Case Report

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Granulomatous orchitis: case report and review of the literature

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Abstract

We report the disease characteristics, diagnosis, and treatment of granulomatous orchitis. A 38-year-old man presented with a history of intermittent swelling, pain, and discomfort in the right testicle of 3 days' duration. Unenhanced magnetic resonance imaging (MRI) of the testis and scrotum revealed an oval mass in the right testis measuring approximately 17 mm in diameter, with clear borders and a target ring-like appearance from periphery to center. T1-weighted imaging (T1WI) showed uniform low-intensity signals, and T2WI showed mixed high- and low-intensity signals. Diffusion-weighted imaging (DWI) signals were iso-intense, and the outer ring on enhanced scans showed progressive enhancement. We performed radical resection of the right testis under combined spinal–epidural anesthesia. The pathological diagnosis was granulomatous right orchitis. Two months postoperatively, ultrasonography showed no testis and epididymal echo signals in the right scrotum, and no obvious abnormalities; color Doppler blood flow imaging (CDFI) findings were normal. Granulomatous orchitis is rare in clinical practice, and the cause is unknown. The disease involves non-specific inflammation; however, it is currently believed that antibiotics and steroids are ineffective for conservative treatment, and orchiectomy should be actively performed.

Keywords

Testicular disease, granulomatous orchitis, orchiectomy, magnetic resonance imaging, ultrasonography, therapeutics, diagnosis, differential diagnosis

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Case report

A 38-year-old man, married with one child, presented to our clinic because of intermittent discomfort in the right testicle of 3 days' duration, and with radiating pain in the right groin and no history of trauma. At admission, he had a body temperature of 39.5°C, and physical examination showed an asymmetrical scrotum. The right side of the scrotum was slightly larger, and a hard, obviously tender, oval-shaped mass was palpable in the right testis, with a clear boundary, and measuring approximately $20 \times 10\,mm^2$ in size. The consistency and size of the left testis were normal. Ultrasonography of the testis and scrotum at another hospital showed that the size of the right testis was approximately $44 \times 28 \times 23\,mm^3$, the internal echo signals were uneven, and the upper pole was detectable and measured approximately $14 \times 15 \times 13\,mm^3$. There was a hypoechoic area with a clear boundary protruding into the right testis. The dark fluid-signal area was explored in the sheath cavity; the deepest part on the right measured approximately 6 mm, and the deepest part on the left measured approximately 9 mm.

Color Doppler blood flow imaging (CDFI) revealed short striated blood flow signals in the hypoechoic area. Blood laboratory test results were as follows: white blood cell count, 8.94×10^9/L; neutrophils 0.669×10^9/L; and erythrocyte sedimentation rate (ESR), 3 mm/hour. Tuberculosis antibody was negative, and routine urinalysis results were normal. Testicular tumor marker concentrations were as follows: blood human chorionic gonadotropin (HCG): <0.100 IU/L, alpha-fetoprotein (AFP): 3.430 μg/L, and lactate dehydrogenase (LDH): 164.5 IU/L. Unenhanced magnetic resonance imaging (MRI) of the testis and scrotum revealed an oval mass in the right testis measuring approximately 17 mm in diameter with clear borders and a target ring-like appearance from the periphery to the center. T1-weighted imaging (T1WI) showed uniform low-intensity signals (Figure 1a); T2-weighted imaging (T2WI) showed mixed high- and low-intensity signals (Figure 1b); and the diffusion-weighted imaging (DWI) signal was iso-intense (Figure 1c). On enhanced scans, the outer ring showed progressive enhancement (Figure 1d). Considering the abnormal signals in the right testis, we considered a high possibility of infection.

