

## Tuberculous orchitis US and MRI findings. Correlation with histopathological findings

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### Abstract

Tuberculosis of the testis is a rare disease. Although Ultrasound (US) findings of tuberculous epididymo-orchitis have been well described, there are only few reported cases describing the Magnetic Resonance Imaging (MR) findings of this disease. Herein, we describe the US and MR findings in a patient with tuberculous orchitis of the left testis and correlate them with the histopathological findings. In our case, the MR findings differ from previous studies because granulomatous areas in the testis had intermediate to high signal intensity on T2WI, while in all studies granulomatous areas in tuberculous epididymo-orchitis demonstrated invariably low signal intensity. Hippokratia 2010; 14 (4): 297-299

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Tuberculous (TBC) orchitis is a rare disease that usually occurs as a result of direct extension from the epididymis<sup>1,2</sup>. Ultrasound (US) has been traditionally the diagnostic method of choice for investigation of TBC epididymo-orchitis<sup>1,2</sup>. However, there are only few studies describing the Magnetic Resonance Imaging (MRI) findings in cases of TBC epididymo-orchitis<sup>3-9</sup>. Herein, we describe the US and MRI findings in a patient with systematic TBC and TBC orchitis of the left testis and correlate them with the histopathological findings. In our case, the MRI findings differ from all previous studies because granulomatous areas in the testis had intermediate to high signal intensity on T2WI.

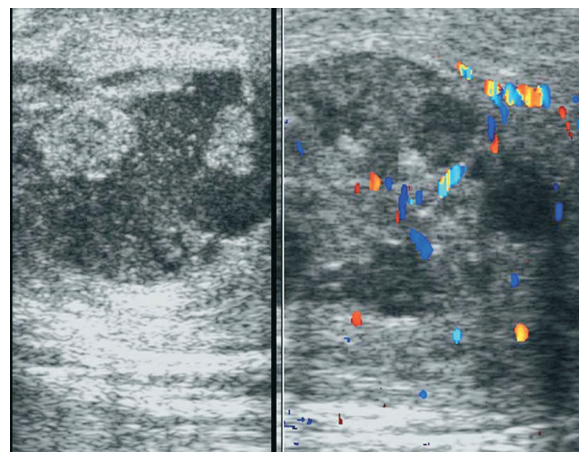
### Case report

A 59-year old man presented with malaise, weight loss, dyspnea, axillary and inguinal lymphadenopathy and a painless acute enlargement of the left hemi-scrotum. He was afebrile with no symptoms from the genitourinary system. Laboratory findings revealed renal failure and nephrotic syndrome. Subcutaneous fat biopsy revealed heavy form of secondary amyloidosis and the diagnosis of renal amyloidosis was established by a renal biopsy. The prostate gland was normal on imaging and physical examination while serum PSA levels were within normal limits. AFP and  $\beta$ -hCG were also within normal levels. Lung parenchyma was normal on thoracic CT. MRI of the thoracic spine revealed spondylodiscitis and biopsy of a swollen axillary lymph node demonstrated lesions of TBC. The patient had a negative test for HIV.

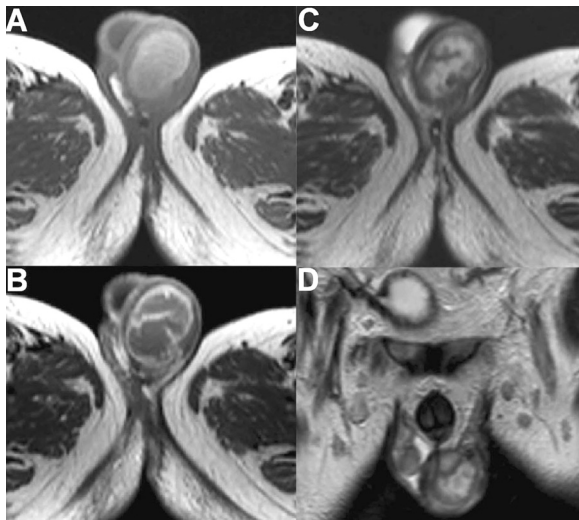
Scrotal US revealed heterogeneous enlargement of the left testis with central hypoechoic areas without any flow detection on Color Doppler (Figure 1). The re-

maining tissue at the periphery and within the testis was more hyperechoic on US, with internal flow detection. On MRI, these areas had intermediate to high signal intensity on T2WI, were slightly hypointense compared to the peripheral testicular tissue on T1WI and did not demonstrate contrast enhancement (Figure 2). The remaining tissue had the same signal intensity on T1WI and T2WI and the same contrast enhancement with the normal right testis.

