Isolated Intracranial Rosai–Dorfman Disease Mimicking Suprasellar Meningioma: Case Report with Review of the Literature

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Rosai–Dorfman disease (RDD) is an idiopathic histiocytic proliferation affecting the lymph nodes. Isolated intracranial RDD is rare and usually appears as a well-defined, dural-based lesion without lymphadenopathy. The clinical and radiological features of intracranial RDD are similar to meningioma. Histopathology and immunohistochemistry are essential for a definitive diagnosis. This is a report of a 43-year old male with isolated intracranial RDD, which manifested as a suprasellar meningioma. The clinical, radiological and pathological aspects of the disease are discussed within the context of a review of previously reported cases.

KEY WORDS: Rosai–Dorfman disease; isolated; intracranial; suprasellar; meningioma

Introduction

Sinus histiocytosis with massive lymphadenopathy, also known as Rosai–Dorfman disease (RDD), is a rare, benign lymphoproliferative disorder that was initially described in 1969 by Rosai and Dorfman.¹ The most common clinical manifestation of RDD is massive, painless, cervical lymphadenopathy. Fever and weight loss may accompany the onset of this disease.

Extranodal disease may occur in the paranasal sinuses, soft tissues, bone, orbit and skin.² – ⁴ Isolated extranodal disease is uncommon and isolated RDD in the central nervous system (CNS) is extremely rare. Prior to the reporting of this case, there have only been 77 cases of Rosai–Dorfman disease with CNS involvement reported in the literature, while suprasellar involvement has been reported in only six cases. The intracranial involvement of RDD is usually a dural-based lesion which is easily misdiagnosed as meningioma.⁵ Histopathology and immunohistochemistry are essential for definitive diagnosis.⁶ The clinical, radiological and pathological findings from a case of isolated intracranial RDD that mimicked suprasellar meningioma are reported here and discussed within the context of a review of previously reported literature.
Case report
A 43-year old Chinese male was admitted to our hospital after experiencing a progressive visual blurring of the left eye for 1 month and persistent mild headache for 2 weeks. His medical history was unremarkable and physical examination revealed normal vital signs and no hepatosplenomegaly or lymphadenopathy. Neurological examination disclosed vision impairment of the left eye and bilateral temporal visual field defect. No other neurological deficits were found. Routine haematological and biochemical studies were normal.

Magnetic resonance imaging (MRI) of the brain using a 1.5T MRI scanner revealed a solid mass occupying the suprasellar cistern around the optic chiasm and laminalis. The mass was isointense to grey matter on T1- and T2-weighted images, and heterogeneous mild enhancement was seen (Fig. 1). The preoperative diagnosis was meningioma.

The patient underwent operation through a transpterional approach. Intraoperatively, the mass was found to be derived from the right posterior clinoid process extending into

FIGURE 1: Magnetic resonance imaging (MRI) features of suprasellar Rosai–Dorfman disease revealed that the lesion showed isointense to grey on (A) T1-weighted and (B) T2-weighted MRIs, and (C) enhanced T1-weighted MRI revealed a heterogeneous, mild enhancing mass that mimicks suprasellar meningioma.
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the suprasellar area. It was a grey–yellow, tough avascular nodus, approximately 3 × 3 × 2.5 cm in size. Gross total resection was carried out and the patient had an uneventful postoperative course. At 3-month follow-up, the patient’s left eye vision was improved and the bilateral temporal visual field defect was also ameliorated. Repeated MRI showed no neuroradiographic features indicative of recurrence.

Microscopic pathology revealed a fibrous stroma with plasma cells, lymphocytes and histiocytes (Fig. 2A). The latter cells had prominent vesicular nuclei and abundant cytoplasm, with many of them exhibiting lymphocytes within their cytoplasm (a phenomenon known as emperipolesis) (Fig. 2B). Immunohistochemical studies revealed that the histiocytes stained strongly for S-100 protein (Fig. 3A) and CD68 (Fig. 3B), but

FIGURE 2: Microscopic pathology of suprasellar Rosai–Dorfman disease revealed: (A) scattered large histiocytes intermixed with numerous small lymphocytes and plasma cells (haematoxylin and eosin; scale bar, 100 µm); and (B) several large histiocytes containing small lymphocytes within their abundant cytoplasm (emperipolesis) (haematoxylin and eosin; scale bar, 20 µm)

FIGURE 3: Immunohistochemistry of suprasellar Rosai–Dorfman disease revealed: (A) histiocytes with positive reactivity to S-100 protein and large histiocytes containing small lymphocytes within their abundant cytoplasm (emperipolesis) (scale bar, 20 µm); and (B) histiocytes with positive reactivity to CD68 and emperipolesis (scale bar, 20 µm)
were negative for CD1a (data not shown). These characteristics were compatible with RDD.

