Imaging of Urethral Pathology Before and After Treatment: A Review with Emphasis on Conventional Urethrography

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Learning objectives

To review adult male urethra anatomy and its evaluation with different imaging modalities, focusing on conventional urethrography (Retrograde Urethrography and Voiding Cystourethrography).

To illustrate urethral diseases and its therapeutic management in order to identify pathologic and post-treatment findings.
Background

Urethral pathology predominantly affects men. It is very rare in women given the limited length of their urethra, which is only 4 cm, while in males it is about 17-20 cm long. For this reason, we will only focus on male urethral pathology.

The male urethra is a tube with a capacity of contraction. It extends from the internal urethral orifice of the bladder to the external urethral orifice (which is the narrowest point of the urethra). It is the passageway for urine as well as sperm and glandular secretions. It has a variable diameter, with three points of greater caliber: navicular fossa, intrabulbar fossa and prostatic urethra.

For the study and assessment of the urethra, it is essential to be familiar with its anatomy, which we may simplify in a diagram, Fig. 1 on page 5.

It is divided into the anterior and posterior urethra:

- **ANTERIOR URETHRA**: from the meatus to the lower margin of the urogenital diaphragm. This portion of the urethra is surrounded by the corpus spongiosum.

  • **Penile (or pendulous) urethra**: extends from the penoscrotal junction to the external meatus. There is a segment of greater caliber at the distal area, within the gland penis, where it forms the navicular fossa, which is approximately 1-1.5 cm in length.

  • **Bulbous urethra**: extends from the inferior margin of the urogenital diaphragm to the penoscrotal junction. The proximal part has a greater diameter than the rest of the urethra, forming the intrabulbar fossa. Proximal to this fossa there is a slight conical narrowing area at the bulbomembranous junction, called the cone.

The anterior urethra has Littré glands (mucinous glands), located predominantly in the dorsal margin of the penile and bulbar urethra.

**Cowper (or bulbourethral) glands** are two pea-sized glands, located posterior and lateral to the membranous urethra, and which, through two small ducts, empty their secretions into the intrabulbar fossa.

- **POSTERIOR URETHRA**:

• **Prostatic urethra**: the continuation of the bladder neck. It is approximately 3.5-4 cm in length and runs alongside the prostate slightly anterior to midline. It is the most expandable part of the urethra and also the one with the greatest caliber. There is a longitudinal fold (an elevation of the mucous membrane) in the posterior wall called the **urethral crest**, extending from the bladder neck and continuing into the **verumontanum** (or **seminal colliculus**). In the midline of verumontanum lies the **prostatic utricle** which forms a cul-de-sac 5-6 mm long, laterally flanked by the two openings of the **ejaculatory ducts**. On each side of the urethral crest, there is a groove (**prostatic sinus**) where most of the **prostatic glands** openings drain directly into the urethra.

• **Membranous urethra**: located between the apex of the prostate and the bulb of the urethra, at the lower margin of the **urogenital diaphragm**. It is the shortest (1-2 cm), narrowest (after the urethral external orifice) and least dilatable part of the canal.

The urethra has two sphincters:

- **Internal sphincter** (proximal): from the bladder neck to the **verumontanum**.

- **External sphincter** (distal): with two components:
  
  • **Intrinsic**: concentric muscle fibers from the distal third of the prostate to the membranous urethra, and including it.

  • **Extrinsic**: paraurethral striated musculature.

Both the intrinsic external sphincter and internal sphincter are responsible for passive continence as they are composed of smooth muscle fibers, with the internal sphincter being the primary continence sphincter and the intrinsic the secondary continence sphincter. The parautrethral extrinsic sphincter, along with the periurethral **levator ani complex**, is responsible for active continence; the two elements are composed of striated, voluntary muscle that surrounds membranous urethra.

The urethra passes through the pelvic floor between the posterior margin of the **transverse ligament of the perineum** and the **deep transverse muscle of the perineum**, adhering to these structures, which can lead to urethral injury in case of pelvic fracture.
**Fig. 1:** Diagram of the male urethra

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IMAGING MODALITIES:

RETROGRADE URETHROGRAPHY (RU): consists of injection of contrast material into the urethra using a catheter. This is considered the modality of choice for urethral assessment in strictures, fistulas and traumatic lesions.

Procedure in our institution:

- Patient is asked to urinate before starting the examination.

- A preliminary pelvic x-ray centered on the pubic symphysis is done in order to evaluate image quality and identify the possible presence of calcifications.

- Sterilization of the area.

