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Isolated Testicular Tuberculosis In A 70 Year Male : A Case Report And Review Of Recent Literature

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Abstract

Inflammation of one or both the testes is referred to as orchitis.Tuberculous orchitis also referred to as Koch's Orchitis ,is a rare but significant manifestation of genitourinary tuberculosis, accounting for 20% ofextra pulmonary tuberculosis cases of which testicular tuberculosis constitutes 0.5%.It typically arisesfrom haematogenous dissemination of Mycobacterium tuberculosis from a primary pulmonary focus or by retrograde spread from the epididymis with which it is frequently associated.It primarily affects men in endemic regions or those with compromised immunity such as HIV positive individuals. Early diagnosis and prompt initiation of Anti-Tubercular Therapy are crucial to prevent complications such as testicular orchidectomy ,infertility or systemic dissemination and Tuberculosis.

Keywords: Koch's orchitis, Testicular mass, Scrotal Swelling, Mycobacterium Tuberculosis

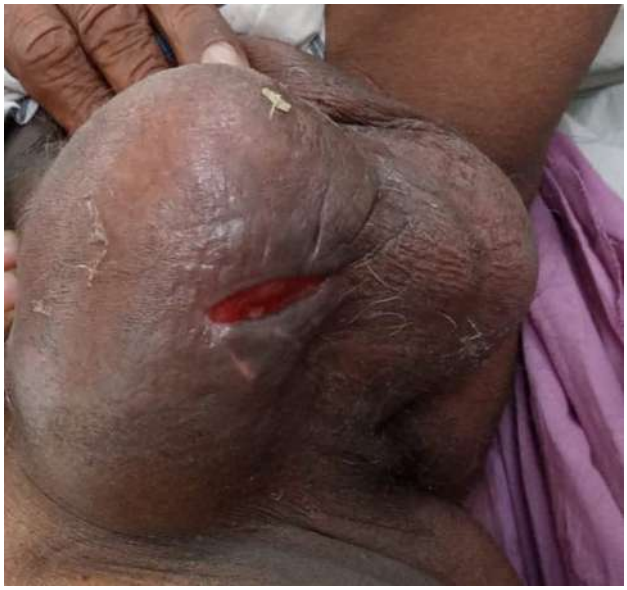
Introduction

Genitourinary tuberculosis constitutes approximately 20% of all extra pulmonary Tuberculosis cases and is the second most common form of extra pulmonary tuberculosis. The most common extra pulmonary tuberculosis areas includes bones, lymph nodes, pleura, joints, genitourinary areas with isolated testicular involvement being rare accounting for 0.5% of cases.Clinically, patients may present with scrotal swelling, pain, or a testicular mass, often mimicking testicular tumors or other inflammatory conditions, leading to diagnostic challenges. Ultrasonography and MRI can aid in diagnosis, but definitive diagnosis is through histopathology and microbiological studies including PCR and culture for Mycobacterium tuberculosis. Treatment typically involves a prolonged course of anti-tubercular therapy (ATT) with surgical intervention reserved for abscess formation, diagnosticuncertainty, or failure of medical management. Early diagnosis and treatment are essential to preserve testicular function and prevent complications.

Case Presentation:

We report a case of testicular tuberculosis involving Right testis in a 70 year old male patient. Patient presented with scrotal swelling since two months associated with dull aching pain and fever.There was no history weight loss ,urinary symptoms associated with swelling. Physical examination revealed enlarged , tender Right testicle with pus discharge.There was also diffuse scrotal wall thickening noted. Patient was diagnosed as a case of testicular abscess at outside hospital and has underwent Incision and Drainage of abscess. Patient then presented to our hospital with recurrent scrotal swelling associated with dull aching pain, low grade fever and pus discharge after 15 days of surgical intervention

