CASE PRESENTATION

Orbital tuberculosis

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ABSTRACT

Tuberculosis (TB) of the orbit is a rare form of extrapulmonary tuberculosis. Orbital TB may occur with or without systemic manifestations and should not be excluded even in the absence of pulmonary TB. Orbital tuberculosis is a vision-threatening disease that inevitably leads to blindness if not properly diagnosed and treated.

Here we presented a 13-year-old girl complained from mild headache for three months that suddenly followed by painless swelling and drooping of right upper lid along with swelling of the adjacent area, On examination, a non-tender, soft, fluctuating diffuse swelling of left upper lid extending over the left fronto-temporal area was found and a loculated fluid collection was seen at the right upper eyelid by CT scan. The genXpert result for aspirate from the fluid collection came positive for TB. The patient was started on a standard regimen of antitubercular therapy (ATT) for one year with a successful and uneventful course.

Key words: Tuberculosis, orbit, Genexpert, BCG.

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by the obligate aerobic, acid-fast bacillus Mycobacterium tuberculosis. [1] Transmission is airborne; the lungs are the most commonly affected organ.[2,3] Commonly, the primary focus of tuberculosis is on pulmonary sites; however, any organ can be involved, particularly lymph nodes and osteoarticular areas.[4] Orbital tuberculosis is a rare form of extrapulmonary tuberculosis, even in endemic areas. It may affect the soft tissue, lacrimal gland, periosteum, or bones of the orbital wall and can extend to adjacent paranasal sinuses or intracranial cavities. [5,6] Orbital tuberculosis can be classified as primary or secondary depending on origin. Primary orbital tuberculosis is an infection of the ocular region with localised symptoms and without systemic involvement. Secondary orbital tuberculosis involves the ocular regions through a hematogenous route from a distant site or an extension of neighbouring structures, such as the paranasal sinuses.[7] Diagnosis can be challenging and may require an orbital biopsy, during which positive acid-fast bacilli (AFB) and characteristic histopathology may be observed. The growth of Mycobacterium tuberculosis from such a specimen remains the gold standard for diagnosis. Ancillary investigations include tuberculin skin tests and chest radiography; however, more recently, alternatives such as whole-blood interferon-γ immunological tests and PCR-based tests of pathological specimens have proven useful. The management of orbital tuberculossi (O-TB) is complex, requiring a stringent public health

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strategy and high levels of patient adherence, combined with long courses of multiple anti-tuberculous medications.[8]

The most common symptoms were vision impairment (71.68%), eyelid swelling (9.73%), and exophthalmos (5.31%). Imaging, particularly computed tomography (CT) scans, which are positive in 60.18% of patients, along with histopathological and molecular biological confirmation, which are positive in 46.02%, were the principal tools for diagnosis.

In most cases, antitubercular therapy (ATT) was the primary treatment, resulting in complete resolution of the condition. However, 30.09% of these cases had some complications like glaucoma and cataracts, which point to careful management and follow-up. Orbital tuberculosis (O-TB) remains a diagnostic challenge due to its rarity and changing clinical presentations. Early diagnosis and identification, primarily through imaging and histopathological examination, are crucial for effective management.[9] (O-TB), though a rare manifestation of TB, represents a significant diagnostic and therapeutic challenge due to its ability to mimic various other orbital conditions such as neoplasms, inflammatory pseudotumors, and abscesses. This mimicry often leads to delays in diagnosis, which can have profound consequences on patient outcomes, including visual impairment and life-threatening complications.[8] The global incidence of O-TB is closely tied to the prevalence of TB, with higher rates observed in endemic regions such as South Asia and parts of Africa.[10] However, increasing rates of extrapulmonary TB, including O-TB, have also been reported in developed countries, driven by factors such as immigration, immunosuppression, and the resurgence of TB in specific populations.[11]

The rising trend of multidrug-resistant (MDR) TB and extrapulmonary TB (EPTB) imposes an additional burden on TB management.[12] Surgery may be used for the diagnosis and treatment of O-TB, which has a good prognosis once diagnosed early and treated adequately.[13]

CASE PRESENTATION

A 13-year-old girl presented complaining of a mild headache for three months, for which she did not seek any medical help until she suddenly developed a painless swelling in her right orbit with drooping of the right upper lid, along with swelling of the adjacent area that developed over five days. There was no history of fever or any other systemic diseases, with a positive history of Bacillus Calmette-Guérin (BCG) vaccination. She consulted an ophthalmologist, and a clinical examination revealed a non-tender, soft, fluctuating, and diffuse swelling of the left upper lid, extending over the left fronto-temporal area (see **Figure 1**). The overlying skin was erythematous, and the local temperature was not raised. Her vision was 6/6 in both eyes. Ocular movements were normal. Anterior segment and fundus oculi were within normal limits. Systemic examination detected right-sided palpable preauricular and sublingual lymph nodes. She was otherwise healthy with no constitutional symptoms. Blood test results showed haemoglobin at 11.7 gm/dL, a total white blood cell count of 10,000 cells/mm^3, and an ESR of 49 mm in the 1st hour. Chest X-ray was normal for both lungs. Sputum for acid-fast bacilli (AFB) was negative. Antibiotics and acetaminophen were administered for 10 days, but there was no clinical improvement.