The patient agreed to undergo surgery, and radical resection of the right testis was performed under combined spinal–epidural anesthesia. Intraoperatively, a solid mass measuring approximately $17 \times 15 \times 10\,mm^3$ in the upper pole of the right testis was seen. The mass was hard and showed diffuse inflammatory changes on the surface. The right testis, epididymis, and part of the spermatic cord were excised. Pathological gross examination of the right testis revealed a size of $50 \times 25 \times 25\,mm^3$ and a smooth surface. The capsule was intact, and a mass was seen on the cut surface. The mass measured $15 \times 15 \times 10\,mm^3$, and the connected epididymis measured $3 \times 10 \times 5\,mm^3$. The cut surface was dark yellow and soft. The connected spermatic cord measured 100 mm long and 50 mm in diameter. Immunohistochemical staining revealed the following: smooth muscle actin (SMA) (+), desmin (−), cluster of differentiation (CD)163 (+), ALK (−), actin (−), CD99 (−), Bcl (−), CD34 (−), CD31 (−), and a Ki-67-positive rate of approximately 10%. The postoperative pathological diagnosis was granulomatous right orchitis (Figure 2). The patient was discharged 5 days after surgery. At the 2-month follow-up, ultrasonography showed no testis or epididymal echo signals in the right scrotum, and no obvious abnormalities; CDFI findings were normal. The patient experienced no further symptoms, and no recurrence or complications, and the treatment effect was satisfactory.

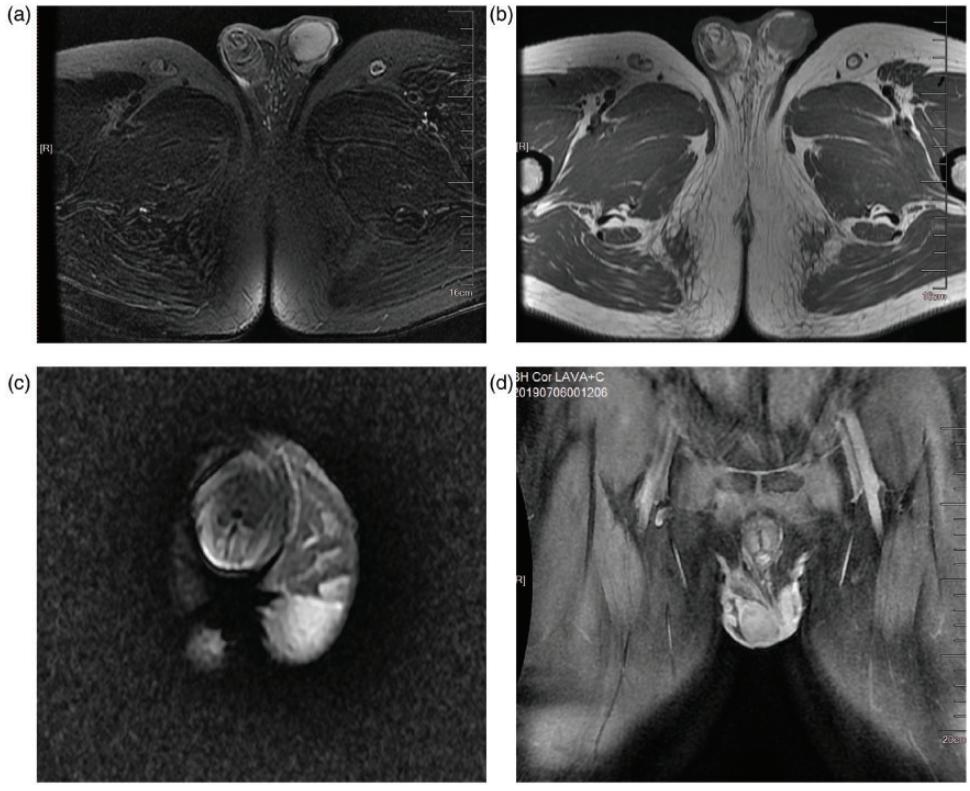

Figure 1. (a) T1-weighted imaging (T1WI): The lesion showed low iso-intensity signals (thick arrow). The left testis shows an iso-intense signal (thin arrow). (b) T2-weighted imaging (T2WI), axial plane: The lesion shows mixed high- and low-intensity signals (thick arrow). The left testis shows iso-intense signals (thin arrow). (c) Diffusion-weighted imaging (DWI) axial view: The lesion shows iso-intense signals (thick arrow). (d) Coronal enhancement: mild enhancement in the center of the lesion and uneven enhancement in the periphery are seen.

