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Orbital tuberculosis mimicking an ocular malignancy: a case report

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Abstract

Background: Tuberculosis (TB), a multi-systemic disease caused by Mycobacterium tuberculosis, is associated with a high burden of morbidity and mortality worldwide. The diagnosis of TB in children is challenging, particularly when it presents in rarer sites such as the eye. We present a case of a female Ghanaian toddler with a right orbital mass which mimicked an orbital malignancy and was confirmed as TB on histopathology. This case report highlights the need for a high index of suspicion for TB among children who present with orbital masses, especially in TB-endemic regions.

Keywords: orbital tuberculosis; orbital mass; ocular malignancy

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INTRODUCTION

Tuberculosis (TB) is a leading cause of mortality globally [1,2]. In 2019, about 44,000 Ghanaians developed TB, of which 6,300 were children [3]. TB primarily affects the lungs but can affect other organs, including the eye [1]. Ocular TB may be intraocular, involving the uvea, retina and optic nerve, or extraocular, involving the orbit, lacrimal gland, eyelid, conjunctiva, sclera or cornea [1,4]. Orbital TB is rare, even in TB-endemic regions [5,6]. In young children, it may mimic neoplastic disorders such as neuroblastoma or rhabdomyosarcoma [7,8]. We describe a case of orbital TB in a Ghanaian child referred to the Paediatric Oncology Unit (POU) as a suspected malignancy.

CASE

A previously well 2- to 5-month-old female was referred to the POU, Korle Bu Teaching Hospital (KBTH) from the Department of Ophthalmology, KBTH, with suspected right orbital rhabdomyosarcoma. She had a five-month history of progressively increasing right eye swelling, which had ulcerated two months into the illness with a purulent discharge. There was no visual loss and no associated fever, cough, weight loss or night sweats. There was no history of contact with an individual with TB. Prior to referral to the POU, an incisional biopsy with tarsorrhaphy was done. She had no prior hospitalisations or surgeries. She had received a one-lifetime transfusion, given just prior to the biopsy. Birth history was unremarkable, and immunisations were complete for age, including a BCG vaccination at birth. Developmental and nutritional history were normal. She was the last of three children of working-class parents who all lived in a poorly ventilated single room in Accra. The family history was negative for malignancy, and their diet did not include intake of unpasteurised milk.

On examination, she was mildly pale and afebrile. She had a soft, fluctuant, tender right pre-auricular lymph node measuring 2.5 cm x 2.5 cm and multiple, firm, non-tender right cervical and submandibular lymph nodes (largest: 3

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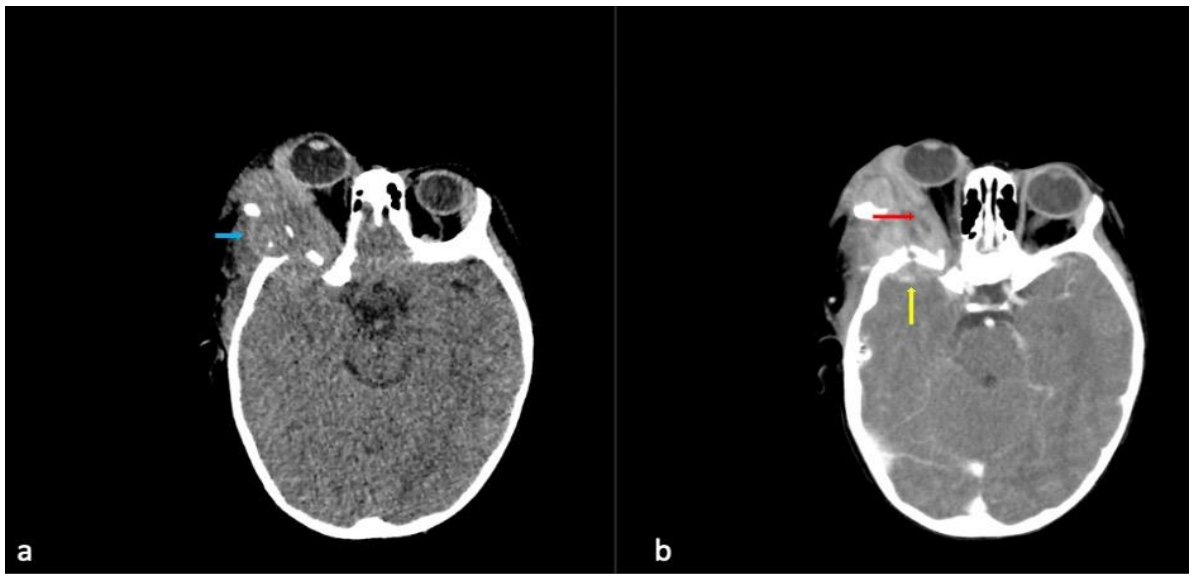

