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LETTER TO THE EDITOR

Solitary tumefactive demyelinating pseudotumor masquerading as a low-grade glioma in a child

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Dear Editor:

Tumefactive demyelinating lesions (TDLs) are uncommon presentations of various demyelinating diseases. These are usually solitary lesions > 2 cm [1]. Clinically, they can mimic a high-grade glioma with an acute presentation with seizures, or a low-grade glioma with non-specific headache and weakness. Their neuroimaging features of mass effect and contrast enhancement closely mimics neoplasms or abscesses [1]. Involvement of grey matter or deep grey nuclei further adds to the confusion [2]. Such lesions are rare in children with few case reports and small case series in the literature [3, 4]. Distinguishing these from malignancy or infection is pertinent for proper patient management, as they respond favourably to corticosteroid therapy and do not require unnecessary medical or surgical interventions. We report an intriguing case of a 13-year-old girl with a solitary TDL in the frontal lobe which mimicked a low-grade glioma on radiologically and morphology during intraoperative consultation.

A teenager girl presented with two weeks history of right facial deviation, blurring of vision, left upper limb weakness and headache. There was no loss of consciousness, seizure, vomiting or fever. She had visual acuity of finger counting at 6 feet and right upper motor neuron type facial palsy. No nystagmus or cranial nerve deficits were noted. Contrast-enhancing magnetic resonance imaging (CEMRI) brain showed a T1 hypo-, T2 hyperintense mildly CE lesion (5 × 5 cm) in right posterior frontal lobe suggestive of a low-grade glioma (Fig. 1a-f). Frontoparietal craniotomy with gross total excision was performed. Crush smear for intra-operative consultation revealed a cellular lesion dominated by sheets of macrophages. Many astrocytes with mild nuclear atypia and endothelial-lined capillaries in background were also present (Fig. 2a, b). Perivascular lymphocytes were seen on rapid H&E-stained sections and a diagnosis of low-grade glioma was given. Paraffin sections revealed multiple cortical fragments and fragments entirely composed of sheets of CD68-positive macrophages with intervening vessels cuffed by CD3-positive lymphocytes (Fig. 2c–f). Few reactive glial fibrillary acidic protein (GFAP)–positive astrocytes (Fig. 2f, g, black arrow) and 'Creutzfeldt astrocytes' (Fig. 2f, white arrow) were also admixed. Luxol fast blue (LFB) stain highlighted myelin-positive debris within macrophages (Fig. 2h). No associated necrosis or mitotic figures were identified. Thus, a diagnosis of tumefactive demyelination was rendered. The reactive gliotic element on paraffin sections was misinterpreted as neoplastic. Post-operatively, the patient is well on follow-up.

TDL appear as solitary enhancing lesion on MRI, resemble intra-axial glial neoplasm and often pose a diagnostic challenge to the radiologist and pathologist. A precise diagnosis of TDL is crucial as the management modalities vary in TDL and gliomas. There are certain features seen on MRI and on histopathological examination that help in clinching the diagnosis. A central dilated vascular structure within the lesion on T2-echoplanar images from MRI perfusion studies is commonly seen in TDL [5]. Additionally, presence of an incomplete or open ring enhancement pattern on contrast MRI is helpful in distinguishing these from neoplasms and infection [2].

