ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26apr473

Tuberculous Epididymo-Orchitis Mimicking Testicular Malignancy: A Radiologic–Pathologic Correlation

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Publication Date: 2026/04/15

Abstract:

- ***Background:***

Urogenital tuberculosis (UGTB) accounts for 8–15% of extrapulmonary TB. Isolated tuberculous epididymo-orchitis without renal involvement is rare and poses a significant diagnostic challenge, as its clinical and imaging features closely mimic testicular malignancy. Misdiagnosis may lead to unnecessary orchiectomy.

- ***Case Presentation:***

A 19-year-old, sexually inactive male presented with a one-year history of progressive painful scrotal swelling, intermittent low-grade fever, and multiple discharging sinuses. Ultrasonography demonstrated diffusely enlarged, heterogeneously hypoechoic testes with epididymal involvement, scrotal wall thickening, and inguinal lymphadenopathy with central necrosis. HRCT chest revealed endobronchial spread with centrilobular nodules and a right upper lobe cavity. Histopathological examination of sinus tract aspirate confirmed tuberculous granulomatous inflammation. The patient was started on anti-tubercular therapy with clinical improvement.

- ***Conclusion:***

Tuberculous epididymo-orchitis should be considered in the differential diagnosis of testicular masses, particularly in TB-endemic regions. Key imaging clues favoring an inflammatory etiology over neoplasm include epididymal involvement, sinus tract formation, scrotal wall thickening, and necrotic lymphadenopathy. Awareness of these radiologic features can help avoid unnecessary surgical intervention.

Keywords: *Tuberculous Epididymo-Orchitis; Testicular Malignancy Mimic; Scrotal Ultrasonography; Urogenital Tuberculosis; Diagnostic Pitfall.*

How to Cite: Dr. Appana Sriram Eswar; Dr. B. K. Durga Prasad; Dr. A. Bhagyalakshmi; Dr. N. C. A. Narsimharao; Dr. Akanksh Chokkapu; Dr. B. Neeraj Vasishta Banavat (2026) Tuberculous Epididymo-Orchitis Mimicking Testicular Malignancy: A Radiologic–Pathologic Correlation. *International Journal of Innovative Science and Research Technology*, 11(4), 661-666. https://doi.org/10.38124/ijisrt/26apr473

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I. INTRODUCTION

Genitourinary tuberculosis (GUTB) constitutes approximately 10–15% of all extrapulmonary TB cases and can involve any segment of the genitourinary tract. Among GUTB cases, isolated genital involvement is reported in approximately 28%, with epididymo-orchitis being an uncommon manifestation. The clinical presentation of tuberculous epididymo-orchitis—including painless or painful scrotal swelling, epididymal enlargement, and constitutional symptoms—overlaps considerably with testicular neoplasms, pyogenic infections, and other granulomatous diseases.

This diagnostic ambiguity is compounded by the limitations of ultrasonography, the first-line imaging modality for scrotal pathology, which lacks the specificity to reliably differentiate inflammatory from neoplastic processes. As a result, patients with tuberculous orchitis may undergo unnecessary orchiectomy based on a presumptive diagnosis of malignancy.

We present the case of a 19-year-old male with tuberculous epididymo-orchitis that clinically and sonographically mimicked a testicular tumor. Through this report, we highlight specific imaging features and clinical clues that favor an inflammatory etiology and propose a structured diagnostic approach to avoid unnecessary surgical intervention.

II. CASE REPORT

➢ *Clinical History*

A 19-year-old, sexually inactive male presented with a one-year history of progressive, painful bilateral scrotal swelling associated with periodic low-grade fever and weight loss. Over the preceding three months, he developed multiple discharging sinuses over the scrotal wall. There was no history of prior urinary symptoms, trauma, or known TB contact.