Left orchidectomy was finally performed because there was no response to antibiotic treatment for bacterial orchitis. Histopathology demonstrated TBC orchitis



**Figure 1:** Grayscale and Color Doppler of the left testis demonstrate hypoechoic avascular areas corresponding to the TBC granulomatous tissue, while the remaining testicular parenchyma is more hyperechoic with flow detection.



**Figure 2:** MRI of the scrotum.

**A.** T1WI in axial plane, showing an enlarged left testis. Granulomatous tissue located centrally cannot be clearly discriminated from testicular tissue, although it seems slightly hypointense compared to the peripheral testicular tissue.

**B.** T1WI after gadolinium administration shows contrast enhancement of the remaining testicular tissue, while granulomatous tissue does not enhance.

**C,D.** T2WI in axial and coronal plane, demonstrating intermediate to high signal intensity of the tuberculous granulomatous tissue. Non-granulomatous testicular tissue has intermediate to low signal intensity on T2WI, similar to the right normal testis. There is small hydrocele of the right hemiscrotum, while right testicle is normal. There is also bilateral inguinal tuberculous lymphadenopathy.

(Figure 3). Correlation of histopathological and imaging findings revealed that granulomatous tissue with caseating necrosis corresponded to the central hypoechoic areas (on US) with intermediate to high signal intensity on T2WI. The remaining, non-granulomatous tissue at the periphery and within the testis represented testicular tissue with fibrotic seminiferous tubules and corresponded to the more hyperechoic areas at the periphery and within the testis (on US), with intermediate to low signal intensity on T2WI and contrast enhancement in post gadolinium T1WI. Epididymis was found normal at histopathology, with no signs of infection.

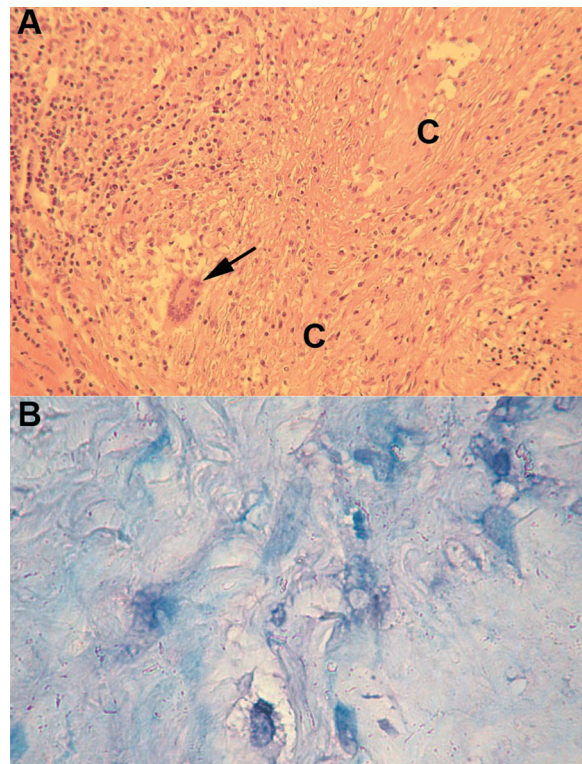
Patient's condition deteriorated gradually the next three weeks postoperatively and he finally died because of the disease.

### Discussion

Genitourinary TBC is the most common manifestation of extrapulmonary TBC<sup>2,4,5,10</sup>. TBC of the scrotum is rare, occurring in about 7% of patients with TBC<sup>11</sup>. The scrotal contents are usually infected by retrograde extension from the prostate and the seminal vesicles and more infrequently from hematogeneous spread. The infection usually begins at the tail of the epididymis, may propa-

gate to the entire gland and finally involve the testis. Isolated TBC orchitis without epididymal involvement, like in our case is very rare<sup>2,4-6,11</sup>. In 70% of the patients with tuberculous epididymitis there is a previous history of tuberculosis. In patients with genital tuberculosis, pulmonary and renal tuberculosis can be documented in 50% and 80-85% respectively<sup>2</sup>. Clinically patients with TBC epididymo-orchitis present with a painless or slightly painful scrotal mass<sup>1,2</sup>.

