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Challenges in the Diagnosis and Management of Testicular Tuberculosis and Schistosomiasis in Endemic Regions

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Abstract **Case Report**

Infections caused by specific pathogens, such as *Mycobacterium tuberculosis* (Koch's bacillus) and *Schistosoma* spp. remain major public health concerns in many regions of the world, particularly in tropical and subtropical areas. Testicular involvement is rare and presents a diagnostic challenge, often mimicking neoplastic processes. We report two cases of testicular tuberculosis and schistosomiasis, both presenting clinically as testicular masses.

Keywords: Testicular Tuberculosis, Testicular Schistosomiasis, Misdiagnosis, Endemic Infectious Diseases.

I. INTRODUCTION

Infections caused by specific pathogens, such as *Mycobacterium tuberculosis* (Koch's bacillus) and *Schistosoma* spp., remain major public health concerns in many parts of the world, particularly in tropical and subtropical regions [(Ondo *et al*., 2014); (Rakototiana *et al*., 2009); (Faucher *et al*., 2004)]. We report two cases of testicular tuberculosis and schistosomiasis, both presenting clinically as testicular masses. The diagnostic challenge they posed raises a crucial question in the context of tuberculosis and schistosomiasis endemicity: can we systematically rule out biopsy for testicular masses, as suggested by protocols in non-endemic regions?

II. OBSERVATIONS

2.1. Observation 01

This is a case of a 13-year-old boy in good general health, who presented for evaluation of a non-inflammatory swelling of the left scrotum, which had gradually developed in an non febrile context. His medical history was unremarkable, except for a family history of tuberculosis in his uncle, who had been treated over a year ago. His vaccinations were up to date, including the Bacillus Calmette-Guérin (BCG) vaccine. Clinical examination revealed an enlarged, non-inflammatory, firm left hemiscrotum, with a palpable and tender testicle (Figure 1). Ultrasound showed a left testicle in an intrascrotal position, displaced by a heterogeneous, hypoechoic, and vascularized intrascrotal mass on Doppler imaging, measuring 30.5 × 23 mm. Urinalysis (ECBU), complete blood count (CBC), and C-reactive protein (CRP) levels were unremarkable. Given the epidemiological, clinical, and paraclinical findings, testicular tuberculosis was strongly suspected, although a testicular tumor could not be definitively ruled out. Tuberculosis screening, including chest X-ray, tuberculin skin test, and sputum examination, yielded no abnormalities. Surgical exploration was performed, revealing an enlarged testicle with caseous necrosis on its surface (Figure 2). A biopsy and tissue sampling were conducted, and *GeneXpert* testing returned positive. Histological examination showed multiple polymorphous inflammatory granulomas composed of epithelioid histiocytes, Langhans giant cells, and peripheral lymphocytes, confirming the diagnosis of testicular tuberculosis (Figure 3). Postoperative recovery was uneventful. The patient was treated with a six-month course of anti-tuberculosis polychemotherapy, including rifampicin (R), isoniazid (H), pyrazinamide (Z), and ethambutol (E), leading to a successful cure.

Figure 1: Patient image with left bursa tumor

Figure 2: Appearance of the left testicle on exploration with necrosis fracture

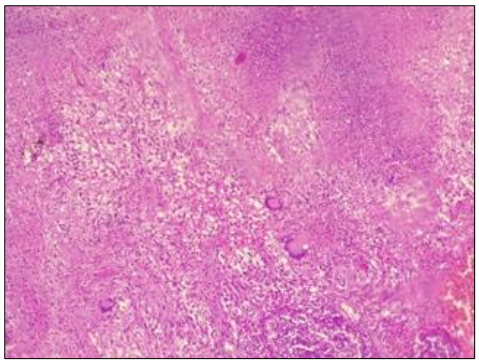

Figure 3: Anatomo-cyto-pathological aspect of the left testicular fragment highlighting the tubercular lesion

2.2. Observation 02

A 7-year-old boy with no significant medical history was referred for suspected hydrocele due to a large, chronic scrotal swelling that had been evolving for six months. The swelling was painless, with no associated functional or urinary symptoms. On examination, the child was in good general health. Locally, there was a large, painless right hemiscrotum with an enlarged testicle, along with a positive Chevassu's sign (Figure 4). Testicular Doppler ultrasound revealed a poorly defined, heterogeneous intratesticular mass with calcifications, raising suspicion of a testicular tumor. The epididymis appeared normal. Urinalysis for *Schistosoma haematobium* eggs, tumor markers, and tuberculosis screening were all negative. Based on clinical, imaging, and paraclinical findings, a testicular tumor was suspected, and an inguinal orchiectomy was indicated and performed.

Intraoperative findings revealed an enlarged testicle with a budding tumor on its surface (Figure 5). Pathological examination showed hyalinized fibrosis containing bilharzial granulomas with numerous eosinophils, exhibiting slight central necrosis and associated with viable and occasionally calcified *Schistosoma* eggs. Epithelioid histiocytes and multinucleated giant cells were also present, with some remaining testicular tubules and an intact spermatic cord, leading to a diagnosis of bilharzial orchitis (Figure 6). Postoperative recovery was uneventful, and the patient received antiparasitic treatment with praziquantel at a dose of 40 mg/kg.

