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Testicular Microlithiasis Associated With Hydrocele: A Rare Case Report in Primary Health Care in the Recôncavo Region of Bahia, Brazil

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Abstract

Testicular microlithiasis (TM) is a rare clinical condition, typically asymptomatic, detected through scrotal ultrasound (US). Generally, it affects adults, but it is also common in the pediatric population. Although it is most often an incidental clinical finding, it can be associated with the investigation of common testicular conditions, benign testicular tumors, or even malignant neoplasms. In this report, we present the case of a 50-year-old man under investigation for recurrent scrotal pain, in whom TM was detected in both testes, associated with bilateral hydrocele. Among the range of testicular diseases correlated with TM, there are few case reports in the literature associating it with hydrocele. In this context, the presence of TM during the syndromic evaluation of the testes makes it imperative to conduct a more thorough and careful clinical investigation. In some cases, such as the one we present in this report, additional diagnostic workup may be required through further tests in order to rule out the risk of more complex conditions that may occur concomitantly with TM. The clinical significance of TM and its association with benign diseases, such as hydrocele, and testicular cancer remain controversial, although the literature demonstrates a considerable prevalence of other potentially associated testicular conditions. In light of the clinical findings from the case report, we hope that our discussions provide relevant data to support the design of future studies and the publication of new studies focused on understanding the significance of TM.

Categories: Urology
Keywords: testicular diseases, testicular hydrocele, testicular microlithiasis, testicular swelling, testis

Introduction

Testicular microlithiasis (TM), a relatively unusual condition, is characterized by the presence of calcifications within the testicular parenchyma, visible through imaging obtained via scrotal ultrasound (US) [1-4]. Nevertheless, this clinical entity, defined as the presence of ⩾5 testicular calcifications ⩽ 3 mm, has become relatively common with the widespread use of US in clinical investigations [1,3-11].

The definitive etiology of TM is still not fully understood [3,5], and its significance remains controversial [4]. It has been suggested that its development may be related to cellular degeneration and apoptotic processes [10]. Some theories attribute its onset to genetic factors, testicular dysgenesis syndrome, dysfunction of Sertoli cells, and/or degeneration of germ cells; however, these remain divergent [5], and the true biological significance of TM remains unclear [2].

Although some reports have indicated a prevalence of TM in asymptomatic men referred for testicular US ranging from 0.6% to 0.7%, the true prevalence of TM in the general population remains unknown [2,11,12], depending on the study group [9]. Studies have reported a higher prevalence of TM among individuals with genetic disorders compared with the general population [9]. In adults, most of the reported data on the risks associated with TM come from individuals undergoing evaluation for infertility and/or testicular dysgenesis syndrome. In children, the significance of TM remains enigmatic, as most research involves heterogeneous populations [5]. In childhood, TM generally presents as a painless increase in testicular size [1].

Microcalcifications themselves are not malignant; however, they have been found in testicles associated with germ cell tumors, in varying proportions. Despite this, the clinical relevance of entities such as TM in terms of symptoms and potential malignancy is not well documented [2]. Whether TM should be considered a premalignant lesion remains controversial [12]. Furthermore, although bilateral testicular carcinoma is associated with microlithiasis, there is not enough robust scientific evidence to assert that microlithiasis provides independent diagnostic information regarding the presence of a tumor mass [6]. TM may be associated with malignant conditions and may, in some cases, reflect a regressed primary tumor or indicate a testicular environment associated with an increased risk of subsequent malignancy [8]. In the pediatric population, the malignant variant is typically the yolk sac tumor, almost always presenting with elevated levels of alpha-fetoprotein in the blood (α-FP) [5]. TM may also be identified as a histopathological finding, as the microliths are composed of calcified cores surrounded by concentric layers of collagen fibers within the lumen of the seminiferous tubules [12].