- We usually use a Foley catheter (12-10 French). With the penis in a vertical position (to avoid curvature), the catheter is gently introduced without forcing obstacles (in case they exist) to avoid creating a false passage. It is preferable not to use lubricant in order not to induce incorrect placement or movement of the balloon, although this will depend on the experience of the technician and the discomfort of the patient.

- The balloon should be located in the navicular fossa. The balloon will be inflated with saline solution, approximately 2cc or until the patient feels discomfort.

- The patient is positioned supine, with a flexed knee and slight right abduction and obliquely (45°) to the side from which the technician will introduce the contrast, so that the penis is resting on the flexed leg.

There are three phases in the study:

1st: visualization of all the urethra:

- We inject approximately 20-50 cc of iodinated contrast material, under fluoroscopic guidance.
2\textsuperscript{nd}: visualization of the bladder:

- We empty the balloon and introduce the catheter into the bladder, where it is re-inflated once inside (or via suprapubic catheter, depending on the patient). It is important not to completely introduce the catheter if there is SUSPICION of URETHRAL STENOSIS or TRAUMATIC INJURY.

- As the bladder is being filled, we may obtain images of early, intermediate and prevoiding filling.

3\textsuperscript{rd}: voiding phase, VOIDING CISTOURETHROGRAPHY (VCUG):

- The patient is given a container for urination and voids while serial spot images are obtained.

Study of ANTERIOR urethra is better depicted in RETROGRADE URETROGRAPHY Fig. 2 on page 14, while the assessment of the POSTERIOR urethra should be done in VOIDING CISTOURETHROGRAPHY, Fig. 3 on page 14.

This is the conventional procedure, but at our institution, when we evaluate post-surgical patients (especially before removing the catheter) or patients in whom urinary catheterization cannot be performed (those with suspicion of urethral stricture or narrowed meatus), we fill the bladder with intravenous injection of contrast material, like an intravenous pielography. In these cases, there are some disadvantages, as we have only antegrade evaluation of the urethra, and there is a significant increase in procedure time. The image quality is also worse, as the quantity of contrast material is lesser. Besides, there is a greater dilution with urine.

In addition to this, our urologists prefer the upright standing position in patients who have undergone urethral reconstruction, in order to better evaluate urine stream.

Pitfalls:

It is a common fact that a spasm of the external sphincter impedes opacification of the bulbar and posterior urethra. In these cases, it only requires a mild pressure to overcome this resistance.
There is a normal slight angulation at the level of the penoescrotal junction (the union of the penile and bulbous urethra). Sometimes an indentation at this point, corresponding to contraction of the constrictor *nudae* muscle (a myotendinous union of the bulbospongiosus muscle), can be seen. This should not be misinterpreted as a stricture, Fig. 3 on page 14.

In addition, the visualization of the membranous urethra should not be interpreted as a pathological finding but rather as secondary to the urogenital diaphragm caliber decrease.

Opacification of Cowper ducts (Fig. 4 on page 15), glands of Littré, prostatic ducts and prostatic utricle can occur (especially in pathological cases due to increased pressure).

Also, the folds of the urethra (when there is an incomplete traction of the penis) can mimic pathology. This can be easily solved by pulling on the penis before continuing the study. Fig. 5 on page 17. Also patient position (45º oblique) should be correctly achieved to avoid a false negative study, Fig. 6 on page 21.

During RU, an ovoid filling defect in the posterior wall of prostatic urethra corresponding to *verumontanum* may be seen.

Identifying the bulbomembranous junction is important when evaluating urethral pathology. The distal portion of *verumontanum* precedes the membranous urethra in the urogenital diaphragm (corresponding also to the external sphincter). It is usually difficult to visualize, especially if the opacification is not optimum. We can also look for it drawing an imaginary line that crosses the urethra connecting the inferior margin of the obturator foramina.

**SONOGRAPHY:**

In some institutions sonourethrography with saline solution is also used in the study of urethral strictures and the assessment of associated spongiofibrosis. Fibrosis is seen as hypoechogenic periurethral tissue.

**Bladder-kidney ultrasound** should be performed in patients with urethral stricture in order to rule out bladder wall thickening and complications of upper urinary tract (ureter dilatation or hydronephrosis).
MR IMAGING OF THE URETHRA:

It is a non-invasive modality which allows evaluation of urethra, periurethral tissues and adjacent structures. It is useful in patients with urethral tumors (local staging), traumatic injuries (showing fistulas) and inflammatory-infectious cases (demonstrating periurethral abscess or sinus tracts). **T2-weighted** images are the more useful sequences.

