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CASE REPORT

Incidental discovery of Mullerian duct cyst in a male patient: A rare case report and differential diagnosis

Chorouk Mountassir, Youness Et-tahir, Lina Maalani, Mohamed Labied, Ghizlane Lembarki, Mouna Sabiri, Samira Lezar

Central Radiology Department, Ibn Rochd Hospital, University Hospital Ibn Rochd, Casablanca, Morocco

Abstract

Müllerian duct cyst (MDC) is a rare congenital intraprostatic cystic lesion that arises from remnants of the Müllerian ducts. Typically found incidentally in males during the 3rd and 4th decades of life, MDCs are usually asymptomatic but can lead to urinary retention and ejaculatory duct obstruction if they reach significant size. Imaging techniques, particularly pelvic magnetic resonance imaging (MRI), are crucial for diagnosis, providing detailed anatomical visualization. Differentiation from prostatic utricle cysts and other cystic lesions is essential, as they present similar characteristics. While most prostatic cysts are benign, rapid growth or irregularities may indicate malignancy, necessitating surgical intervention for symptomatic or malignant cases. Accurate diagnosis requires comprehensive imaging and clinical assessment. We present a case of a typical MDC found incidentally in a male patient with urinary stone disease. This case underscores the significance of MRI in diagnosing and differentiating prostatic and peri-prostatic cysts.

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Introduction

Mullerian duct cyst (MDC) is a congenital intraprostatic cystic lesion that arises from remnants of the duct [1]. It is a rare condition, usually asymptomatic, that can be difficult to distinguish from other male pelvic cyst etiologies [2].

MDCs, although uncommon, should be distinguished from other types of midline prostatic cysts because of their similar imaging characteristics and the possible risks of complications, including infection or malignancy.

Thus, we present the case of a typical MDC incidentally found in a male with urinary stone disease, to illustrate the findings of magnetic resonance imaging (MRI) and highlight its importance in the diagnosis of prostatic and peri-prostatic cysts.

Patient and Observation

Patient information and clinical results

A 39-year-old male with a history of treated kidney stones presented to our facility in July 2024 with a 1-week history of left lower back pain, without any additional urinary, digestive, or general symptoms.

During the physical examination, the patient was apyretic, and no abnormalities were detected.

Diagnostic evaluation

Ultrasound of the urinary tract was realized and revealed a left lumbar ureteral stone causing mild ureterohydronephrosis. Pelvic exploration revealed an oval-shaped midline intraprostatic cyst that extends vertically above the prostate. The cyst has a thin wall and contains a fluid–fluid level, with a transonic component floating above an echogenic component (Fig. 1).

A pelvic MRI was performed for further evaluation, as there were no contraindications using a 1.5T machine. We obtained T2-weighted sequences on the 3 planes, axial T1-weighted sequences with and without fat saturation, axial diffusion sequence, and T1-weighted sequences with fat saturation after Gadolinium injection on the 3 planes.

Contact Youness Et-tahir younessettahir@gmail.com Central Radiology Department, Ibn Rochd Hospital, University Hospital Ibn Rochd, Casablanca, Morocco.

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Pelvic MRI revealed an intraprostatic tear-drop-shaped midline cyst, with a tapered inferior end, and a round superior end extending above the prostatic base. The cyst features a thin, regular, non-enhanced wall with no diffusion restriction, and shows a liquid–liquid level: The upper component has a fluid signal, and the lower component exhibits hyperintensity on T1-weighted images, which persists after fat saturation, indicating a hemorrhagic or proteinaceous content (Fig. 2). There was no evidence of communication between the cyst and the posterior urethra.

Therapeutic intervention

Since the patient did not show any symptoms related to the cyst, and the cyst did not exhibit any radiological features suspicious of malignancy, the final decision was to adopt a watchful waiting approach with annual MRI monitoring.

Discussion

The embryology of Mullerian duct remnants has been discussed in detail by many authors.

