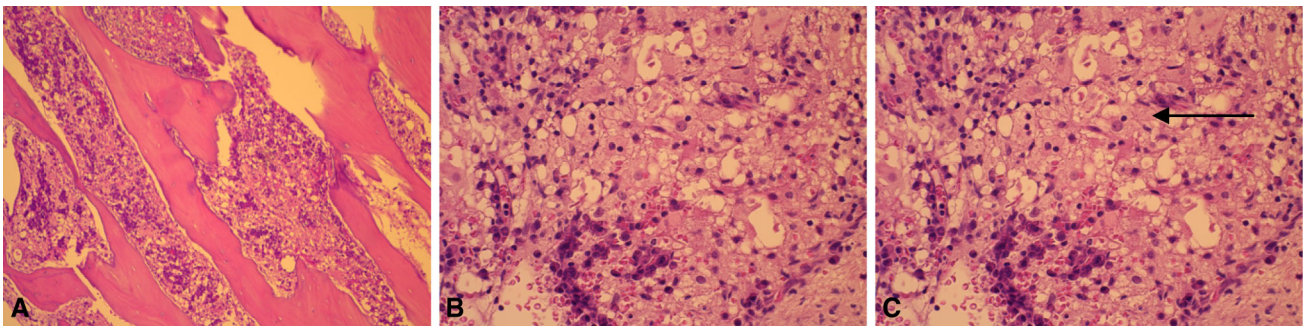

Fig. 5 **a** Bone marrow containing a lymphoplasmacytic infiltrate (H&E ×4). **b** The infiltrate is composed of pale histiocytes and groups of plasma cells (H&E ×40). **c** Emperipolesis—plasma cells can be seen passing through the cytoplasm of histiocytes (H&E ×40)

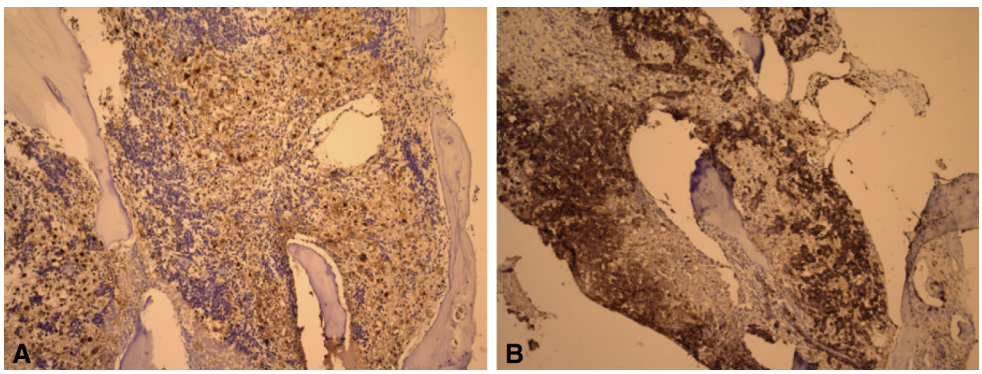

Fig. 6 **a** S100 positive staining of histiocytes (S100 ×4). **b** CD138 positive staining of plasma cells (CD138 ×4)

disease, in some cases with periodic exacerbations and remissions. A minority of patients may develop an extremely aggressive course with widespread dissemination and multi-organ involvement which may be fatal [6, 7, 17].

The diagnosis of RDD cannot depend on imaging since there are no pathognomonic features. RDD can show different characteristics, mimicking other more common conditions such as metastasis, lymphoma, or infection.