URETHRAL STRICTURES:

Urethral stenosis occurs when there is a lesion of the mucosa that leads to a circular scar, causing a caliber reduction, which can be of variable length. When a stricture is present, there is a secondary retrograde pressure increase that can cause bladder diverticulum, vesicoureteral reflux and hydronephrosis (with possible infections and renal failure).

CLINICAL PRESENTATION:

The main clinical presentations are dysuria, decreased force of stream (which can be quantified by fluxometry), and, in more severe cases, eventual acute urine retention.

MANAGEMENT:

- **DILATATION with a balloon.**

- **ENDOSCOPIC URETHROTOMY**: consists of an endoscopic incision of the stricture. Subsequently, a urethral catheter is left three or four days to keep the urethra open. Later, it can be supplemented with urethral dilations or intermittent catheter to maintain the caliber of the urethra.

- **PROSTHESES or STENTS**: may constitute a temporary solution. They are not suitable for bulbomembranous strictures because the stent should transverse the external sphincter. The complication rates are high (up to 55%), most of them due to tissue hyperplasia which leads to stent obstruction **Fig. 7 on page 18, Fig. 8 on page 18, Fig. 9 on page 19**. Migration of the stent can also occur.

TREATMENT:
-ENDOSCOPIC URETHROTOMY: an efficient and cost-effective option in selected cases, yielding optimal results in:

• **Short and single** stenosis (up to 1 cm length)
• located in **bulbous** urethra
• **No spongiofibrosis** (fibrosis of the surrounding corpus spongiosum).

Despite this, urethral stenosis managed with urethrotomy may recur up to 40-70% within 2 years.

-URETHRAL RECONSTRUCTION:

• **End-to-end anastomosis of the urethra**: the best choice but limited since success will be greater in short urethral stenosis. Only for **selected cases**. Fig. 12 on page 25, Fig. 13 on page 26 and Fig. 14 on page 27.

• **Urethroplasty with grafts** (transfer of tissue which will develop neovascularization):
  • penile skin
  • buccal mucosa
  • bladder epithelium,

Examples: Fig. 15 on page 22, Fig. 16 on page 23 and Fig. 17 on page 24.

• **Urethroplasty with cutaneous flaps** (transfer tissue that preserves its own vascularization). The kinds of tissue that can be used:

  • non-hairy genital skin: penile or prepuce
  • hairy genital skin: **BAES (BiAxialEpilatedScrotal-Flap) technique**, consisting of biaxial flap of scrotum permanently epilated and conditioned with cutaneous expanders. It is important to recognize the post-surgical normal morphology of the urethroplasty, in order not to misinterpret it as a pathological dilation of the urethra or a diverticulum. Example: Fig. 18 on page 28, Fig. 19 on page 29, Fig. 20 on page 30, Fig. 21 on page 31 and Fig. 22 on page 32. After removing postoperative urethral or suprapubic catheter, contrast agent leaks should be ruled out.

Urethroplasty may be keel-shaped (Fig. 23 on page 34) or have saccular morphology (Fig. 24 on page 33). BAES reconstruction may have complications such as
urethroplasty stenosis (Fig. 25 on page 35), ptosis (Fig. 26 on page 36) and intraluminal calcification (Fig. 27 on page 37).

- Urethral replacement with synthetic materials (prosthesis).

ETIOLOGY:

-CONGENITAL:

Congenital urethral strictures are very rare. It would be more appropriate to talk about congenital urethral malformations. Among these, the most common are the posterior urethra valves (Fig. 28 on page 38). Depending on the degree of obstruction this can result in bladder diverticulum, ureterohydronephrosis and oligohydramnios, which makes it possible to suspect them in prenatal ultrasound (the vast majority are diagnosed prenatally). Retrograde cystourethrography is the imaging modality of choice.

There are also anterior urethral valves, much less frequent, which can be positioned at any point in the anterior urethra. They can be associated or not with a proximal diverticulum. In the same way as in the previous case, morphological and clinical involvement will depend on the degree of obstruction. Association with vesicoureteral reflux occurs in one third of the patients.

-TRAUMATIC STRICTURES:

-ACCIDENTAL: they occur due to a lack of irrigation of the urethra.

- ANTERIOR injury: is frequent in straddle pelvic injuries. Normally, without any other lesions associated. Fig. 29 on page 39.