An MRI of the brain and orbit, native and with contrast, showed a loculated fluid collection/soft tissue phlegmon at the right upper eyelid. It measured 26 mm in thickness and 17 mm in side-to-side dimension, showing T1 hypointensity and T2 and FLAIR hyperintensity with enhancing walls. It likely represented a small abscess surrounded by an inflammatory phlegmon at the upper eyelid, with lateral intraorbital extraconal extension, which shows diffuse T2 hyperintensity and diffuse post-contrast enhancement. There was a minimal meningeal enhancement at the right temporal region.

In the brain study, there was evidence of brain cystic mass lesion, measuring approximately 20 x 17 mm, was detected in the right anterior temporal lobe, demonstrating a

Figure 1 | A yellow crusted lesion in the lateral part of the right upper eyelid with swelling of the eyelid and surroundng area of the right orbit.

low T1 and high T2 signal with a hypointense rim in all sequences. The lesion exhibited a restricted diffusion, as indicated by high DWI and low ADC signals, with marginal post-contrast enhancement, surrounded by vasogenic brain oedema that effaces the related cortical sulci. The relevant meninges were thickened and enhanced, and the right greater wing of the sphenoid bone exhibited features suggestive of osteomyelitis, characterised by T1 hypointensity, T2 hyperintensity, and heterogeneous enhancement. The right masticator space, the pterygoid muscles and the right infra-temporal fossa showed inflammatory changes with high T2 signal and heterogeneous post-contrast enhancement.

The ventricular system is not dilated. Small bilateral corona radiata and centrum semi-oval foci with high T2/FLAIR SI. Normal sellar region and posterior fossa. No signs of dural venous sinus thrombosis. Overall picture reflecting RT orbital pre-septal cellulitis with post-septal extension, mostly sequel to complicated brain abscess.

The patient was referred to a neurosurgeon and an ophthalmologist. An operation was done to aspirate the cystic lesion and to have a biopsy. The aspirate showed fragments of glial tissue with hemorrhagic foci. Histopathological examination of the right orbital lesion revealed a mixed population of acute and chronic inflammatory cells, multinucleated giant cells, ill-defined granulomas, foamy histiocytes, and necrotic foci, consistent with granulomatous inflammation. The GenXpert result was positive for TB.

The patient was diagnosed with an extrapulmonary tuberculosis/ ocular tuberculosis. She was referred to the National Tuberculosis Program Institute (NTP), where the patient initiated the initial phase of treatment with four tablets daily of a fixed-dose formula consisting of rifampicin 150 mg, isoniazid 75 mg, pyrazinamide 400 mg, and ethambutol 275 mg for two months. After that, she continued on four tablets daily of a fixed-dose formula of rifampicin 150 mg and isoniazid 75 mg for 10 months with an uneventful course.

DISCUSSION

A total of 1.5 million people died from TB in 2020, including 214,000 people with HIV. Worldwide, TB is the 13th leading cause of death and the second leading infectious killer after COVID-19 (above HIV/AIDS).[14] Orbital involvement in tuberculosis is a rare manifestation.[13] Although the precise incidence of ocular TB is much more difficult to discern, it ranges from 1.4% to 18% in various studies.[15,16] Although several reports of orbital TB have been published since it was first described by Abadie in 1881, the condition is still rare.[17]

After primary infection, which usually occurs during childhood, there can be two fates for the bacilli. Either the infection spreads through the bloodstream to various organs, causing fulminant disease (primary TB), or the body's immunity contains it, and the bacilli remain dormant in those organs, without causing disease. Later in life, with suppression of immunity, these bacilli can be reactivated, causing secondary TB. Similar to TB elsewhere, ocular TB can be either primary, when an external infection directly affects the eyes or their appendages, or secondary to an infection elsewhere, with hematogenous spread from the lungs or direct spread from the skin or sinuses.[18] The hematogenous spread from the lungs is

the primary mechanism by which TB affects the orbit and eyes.[15,19]

Our patient is a 13-year-old girl from Baghdad, and according to studies, Orbital involvement is more common in children, but cases have also been reported in adults.[20, 21] In a prospective study conducted in 2022 in South Africa, ocular TB is significantly more common in females, and an indian study in 2024 revealed that 66% of ocular TB occurs in females.[22,23]