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The natural history of TM is also not well defined, and recommendations regarding clinical, laboratory, and imaging surveillance are not consensual [1]. Therefore, the standard approach for monitoring TM remains controversial, ranging from performing US only after discovering another relevant finding (either in clinical evaluation or self-palpation by the patient) to implementing protocols involving semiannual or annual US [4,5]. In this context, given that TM can be detected in various clinical settings, an individualized approach to follow-up may be required [4]. In response, the European Society of Urogenital Radiology (ESUR) established a scrotal imaging subcommittee in September 2012, tasked with producing guidelines on imaging and follow-up for TM [4]. According to the ESUR, TM is defined by the presence of ⩾5 hyperechoic foci, measuring <3 mm in diameter and lacking posterior acoustic shadowing, per US field of view.

Hydrocele is the accumulation of serous fluid within the tunica vaginalis, resulting in scrotal enlargement that is usually painless but may be associated with a sensation of heaviness and discomfort. Diagnosis is primarily clinical and is complemented by scrotal US with Doppler [13]. Hydrocele management ranges from conservative observation for asymptomatic cases to surgical hydrocelectomy for persistent, symptomatic, or large hydroceles [13]. Although the potential association between TM and hydrocele has been conceptually described in the literature, few case reports have been published to date. Furthermore, the biological basis underlying the coexistence of these two clinical conditions remains unknown.

Therefore, given the novelty of this case, which documents the rare coexistence of two clinical conditions scarcely reported in the literature, this study aimed to describe a case of TM associated with hydrocele in an adult diagnosed in an outpatient primary health care setting, thereby contributing evidence to inform future research on this clinical condition.

Case Presentation

A 50-year-old man, with no previous comorbidities, presented to the medical consultation with a complaint of mild pain in the right inguinal region, which had begun approximately three months prior to the consultation. He reported that after one month, the pain radiated to the scrotal region, where it persisted with mild intensity. He stated that the symptom persisted in the scrotal sac every day since then and disappeared from the inguinal region.

On physical examination, the right inguinal region was painless upon palpation and showed no bulging. During the Valsalva maneuver for the evaluation of the right inguinal canal, no protrusion was observed in the inguinal ring region. The testicles were palpable, in their normal position, symmetrical, and without swelling, with the cremasteric reflex present bilaterally. The epididymides and spermatic cords were painless on palpation, with no swelling or masses.

Although clinical guidelines indicate that isolated TM, in the absence of clinical risk factors, does not require routine biochemical monitoring, additional tests were requested as part of the clinical and diagnostic workup to investigate the etiology and establish a differential diagnosis. The biochemical laboratory results are presented in Table *1*.

Test	Patient's results	Reference ranges*
α-FP	4.2	≤5.8 UI/mL
β-hCG	2.0	≤2.0 mUI/mL
FSH	4.9	1.5–12.4 mUI/mL
LH	4.3	1.7–8.6 mUI/mL
Total testosterone	2.82	1.93–7.40 ng/mL
DHEA	2.20	1.33–6.48 ng/mL
SHBG	22.5	13.2–89.5 nmol/L

TABLE 1: Biochemical laboratory results

*Ranges used by the laboratory where the tests were performed.

α-FP, alpha-fetoprotein; β-hCG, beta-human chorionic gonadotropin; FSH, follicle-stimulating hormone; LH, luteinizing hormone; DHEA, dehydroepiandrosterone; SHBG, sex hormone-binding globulin

Scrotal US showed a right testicle in its normal position, with regular contours and preserved dimensions,

3.51 x 1.74 x 2.97 cm [volume = 9.5 cm^3, using the following ellipsoid formula: V = L x W x AP x 0.52 ($\pi/6$)], displaying homogeneous parenchymal echotexture, except for multiple scattered hyperechoic foci without posterior acoustic shadowing, and a small amount of fluid in the scrotal sac (Figure *1*). The left testicle was also in its normal position, with regular contours and preserved dimensions, 3.17 x 1.66 x 3.19 cm [volume = 8,8 cm^3, using the following ellipsoid formula: V = L x W x AP x 0.52 ($\pi/6$)], displaying parenchyma with homogeneous echotexture, despite multiple scattered hyperechoic foci without posterior acoustic shadowing, and a small amount of fluid in the scrotal sac, bilaterally (Figure *2*). Adjacent to the right testicle, the epididymis exhibited normal morphology, with preserved dimensions, homogeneous echotexture, and normal vascular flow on Doppler study (Figure *3*). The report issued by the ultrasonographer stated that there was no evidence of varicocele.