➢ *Physical Examination*

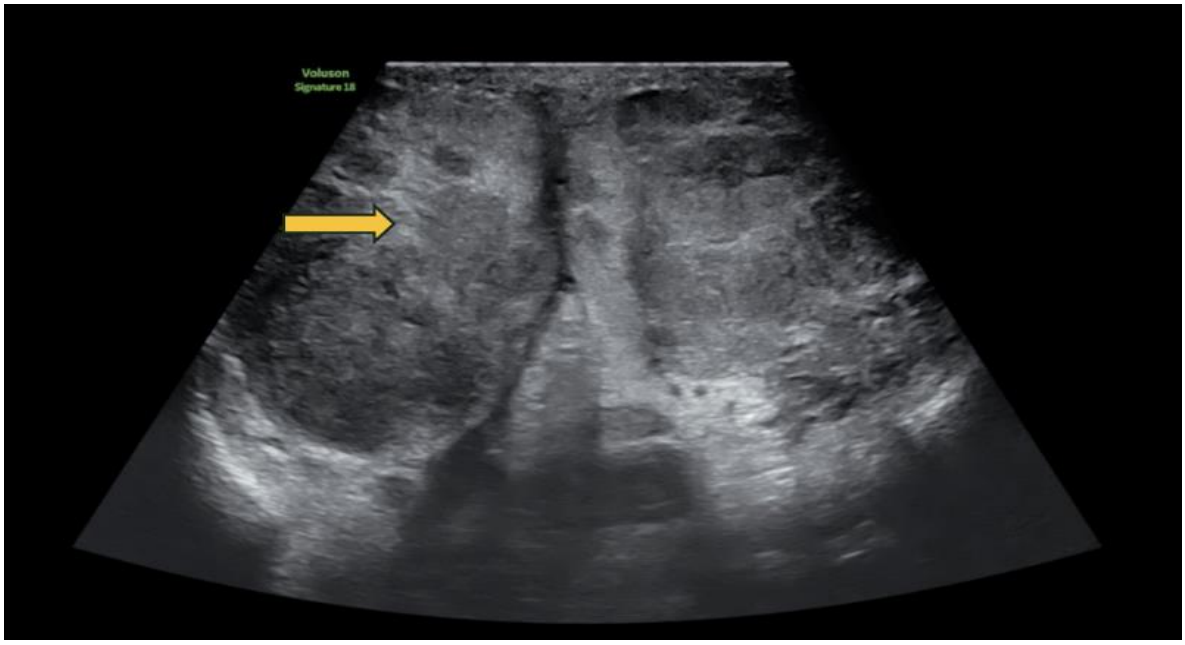
Examination of the external genitalia revealed diffuse bilateral scrotal wall thickening with erythematous, indurated skin and multiple active draining sinuses. Both testes were enlarged, firm, and diffusely tender. The epididymides were palpably thickened, more prominent in the tail region. The spermatic cords were swollen bilaterally. No discrete nodular mass was palpable.

➢ *Laboratory Evaluation*

Urinalysis revealed sterile pyuria with acidic pH. Urine cultures for common pathogens and acid-fast bacilli were negative. Serum tumor markers including alpha-fetoprotein (AFP), beta-human chorionic gonadotropin (β-hCG), and lactate dehydrogenase (LDH) were within normal limits. Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) were elevated.

➢ *Imaging Findings*

- Scrotal Ultrasonography: Both testes were diffusely enlarged with a heterogeneously hypoechoic echotexture, demonstrating a diffuse pattern of involvement rather than a discrete focal mass. The normal testicular architecture was distorted. The scrotal wall was markedly thickened and edematous. No hydrocele, varicocele, or intratesticular calcifications were identified. Color Doppler did not demonstrate focal hypervascularity typically seen in testicular neoplasms



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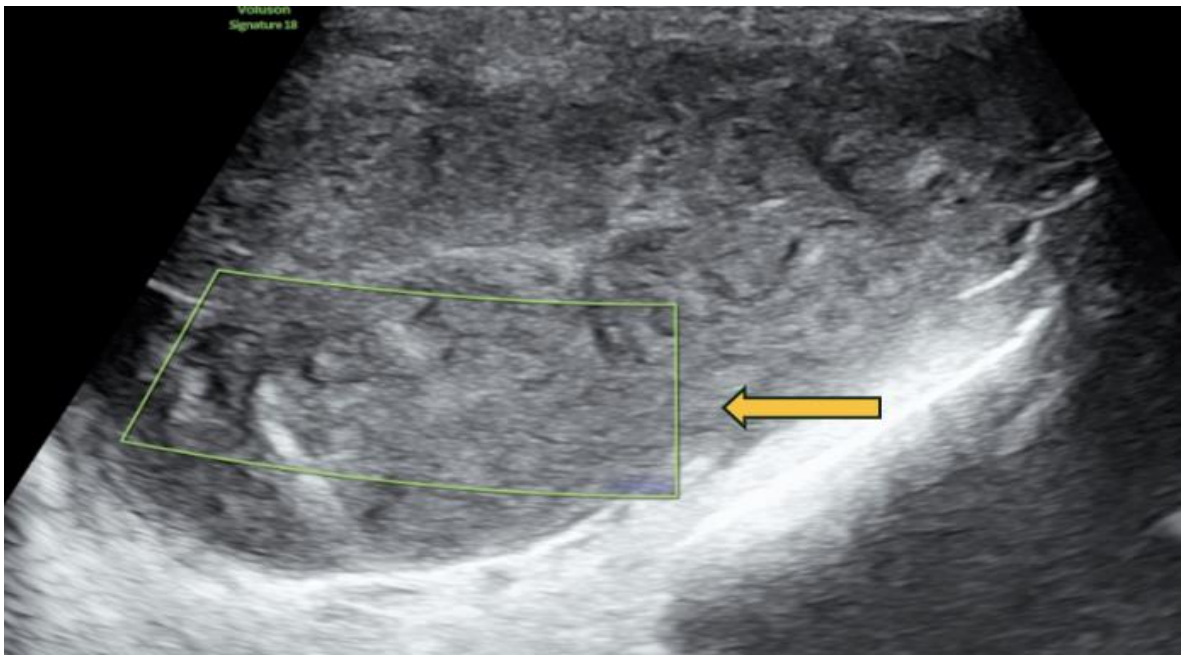