Our case began with a three-month headache, followed by sudden, increasing, painless swelling and drooping of the right upper eyelid, along with swelling of the adjacent area over five days. TB involvement of the orbit can present as proptosis secondary to mass effect or diplopia from cranial nerve or extraocular muscle involvement.[24] The clinical presentation of O-TB was highly variable, reflecting the potential of the disease to involve different structures within the orbit. Prominent common symptoms included proptosis with eyelid swelling, diplopia, and loss of vision. [25] The most common clinical presentations of ocular TB are anterior uveitis, choroiditis, and sclerokeratitis. Among the various intraocular structures, the most common site of involvement is the uveal tract due to its profuse blood supply. Although primary ocular TB is unusual, only 40% of patients with features suggestive of ocular TB have evidence of coexisting pulmonary TB.[26]

Our patient had no history of fever or cough, and her chest x-ray was normal and negative for direct AFB. So, it is vital to keep in mind that ocular TB can occur in the absence of pulmonary TB, and the majority of chest radiographs may be normal in these patients.[27,28] Healed or reactivated pulmonary TB lesions can also be observed, and any positive chest imaging finding requires sputum evaluation.[17] The patient consulted an ophthalmologist and a neurologist to reach the correct diagnosis, as ocular TB can be challenging to diagnose due to its potential to affect almost any part of the eye, and its clinical findings can mimic those of a wide array of underlying diseases, necessitating a comprehensive workup to exclude other causes.

Delays in diagnosis and initiation of appropriate anti-TB treatment are common and may lead to significant vision loss or even loss of the eye.[29] Accurate diagnosis requires a high index of suspicion, review of associated systemic signs and symptoms, and appropriate laboratory testing. There are no clearly defined criteria for diagnosing ocular TB.[30] Diagnosis requires a suggestive history and radiology, and is confirmed by histopathological evidence of caseating granulomas in the tissue, or the presence of acid-fast bacilli (AFB) in smear and culture. Polymerase chain reaction (PCR) is emerging as the investigation of choice in patients with ocular TB, because of faster results and a smaller sample required. PCR can be used in the tissue obtained from the skin of the eyelid, conjunctiva, vitreous, and choroid. However, the sensitivity and specificity of PCR for diagnosing ocular TB have not been studied in large-scale studies.[31] The MRI findings in our patient included a loculated fluid collection and soft tissue phlegmon at the right upper eyelid, as well as osteomyelitis of the right greater wing of the sphenoid bone. Similarly, studies reported that the common CT scan findings included hyperdense lesions, soft tissue masses, or bony erosions, suggesting tubercular involvement.[8]

An operation was done on our patient to aspirate the fluid and have a biopsy and histopathological examination revealed fragments of glial tissue with hemorrhagic foci. The right orbital lesion showed a heavy mixed population of acute and chronic inflammatory cells, multinucleated giant cells, ill-defined granulomas, foamy histiocytes, and necrotic foci, suggestive of granulomatous inflammation. Typically, histopathological examination revealed granulomatous inflammation with caseation necrosis, a finding similar to that in most cases in this study.[25]

The condition of our patient is represented as O-TB with bony involvement, which is one of the five forms of orbital TB, including: classical periostitis; orbital soft tissue tuberculoma or cold abscess, with no bony involvement; O-TB with bony involvement; spread from

the paranasal sinuses; and tuberculous dacryoadenitis. The ocular adnexa, including the nasolacrimal system and overlying skin, may also be involved.[10]

The patient was diagnosed as a case of extrapulmonary TB (ocular TB) and she was referred to the NTP, for which the patient started on the initial phase with four tablets daily of a fixed-dose formula of rifampicin 150 mg, isoniazid 75 mg, pyrazinamide 400 mg, and ethambutol 275 mg for two months. After that, she continued on four tablets daily of a fixed-dose formula of rifampicin 150 mg and isoniazid 75 mg for 10 months with an uneventful course for a total duration of 1 year because of involvement of the orbital bone and central nervous system.[32] The CDC recommends four-drug treatment with isoniazid, rifampin, pyrazinamide, and ethambutol for a total of 2 months, followed by an additional 4–7 months of dual therapy with isoniazid and rifampin.[33] Whereas Khurana et al. described complete resolution of all cases post-ATT and surgical intervention.[34]

CONCLUSION

Orbital tuberculosis (TB) is a rare form of extrapulmonary TB, a vision-threatening disease that inevitably leads to blindness if not properly diagnosed and treated. Histopathological examination, including biopsy and GeneXpert testing, is essential for confirming the diagnosis. Early identification and appropriate treatment with anti-tuberculosis medications are crucial to prevent complications and the spread of the infection..

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Abbreviations list: Acid-fast bacilli (AFB), Acquired immune deficinecy syndrome (AIDS), Antitubercular therapy (ATT), Bacillus Calmette-Guérin (BCG), Centers for Disease Control and Prevention (CDC), Computed tomography (CT), Corona Virus disease 2019 (COVID-19), Erythrocyte sedimentation Rate (ESR), Extrapulmonary TB (EPTB), Human immune deficency virus (HIV), Magnetic resounance Image (MRI), Multidrug-resistant (MDR), National Tuberculosis Institute (NTP), Orbital tberculosis (O-TB), Polymerase chain reaction (PCR), Tuberculosis (TB)..

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