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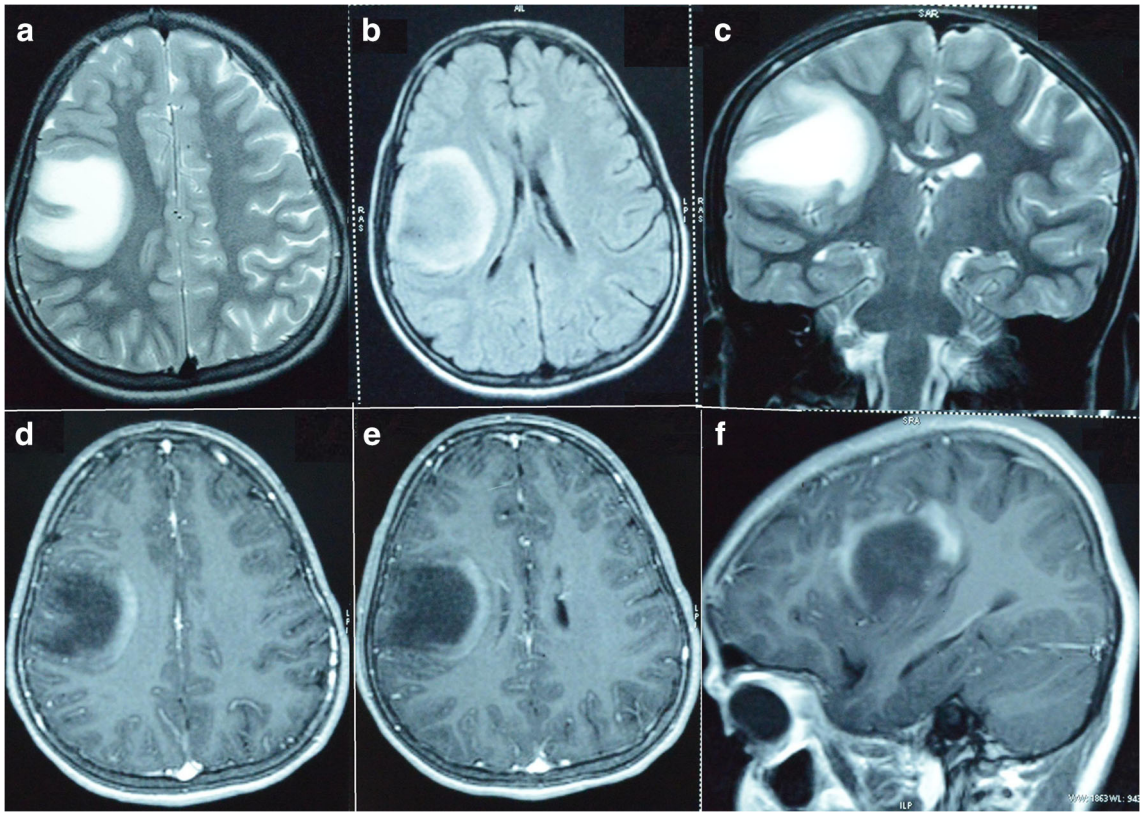

Fig. 1 **a** Axial T2W MRI showing hyperintense juxta cortical lesion in the right posterior frontal lobe. **b** FLAIR image showing the non-inversion of signal. **c** Coronal T2W MRI showing the extent of lesion and involvement of the subcortical white matter. **d**–**f** Axial (**d** and **e**) and sagittal (**f**) post contrast MRI showing lesion with peripheral enhancement. The enhancement is in the form of a crescent/open ring circumscribed to the white matter

In majority of TDL, either gross total excision or a stereotactic biopsy is undertaken to arrive at a tissue diagnosis. Intraoperative squash preparations from TDL may be helpful in identifying these lesions, although in several instances, these have been misdiagnosed [6]. TDL with areas showing hypercellularity, reactive astrocytes, occasional mitotic figures and focal necrosis can be easily mistaken for a glioma [6]. While the foamy macrophages overshadowed the whole crush smear, the nuclear atypia noted in the minor component of astrocytes tricked us in labelling it as low-grade glioma. Abundance of foamy macrophage with perivascular lymphocytic infiltrate on squash smears should always arouse a suspicion of TDL. Histopathological examination on paraffin-embedded sections is essential for confirmation of TDL. The characteristic features are abundant foamy macrophages, reactive gliosis and perivascular lymphocytic infiltrate [2, 6]. Supportive clues are loss of myelin in areas of macrophage infiltration as depicted by LFB stain. Extensive perivascular lymphocytic infiltrates in TDL may mimic a primary CNS lymphoma. Similarly, a cerebral infarct can also show perivascular inflammatory infiltrate, necrosis and foamy macrophage collections [6]. Necrosis is extremely rare in TDL. The clonality of lymphocytic infiltrate as determined by CD20 and CD3 stain resolves the former while clinical symptomatology and territorial distribution resolves the latter differential. Also, in infarcts, axons as well as glial fibres will be absent in the necrotic zones and foci with macrophage collections. Characteristic hyperchromatic nuclear morphology, atypical mitotic figures, necrosis and endothelial proliferation distinguishes gliomas from TDL [6].