Fig 1 (A and B): Ultrasonography Showing Enlarged Testis with Heterogeneously Hypoechoic Areas Involving Both Testis and No Evidence of Hydrocele/Varicocele.

- Renal Ultrasonography: Bilateral kidneys demonstrated normal cortical thickness with no evidence of hydroureteronephrosis, papillary necrosis, or parenchymal calcification, effectively excluding concomitant renal TB [Figure 2].

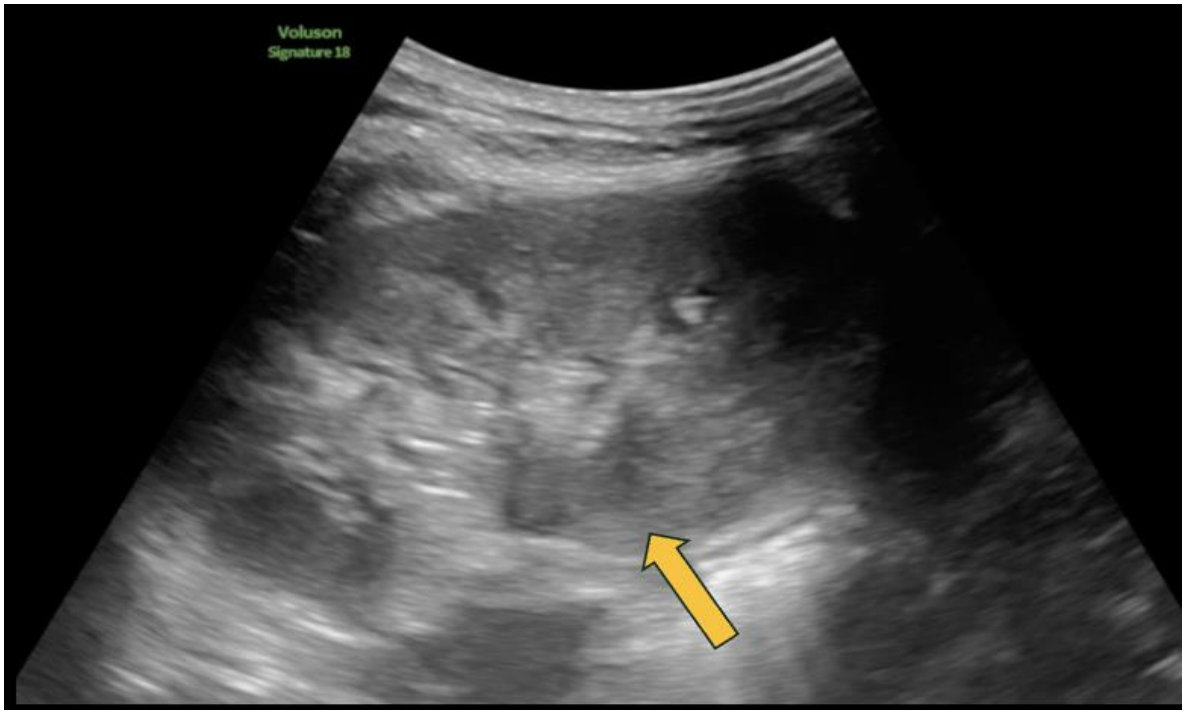

Fig 2 Ultrasonography Showing Normal Cortical Thickness and No Evidence of Hydroureteronephrosis/Papillary Necrosis.