Figure 1. CT scans of the head
(a)Pre and (b) post-contrast CT scans of the head, showing a heterogeneously enhancing mass centered on the lateral wall of the right orbit and right greater wing of sphenoid with dural thickening (yellow arrow). The mass extended to the right temporal fossa (blue arrow) and right lateral extraconal space (red arrow), with the latter displacing the right lateral rectus muscles causing severe proptosis. No brain lesions were present.

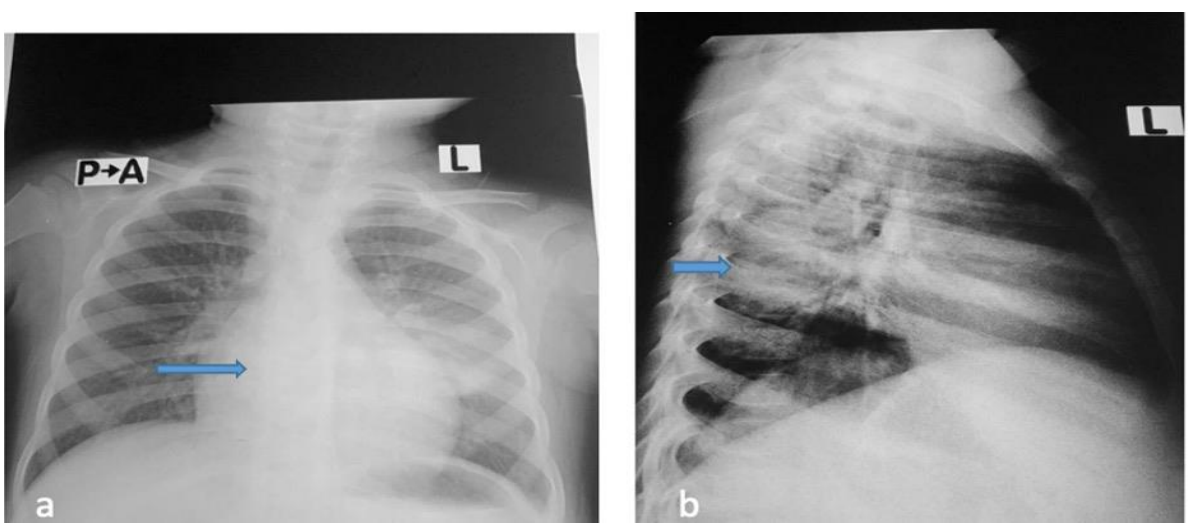

Figure 2. Chest radiographs (Postero-anterior [PA] and Lateral)
(a) PA radiograph demonstrating a faint, roundish subcarinal retrocardiac opacity and (b) lateral radiograph showing a lobulated retrocardiac opacity.

cm x 3 cm). Her weight and height were 10.5 kg and 86 cm, respectively. Anthropometric z-scores were within normal range. There was a mass over the superolateral portion of her right upper lid extending towards the temporal region, with downward displacement of the right eye and proptosis. An ulcer over the right upper eyelid showed areas of crusting and a purulent discharge. The left eye appeared grossly normal. Clinical notes from the Ophthalmology Department indicated that the cornea, anterior chamber, pupil, iris, lens, vitreous and fundus of both eyes showed no abnormalities. A 6 cm x 6 cm, firm, smooth, non-tender swelling was overlying the 9^{th}-12^{th} ribs on the left anterior chest wall. There was no spinal deformity or swelling and no other significant examination