Most patients with TDLs respond to steroid therapy; however, the response is suboptimal in TDL associated with multiple sclerosis. A correct diagnosis of TDL is extremely challenging and vital since an early treatment results in a dramatic complete clinical recovery. This case highlights the importance of keeping TDL in the

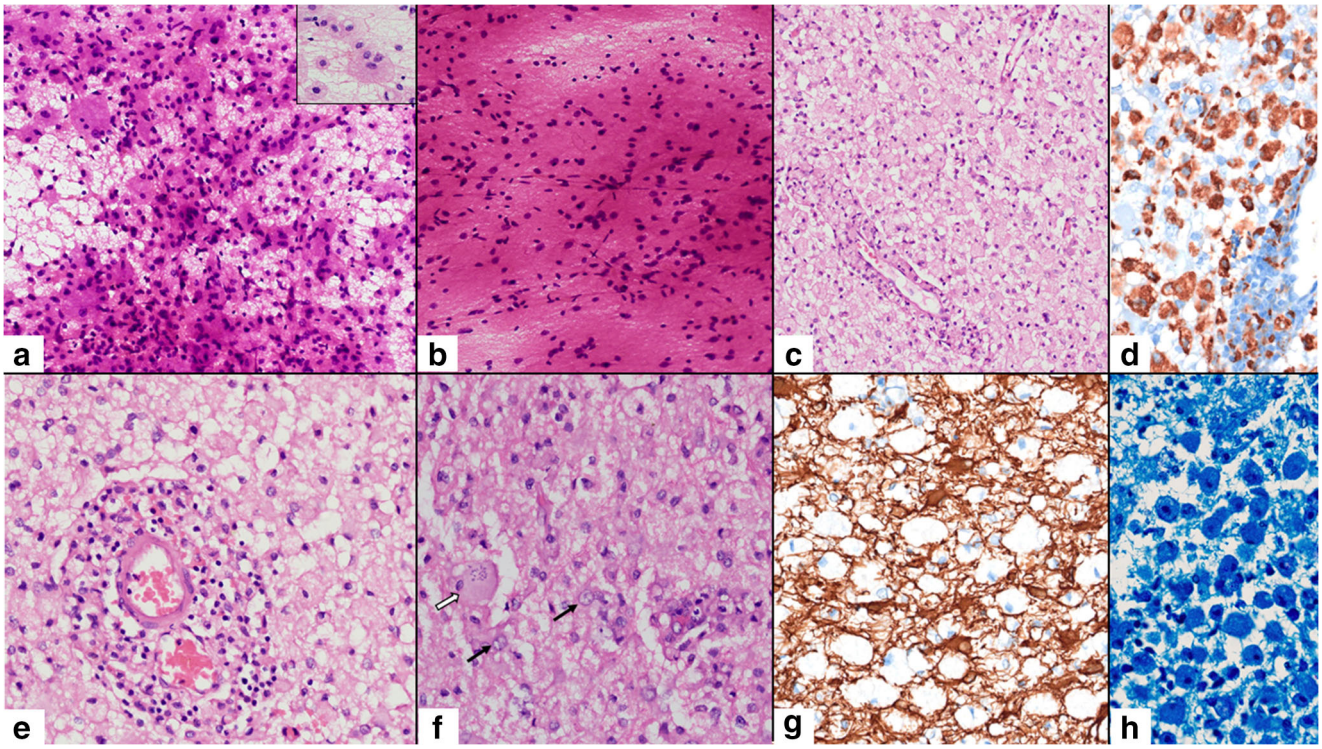

Fig. 2 **a** Intraoperative crush smears depicting sheets of macrophages admixed with few astrocytes on (haematoxylin & eosin, H&E × 200), inset: Foamy macrophages with abundant vacuolated cytoplasm at high magnification (H&E × 400). **b** Glial component showing mild nuclear atypia interpreted as a low-grade glioma (H&E × 400). **c** Paraffin section depicting fragments dominated by sheets of macrophages with abundant vacuolated cytoplasm (H&E × 400). **d** CD68 highlights the sheets of macrophages (immunoperoxidase × 200). **e** Perivascular lymphocytic infiltrate (H&E × 400). **f** Admixed reactive astrocytes (small black arrow) with few Creutzfeldt astrocytes (white arrow) also seen (H&E × 400). **g** Glial fibrillary acidic protein highlights the reactive astrocytes (immunoperoxidase × 200). **h** Luxol fast blue (LFB) stain demonstrates the debris within the macrophages (LFB × 200)

differentials of solitary space-occupying lesion even in paediatric age group.

Compliance with ethical standards

Conflict of interest The authors declare that they have no financial or other conflicts of interest in relation to this research and its publication.

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