

Testicular cholesterol granuloma mimicking a testicular tumor: A case report

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Received September 20, 2023; Accepted February 9, 2024

DOI: 10.3892/wasj.2024.232

Abstract. Cholesterol granulomas (ChGs) are benign fibro-granulomatous lesions that develop following trauma and inflammation. The most common sites of presentation are the middle ear, paranasal sinuses and petrous apex; however, they can present in any area of the body where cholesterol deposition can occur. The present study describes the case of a 62-year-old male who presented with a painless right scrotal mass that had been there for the past 6 years. Upon a physical examination, a hard non-tender mass at the lower pole of the right testis with normal overlying scrotal skin was detected. Blood analyses revealed normal levels of tumor markers (β -human chorionic gonadotropin, alpha-fetoprotein and lactate dehydrogenase) and a normal lipid profile. A right scrotal color Doppler ultrasound revealed a well-defined hypoechoic 13x14 mm lower pole testicular mass. Scrotal magnetic resonance imaging revealed a well-defined nodule (13x11x12 mm) at the lower pole of the right testis near the epididymis. Under spinal anesthesia, via inguinal incision, a right partial orchiectomy was performed. The post-operative period was uneventful. The results of the histopathological examination were consistent with testicular ChG. ChG of the testis is extremely rare, and only one other case has been recorded in the literature to date, at least to the best of our knowledge. Differentiating between ChGs of the testis and testicular tumors before surgery can be relatively challenging. This should be regarded as a differential diagnosis in cases of testicular masses.

Introduction

Cholesterol granulomas (ChGs) are chronic inflammatory lesions that develop due to the body's reaction to cholesterol crystals. They may be found in any part of the body where cholesterol crystals can accumulate (1). The ChGs lack an epithelial lining; for this reason, they are usually known as pseudotumors or not true tumors. These lesions are most commonly found in the middle ear, paranasal sinuses, or temporal bones, specifically the petrous apex. Less common reports of ChGs in the breasts, liver, spleen, kidney, lymph nodes and peritoneum have also been recorded (2). Although the etiopathogenesis of these pseudotumors is unknown, they are considered to be caused by trauma and inflammation (2). ChGs in testicular and paratesticular tissues are rare, and pose a significant challenge in their differentiation from intrascrotal tumors. This difficulty persists during physical examinations, ultrasonography and even surgery, as ChGs may mimic the appearance of intrascrotal tumors (3-5).

The present study describes the second recorded case, to the best of our knowledge, of a ChG of the testis mimicking a testicular tumor.

Case report

Patient information. A 62-year-old male presented with a painless right scrotal mass which had been present for 6 years. There was no history of trauma to the testis. The patient had a positive medical history for hypertension, diabetes and two percutaneous coronary interventions a few years prior. Previous surgical history included a left-side scrotal exploration for an abscess in 2017 that proved to be tuberculosis. He received a 6-month course of anti-tuberculosis medication. Since then, no recurrence has been detected. He was receiving amlodipine (10 mg, single daily dose), metformin (500 mg, twice daily), atorvastatin (40 mg, single daily dose) and aspirin (100 mg, single daily dose).

Clinical findings. A physical examination revealed a hard non-tender mass at the lower pole of the testis with normal overlying scrotal skin and transillumination was negative. His vital signs were normal.

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Key words: cholesterol cyst, partial orchiectomy, foreign body reaction, testicular mass, inflammatory lesion

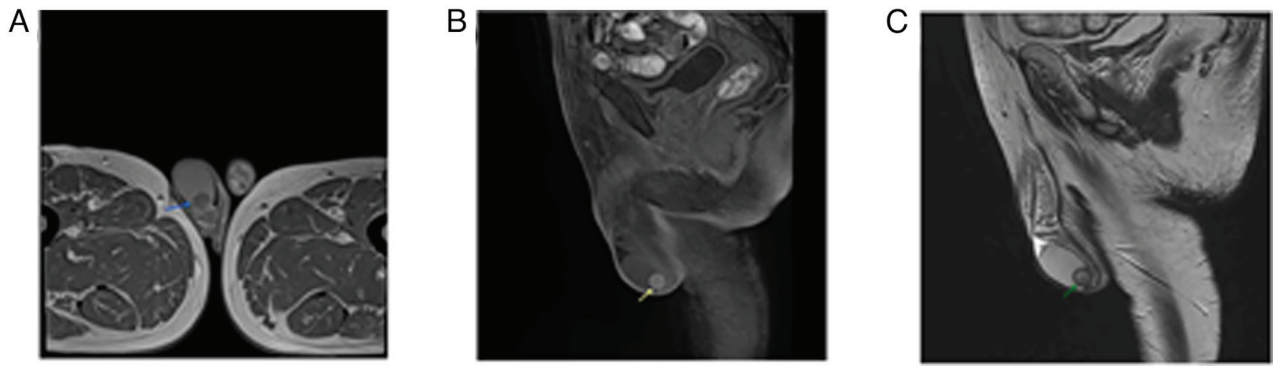


Figure 1. Testicular magnetic resonance imaging illustrating a well-defined round lesion in the lower part of the right testis. (A) Axial section T1WI post-contrast illustrating no intralesional enhancement (blue arrow). (B) Sagittal section T1WI fat suppression image illustrating a hyperintense signal (yellow arrow). (C) Sagittal section T2WI illustrating a low signal (green arrow).

