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Inflammation and infection

Isolated testicular tuberculosis: A case report

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ABSTRACT

Genitourinary tuberculosis (GUTB) constitutes 20 % of extrapulmonary TB cases, with isolated testicular involvement being rare (2–4%). This case details a 41-year-old male with chronic left scrotal swelling, fistulization, and purulent discharge, ultimately diagnosed with testicular tuberculosis. Diagnostic imaging and histopathology confirmed caseating granulomas and acid-fast bacilli. The patient underwent high inguinal orchidectomy and was treated with a standard four-drug anti-tuberculosis regimen. Postoperative semen analysis revealed persistent azoospermia, indicating permanent fertility impairment. This case underscores the importance of considering GUTB in differential diagnoses of testicular masses, particularly in TB-endemic regions.

1. Introduction

Genitourinary tuberculosis (GUTB) constitutes 20 % of extrapulmonary TB cases, with kidneys most commonly affected.[1] Isolated testicular involvement is rare, occurring in only 2–4% of GUTB cases. Tuberculous orchitis can resemble testicular tumors, complicating diagnosis, especially in high TB prevalence regions.[2] In Morocco, TB is endemic, with an incidence of 97 cases per 100,000 people annually. This case highlights the need for increased awareness and diagnostic vigilance.

2. Case presentation

A 41-year-old male, with no significant medical history, presented with a chronic left scrotal swelling persisting for over eight weeks. The mass had progressively increased in size, reaching a diameter of 15 cm, and had fistulized three weeks prior to presentation, discharging purulent material. The patient reported no systemic symptoms such as fever, night sweats, weight loss, or signs suggestive of pulmonary tuberculosis. A chest X-ray was performed to rule out any pulmonary involvement and returned normal, eliminating the possibility of active pulmonary tuberculosis. He also denied any urinary symptoms, prior scrotal trauma, or history of tuberculosis exposure. Physical examination revealed a tense, enlarged left hemiscrotum with a fistulous opening at the lower pole discharging thick purulent fluid. The left testis was firm, irregular, and non-tender, while the right testis was normal. There was no palpable lymphadenopathy, and systemic examination, including the chest and abdomen, was unremarkable (Fig. 1).

A scrotal ultrasound showed an enlarged left testis measuring 48 mm × 36 mm x 33 mm with a heterogeneous echotexture and multiple hypoechoic, necrotic hemorrhagic areas, non-vascularized on Doppler. Irregular microcalcifications were scattered throughout the testicular tissue. The scrotal wall appeared thickened (9 mm) with infiltration of the surrounding tissues. The epididymis was also enlarged (17 mm × 12 mm) with a heterogeneous structure, raising suspicion for a neoplastic process. Tumor markers, including alpha-fetoprotein (AFP), beta-hCG, and LDH, were all within normal limits. A complete blood count revealed mild anemia (Hb 13.2 g/dL) with a slight elevation in the erythrocyte sedimentation rate (ESR) at 42 mm/h. A QuantiFERON-TB Gold test returned positive.

A contrast-enhanced CT scan of the abdomen and pelvis was performed to rule out any associated renal or bladder tuberculosis, and no other genitourinary or systemic lesions were identified. Given the concern for malignancy, a left high inguinal orchidectomy was performed. Perioperative findings revealed a grossly enlarged testis with a necrotic, heterogeneous appearance. The testicular parenchyma was largely replaced by caseous, yellowish material, and the surrounding tunica was thickened and infiltrated, consistent with an infectious process (Fig. 2).

Histopathological examination of the excised testis revealed caseating granulomas with central necrosis, characteristic of tuberculosis.

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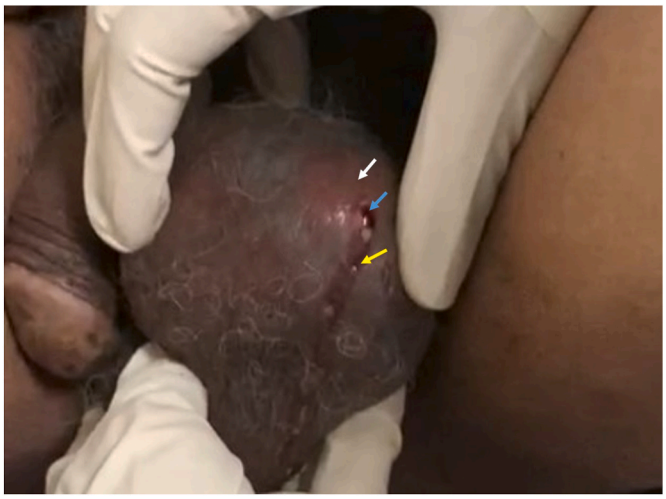

Fig. 1. Examination of the left testicle: inflamed testicle indicated by a white arrow, fistulous opening shown by a blue arrow and discharge of purulent material upon pressure marked by a yellow arrow. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