- Chest Imaging: Chest radiograph PA projection showed fibrotic changes in bilateral upper lobes with a cavitary lesion in the right upper lobe. HRCT chest confirmed active pulmonary TB, demonstrating centrilobular nodules and tree-in-bud opacities consistent with endobronchial spread [Figure 3]. The diffuse pattern of involvement without a discrete focal mass was a key imaging feature favoring an inflammatory etiology.

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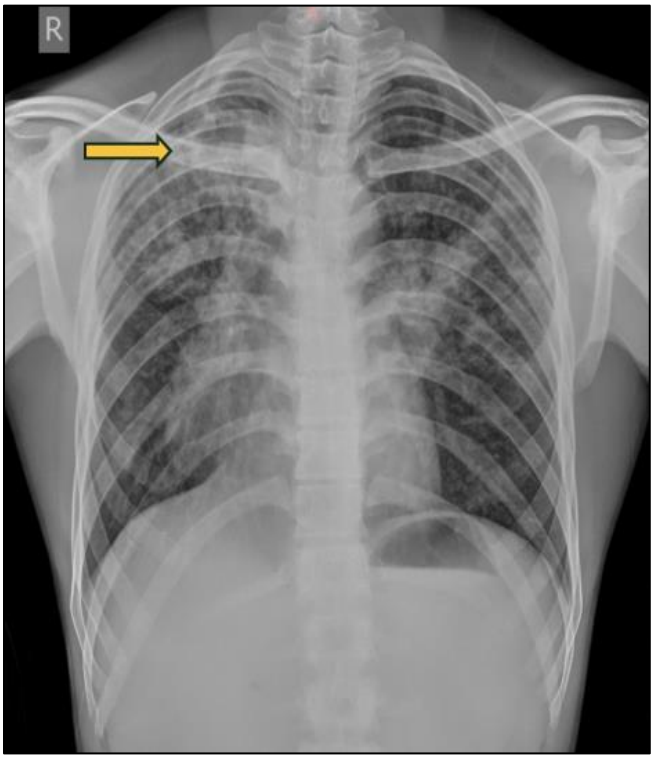

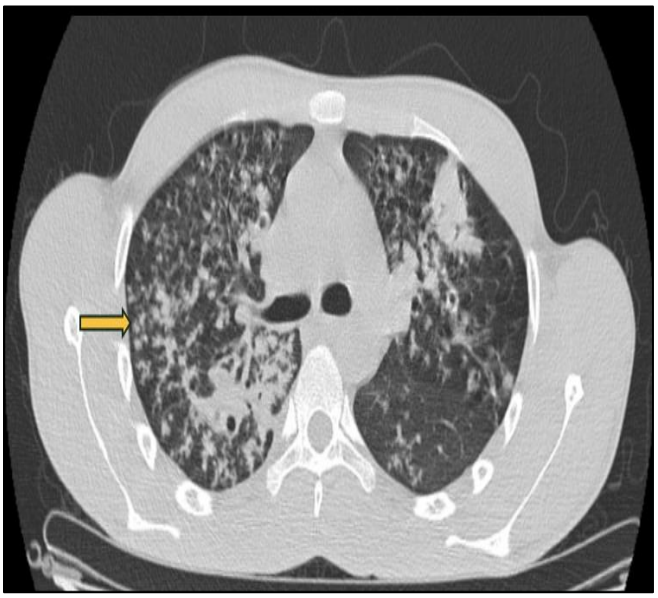

Fig 3 (A and B): Chest x-ray PA projection Showing Fibrotic Changes in Bilateral Upper Lobes and Cavitary Lesion in Right Upper Lobe.

HRCT showing endobronchial spread in the form of centriacinar nodules in both lung fields.

➢ *Diagnosis*

Given the clinical suspicion of TB and the presence of discharging sinuses, aspirate from a sinus tract was sent for histopathological examination. This revealed caseating granulomatous inflammation with Langhans-type giant cells, consistent with tuberculosis [Figure 4]. In view of the histopathological confirmation, fine-needle aspiration of the testis was deferred to avoid the theoretical risk of tumor seeding along the needle tract in case of an occult neoplasm.