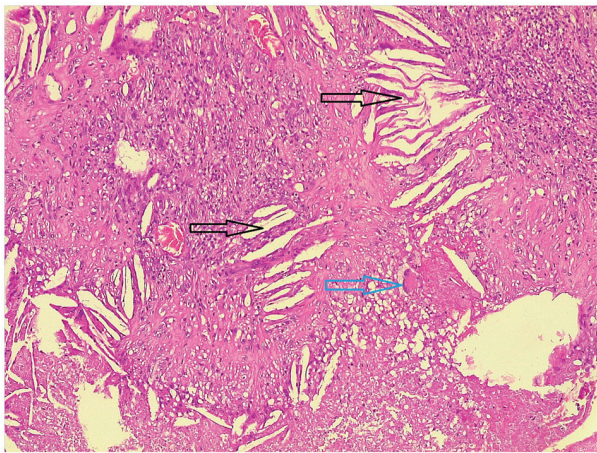


Figure 2. Section illustrating cholesterol cleft formations (dark arrows) with mixed inflammatory cell infiltration and multinucleated giant cell reaction (blue arrow). Magnification, x40.

Diagnostic assessment. A complete blood count yielded normal results. C-reactive protein levels (0.78 mg/l; normal range, <5 mg/l) and the erythrocyte sedimentation rate (17 mm/h; normal range, 0-20 mm/h for males >50 years old) were both within normal limits. Lipid profile analysis revealed normal levels of total cholesterol (138.9 mg/dl; normal range, <200 mg/dl), triglycerides (147.8 mg/dl; normal range, <170 mg/dl), low-density lipoprotein (82.8 mg/dl; normal range, <130 mg/dl) and high-density lipoprotein (48.5 mg/dl; normal range, 35-55 mg/dl). Other analyses revealed normal levels of tumor markers [β -human chorionic gonadotropin (0.03 IU/l; normal range, 0.02-0.8 IU/l), alpha-fetoprotein (8.2 ng/ml; normal range, 0-40 ng/ml) and lactate dehydrogenase (174 IU/l; normal range, 105-233 IU/l)]. A scrotal color Doppler ultrasound revealed that the right testis was normal in size (39x18 mm), shape and echo texture, apart from a well-defined hypoechoic 13x14 mm lower pole testicular mass with surrounding hypervascularity, suggesting a tumor. Scrotal magnetic resonance imaging revealed a well-defined nodule (13x11x12 mm) (in transverse x anteroposterior x craniocaudal dimensions) at the lower pole of the right testis near the epididymis (Fig. 1). The lesion elicited a slightly hyperintense signal in the T1-weighted image and a heterogenous hypointense

signal in the T2-weighted image. There was no post-contrast enhancement.

Therapeutic intervention and follow-up. The case was discussed with a multidisciplinary team, and based on these findings, the surgeon decided to perform an inguinal orchiectomy. However, the patient gave his consent to a partial orchiectomy. Under spinal anesthesia, via inguinal incision, a right partial orchiectomy was performed. A histopathological examination was performed on 5- μ m-thick paraffin-embedded sections. The sections were fixed in 10% neutral-buffered formalin at room temperature for 24 h and stained with hematoxylin and eosin (Bio Optica Co.) for 1-2 min at room temperature. The sections were then examined under a light microscope (Leica Microsystems GmbH). The results of the histopathological examination were consistent with testicular ChG (Fig. 2). The post-operative period was uneventful.

Discussion

ChGs are benign masses that develop due to the reaction of a foreign body to cholesterol crystals. They are characterized by fibrous tissue, granulomatous inflammation and the accumulation of foreign body giant cells (6,7).

The pathophysiology of ChG development remains unknown and the suggested cause of development may differ depending on the location. Hemorrhage, drainage obstruction and the disruption of ventilation are factors that may be associated with the development of the condition (8). Trauma leading to inflammation and ischemia results in the extravasation of blood containing cholesterol, fibrin and hemosiderin. The extravasated cholesterol evokes a foreign body reaction, causing the formation of a fibrogranulomatous lesion, which is the ChG (1). Although rare, there are reported cases of ChGs in the kidneys (9), mediastinum (10), breast (11) and femur (12) in the literature. In the breasts, duct ectasia leads to cholesterol crystal formation, and the leakage of these crystals through the ducts then initiates an inflammatory response (11).

