Imaging of bulbo-urethral glands pathology

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Learning objectives

To review the anatomy of Cowper's glands and ducts.

To describe the radiological and ultrasonographic technique.

To show the most common pathologies involving Cowper's glands and the ducts.

Background

Clinical implications of the prostate gland have long since overshadowed those of the paired bulbourethral glands. However, lesions of this gland and its duct are far more common than previously reported, which may be either congenital or acquired (1). They may be asymptomatic, cause micturition difficulties or urinary retention or they are one of the reasons for lower urinary tract symptoms (LUTS). The diagnosis is generally delayed and the patients are usually treated with multiple long-term courses of antibiotics. The aim of the presentation is to describe the role and features of imaging in congenital and acquired Cowper's glands and ducts pathologies.

Anatomy

Cowper's gland is an accessory sexual organ that contributes to urethral lubrication. The two main glands are situated within the urogenital diaphragm, with a second pair of accessory glands situated in the bulbospongiosal tissue. The Cowper's ducts enter the ventral surface of the bulbourethra near the midline by piercing the spongiosum (Fig. 1). Cowper’s gland consists of well-demarcated lobules of small, compact tubuloalveolar glands radiating from a central excretory duct lined by pseudostratified epithelium, and entrapped within fascicles of muscle.

Material and Methods

Observations were collected over a long period of 23 years (1984-2007). During this period of time 16700 voiding cysto-urethrographies and 2450 retrograde urethrographies were performed in adult males in the Uroradiology Section of the Department of Radiology. 23 adult patients with Cowper's gland or duct pathologies were detected. Radiography was used in 23 cases, sonography in 16, and cystoscopy in 7 (Tab.1). Ultrasound examinations were performed with transrectal probe and with linear high-frequency probe for urethral and trans-perineal scanning. Urethral distension was obtained with saline solution introduced with a small size Foley catheter in the fossa navicularis (so called "sono-urethrography")

Tab 1
<table>
<thead>
<tr>
<th>Condition</th>
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<tr>
<td>Calcification</td>
<td>2</td>
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<tr>
<td>Cystic dilatation</td>
<td>2</td>
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<tr>
<td>Acute Cowperitis</td>
<td>1</td>
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<td>Abscess</td>
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Images for this section:

**Fig. 1:** Anatomy of the male pelvis with the urogenital-tract. The Cowper's gland is located within the urogenital diaphragm (arrow) and the duct is running anteriorly and enters the bulbar urethra.
Imaging findings OR Procedure details

Cowper's gland can be affected by both congenital and acquired lesions (usually inflammatory). Congenital lesions include cystic dilation of the duct. Congenital lesions tend to be asymptomatic but can be easily confused with more serious conditions on diagnostic tests. Acquired lesions include infection, calcification and neoplasms.

Congenital lesions

Syringocele

Cowper's syringocele is an uncommon deformity in the male urethra that is a cystic distention of the duct of Cowper's gland. Cowper's syringocele may be closed (a distended cyst-like swelling in the wall of the urethra) or open (an opening enabling urine reflux into the syringocele). Lesions of Cowper's gland have been classified by Maizels et al. (2) into four groups (Fig. 2): (1) simple syringocele - a minimally dilated duct (Fig. 3 a,b), (2) perforate syringocele - a bulbous duct that drains into the urethra and appears as a diverticulum (Fig. 4 a,b), (3) imperforate syringocele - a bulbous duct that resembles a submucosal cyst and appears as a radiolucent mass (Fig. 5 a,b), and (4) ruptured syringocele - the membrane remaining in the urethra after a dilated duct ruptures (Fig. 6 a,b).

Most cases are asymptomatic, mainly affecting children and adolescents. When symptomatic the usual manifestations are haematuria (especially ruptured), urinary infections with frequency, pain and discharge, symptoms of urethral obstruction, or chronic post-void dribbling. Less frequent associations include those of Cobb's collar and a contractile bladder (3). Diagnosis is achieved through retrograde/voiding urethrography and endoscopy. Transperineal ultrasound can also be utilized for the diagnosis, avoiding the use of radiation. These studies have reported the identification of a diverticulum-like structure of the bulbourethra area, which is produced by the distended syringocele (4). Treatment, when appropriate, is endoscopic through incision extending to the outlet of the syringocele or transurethral marsupialization (5). In certain cases, perineal incision and surgical resection of the syringocele with urethral closure has been performed. Some cases may require open surgery via the perineal approach. One case has been described where symptomatic syringocele resolved spontaneously after an infection (6). Cowper's syringocele may be more common than currently realized and radiologists should rule out this possibility in young male patients with lower urinary tract symptoms and persistent post-void dribbling. A dilated duct should not be confused with partial urethral duplication, a true urethral diverticulum, or an ectopic ureter because such an error may lead to unnecessary surgery.