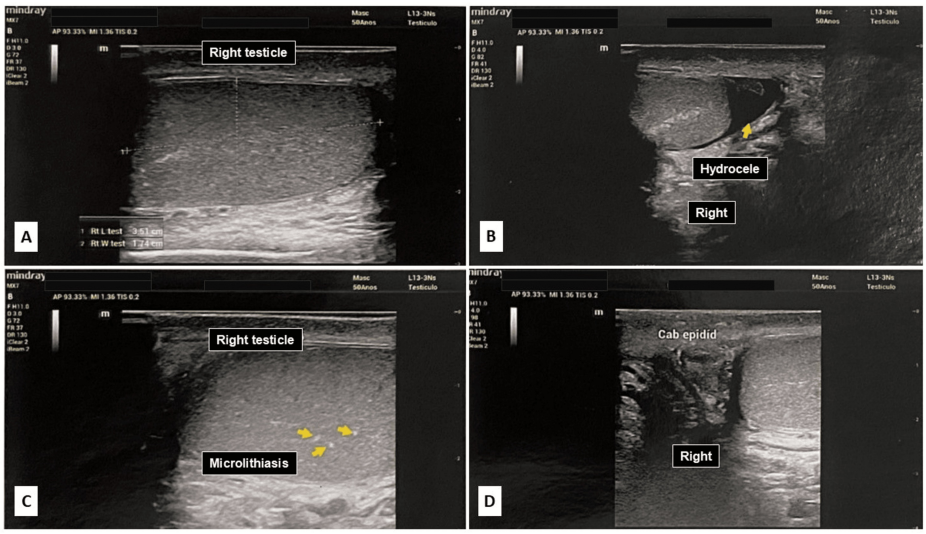


FIGURE 1: US of the right testicle.

The image presents four US views of the right testicle and surrounding structures. The first view shows the right testicle with normal size and morphology. The second view reveals a hydrocele, which is fluid accumulation around the right testicle. The third view identifies microlithiasis, small calcifications within the testicular tissue. The fourth view displays the epididymis region adjacent to the right testicle with normal morphology.

US, ultrasound

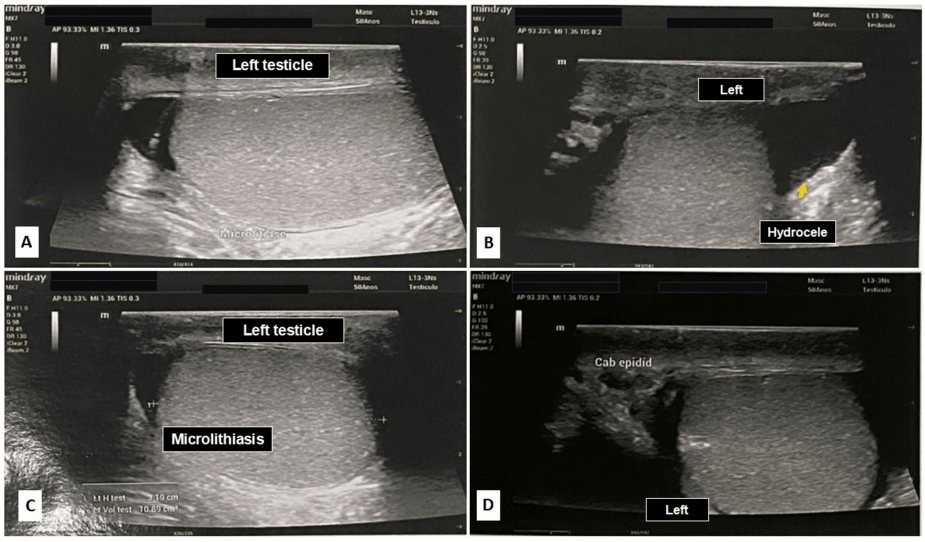


FIGURE 2: US of the left testicle.