Müllerian cysts, which usually occur in the 3rd and 4th decades of life, may originate from any part of the Müllerian ducts that should have regressed in utero. They are uncommonly associated with renal agenesis, but external genitalia are normal [3].

Clinically, the early symptoms of MDC are not obvious as is the case with our patients, and the cysts are often found when the duct cyst has achieved a certain volume that causes pressure on surrounding tissues and organs [1].

If symptomatic, they may cause urinary retention, urinary tract infection, or symptoms of ejaculatory duct obstruction such as hemospermia [2].

Apart from the clinical manifestations, imaging technology such as trans rectal ultrasound and computed tomography could assist the diagnosis, but pelvic MRI is the imaging test of choice given its optimal noninvasive depiction of the prostate gland with excellent anatomic detail.

Cysts in the region of the prostate seen on MRI may be described as either intraprostatic or periprostatic [1].

MDCs may originate from the region of the verumontanum but usually extend above the prostate and may be slightly lateral to the midline. They do not communicate with the urethra, and commonly contain calculi [4].

They are tear-shaped and contain sperm-free brownish fluid, which is of high signal intensity on T2-weighted images [5]. Calculi may cause hemorrhage into the cyst, which can be demonstrated on T1-weighted images. Carcinoma is a rare potential complication [6].

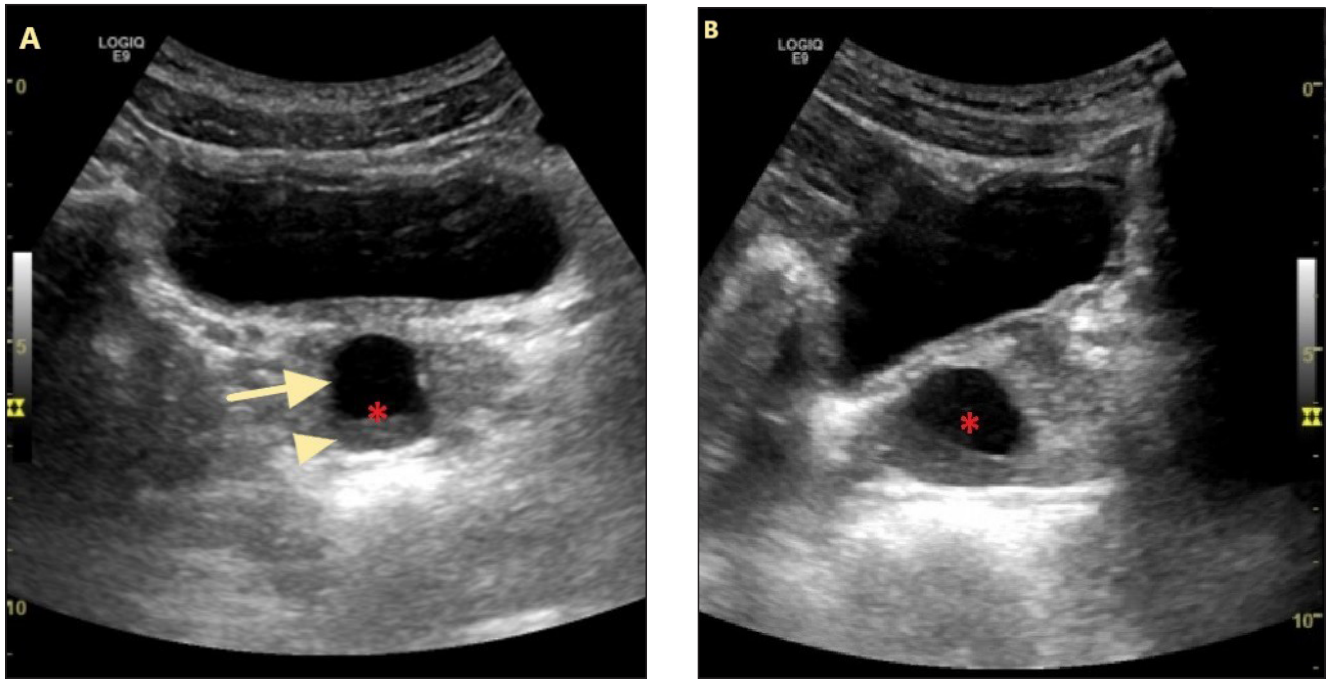


Figure 1. Pelvic ultrasound: axial (A) and sagittal (B) slices demonstrate a midline intra-prostatic cyst (Asterisk) containing a fluid–fluid level, with a transonic component floating (Arrow) above an echogenic component (Arrowhead).