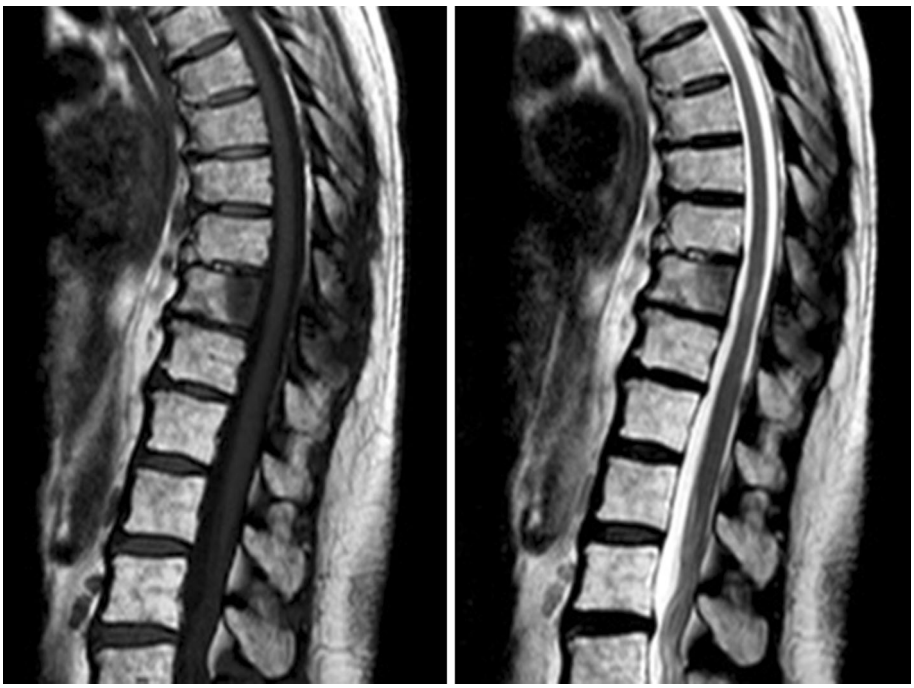

Fig. 7 MRI images: follow-up. Sagittal images, T1 and T2, respectively, demonstrating resolution of the T10 lesion

They are more frequently hypo- or iso-intense on T1- and T2-weighted MRI and enhance intensely and uniformly with contrast [1, 7, 16, 17, 39]. Histopathology is decisive in allowing a definitive diagnosis, showing nodular cellular infiltrates composed of histiocytes intermixed with plasma cells and lymphocytes in a background of increased collagen and/or reticulin fibres [3, 4]. Many histiocytes are characterized by emperipolesis, phagocytosed but intact and viable lymphocytes, which represent the most typical diagnostic feature of RDD, as they are rarely seen elsewhere [3, 10, 40]. The main histopathologic finding is of mixed lymphoplasmacytic infiltrate comprising C20 and C79a positive B-cells, CD3 positive T-cells and numerous CD68 positive histiocytes. CD138 stains numerous plasma cells, which appear to be polytypic. CD56 and cyclin D1 are negative.

The treatment of choice for CNS RDD is controversial and comprises of many options, including: surgical resection, corticosteroids, immunomodulatory agents, chemotherapy, radiotherapy, cryosurgery and radiosurgery. The literature suggests that complete surgical resection offers a better outcome and prognosis [11, 14, 18–29] with relapse in approximately 14 % of cases [18, 28].

Adjuvant treatment with corticosteroids, chemotherapy, radiotherapy or cryosurgery should be used in cases of incomplete resection or recurrence of the lesion. [18, 22, 24, 26, 27, 30–33] RDD has been shown to be sensitive to treatment with corticosteroids [18, 34, 35], which is in keeping with its pathophysiology likely related to immunological dysfunction [18, 34, 36, 37].

Most of the cases of spinal RDD reported in the literature have been treated with total or subtotal surgical resection, often with stabilisation [1–4]. Seyednejad et al. [12] reported a case of recurrence of intracranial RDD as a cervical spine tumour, which was treated with corticosteroids and external beam radiation.

In our patient corticosteroid treatment has been the one of choice following laminectomy and debulking of the lesion. Given the success in improving her clinical condition, the fact that the diagnosis was made only after the second operation and the multiple comorbidities of the patient we did not think that a third operation with more radical excision and stabilisation would be of benefit.

Another interesting factor in the case we report, compared with the other rare cases of isolated spinal RDD causing cord compression reported in the literature, is the absence of diagnostic pathological features in the specimens from repeated CT-guided biopsies. With the increasing diagnosis of spinal lesions, CT-guided percutaneous biopsies have increased in use with accuracy in diagnosis of up to 92 % [41–43]. The case we report demonstrates the limitations of them, despite excellent technical procedures. In our case the multiple attempts to obtain a histopathological diagnosis from CT guided biopsy failed, so the patient needed surgery with both therapeutic and diagnostic purposes. Even so the histopathological analysis of the samples obtained from the first operation failed to give a diagnosis. This demonstrates the challenge that clinicians, radiologists and pathologists face in making a diagnosis. Therefore RDD should be taken into

account and considered as a differential diagnosis in case of spinal lesion and non-diagnostic biopsy, especially in steroid sensitive lesions.

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Conflict of interest None of the authors has any potential conflict of interest

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