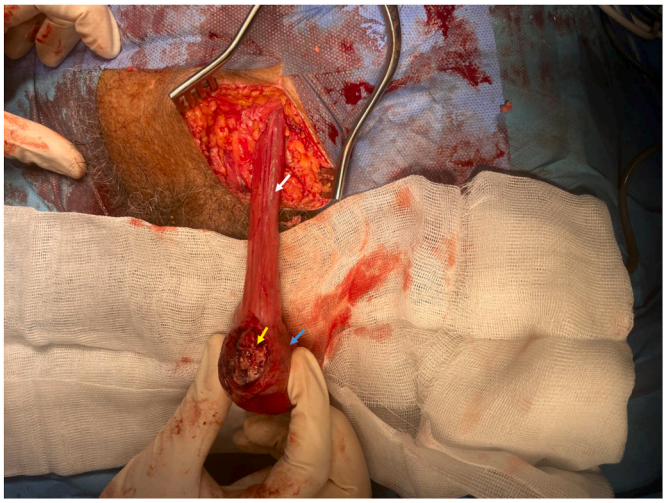

Fig. 2. Intraoperative view of a high inguinal orchidectomy: infiltrated and thickened spermatic cord indicated by a white arrow, left testicle shown by a blue arrow and necrotic area adherent to the scrotal wall described by a yellow arrow. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

Acid-fast bacilli were identified on Ziehl-Neelsen staining, confirming the diagnosis. There was no evidence of malignancy (Fig. 3).

Following surgery, the patient was started on a standard four-drug anti-tuberculosis regimen, consisting of: Isoniazid (H) 300 mg/day, Rifampin (R) 600 mg/day, Pyrazinamide (Z) 1500 mg/day, and Ethambutol (E) 1200 mg/day. This intensive phase was planned for two months, followed by a continuation phase with isoniazid and rifampin for an additional four months. The patient's liver function tests were monitored monthly due to the hepatotoxic potential of these medications, especially with the use of isoniazid and rifampin. Visual acuity and color vision testing were conducted regularly to monitor for ethambutol-induced optic neuropathy. The patient tolerated the treatment well, and no significant side effects were reported.

Regarding fertility, the patient's semen analysis was performed preoperatively and postoperatively. The initial analysis revealed azoospermia, likely secondary to the advanced necrotic involvement of the testicle and epididymis. A follow-up semen analysis three months post-orchidectomy confirmed persistent azoospermia, suggesting permanent impairment of fertility. Given the unilateral nature of the disease, the remaining testis was monitored for any signs of compensatory hypertrophy or functional recovery. Testosterone levels remained within normal limits, and the patient reported no symptoms of hypogonadism.

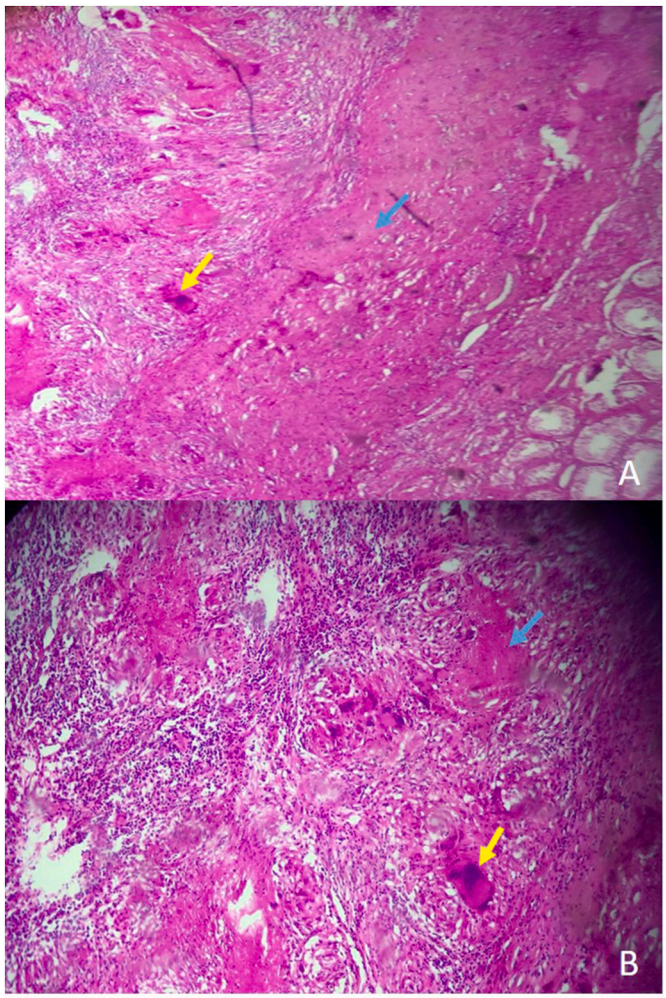

Fig. 3. Histopathological examination: epitheloid granuloma with giant cells indicated by a yellow arrow and caseating necrosis shown by a blue arrow. (A) Low magnification and (B) medium magnification. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