The US images compare different conditions of the left testicle and adjacent structures. Image A shows a left testicle with normal size and shape. Image B reveals a hydrocele, which is a fluid collection next to the left testicle. Image C displays microlithiasis, characterized by small calcifications within the testicular tissue. Image D depicts the epididymis with normal morphology adjacent to the left testicle.

US, ultrasound

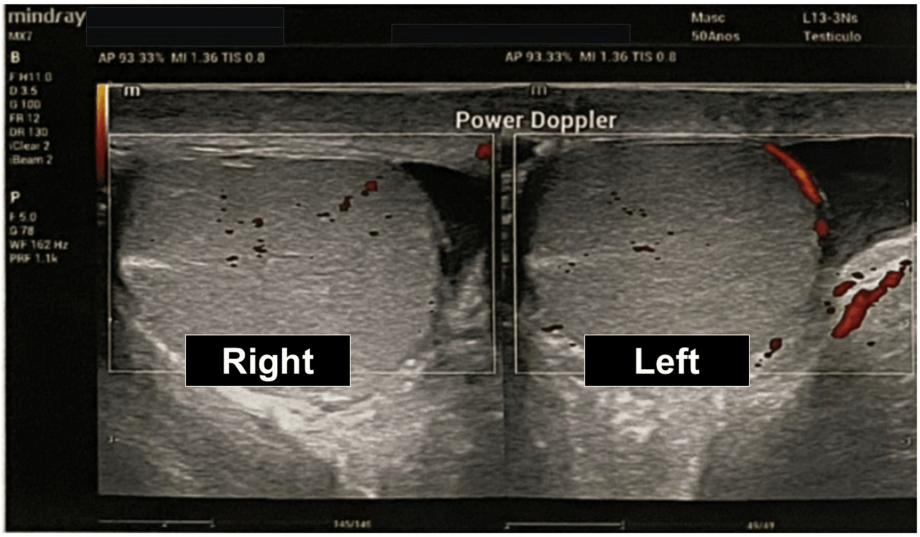


FIGURE 3: Power Doppler US.

The US image presents Power Doppler scans of both the right and left testicles, showing areas of blood flow within each testicle. The right testicle displays scattered small regions of blood flow, while the left testicle shows more extensive and concentrated blood flow areas.

US, ultrasound

US of the right inguinal region revealed widening of the inguinal canal, without significant herniation of abdominal contents (Figure *4*). Despite TM, in the absence of clinical risk factors, patients require only monthly testicular self-examination, and routine imaging monitoring is not recommended. To conduct a more detailed and thorough analysis of the observed widening in the inguinal region, a magnetic resonance imaging (MRI) was requested, which revealed the presence of hydrocele without other pathological findings. The MRI images were not included in this report because the patient independently underwent the examination at a private clinic and personally covered the associated costs. Consequently, the digital images were not made available to the authors. However, the original MRI report, issued by the clinic and signed by

the radiologist, was provided to the editorial team as a supplementary file.