Figure 1

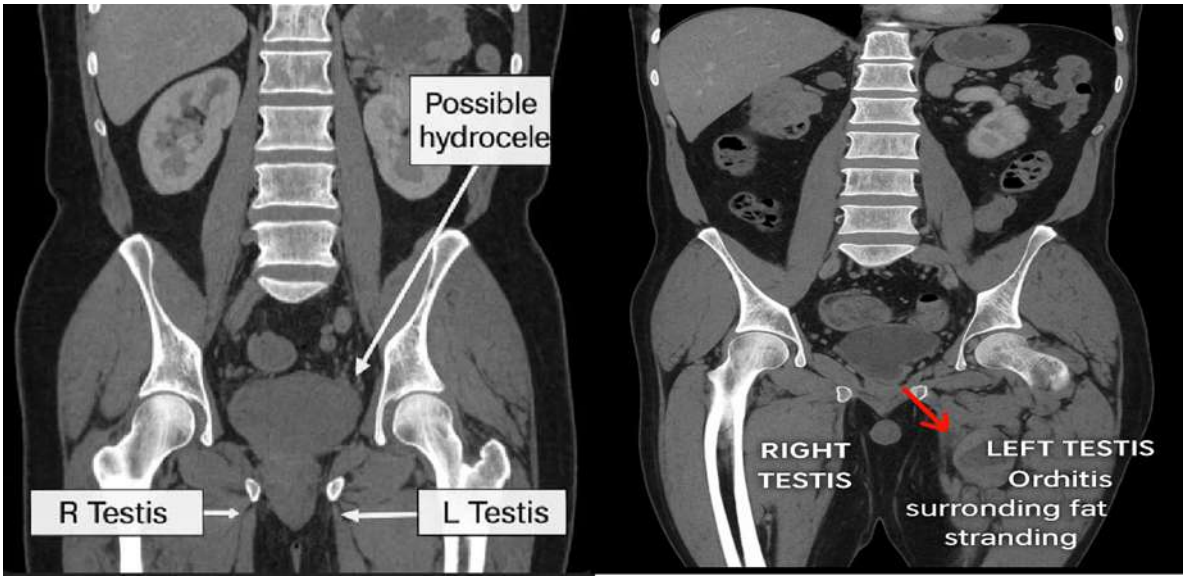


Ultrasound (USG) imaging revealed left testis normal in size, shape & echo texture with swollen ,edematous Left epididymis.Right testes showing hypo echoic collection of size 2.8 x2.2 cms suggestive of Testicular Abscess associated with bilateral epididymoorchitis and bilateral gross hydrocele.

Contrast Enhanced Computed Tomography (CECT) (Abdomen and Pelvis) revealed –Mild fluid collection in bilateral scrotal sac associated with mild diffuse wall thickening involving scrotal wall.

Heterogeneous enhancement and enlargement of the left testis with irregular margins. Hypo dense area within the testis suggestive of caseaos necrosis or abscess formation.

Figure 2 **Figure 3**



The patient did not have any history of Anti Tuberculosis treatment.The chest x ray showed normal size of heart and mediastinum with the two lateral angles open ,with no pathological point seen on chest wall.In vital signs ,temperature :380C,pulse: 92 beats per minute,blood pressure :130/80 mm Hg. Other systemic findings were unremarkable.Laboratory data revealed a white blood cell count of 6,160 cells per µl ,Neutrophils:4.22%,Monocytes:9.5%,Eosinophils:1.3%,Basophils:0.1%,Plateletcount:121

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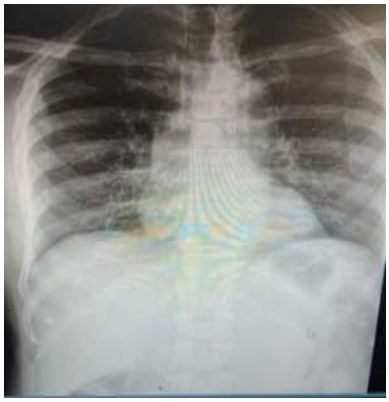
(10^3/µL),hemoglobin concentration of 12g/dl, aspartate amino transferase (AST) 16U/l, alanine amino transferase 21 U/l, Prostate specific antigen 2.7 ng/ml ,CA 19.9 -26.5 units/ml ,CEA 8.78 ng/ml.

Figure 4



Patient was planned for scrotal exploration and underwent Right orchidectomy as the intra-operative findings were suggestive of approximately 25 ml frank pus in the Right Testes and epididymis with sinus tract extending from skin with active purulent discharge and non viable right testeswith presence of unhealthy slough.