Acquired lesions

Cowperitis
Cowperitis is an inflammation of the gland which can be either chronic or acute. Acute cowperitis presents as fever, malaise and severe pain (Fig.7) in the perineum with frequency, urgency, painful defecation and sometime acute urinary retention. Rectal examination is also painful. Infections are usually caused by the same organisms that cause urinary tract infections. These include urea-splitting organisms, Escherichia coli, Neisseria gonorrhoea and Chlamydia trachomatis. The treatment is an appropriate antibiotic. In cases of an abscess formation, direct aspiration is the most efficacious procedure (Fig.8).

A chronic bacterial infection (Fig.9) is sometimes associated with an underlying defect (i.e. syringocele) in Cowper’s gland, which becomes a focal point for bacterial persistence in the urinary tract. Effective treatment usually requires identifying and removing the defect and then treating the infection with antibiotics. However, antibiotics often do not cure this condition.

The extremely rare occurrence of genital tuberculosis affecting the penis, seminal vesicles, epididymides, vas deferens and Cowper’s gland has been described (7).

Stones

Cowper’s gland calcification has been reported in elderly patients. Postulated aetiologies of Cowper’s gland calcification include ductal obstruction with stasis of secretions, infection with urea-splitting organisms and sequelae of diabetes mellitus (8). Stones usually contain phosphate salts of calcium, magnesium, potassium, calcium carbonate or calcium oxalate. These stones tend to be radio-opaque and can be detected through pelvic ultrasound. These stones are rarely infected or cause abscesses. Asymptomatic stones may be observed.

Neoplasms

Adenocarcinoma of Cowper’s gland, located in the bulbomembranous urethra, exhibits irregular-shaped glands lined with anaplastic cells. It may be adenocystic in appearance and contain lakes of mucin (9). Symptoms of adenocarcinoma include that of stricture of the urethra, possibly including bloody discharge with no increase in PSA. Fewer than 15 cases have been reported in the literature on carcinoma of Cowper’s gland.

Images for this section:
Fig. 1: Maizels et al classification of syringocele. A: simple syringocele (minimally dilated duct) B: Imperforate syringocele (a bulbous duct that resembles a submucosal cyst); C: Perforate syringocele (a bulbous duct that drains into the urethra and appears as a diverticulum); D: Ruptured syringocele (the membrane remains in the urethra after a dilated duct rupture).
Fig. 2: Simple syringocele. Voiding cystourethrography. The Cowper duct is opacified and appears as a thin linear channel running under the bulbous urethra during voiding (a).
**Fig. 3:** Simple syringocele. Sonourethrography depicts a thin duct parallel to the distended urethra, directed to the perineal region (b).
**Fig. 4:** Imperforate syringocele. Retrograde urethrogram showing a compression on the lower profile of the bulbous urethra, without stenosis (a).
**Fig. 5:** Imperforate syringocele. Sonourethography depicts a cystic-like structure at the level of the bulbous urethra (b)

**Fig. 6:** Perforate syringocele. Retrograde urethrography. The duct dilatation appears as a diverticular structure that opens into bulbar urethra (a). There is reflux of the contrast in the gland.
**Fig. 7:** Perforate syringocele. The corresponding image at sonourethrography (b) shows a double channel, one corresponding to the urethra and the second to the dilated Cowper’s duct.
**Fig. 8:** Ruptured syringocele. Voiding cystourethrography. The dilated duct opens widely into the bulbous urethra after membrane rupture.
Fig. 9: Ruptured syringocele. This is the corresponding image at sonourethrography (b).
**Fig. 10:** Acute Cowperitis. Transrectal ultrasonography in trasversal plane, with the scanning plane under the pubic arch. In the midline the membranous urethra is visible, while the left Cowper gland is enlarged with fuzzy margins due to inflammation. The right gland appears normal.
**Fig. 11:** Cowper's gland abscess. Transrectal ultrasonography in longitudinal scan, with the scanning plane under the pubic arch. Under the prostate apex a fluid collection is detected, very painful with compression. After transperineal puncture purulent material was extracted, corresponding to E.Coli chronic infection.
**Fig. 12:** Chronic Cowper’s gland infection, with gland enlargement and fluid collection. Transrectal ultrasonography in transversal plane, with the scanning plane under the pubic arch.
Conclusion

Cowper's glands and duct pathology is rare but the diagnosis should be considered in any male presenting with long standing irritative or obstructive symptoms when no other explanation is found. Most Cowper's gland duct or gland lesions cause irritative and obstructive symptoms, but some are asymptomatic. Cowper's gland syringocele can be visualized in the form of a duct image parallel to the urethra, sometimes associated with opacification of the gland during VCUG or retrograde urethrography. This image must be differentiated from a fistula, extravasation of contrast agent, urethral duplication or an artefactual image, by the course parallel to the urethra, the upper limit not exceeding the urogenital diaphragm, and the position of the orifice. Transperineal sono-urethrography is very helpful in all cases prior to any therapeutic procedure because it better defines the size of the lesion and the thickness of the intraurethral septum.

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References