Figure 4: Patient image with right bursa swelling

Figure 5: Appearance of the right testicle after orchidectomy

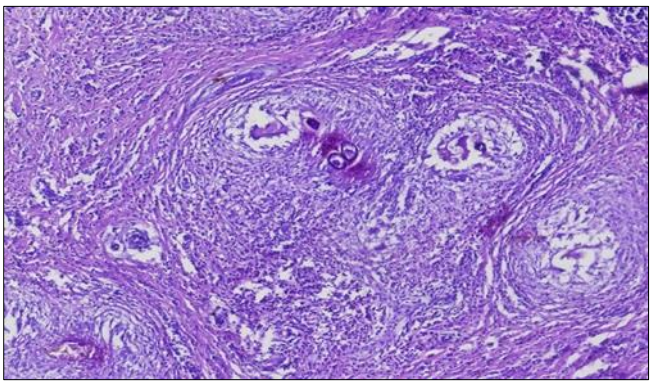

Figure 6: Anatomo-cyto-pathological aspect of the right testicular fragment highlighting granulomas around Bilharz eggs

III. DISCUSSION

Tuberculosis is a bacterial disease caused by *Mycobacterium tuberculosis*. It remains a significant public health concern worldwide. Urogenital tuberculosis is the second most common form of extrapulmonary tuberculosis [(Kharbach *et al*., 2021)]. Isolated genital involvement is rare, as it is often associated with concurrent urinary tract involvement [(Rakototiana *et al*., 2009)]. From an etiopathogenic perspective, the mechanism by which tubercular bacilli spread to the testicles remains controversial [(Kharbach *et al*., 2021)]. The clinical presentation is highly variable, nonspecific, and often delayed, particularly in the absence of other suggestive localizations, known

exposure, or a history of tuberculosis [(Rakototiana *et al*., 2009)].

Bilharziasis, or schistosomiasis, is a parasitic disease caused by blood-feeding trematodes that reside in the mammalian circulatory system at the adult stage and develop in freshwater snails at the larval stage. Infection occurs through skin penetration following contact with contaminated freshwater. The increasing prevalence of schistosomiasis in endemic regions remains a critical global public health issue, particularly in West Africa [(Ahamide *et al*., 2023)]. Testicular involvement is rare and occurs due to portocaval anastomoses between the gonadal and mesenteric veins [(Ondo *et al*., 2014)].

Testicular involvement in both infections is uncommon and frequently poses a diagnostic challenge, as it can mimic neoplastic processes, often leading to unnecessary orchiectomies [(Ondo *et al*., 2014); (Kharbach *et al*., 2021)]. Definitive diagnosis relies on commonly used microbiological tests, such as urinalysis for tuberculosis and the identification of characteristic eggs in stool or urine for bilharziasis [(Rakototiana *et al*., 2009); (Guiguen *et al*., 2013)]. Medical imaging, including ultrasound and CT scans, typically reveals an intratesticular mass but does not provide specific diagnostic elements [(Kharbach *et al*., 2021)]. No imaging modality can reliably distinguish between benign and malignant tumors—only histopathological examination can establish a definitive diagnosis [(Rakototiana *et al*., 2009)].

Furthermore, these diseases often affect socioeconomically disadvantaged patients with limited access to comprehensive diagnostic tools. In such cases, biopsy is essential for an accurate diagnosis [(Ondo *et al*., 2014); (Kharbach *et al*., 2021)]. Fine-needle aspiration or surgical biopsy could help avoid unnecessary orchiectomies, but there is no consensus on their routine use [(Kharbach *et al*., 2021)]. In our second case, the clinical presentation closely mimicked testicular cancer, with no signs suggestive of bilharziasis, making orchiectomy unavoidable. Conversely, in the first case, given the patient's history of tuberculosis, a testicular biopsy was performed, successfully preventing an unnecessary orchiectomy. Histopathological examination is crucial for a definitive diagnosis, as it reveals polymorphous inflammatory granulomas composed of epithelioid histiocytes, Langhans giant cells, and peripheral lymphocytes in tuberculosis, while the presence of bilharzial eggs confirms bilharzial orchitis.

The treatment of testicular tuberculosis and bilharziasis is both medical and surgical. It involves nodule resection followed by targeted antimicrobial therapy. The standard regimen for urogenital tuberculosis consists of a six-month course: two months of rifampicin, isoniazid, pyrazinamide, and ethambutol, followed by four months of rifampicin and isoniazid (2RHZE/4RH). Bilharziasis is treated with a single-dose regimen of praziquantel at 40 mg/kg [(Rakototiana *et al*., 2009); (Kharbach *et al*., 2021)].

IV. CONCLUSION

The cases of testicular tuberculosis and bilharziasis observed in our study highlight the complexity of the differential diagnosis with testicular tumors. Current treatment protocols, often based on European guidelines, do not always consider the specific characteristics of endemic regions where tuberculosis and bilharziasis are highly prevalent. Therefore, it is essential to conduct multicenter studies to determine the exact prevalence of these infections in different endemic areas. Such research would not only enhance our understanding of the incidence of these diseases but also help develop and adapt diagnostic and therapeutic protocols tailored to local realities.

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