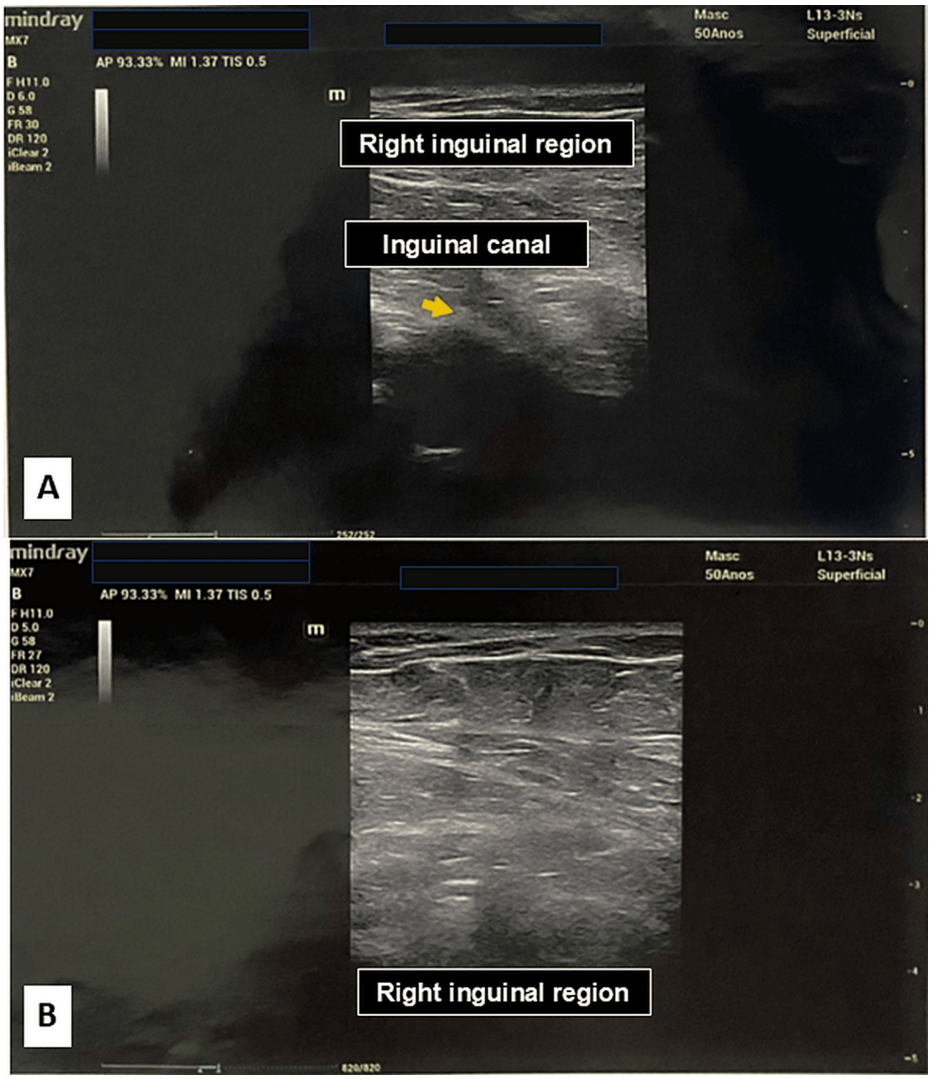


FIGURE 4: US of the right inguinal region.

The image compares two US scans of the right inguinal region. In the first scan (A), the inguinal canal is visibly widened. In the second scan (B), the inguinal canal appears without any signs of herniation. This contrast highlights the difference between a widened inguinal canal and the absence of herniation in the evaluated structures.

US, ultrasound

At the three-month follow-up, the patient reported no signs or symptoms during the medical consultation. Therefore, conservative management was maintained, with periodic physical examinations only.

Discussion

TM is a clinical entity that generally lacks clinical expression [1,2], and its etiology remains enigmatic [1-12]. Primarily, it was categorized as limited TM if there was at least one image showing fewer than five microliths or as classic TM if there were five or more microliths [7-12]. However, the pathogenesis of microcalcifications is likely attributed to testicular dysgenesis, with shedding of degenerated cells within an obstructed seminiferous tubule and failure of Sertoli cells to phagocytize the debris. Secondly, calcification occurs [8-12]. This fact could explain why microlithiasis is associated with both germ cell tumors and non-malignant conditions related to infertility [2,8-12]. Histologically, it is characterized by the presence of microdeposits of calcium with surrounding fibrosis [3,4,12].

The diagnosis of TM is typically established through US examination, characterized by the presence of multiple microcalcifications, ranging from 1 to 2 mm in diameter, randomly distributed throughout the testicle [1,3-12], as observed in the case reported in this study. Moreover, in most cases, microcalcifications

are not visible on MRI [4], which was also confirmed by the results obtained after performing this imaging method in this case report.

Generally, microliths do not cause pain or symptoms and are impalpable [4], although the patient studied presented with recurrent testicular pain, which may have been explained by the presence of bilateral hydrocele, due to fluid accumulation within the tunica vaginalis, which increases intratesticular pressure, causes tissue distension, and may result in discomfort, a sensation of heaviness, and scrotal pain [13]. In the pediatric age group, TM is typically asymptomatic and is often detected during the investigation of testicular enlargement [5]. This was not observed in the adult patient reported in our study, where the testicles had normal dimensions and morphology. However, this condition, which is considered common in childhood, raises concern regarding the risk of testicular tumors and infertility, although these tumors are rare (0.5-2/100,000) [8-12]. It is worth noting that, in these cases, there is a predominance of benign dermoid tumors and teratomas before puberty, while yolk sac tumors represent the majority of malignancies [5].