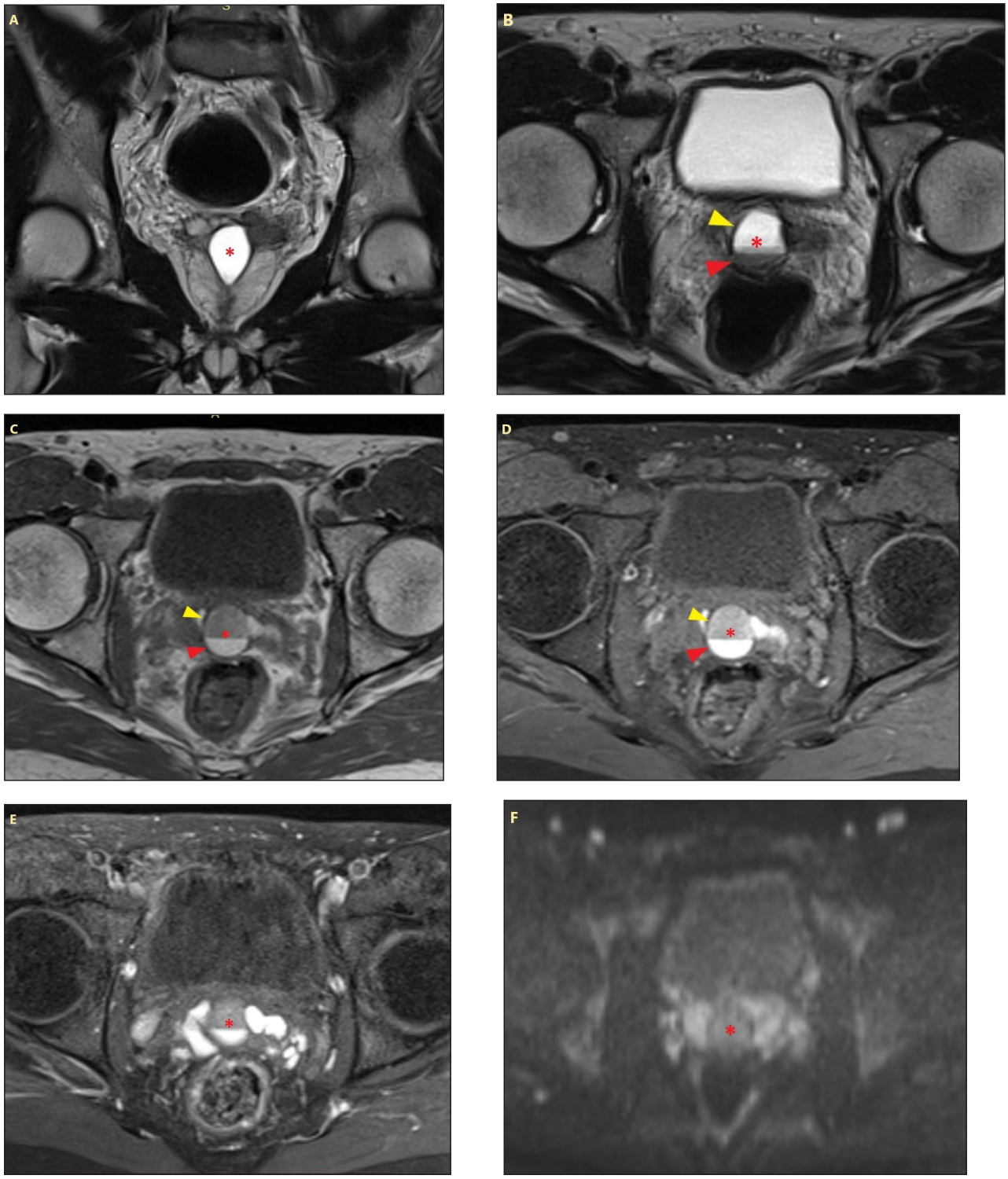


Figure 2. Pelvic MRI reveals a teardrop-shaped intraprostatic midline cyst (Asterisk) with no sign of malignancy on the coronal T2-weighted image (A). Axial images show an intrinsic liquid–liquid level within the cyst: the upper component (Yellow arrowhead) exhibiting water signal, while the lower component (Red arrowhead) exhibits a low signal on the T2-weighted image (B) and a high signal on the T1-weighted image (C), persisting after fat suppression (D). The cyst wall is thin and regular, showing no contrast enhancement on the fat-saturated post-Gadolinium T1-weighted image (E), and no high diffusion signal (F).

The current literature presents some debate over whether MDC and prostatic utricle cyst (PUC) are identical or represent separate entities [7–9]. Kato et al. [9] found that in the past the two terms have been used synonymously, although certain authors have distinguished them based on whether

there is (utricle) or is not (Müllerian) communication between the urethra and the cyst.

Recent studies suggest that immunohistochemical markers can aid in distinguishing MDCs from other cystic lesions such as PUCs which have a distinct urogenital sinus origin from MDCs, offering additional diagnostic tools beyond imaging [8].

Most PUCs are diagnosed in childhood because of associations with hypospadias, pseudohermaphroditism, and cryptorchidism [10].

PUC always arises from the verumontanum and are always in the midline. It is usually 8–10 mm long, pear-shaped, with no extension above the base of the prostate, features that help distinguish it from an MDC [11].

Both MDC and PUC can become infected and may contain pus, which can cause confusion on imaging because the appearances overlap those of abscess and cystic tumor of the prostate [12].