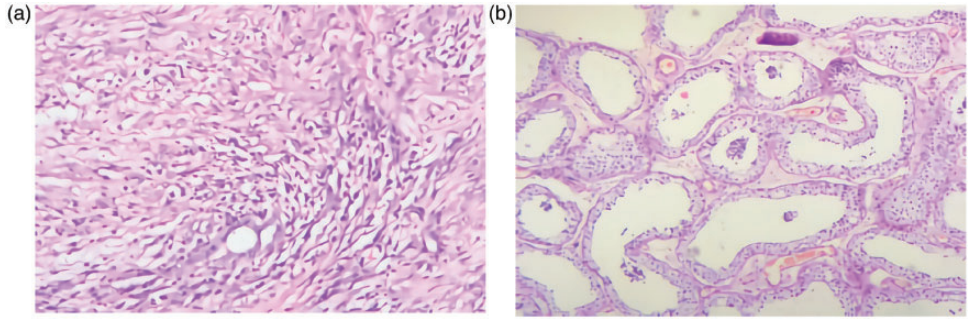

Figure 2. (a, b) Pathological diagrams of granulomatous orchitis; hematoxylin and eosin stain, ×200.

Discussion

Granulomatous orchitis is rare. It was first reported by Grunberg in 1926, and is described as a non-specific inflammation of the testicles, seen in middle-aged and elderly men, with unknown etiology.[1–3] It is generally thought to be related to testicular trauma, urinary tract infection, or autoimmunity.[2,4–7] The clinical symptoms are atypical, usually involving one testicle; the onset may be rapid or slow, affected testicles are enlarged and hard, and these findings may be accompanied by pain and swelling. Owing to repeatedly generated new and old lesions, ultrasonography shows diffuse hypoechoic or focal hypoechoic signals. CDFI shows blood flow signals inside and on the edge of the hypoechoic zone.[8–10]

Ultrasonography can show the location, size, and peripheral relationship of the lesion, but cannot determine the benign or malignant nature of the mass. Yilmaz et al. believe that the ultrasonographic manifestations of testicular masses show diverse changes, and the characteristics are not obvious.[11] Some scholars believe that ultrasound elastography and MRI can provide information for the diagnosis and differentiation of granulomatous orchitis.[12] Ultrasound elastography can measure the hardness of biological tissues and the manifestations of malignant tumors, which are "hard" lesions; benign lesions are more likely to be "soft" lesions. The typical manifestation of granulomatous orchitis differs from the "hard" lesion of testicular cancer; granulomatous orchitis is a "harder" lesion. MRI can better show the boundary of the lesion, with T1WI showing slightly low signal intensity. T2WI shows mixed high- and low-signal intensities, uneven enhancement, and uneven thickening and strengthening of the testicular sheath.

Our patient had testicular pain, atypical symptoms, and no history of trauma, which are signs considered to be related to autoimmunity. Ultrasonography showed a very low-intensity signal area on the testis, and a malignant testicular tumor could not be ruled out. T1WI of the patient's mass showed mainly low-intensity signals, with a small amount of iso-intense signals in the center. T2WI showed mainly high-intensity signals mixed with a small amount of low-intensity signals, and the mass periphery on enhanced scans showed progressive enhancement, which is slightly different from findings in previous reports.

The major clinical differential diagnoses of granulomatous orchitis are testicular syphilis, testicular tumor, tuberculous epididymo-orchitis, bacterial epididymo-orchitis, and spermatogenic granulomas. Testicular syphilis is extremely rare, and the diagnosis is based mainly on a history of travel. The testes are enlarged, hard, doughy to the touch, and non-tender, with syphilis. Serological testing for syphilis is positive, and pathology shows necrotic tissue replacing the normal tissues of the testis, with a large number of lymphocytes and plasma cells at the edges. Cell infiltration distinguishes *Treponema pallidum*. Testicular tumors are harder, nodular, and without tenderness, and concentrations of the tumor markers, HCG, AFP, and LDH are generally elevated. There are no granulomatous lesions in the seminiferous tubules on microscopy, with reticular cell tumors.