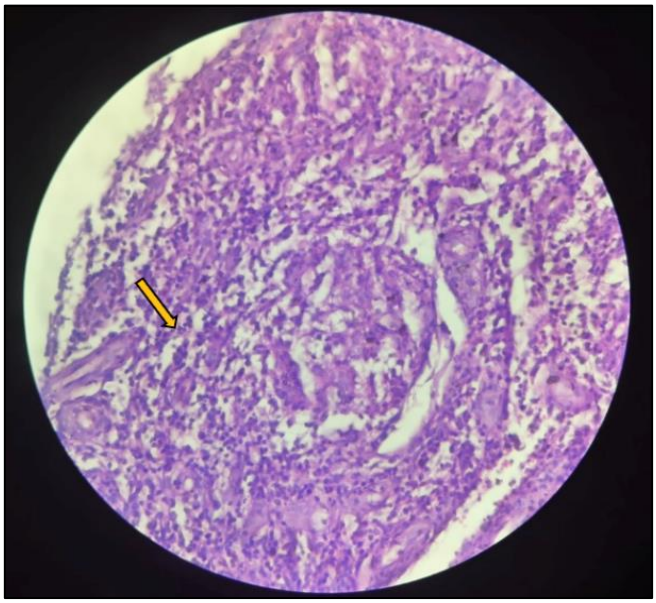

Fig 4 Aspirate from the Sinus Tract Showing Langhans-Type Giant Cells- Consistent with Tuberculosis.

➢ *Management And Outcome*

The patient was commenced on standard anti-tubercular therapy (ATT) with a four-drug regimen (isoniazid, rifampicin, pyrazinamide, and ethambutol). At three-month follow-up, there was significant reduction in scrotal swelling with closure of the sinus tracts. Orchiectomy was avoided.

- *Figure Legends*

✓ Figure 1 (A and B): Scrotal ultrasonography demonstrating diffusely enlarged testes with heterogeneously hypoechoic echotexture and loss of normal architecture. No hydrocele or varicocele is seen. Note the diffuse pattern of involvement rather than a discrete focal mass, with epididymal thickening predominantly involving the tail (arrows).

✓ Figure 2: Renal ultrasonography showing normal cortical thickness with no hydroureteronephrosis or papillary necrosis, excluding concomitant renal TB.

✓ Figure 3 (A and B): (A) Chest radiograph showing fibrotic changes in bilateral upper lobes with a cavitary lesion in the right upper lobe. (B) HRCT thorax showing centrilobular nodules and tree-in-bud opacities in both lung fields, consistent with endobronchial spread of active pulmonary TB.

✓ Figure 4: Histopathological examination of sinus tract aspirate demonstrating caseating granulomatous inflammation with Langhans-type giant cells, confirming tuberculous etiology (H&E stain).

III. DISCUSSION

In TB-endemic regions such as India, infectious etiologies must always be considered before labeling a testicular lesion as malignant. The central diagnostic challenge in this case lies in the overlap of imaging findings between tuberculous orchitis and testicular neoplasms. Both conditions can present as a hypoechoic lesion within an

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26apr473

enlarged testis on ultrasonography, and both may demonstrate altered vascularity on Doppler imaging. Additionally, the relatively young age of our patient (19 years) falls within the peak incidence range for testicular germ cell tumors, further increasing the clinical suspicion for malignancy.

➢ *Imaging Clues Favoring Tuberculous Etiology*

Despite the overlap, several sonographic features in this case favored an inflammatory etiology over neoplasm. These included:

- Diffuse rather than focal involvement: Testicular tumors typically present as a well-defined focal intratesticular mass, whereas TB orchitis tends to cause diffuse testicular enlargement with heterogeneous echotexture.
- Epididymal involvement with tail predominance: In TB, the epididymis is commonly involved (often the first site of genital TB), particularly the tail—a pattern seldom seen with testicular neoplasms.
- Sinus tract formation: The presence of draining cutaneous sinuses is virtually pathognomonic of TB and is not a feature of testicular malignancy.
- Scrotal wall thickening: Marked scrotal wall edema and thickening suggest an inflammatory process extending beyond the testis, which is uncommon in neoplastic disease.
- Lymphadenopathy with central necrosis: Necrotic lymph nodes with central hypoechoic areas suggest caseous necrosis (TB), as opposed to the cortical thickening or heterogeneous enhancement seen in metastatic nodal disease.

➢ *The Radiologic Pitfall*

Ultrasonography, though the first-line imaging modality for scrotal pathology, cannot reliably distinguish TB from malignancy based on echotexture alone. The finding of a hypoechoic intratesticular lesion may reflexively prompt a recommendation for orchiectomy. This case underscores the importance of integrating clinical context—chronic symptoms, constitutional signs, sinus tract, TB-endemic setting—with imaging findings before proceeding to radical surgery.