Not all cystic lesions located at the midline of the prostate are MDCs or PUCs, and the possibility of other cystic lesions should also be considered [13].

MDCs should be differentiated from ejaculatory duct cysts, seminal vesicle cysts, and congenital or secondary prostate cysts. Ejaculatory duct cyst lesions point to the seminal caruncle of the prostate. The seminal vesicles on the ipsilateral side are often dilated. They are of high signal intensity on T2-weighted images but commonly contain calculi that have low signal intensity [13]. The cyst fluid is dark brown and laboratory examinations of the cystic fluid contain sperm, while the MDC fluid is clear and does not contain sperm [2].

Seminal vesicle cysts are lateral cysts that result from congenital atresia of the ejaculatory duct. The cysts are unilateral and commonly protrude into the bladder. The cyst fluid is commonly hemorrhagic and contains inactive spermatozoa [14].

Congenital prostate cysts may appear as single cysts with regular shapes and clear edges, and these are differentiated from MDCs and ejaculatory duct cysts because of the more specific disease sites for the latter. Secondary cysts, accompanied by benign prostatic hyperplasia, are most often multiple, irregular in shape, and small in size [1].

A cystic carcinoma should be suspected if the cyst grows rapidly or if it has irregular walls, irregular signal intensity, or a solid component [15].

Figure 3 summarizes the key features of the main pelvic cysts, including their location, as well as their clinical and radiological presentations [16].

Most prostate cysts are benign and self-healing but some lesions can undergo malignant degeneration. While asymptomatic cases like ours may only require annual monitoring, surgical intervention is recommended for symptomatic cases (hematospermia and