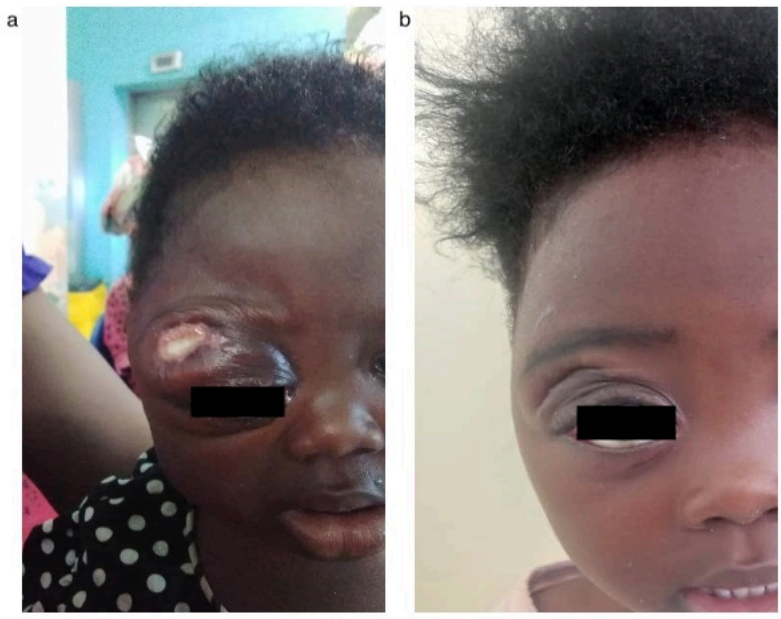

Figure 3. Right eyelid mass (before and during treatment)
(a) Image showing right eyelid mass with ulceration over the lateral aspect, with a purulent discharge
(b) Image showing marked clinical response six months into treatment.

findings. A full blood count showed: haemoglobin - 9.8 g/dl (11.0 - 18.0), white blood cell count - 12.19 x 10^9/ l (2.50 - 8.50), neutrophil count - 6.10 x 10^9/ l (2.0 - 7.0), lymphocyte count - 5.00 x 10^9/ l (1.0 - 3.0), and platelet count - 399 x 10^9/ l (150 - 400). Renal and liver function tests were normal. The erythrocyte sedimentation rate was 50 mm fall/hr (0 – 10 mm/hr). The HIV test was negative. A swab of the right eyelid ulcer cultured Pseudomonas aeruginosa, sensitive to Gentamicin and Levofloxacin. Computed Tomography (CT) scan of the orbits and brain (Figure 1) showed a heterogeneously enhancing soft tissue mass on the right superolateral orbital wall and right greater wing of the sphenoid bone with bony destruction, sclerosis of adjacent bones and dural thickening. Proptosis of the right globe was noted, and differentials of neuroblastoma, rhabdomyosarcoma, and orbital lymphoma were considered.

On histopathology, sections of the orbital mass showed granulation tissue fragments infiltrated by dense mixed acute and chronic inflammatory cells, including foreign body type giant cells and granulomas with central necrosis, suggestive of tuberculosis. Also noted were dead bone fragments surrounded by neutrophils and fibrin thrombi. No tumour cells were seen. Periodic Acid Schiff stain showed no organisms, and the Ziehl-Nielsen stain for acid-fast bacilli (AFB) was indeterminate. The conclusion was chronic osteomyelitis with a differential of TB. Further imaging included a chest x-ray, which showed a roundish retrocardiac opacity (Figure 2), presumed to be a conglomerate of lymph nodes. An ultrasound scan of the chest wall mass showed a non-vascular, well-defined, heterogeneous 2.7 cm x 2.4 cm x 1.4 cm solid mass with calcifications in the subcutaneous tissue overlying the left inferior rib. Given these findings, a tuberculin skin test (TST) was done. This was positive with a 21 mm induration at 72 hours. GeneXpert on gastric lavage specimens did not detect Mycobacterium tuberculosis.
The final diagnosis was extrapulmonary TB with involvement of the orbit, lymph nodes and left anterior ribs. She was started on anti-tuberculous treatment (rifampicin, isoniazid, ethambutol and pyrazinamide), with a marked clinical response six months into treatment (Figure 3). The total planned duration of therapy is 12 months. Family screening for TB was negative.