Currently, there are varying opinions regarding the clinical significance of microlithiasis in relation to testicular cancer [7, 8-12]. Even after previous studies have statistically analyzed the association between pathologically confirmed TM and testicular cancer [2], this association remains controversial [5, 8-12]. Despite this, a meta-analysis conducted by Wang et al. [7] suggested a potential harmful effect of microlithiasis on the development of testicular cancer. Therefore, it should be considered that there may be missing records due to publication bias in case reports and short follow-up periods involving patients with TM [5].

The literature reports cases of TM associated with male pseudohermaphroditism, cryptorchidism, subfertility, infertility, hypogonadism, varicocele, testicular torsion, Klinefelter syndrome, and Down syndrome [7], among various other clinical conditions [8-12]. In our study, we observed a case of bilateral hydrocele, which is rarely reported in the literature, highlighting the complexity involved in understanding this clinical entity as both a cause and/or effect of this comorbidity.

Although studies indicate that TM is not associated with any individual symptom or other non-malignant testicular condition [2], the patient reported here experienced recurrent pain caused by the hydrocele [13]. This fact suggests that the detection of TM may not always be attributable to chance. Konstantinos et al. [2] reported an incidence of TM of 4.6% and a percentage of patients with testicular cancer among those with TM of 11%. Thus, surgical treatment is not justified solely for microlithiasis in testicles with normal characteristics [6].

The incidental diagnosis of TM should lead to a thorough clinical evaluation to detect the possibility of subfertility/infertility or other systemic diseases that may be associated [3]. Additionally, there is scientific evidence supporting the ultrasonographic monitoring of patients with TM to facilitate the early diagnosis of testicular tumors [3].

Typically, patients with TM, in the presence of additional oncologic risk factors (such as cryptorchidism, atrophy, or history of germ cell tumor), may be subsequently investigated with biochemical tumor marker assays, X-rays, and abdominal and pelvic computed tomography, and are placed on semiannual follow-up with physical examination and scrotal US [2]. Despite the absence of risk factors in the patient described in this report, additional investigations were performed to establish a differential diagnosis. Thus, in the case presented in this study, it was decided to complement the diagnostic workup with MRI due to the need to rule out the possibility of a tumor mass associated with the widening observed in the inguinal region on US, which was not noted in the results.

Conclusions

TM is generally considered a benign condition; however, its potential association with testicular tumors warrants clinical attention. In the absence of additional risk factors, TM alone does not justify routine scrotal US, imaging-based screening, or testicular biopsy. US follow-up should instead be considered for patients presenting with microlithiasis alongside established risk factors for testicular malignancy. Although the coexistence of TM and hydrocele is rarely described in the literature, patients presenting with testicular pain or abnormal physical examination findings warrant further investigation. In such cases, scrotal US may help identify fluid accumulation within the tunica vaginalis and detect associated abnormalities. Thus, additional diagnostic evaluation should be guided by clinical findings rather than the incidental detection of microlithiasis alone.

Given the uncertainty surrounding the magnitude of the risk and the timing of potential testicular malignancy in patients with TM, periodic physical examinations remain a reasonable approach to facilitate the early detection of suspicious changes. Therefore, the clinical observations presented in this case report underscore the importance of evaluating associated conditions, particularly hydrocele, when relevant symptoms or abnormal examination findings are present. Further studies are needed to clarify the clinical significance of these associations and establish evidence-based recommendations for the diagnosis, surveillance, and management of TM.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: George G. Santos, Cassandra S. Cunha

Acquisition, analysis, or interpretation of data: George G. Santos, Cassandra S. Cunha

Drafting of the manuscript: George G. Santos, Cassandra S. Cunha

Critical review of the manuscript for important intellectual content: George G. Santos, Cassandra S. Cunha

Supervision: George G. Santos

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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