Testicular ChGs are very rare and there has been only one other recorded case in the literature to date, at least to the best of our knowledge (4). Cases of ChGs in the tunica vaginalis (13,14), hydrocele sac (2,14), epididymis (6,15) and tunica albuginea (5,16) have also been recorded in the literature.

Lowenthal *et al* (13) reported a case of a 52-year-old male patient with a left testicular mass that caused testis enlargement for >25 years due to a trauma that was found to be ChG of the tunica vaginalis. Another study reported a case of a 38-year-old male who presented with a right scrotal mass for 7 years, without having infections, such as tuberculosis or any history of trauma (6). In that study, the results of the histopathological analysis revealed a paratesticular ChG, and they suggested that the condition should be a differential diagnosis in cases with large and non-tender scrotal masses (6). Gupta *et al* (2) also reported a case of ChG of the left hydrocele sac presenting as a testicular tumor. ChG mimicking the clinical signs of an acute scrotum has also been reported (15). Doi *et al* (16) reported the first case of ChG associated with hematoma of the tunica albuginea. The case described in the present study, unlike that in the study by Lowenthal *et al* (13), did not have any history of trauma and had no infectious diseases in the same testis as the other mentioned studies (2,6,15,16).

ChG of the testes and paratesticular tissue most commonly occurs after the age of 30, while Saeki *et al* (5) recorded a case of ChG of the tunica albuginea in a child aged 6 years. The only other recorded case of ChG of the testis was that of a 76-year-old male (4), further supporting that ChGs of the testes and paratesticular tissue occur in older age groups.

The case report of testicular ChG by Lin *et al* (4) described a patient who was admitted to the hospital for fever and shortness of breath. He had a history of squamous cell carcinoma of the tongue and radiation therapy. The condition of the patient deteriorated and the patient passed away on the 12th day of hospitalization. A genitourinary examination revealed a firm enlargement in the right testis. Initially, it presented as a caseating tuberculous granuloma, and a microscopic examination was necessary to establish the diagnosis of ChG (4). The patient described herein was vitally stable and had no history of cancer or radiation therapy.

The clinical presentation of testicular and paratesticular ChG is variable and may be encountered incidentally during a physical examination or may present as mild scrotal discomfort and a painless lump (6,13). The case of testicular ChG recorded in the study by Lin *et al* (4) presented for reasons other than the scrotal swelling and the swelling was noted during a physical examination.

Although patients reported with testicular and paratesticular ChG did not have hypercholesterolemia (15), Albakheet *et al* (17) suggested an association between familial hypercholesterolemia and ChG. The patient in the present study had a normal lipid profile, but was on atorvastatin. Unal *et al* (6) reported a case with a mild elevation in serum cholesterol levels, but did not assume this to be a direct cause of the ChG.

The diagnosis of testicular ChG can be challenging without a histopathological examination (2,5). In the present study, the pre-operative investigations of the patient suggested a testicular tumor and the diagnosis of ChG was confirmed by a histopathological examination.

The treatment of choice for the patient described herein was inguinal orchiectomy; however, he only gave consent to a partial orchiectomy. A right partial orchiectomy was performed via an inguinal incision. In their report of testicular ChG, Lin *et al* (4) performed an autopsy. In the study by Unal *et al* (6), a radical inguinal orchiectomy was performed for their case of ChG of

the paratesticular tissue. Saeki *et al* (5) performed a surgical enucleation via a scrotal approach for their case of paratesticular ChG, and were able to preserve the testis and epididymis. All the cited references in the present case report have been confirmed to be reliable (18).

In conclusion, ChG of the testis is an extremely rare condition. Upon presentation, ChGs may be non-tender and may only cause mild discomfort. Differentiating between the condition and testicular tumors prior to surgery can be relatively challenging and should be regarded as a differential diagnosis in cases of testicular masses.

Acknowledgements

Not applicable.

Funding

No funding was received.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Authors' contributions

RB was a major contributor to the conception of the study, as well as to the literature search for related studies. NHH and FHK were involved in the design of the study, in the literature review and in the writing of the manuscript. JIH, AMA, BAA and IA were involved in the literature review, in the design of the study, in the critical revision of the manuscript and the processing of the figures. AMA was the pathologist who performed the histopathological diagnosis. SHT and AAMA were the radiologists who performed the radiological assessments of the case. FHK and RB confirm the authenticity of all the raw data. All authors have read and approved the final manuscript.

Ethics approval and consent to participate

Written informed consent was obtained from the patient for this participation in the present study.

Patient consent for publication

Written informed consent was obtained from the patient for the publication of the present case report and any accompanying images.

Competing interests

The authors declare that they have no competing interests.

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