The incidence of tuberculosis has increased worldwide over the past decade. Genitourinary tuberculosis represents 2% to 4% of the cases or approximately 15% of tuberculous extrapulmonary manifestations. When the genital organs are involved, the epididymis is the most common site, followed by the prostate; however, isolated epididymo-orchitis may produce diagnostic difficulty in excluding a possible testicular neoplasm. MRI shows that the testicular lesions are relatively low-intensity signals on T2WI, enhanced lesions are unevenly

enhanced, and the scrotal septum is fused with the lesional testis. The image is unclear, and the scrotal septum shifts to the affected side. Pathology shows tuberculous granulomas and nodule formation. Previous studies reported that testicular color Doppler ultrasonography may be useful to increase diagnostic accuracy. In patients with bacterial epididymo-orchitis, a diffuse increased blood flow pattern is seen, whereas focal linear or spotty blood flow signals are seen in the peripheral zone of the affected epididymis in subjects with granulomatous disease.[13,14]

The diagnosis of granulomatous orchitis depends on histopathological examination. Microscopic granulomatous lesions surround the seminiferous tubules, and in the tubular lumen, multinucleated giant cells, epithelioid cells, lymphocytes, and plasma cells coexist. In the early stage, the structure of the seminiferous tubules remains, and the granulomatous lesions replace spermatogenic cells. In the later stage, Sertoli cells proliferate and block the lumen of the seminiferous tubules, resulting in damage to the basement membrane, changes in appearance, and gradual fibrosis. The epididymis may have chronic inflammation, hyperplasia, or granulomatous lesions.[3,4,15] In the histopathology of granulomatous orchitis, the normal structure of the testis has been lost to a large extent, and preserving the testis is of little significance. Orchiectomy can relieve the patient's pain, swelling, and other symptoms, and avoid disease in the remaining testis. Additionally, removing the affected testis permits histopathological examination to exclude a malignant tumor, prevent malignant transformation of a mass, or confirm the diagnosis. Previously, conservative treatment with antibiotics or steroids was believed to effectively reduce symptoms. Most cases underwent orchiectomy at an early stage, but a few cases were treated with conservative treatment. Currently, conservative treatment is generally considered ineffective, and orchiectomy or orchiectomy with epididymectomy is the most common treatment. Effective treatment methods usually have a better prognosis after surgery.[8,16–18]

In our case, the patient's body temperature at admission was not elevated, and routine blood laboratory test results were not abnormal. However, scrotal enhanced MRI findings were slightly different from typical ultrasonographic findings, and testicular tuberculosis could not be ruled out. Negative tuberculosis antibody and a normal ESR ruled out testicular tuberculosis. Color Doppler sonography of the anterior scrotum showed a solid mass on the right testis, and the possibility of a malignant tumor was high. Although malignant tumors were not considered in the admission scrotal MRI, and testicular tumor marker (HCG, AFP, LDH) concentrations were normal, malignant tumors could not be excluded.

Although there are previous reports of a small number of patients undergoing spontaneous resolution of granulomatous orchitis, the diagnosis depends on histopathology. Considering that our patient had no history of testicular trauma before admission, routine urinalysis findings were normal, autoimmune disease was not ruled out, and the patient had a child, radical orchiectomy was performed. During follow-up, the patient had no recurrence or complications, and the treatment was considered effective.

Conclusion

The incidence of granulomatous orchitis is low. The condition is rare in clinical practice, and the cause is unknown. The disease constitutes non-specific inflammation; however, it is currently believed that antibiotics or steroids are ineffective for conservative treatment, and orchiectomy should be actively performed.

Ethics statement

The patient provided written informed consent and agreed to the use of his medical records and images for publication of this case report. Our ethics committee does not require approval for case reports.

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Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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