When ultrasonography is equivocal, MRI of the scrotum with contrast may provide additional diagnostic information. MRI can better characterize the extent of epididymal and scrotal wall involvement and may demonstrate features suggestive of granulomatous disease. However, definitive diagnosis requires tissue confirmation.

➢ *Diagnostic Approach: Avoiding Unnecessary Orchiectomy*

In patients with scrotal masses where TB is in the differential, we recommend the following approach: (1) Check serum tumor markers (AFP, β-hCG, LDH) to assess the likelihood of germ cell tumors. (2) Look for extra-scrotal evidence of TB, including chest imaging and urine analysis. (3) Obtain tissue from the least invasive source; in this case, sinus tract aspirate provided a histopathological diagnosis without the need for testicular biopsy. (4) Reserve fine-needle aspiration of the testis for cases where no alternative tissue source is available, given the theoretical risk of tumor seeding. (5) Initiate a trial of ATT when clinical and imaging features strongly suggest TB, with close follow-up to document response.

➢ *Literature Context*

Several case reports in the literature have described tuberculous orchitis mimicking malignancy. Muttarak et al. (2001) emphasized the importance of recognizing epididymal involvement and scrotal wall changes as distinguishing features. Figueiredo and Lucon (2008), in their review of 8,961 cases, reported that UGTB is frequently misdiagnosed, with delays averaging 4–8 years. Our case adds to this body of evidence by highlighting the utility of sinus tract histopathology and the role of imaging pattern recognition in guiding clinical decision-making.

Table 1 Differentiating Features Between Tuberculous Epididymo-Orchitis and Testicular Tumor

Feature	Tuberculous Orchitis	Testicular Tumor
Pain	Common; insidious onset	Usually painless (except torsion/hemorrhage)
Duration	Chronic (weeks to months)	Subacute; progressive growth
Epididymal Involvement	Usually present (tail > head)	Usually absent
Sinus Tract	Pathognomonic for TB	Absent
Pattern on USG	Diffuse heterogeneous hypoechogenicity	Well-defined focal hypoechoic mass
Doppler Vascularity	Mildly increased, diffuse pattern	Focal neovascularity; high-flow vessels
Scrotal Wall	Thickened, edematous	Usually normal
Calcifications	Late; coarse, dystrophic	Microcalcifications; "burned-out" tumor
Lymphadenopathy	Necrotic (central hypoechoic)	Solid, cortically thickened
Tumor Markers (AFP, β-hCG)	Normal	Frequently elevated
Constitutional Symptoms	Fever, weight loss, night sweats	Uncommon
Chest Imaging	Often abnormal (active or healed TB)	Usually normal

➢ *Teaching Points*

- Tuberculous epididymo-orchitis commonly involves the epididymis first, with a predilection for the tail; look for this pattern on ultrasonography before attributing a hypoechoic testicular lesion to malignancy.
- The presence of a draining sinus tract is a red flag for infection (particularly TB) and is virtually never seen with testicular neoplasms.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26apr473

- Necrotic inguinal lymph nodes with central hypoechoic areas favor granulomatous infection (TB) over metastatic disease, which typically shows cortical thickening or replacement.
- Normal serum tumor markers (AFP, β-hCG, LDH) in the presence of a testicular mass should prompt reconsideration of the differential diagnosis.
- Scrotal wall thickening, diffuse testicular involvement (rather than a focal mass), and constitutional symptoms collectively shift the probability toward an inflammatory etiology.
- When imaging overlap exists, tissue diagnosis from the least invasive source (e.g., sinus tract aspirate, epididymal FNAC) should be pursued before orchiectomy.

IV. CONCLUSION

Tuberculous epididymo-orchitis, though uncommon, is an important diagnostic mimic of testicular malignancy, particularly in TB-endemic regions. This case illustrates that a combination of clinical features (chronic course, sinus tracts, constitutional symptoms), targeted laboratory evaluation (normal tumor markers, sterile pyuria), and careful sonographic pattern analysis (diffuse involvement, epididymal tail predominance, necrotic lymphadenopathy) can raise suspicion for TB and prevent unnecessary orchiectomy. Radiologists play a pivotal role in flagging these distinguishing features and recommending tissue sampling before radical surgery. Early recognition and initiation of anti-tubercular therapy can lead to complete resolution without surgical intervention.

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