Cartridge Based Nucleic Acid Amplification Test (CBNAAT) for pus from left testes detected Mycobacterium Tuberculosis.

The patient was started on a standard four drug anti tubercular regimen : Rifampicin, Isoniazid, Pyrazinamide and Ethambutol for two months followed by Rifampicin and Isoniazid for additional four months as per National Tuberculosis Elimination Programme.

Figure 5

Figure 6

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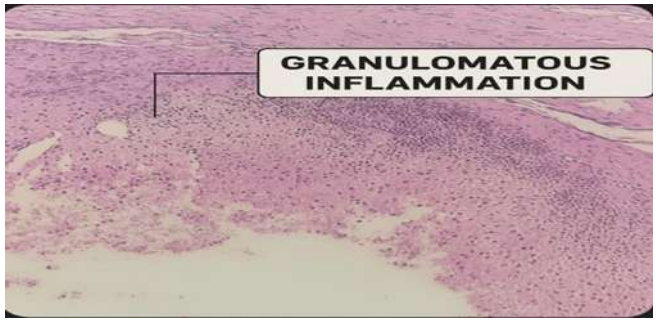
Figure 7



Haemotoxyline & Eosin stained sections from testes ,vas deferens and epididymis suggestive of multiple granulomas comprising of epithelial cells, langerhens giant cells and caseation necrosis. Areas of fibrosis seen along marked inflammatory cell infiltrate comprising of lymphocytes & neutrophils s/o Caseating Granulomatous Orchitis-Koch's Orchitis

Discussion

Tuberculosis (TB) is a chronic infectious disease caused primarily by Mycobacterium tuberculosis. While pulmonary TB is the most common form, affecting the lungs, extrapulmonary tuberculosis (EPTB) refers to TB infections occurring outside the lungs, involving various organs and tissues such as lymph nodes, pleura, bones and joints, central nervous system, genitourinary tract, and abdomen.EPTB accounts for approximately 15-20% of all TB cases globally, with higher incidence in immunocompromised individuals, including those with HIV/AIDS. Diagnosis of EPTB is often more challenging due to its diverse clinical presentations and the difficulty in obtaining microbiological confirmation from extrapulmonary sites.Management of EPTB generally follows the same principles as pulmonary TB but may require prolonged treatment durations and adjunctive therapies, depending on the site and severity of disease. Early diagnosis and appropriate treatment are essential to prevent morbidity, complications, and transmission

Testicular tuberculosis remains a rare manifestation of genitourinary tuberculosis.It typically arises from retrograde spread of Mycobacterium tuberculosis from its urinary tract or prostrate

Etiopathogenesis of Testicular tuberculosisinvolves:

Primary Infection Site:

1. Usually begins with pulmonary tuberculosis.
2. The testis is rarely the primary site.

Spread to the Testis

Haematogenous spread: TB bacilli spread via bloodstream from a primary focus (kidney, lungs)

Retrograde spread: From the epididymis ,which often gets infected first via retrograde extension from prostate

seminal vesicles or vas deferens.

Lymphatic spread :Less commonly TB can spread via lymphatics from nearby pelvic organs.

It can present with symptoms similar to testicular malignancy,including pain, swelling often leading to misdiagnosis.Early diagnosis through imaging and molecular testing is vital for effective treatment.

Investigations:

Testicular tuberculosis often presents a diagnostic challenge due to its mimicry of testicular tumors or non specific inflammatory conditions. Traditional methods including ultrasound and histopathology are essential but often insufficient for definitive diagnosis. Recent advancements in imaging and molecular microbiology have significantly improved the diagnostic accuracy and timelines if testicular tuberculosis detection.

3.2.1 Imaging Advances

High-resolution ultrasound with color Doppler has improved the ability to detect characteristic features of TB such as heterogeneous hypoechoic lesions, intratesticular abscesses, and peripheral calcifications. Contrast-enhanced ultrasound (CEUS) further refines lesion assessment by evaluating vascularity and necrotic areas. Magnetic resonance imaging (MRI),

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particularly diffusion-weighted imaging (DWI), provides superior soft tissue contrast and can differentiate TB from neoplastic lesions in ambiguous cases.