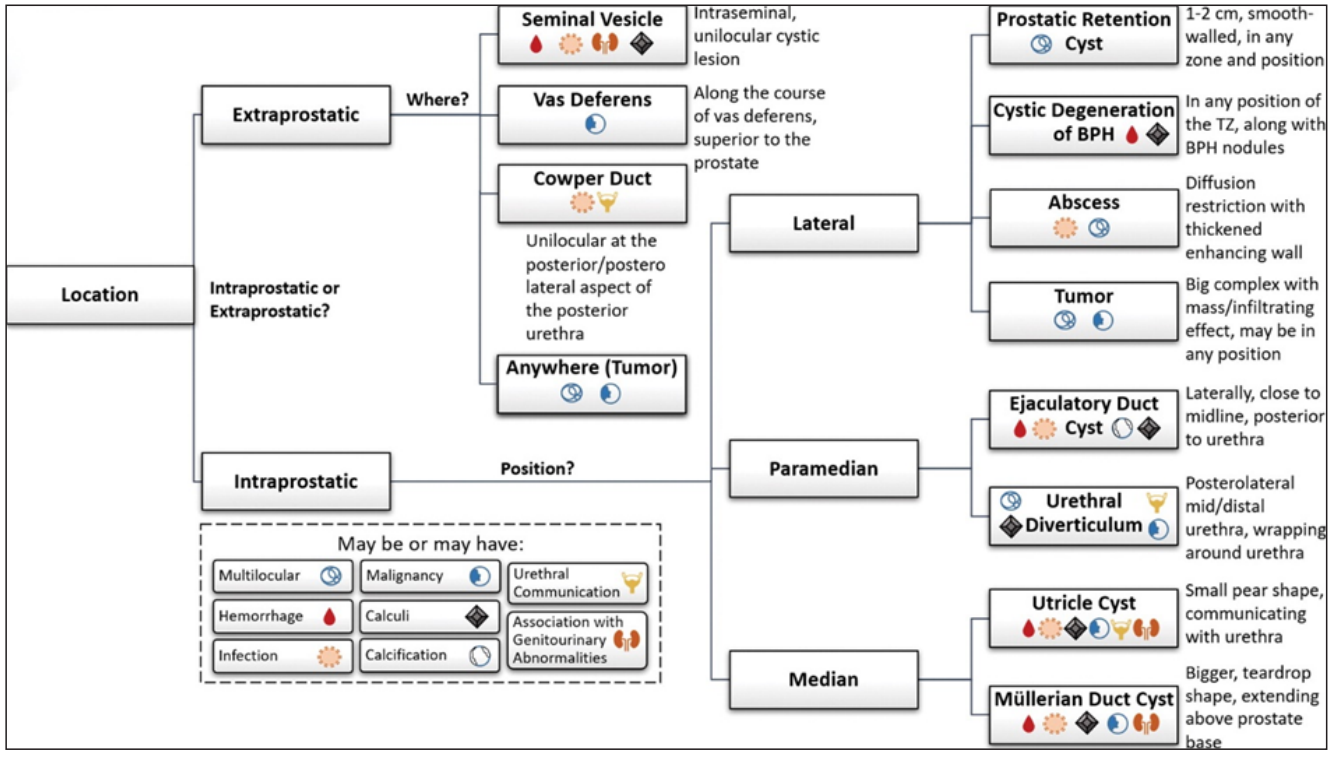


Figure 3. Schematic proposed for differential diagnoses of MPCs. TZ = transition zone, w = with.

other ejaculatory disorders, testicular or pelviperineal pain, lower urinary tract symptoms, and lower urinary tract infection) and those with suspicious features suggestive of malignancy [17].

Different treatment options are available for MDC. Transurethral resection and percutaneous aspiration are performed for small MDCs [18].

Laparoscopic excision has been reported. In large pelvic or abdominal cysts, open surgical excision is the treatment of choice [19].

Conclusion

The differential diagnosis of the various types of prostatic or periprostatic cystic lesions can be challenging, further complicated by the fact that cystic lesions originating from nearby structures can imitate prostatic or periprostatic lesions.

Precise anatomic localization through MRI, along with a detailed clinical history, can aid in refining the differential diagnosis and determining whether additional invasive diagnostic tests are necessary.

Furthermore, comprehensive imaging and careful differentiation of MDC from other cystic lesions are critical for appropriate patient management, reducing unnecessary interventions.

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