Although US findings of TBC epididymo-orchitis are well described<sup>1,2,11</sup>, there are only few references describing the MRI<sup>3-9</sup>. The location of the disease and the MRI findings of these cases are summarized in Table 1. Reviewing these cases, TBC was bilateral in 3 patients; consequently 10 semi-scrotums were evaluated with MRI. In 4 semi-scrotums there was isolated TBC epididymitis without testicular involvement, in 4 semi-scrotums there was TBC epididymo-orchitis and in 2 semi-scrotums there was isolated orchitis. All lesions demonstrated in-



**Figure 3:** Histopathology specimens of the left testis.

**A.** Hematoxylin-Eosin staining, showing caseating necrosis (C), multiple epithelioid cells and lymphocytes at the periphery and a multinucleated giant cell (arrow). These areas correspond to the hypoechoic areas (on US), with intermediate to high signal intensity on T2WI. Remaining testicular tissue with fibrotic seminiferous tubules was found at the periphery of the specimen and in isolated areas between granulomatous areas (not shown). These areas correspond to the hyperechoic areas (on US), with contrast enhancement on T1WI and with intermediate to low signal intensity on T2WI.

**B.** Ziehl-Nielsen staining, demonstrating the mycobacteria tuberculosis as tiny red spots.

**Table 1:** Location of scrotal TBC and MRI findings. (NA: non-available).

	Epididymitis	Orchitis	T2WI -signal intensity	T1WI -signal intensity	Contrast enhancement
Park KW et al. 2008 <sup>3</sup>	Yes (right)	Yes (upper portion)	↓ (homogeneous hypointensity)	↑ (multifocal hyperintense nodules within the enlarged epididymis)	No
Tsili AC et al. 2008 <sup>7</sup>	Yes (bilateral)	Yes (bilateral)	↓ (multiple areas of low-intensity signal)	↑ (multiple areas of high-intensity signal)	Yes (strongly enhanced lesions)
Jung YY et al. 2005 <sup>5</sup>	Yes (left)	No	↓	NA	Yes
Liu HY et al. 2005 <sup>4</sup>	Yes (Bilateral)	No	↓ (heterogeneous hypointensity)	↓ (heterogeneous hypointensity)	Yes (slightly enhanced lesions)
Okada H et al. 2003 <sup>6</sup>	Yes (only right)	Yes (bilateral)	↓ (multiple areas of low-intensity signal)	↑ (multiple areas of high-intensity signal)	NA
Cramer BM et al. 1991 <sup>9</sup>	Yes (unilateral)	No	↓	NA	NA
Baker LL et al. 1987 <sup>8</sup>	No	Yes (unilateral)	↓ (inhomogeneous low signal intensity)	NA	NA

variably low signal intensity on T2WI sequence. Signal intensity on T1WI sequence varied, though in most cases areas of high signal intensity were demonstrated. Contrast enhancement of the lesions also varied, from absence of obvious enhancement to strongly enhancing lesions (Table 1). Low signal intensity of the lesions on T2WI is attributed to chronic inflammation, fibrosis and calcifications since TBC infection of the scrotum is usually diagnosed at the chronic stage<sup>3-5,8,9</sup>. In contrast to all previous published cases, in our case the granulomatous areas demonstrated increased signal intensity on T2WI. We hypothesize that TBC orchitis in our patient had a more acute onset than the previously reported cases, mimicking acute bacterial orchitis. The patient's bad physical condition, the decreased white blood cell count, the acutely swollen left hemi-scrotum and the absence of previously documented testicular disease are in favor of acute testicular involvement, although there was not tenderness during palpation of the testis. High signal intensity on T2WI may be attributed to the high water content of this acute form of TBC orchitis and to the lack of changes of chronic inflammation, including fibrosis and calcifications.

Differential diagnosis in our case included TBC orchitis, bacterial orchitis and tumor. The history of the patient, the presence of TBC lymphadenopathy, the negative tumor markers, the absence of fever and leukocytosis, the absence of tenderness or increased temperature of the scrotum and the failure to respond to conventional antibiotics were suggestive of TBC orchitis that was confirmed with biopsy.

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