Discussion
First described in 1969 by Rosai and Dorfman,\(^1\) RDD is a rare pseudolymphomatous disorder of unknown aetiology that is best classified within the spectrum of histiocytosis. Infectious and immunological causes have been postulated but remain unidentified.\(^7\) Extranodal RDD has been reported in up to 43% of cases, with the most common sites being the paranasal sinuses, orbit, spine, skull base, skin and upper respiratory tract. Involvement of the CNS is much less frequent, occurring in < 5% of RDD patients.\(^4,8,9\) To the best of our knowledge, before this case, there have been only 77 reported cases of RDD with CNS involvement.

The mean age of onset with nodal disease is 20.6 years with a slight male to female predominance and a higher incidence reported in those of African or West Indian descent.\(^3,10\) In contrast, however, to nodal-based RDD, patients with intracranial RDD are predominantly males and typically present during their fourth or fifth decade.\(^11\) Massive cervical lymphadenopathy is not always seen with intracranial RDD.\(^12\) Nodal involvement may not be seen in up to 10% of overall cases. A previous review of reported intracranial cases found that 70% had no lymphadenopathy and 52% had no associated systemic disease.\(^5\)

The typical imaging feature of intracranial RDD shows an enhancing meningeal based mass with a variable amount of oedema surrounding the lesion. Although it usually presents as a solitary dural-based lesion, multiple intracranial lesions have also been reported.\(^2,13 - 16\) Location can include the convexity, parasagittal region, cavernous sinus, suprasellar region, cerebellum, fourth ventricle and petroclival region.\(^5,11,17\)

Suprasellar involvement is uncommon and has been reported in six cases, only two of which were isolated to this site alone, as in the case reported here.\(^4,18 - 22\) Symptoms of intracranial involvement include cephalgia, seizure, or cranial nerve deficit. Hemiparesis, dysphasia and neglect have also been reported, depending on the location of the lesion.\(^5\) Cases involving the sellar region may produce visual loss or disturbance of pituitary function.\(^9,23\)

Definitive diagnosis primarily relies on histopathological examination of biopsy tissue. Microscopic examination typically reveals a polymorphous infiltrate of histiocytes, lymphocytes and plasma cells in a fibrous stroma. In some cases, eosinophils may also be seen. Two subtypes of histiocytes, differentiated by size, are present in RDD.\(^13,24\) The large histiocytes typically exhibit emperipolesis, containing well-preserved lymphocytes and are usually S-100 positive.\(^24\) It should be noted that medium-sized histiocytes may not exhibit emperipolesis, are probably representative of a histiocyte at an earlier stage and are typically S-100 negative. Both large and medium size histiocytes are positive for CD68 and negative for CD1a.\(^16,25\)

The differential diagnosis includes meningioma, histiocytosis X (i.e. eosinophilic granuloma), lymphoproliferative disorders, plasma cell granulomas and infectious disease. RDD can seem identical to meningioma on a computed tomography scan, MRI and even during surgery. At a microscopic level, however, there are no similarities between the two entities. Meningiomas can be easily diagnosed by routine microscopic haematoxylin and eosin examination. Langerhans cell histiocytosis
may also present as a dural-based lesion with lymphocytes infiltrating a fibrous stromal background and S-100 protein positive in the histiocytes, however the histiocytes in this lesion typically have indented or reniform nuclei, stain positive for CD1a and contain Birbeck granules ultrastructurally. Histiocytosis X syndromes, however, usually involve bone, do not exhibit emperipolesis and will usually have extensive eosinophilia.26 Lymphoproliferative disorders may also be confused with RDD as the histiocytes show phagocytic properties and can be S-100 protein positive, however they can be distinguished because they show erythrophagocytosis rather than lymphophagocytosis.27 Furthermore, aggressive lymphoproliferative disorders will show clear malignant cytological features on microscopic examination. Plasma cell granulomas and infectious diseases, such as necrotic abscesses, may also occur intracranially. Both can be differentiated from RDD as neither of them exhibit emperipolesis nor S-100 protein positivity.28

Resection of the intracranial mass is the most effective treatment for intracranial RDD.13,26,29 Adjunctive treatments have included irradiation, chemotherapy and steroids.2,15,30 The benefit of radiotherapy alone seems rather limited (30%), while chemotherapy is in general ineffective.16 In the case of subtotal resection of the mass or recurrence of neurological symptoms, early local low dose (10 – 20 Gy) radiotherapy was proposed.9 Corticosteroid agents have also been suggested as an effective option in the treatment of intracranial RDD.31 Mortality of intracranial RDD has been reported at approximately 7%.10

In conclusion, RDD is an idiopathic disorder classified as a histiocytosis, which typically presents with massive cervical lymphadenopathy. Extranodal RDD, especially isolated intracranial RDD as shown in the present case, may pose a diagnostic challenge both for the clinician and the pathologist. Definitive diagnosis primarily relies on histopathological examination of biopsy tissue, and resection of the intracranial mass is the most effective treatment for intracranial RDD.

Conflicts of interest
The authors had no conflicts of interest to declare in relation to this article.

References
8 Kayali H, Onguru O, Erdogan E, et al: Isolated

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