3. Discussion

Genitourinary tuberculosis (GUTB) accounts for approximately 27 % of all cases of extrapulmonary tuberculosis, making it the second most common form after lymphatic involvement.[1] GUTB predominantly affects the kidneys, followed by the ureters and bladder, while the external genital organs are less frequently involved. Isolated testicular tuberculosis is a rare presentation, constituting only 2–3% of GUTB cases, with most cases involving concomitant epididymal or prostatic disease.[2]

The pathogenesis of testicular tuberculosis typically involves hematogenous spread from a primary pulmonary or extrapulmonary focus.[3] This dissemination is seen in up to 50 % of GUTB cases, with concurrent pulmonary TB detected in 20–30 % of patients. However, in regions where tuberculosis is endemic, up to 10 % of patients with GUTB may present without any evident primary focus, making isolated genital TB difficult to diagnose.[1]

The clinical presentation of testicular tuberculosis is often nonspecific, mimicking conditions such as bacterial orchitis, abscesses, or malignancy. Common symptoms include painless scrotal swelling (observed in 60–70 % of cases), pain (30–40 %), and, in advanced cases, fistula formation. Fistulas are more common in patients with delayed diagnosis or inadequate treatment, occurring in approximately 10–15 % of advanced cases.[2]

Ultrasound is the primary imaging modality, with sensitivity rates for detecting testicular TB exceeding 80 %.[3] Characteristic findings include a heterogeneous testicular echotexture with hypoechoic necrotic areas and calcifications, present in 50–60 % of cases. Doppler ultrasound may show an absence of vascular flow in necrotic areas, distinguishing it from malignancy. Scrotal wall thickening and epididymal involvement, seen in about 60–70 % of testicular TB cases, are also key diagnostic indicators.[3]

Histopathology remains the gold standard for diagnosing testicular tuberculosis. Typical findings include caseating granulomas with central necrosis, and acid-fast bacilli can be detected in 30–50 % of cases through Ziehl-Neelsen staining. Granulomatous inflammation with caseation is highly specific for TB.[4] In contrast, non-caseating granulomas may be seen in other conditions such as sarcoidosis or idiopathic granulomatous orchitis, making TB difficult to exclude without microbiological confirmation.[1]

The diagnosis of GUTB may be further supported by microbiological testing, with urine cultures yielding Mycobacterium tuberculosis in approximately 60–70 % of cases. However, the sensitivity of urine cultures is lower in isolated genital TB.[2] Modern molecular diagnostic tools, such as polymerase chain reaction (PCR) for Mycobacterium tuberculosis, have enhanced the diagnostic yield, with sensitivity rates approaching 90 % and specificity rates over 95 %.[1]

The standard treatment for testicular tuberculosis follows WHO guidelines with a four-drug regimen: isoniazid (300 mg/day), rifampin (600 mg/day), pyrazinamide (1500–2000 mg/day), and ethambutol (1200 mg/day) for two months. This is followed by isoniazid and rifampin for an additional four months.[5] Treatment completion rates exceed 90 %, and cure rates are above 95 % with adherence.[1]

Close monitoring is crucial as up to 20 % of patients on antituberculosis therapy experience side effects. Hepatotoxicity from isoniazid and rifampin occurs in 2–8%, requiring liver function tests.[2] Ethambutol can cause optic neuropathy in 1–3%, necessitating vision screening. Pyrazinamide is linked to hyperuricemia and gouty arthritis in 5–10 % of patients.[1]

Fertility concerns are significant in testicular tuberculosis. Azoospermia, oligospermia, and impaired sperm motility affect 30–50 % of advanced cases.[1] Unilateral involvement may preserve hormonal function, but bilateral disease, affecting 5–10 % of cases, often results in hypogonadism and infertility.[2] Semen analysis before and after treatment is essential, with long-term follow-up recommended for those with preserved spermatogenesis.[4]

4. Conclusion

Testicular tuberculosis is a rare but important differential diagnosis for testicular masses, particularly in endemic regions. Prompt recognition, imaging, and histopathological confirmation are essential for guiding treatment and preventing complications.

Consent

The patient provided informed consent after receiving detailed information regarding the study and its implications.

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CRediT authorship contribution statement

Salim Lachkar: Conceptualization, Data curation, Investigation, Methodology, Writing – original draft. **Mamoun Diouri:** Data curation, Investigation. **Ahmed Ibrahimi:** Investigation, Methodology, Supervision. **Imad Boualaoui:** Methodology, Supervision, Writing – original draft. **Hachem El Sayegh:** Supervision, Validation, Writing – original draft. **Yassine Nouini:** Conceptualization, Supervision, Validation.

Conflict of interest

None.

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