3.2.2 Molecular Diagnostic Techniques

Nucleic acid amplification tests (NAATs), particularly CBNAAT (GeneXpert MTB/RIF), allow rapid identification of M. tuberculosis DNA from fine needle aspiration cytology (FNAC) or biopsy samples. These methods are highly sensitive even in paucibacillary cases and can simultaneously detect rifampicin resistance, aiding in early management of multidrug-resistant TB.

3.2.3 Fine Needle Aspiration Cytology and Histopathology

FNAC remains a frontline diagnostic approach, providing cytological evidence of granulomatous inflammation. When paired with molecular assays (PCR), its diagnostic yield improves significantly.Recent guidelines emphasize its role in early detection and differential diagnosis from testicular tumors.

FNAC is used for

Initial evaluation of testicular swelling, especially in suspected infection or granulomatous disease.

- Preferred before excisional biopsy or orchidectomy in non-neoplastic presentations.
- Recommended in resource-limited settings for early, accessible diagnosis Recent advancements in FNAC

INDEX-TB Guidelines recommend tissue-based confirmation; FNAC is a frontline method.

1. Use of Xpert MTB/RIF on FNAC material enhances specificity and drug resistance detection.
2. Ultrasound-guided FNAC increases sampling accuracy and safety.
3. Particularly useful in elderly patients to avoid unnecessary orchidectomy.

3.2.4 Microbiological Advances

Liquid culture systems such as MGIT (Mycobacteria Growth Indicator Tube) have reduced the turnaround time compared to conventional cultures, improving diagnostic confirmation from tissue or semen samples.

3.2.5. Immunological Tests

Interferon-Gamma Release Assays (IGRAs) have become more commonly used to support TB exposure in patients with suspected extrapulmonary TB, although they do not differentiate active from latent infection.

Table 1: Comparison of traditional (older) and recent diagnostic methods in testicular tuberculosis

Category	Traditional Methods	Recent Advances
Clinical Evaluation	Physical exam, history of scrotal swelling, chronic symptoms	Same, but integrated into AI-based algorithms and clinical decision tools
Tuberculin Skin Test	Mantoux test (limited specificity/sensitivity)	Still used, but complemented by Interferon-Gamma Release Assays (IGRAs)
Imaging	Basic grayscale ultrasound	Multiparametric USG (grayscale + Doppler + elastography), MRI, PET-CT
Laboratory (Urine Tests)	Urine AFB smear/culture (low yield in isolated orchitis)	Urine LAM antigen test (especially for HIV+), and urine PCR/NAAT

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Microbiological Diagnosis	AFB smear & culture (slow, low sensitivity)	Xpert MTB/RIF, Xpert Ultra, and NAAT – faster, more sensitive/specific
Histopathology	FNAC, H&E stain, granulomatous inflammation	Core needle biopsy, IHC, and digital pathology with AI interpretation
Confirmation of TB	Often by response to anti-TB treatment or late	Molecular confirmation (Xpert/NAAT) even from aspirated
	histology	pus
Surgical Role	Often required orchidectomy for diagnosis	Minimally invasive sampling preferred; surgery only when malignancy can't be excluded

Management of Testicular Tuberculosis

According to recent global (eg: WHO) and national (eg-INDEX –TB,India) recommendations ,testicular tuberculosis is treated as a part of extrapulmonary tuberculosis using standard anti-tubercular therapy (ATT)

Table 2: WHO 2023 Anti-Tubercular Treatment Regimens

TB Type	Regimen	Drugs Used	Duration	Notes
Drug-Susceptible TB (DS-TB)	Standard 6-month regimen	Isoniazid (H), Rifampicin (R), Pyrazinamide (Z), Ethambutol (E)	2 months (HRZE) + 4 months (HR)	Most widely used regimen globally
Drug-Susceptible TB (DS-TB)	Shorter 4- month regimen	Rifapentine, Isoniazid, Pyrazinamide, Moxifloxacin	4 months	Recommended for select populations (e.g., children with non- severe TB)
MDR/RR-TB	BPaLM regimen	Bedaquiline (B), Pretomanid (Pa), Linezolid (L), Moxifloxacin (M)	6 months	All-oral, preferred for eligible MDR/RR-TB patients
MDR/RR-TB	BPaL regimen	Bedaquiline (B), Pretomanid (Pa), Linezolid (L)	6 months	For patients not eligible for fluoroquinolones or where resistance is known