DISCUSSION

Orbital TB affects all age groups but is relatively more common in children [1,5]. The majority of reported cases have been from India [9]. We found no previously published case from Ghana [8,9]. Orbital TB is usually slowly progressive with a median time to the presentation of three months (1 week to 12 years) [9]. Although the left orbit is more commonly affected than the right [5,9], our patient had a right-sided lesion. Orbital TB can manifest in different forms: bony involvement with or without sclerosis, affecting the bones of the orbital wall; abscess formation with extraconal inflammation; infratemporal fossa or intracranial (commonly extradural) extension and tuberculous dacryoadenitis. Periostitis can also occur in the first two decades of life during the period of active

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bony growth [10], classically presenting with chronic ulceration or discharging sinus in the periorbital region [9]. The pattern of presentation of our patient was, however, more consistent with orbital TB with bony involvement. In this form, bony involvement is manifested by radiological destruction, osteomyelitis changes (demonstrated both radiologically and by histopathology in our patient), erosion, and, rarely, sclerotic changes. Intracranial spread with extradural abscess formation may occur concurrently and denotes progressive disease [1]. Our patient's CT scan showed evidence of dural involvement. Another feature of orbital TB is TB's metachronous involvement of distal bones, which was also evident in this case.

The involvement of the lateral orbital wall connotes haematogenous spread, whereas medial wall involvement usually indicates a contiguous spread from a paranasal sinus [5,7]. Our patient had lateral orbital wall involvement, implying haematogenous spread, likely due to extrapulmonary dissemination from the lungs. She, however, did not have any previous or current respiratory symptoms. Patients with ocular TB may have normal chest findings in the setting of haematogenous spread [11]. It is unclear how she acquired the disease in our case, as family testing was negative for TB. Diagnosis of orbital TB can be challenging and is mostly made on clinical grounds. Diagnostic and treatment delays are common and can lead to life-altering consequences such as loss of vision [1]. Clinical features of orbital TB include proptosis, orbital or lid swelling, and sinus formation [5], which our patient had. These features are similar to those of orbital malignancies, especially in low and middle-income countries where patients usually present late with advanced disease. Some characteristics may help differentiate between malignancies and TB affecting the orbit. For example, in orbital neuroblastoma, abscesses are usually not seen, and a characteristic spiculated pattern of periosteal reaction is seen in Ewing sarcoma [5]. Diagnostic imaging modalities include chest radiographs to look for evidence of primary pulmonary TB, orbital ultrasonography and CT scan or magnetic resonance imaging (MRI) of the orbits. The absence of bony artefacts on MRI gives it an advantage over CT scans in the evaluation of orbital masses [5]. CT scans are, however, superior for evaluating bony destruction. Orbital TB is paucibacillary, making it difficult to isolate Mycobacterium tuberculosis. Biopsy confirmation is often required. Histologically, the hallmark of TB is epithelioid granuloma with Langhans giant cells and caseous necrosis. As with our patient, AFB may not be detected, especially in formalin-fixed or paraffin-embedded tissue. This is consistent with findings reported by Madge et al. [9], where only 18 out of 59 cases had AFB visualised. Although the gold standard for diagnosis is mycobacterium culture, there is a high rate of false negatives. In our patient, culture was not done. To support the diagnosis of orbital TB, ancillary tests such as tuberculin skin test (TST) or interferon-based assays are helpful. TST is considered positive in non-immunosuppressed children if the induration is $\geq$ 10 mm [12]. Patients with orbital TB require systemic anti-tuberculous therapy [1]. Treatment comprises a four-drug regimen, administered in two phases: an intensive phase with rifampicin, isoniazid ethambutol and pyrazinamide for two months and a continuation phase with rifampicin and isoniazid [4,13]. There is no consensus on the total duration of treatment, which varies from 6 to 18 months [8,13]. Our patient's treatment duration is twelve months due to the involvement of her ribs (osteoarticular TB). Steroids can be prescribed as adjunctive treatment to prevent inflammatory tissue damage, although they were not used in this case [14].

Conclusion

Orbital TB is rare, even in endemic areas and can masquerade as an orbital malignancy. It must, therefore, be considered among the differential diagnoses of orbital masses.

DECLARATIONS

Ethical considerations

Informed consent was obtained from parents for the use of patient images and medical information for publication.

Consent to publish

All authors agreed to the content of the final paper.

Funding

None

Competing Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Author contributions

LGT, VSM, AKA, SA and LAR were major contributors in writing this manuscript and patient care. HG participated in the interpretation of diagnostic (imaging) studies of the patient and in the writing of this manuscript. LE participated in the diagnostic (histopathologic) study of the patient and in the writing of this manuscript. CIS participated in patient care and critically reviewed the final manuscript. All the authors have read and approved the final version of the manuscript.

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Availability of data

The datasets used and/or analysed during the current study are available from the corresponding author upon reasonable request.

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