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MDR/RR-TB	Longer individualized regimen	Based on drug susceptibility (e.g., levofloxacin, clofazimine,	18–20 months	Used when shorter regimens are not appropriate

Table 3:Standard First-Line Antitubercular Drugs and Adult Dosages

Drug	Daily Dose (mg/kg)	Maximum Daily Dose
Isoniazid (H)	5 mg/kg (range: 4–6 mg/kg)	300 mg
Rifampicin (R)	10 mg/kg (range: 8–12 mg/kg)	600 mg
Pyrazinamide (Z)	25 mg/kg (range: 20–30 mg/kg)	~2000 mg
Ethambutol (E)	15 mg/kg (range: 15–20 mg/kg)	~1600 mg

Note: FDC = Fixed-dose combination. Doses are for daily therapy.

Table 4: WHO Weight-Band Based Adult Dosing (Fixed-Dose Combinations)

Weight (kg)	Number of HRZE Tablets per Day
30–37 kg	2 tablets
38–54 kg	3 tablets
55–70 kg	4 tablets
>70 kg	5 tablets

Each HRZE tablet typically contains: H 75 mg + R 150 mg + Z 400 mg + E 275 mg

Orchidectomy (surgical removal of the testis) is generally not a first-line treatment in testicular tuberculosis (TB). Medical management with anti-tubercular therapy (ATT) is preferred. However, orchidectomy is indicated in specific clinical situations where diagnosis is unclear, complications arise, or response to therapy is inadequate.WHO and national TB control programs (e.g., RNTCP/NTEP) do not recommend routine orchidectomy for tuberculosis.

Table 5 :Indications for Orchidectomy in Testicular TB

Indication	Explanation
Diagnostic uncertainty	When it is difficult to differentiate TB from testicular cancer despite imaging and biopsy.
Non-responsiveness to ATT	No improvement or worsening symptoms after 6–8 weeks of appropriate anti-tubercular treatment.
Large abscess or extensive necrosis	Cold abscess, sinus formation, or testicular destruction due to caseous necrosis.
Severe pain or cosmetic disfigurement	Persistent large swelling causing discomfort or affecting patient's quality of life.

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Complications	Presence of torsion, ischemia, or superadded bacterial infection.
Bilateral involvement with loss of nction	When one testis is non-functional due to TB and the other is at risk.

Conclusion

Isolated testicular tuberculosis though rare should be considered in differential diagnosis of testicular swellings.Early detection and appropriate treatment are vital to prevent complication such as infertility.

Testicular tuberculosis, though a rare manifestation of genitourinary TB, presents a unique diagnostic and therapeutic challenge. It often mimics more common conditions such as testicular tumors, bacterial epididymo-orchitis, or torsion, which may lead to delayed diagnosis or inappropriate interventions.

Early recognition is critical, especially in endemic regions or in patients with known TB exposure or systemic symptoms.Accurate diagnosis hinges on a combination of clinical suspicion, imaging (typically scrotal ultrasound), and microbiological or histopathological confirmation via urine AFB testing, GeneXpert, or tissue biopsy. Prompt initiation of standard anti-tubercular therapy (ATT) can lead to excellent outcomes, often avoiding the need for surgical intervention.However, in certain scenarios—such as failure to respond to ATT, extensive tissue destruction, or suspicion of malignancy—surgical options like biopsy or even orchidectomy may be warranted. Long-term follow-up is essential to monitor treatment response, assess for recurrence, and manage potential complications such as infertility or scrotal sinus formation.From a public health perspective, increasing awareness of testicular TB among clinicians and integrating urogenital screening into TB programs could help reduce diagnostic delays and preserve reproductive function in affected individuals.

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