- POSTERIOR injury: is associated with pelvic fractures due to high-energy forces. An estimated 4-14% of pelvic fractures have associated urethral injury. That is why, in these cases, bladder injury must also be ruled out (up to 20% may have also bladder injury)

-IATROGENIC: this etiology is currently increasing. They are mainly caused by catheterization and endoscopic (transurethral) examinations and treatments Fig. 30 on page 40, that may lead to an inflammatory tissue reaction, resulting in fibrosis and reduction of caliber of the urethra. Lumen et al reviewed the etiology of urethral
strictures. Nowadays, iatrogenic causes account for about half of cases in the developed world. In patients younger than 45 years, the most frequent causes are: idiopathy, hypospadias surgery and pelvic fracture. In patients older than 45 years the main causes are transurethral resection and idiopathy. Fig. 31 on page 41 and Fig. 32 on page 42.

INFECTIOUS-INFLAMMATORY:

The most frequent infectious pathogen of stricture is Gonococcus. The drastic decline in its incidence has made strictures of infectious origin quite rare. The second most frequent pathogen is Chlamydia. The typical finding in a gonococcal stenosis is a caliber reduction of several centimeters length (Fig. 33 on page 43 and Fig. 34 on page 44). There is a predominant involvement of the bulbous urethra, which loses its tapered morphology. Stricture due to Tuberculosis etiology is less frequent, typically affecting the anterior urethra with multiple fistulas.

Less frequently, the pathogen may be Human papillomavirus, forming Condiloma acuminata. There is involvement of the urethra in 0.5-5%. It is better to avoid RU, to prevent retrograde seeding, being VCUG the modality of choice. Fig. 35 on page 45.

Another inflammatory cause of not very clear etiology is Balanitis Xerotica Obliterans, a chronic and sclerotic dermatitis, sometimes also known as sclerosus lichen or scleroatrophic lichen. It seems to be more frequent in males who are uncircumcised or who had circumcisions later in life Fig. 36 on page 46.

TRAUMATIC URETHRAL INJURIES:

- BLUNT URETHRAL TRAUMA:

As mentioned before, they are classified in:

- ANTERIOR injury: in straddle pelvic injuries.

- POSTERIOR injury: in pelvic fractures due to high-energy forces. Colapinto and McCallum classified posterior urethral injuries. Fig. 37 on page 46, Fig. 38 on page 47, Fig. 39 on page 48, Fig. 40 on page 49 and Fig. 41 on page 50.
As mentioned above, if there is suspicion of traumatic injury lesion of the urethra, catheterization is contraindicated. In these cases, a suprapubic catheter should be placed.

**PENETRATING URETHRAL INJURIES:** due to gunshot or knife wounds.

**URETHRAL INJURY IN PENILE FRACTURES:** there is a rupture of the *corpus cavernosum*, which is associated with urethral injury in 38% of the patients, so it must be ruled out.

**POST-IRRADIATION INJURIES:** causing urethritis, urethral fistula and strictures.

**UNKNOWN:** In about 1 of 3 cases no obvious cause could be identified.

**URETHRAL DIVERTICULUM:**

They are more frequent in females, being rare in male. Usually, they appear in the posterolateral wall. **MR** has higher sensitivity to detect urethral diverticulum than **VCUG** or cystoscopy. **Fig. 42** on page 50 and **Fig. 43** on page 51

**ACKNOWLEDGEMENTS:** The pictures of physical examination, and endoscopic and surgical procedures, are courtesy of Dr. Céspedes.
**Fig. 2:** Normal retrograde urethrography. Anterior urethra is correctly opacified. There is no filling of posterior urethra due to spasm of external urethral sphincter.

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Fig. 3: Normal voiding cystourethrography (a). See the conical shape of bulbous urethra and a dilatation (blue arrow) of the proximal portion. In previously obtained RU of the same patient (b), it is proven that this indentation at penoscrotal junction does not correspond to a true stenosis. Note also in this patient a smooth indentation (yellow arrow), suggestive of contraction of compressor nudae muscle in RU.

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**Fig. 4:** Retrograde opacification of Cowper duct and gland (arrows) in a patient with bulbous stricture.

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Fig. 11: RU (a) and VCUG (b) showing a short (less than 1cm) stricture in proximal bulbous urethra (arrow) secondary to transurethral resection of the prostate (TURP) in a 69 year-old patient. This is a good case to treat with endoscopic urethrotomy as first choice. The patient improved the flow of urine after the procedure.

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**Fig. 5:** (a) RU showing a fold in penile urethra that disappears after penis traction (b).

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**Fig. 7:** RU (a) and VCUG (b) in a patient with urethral stent. (a) Note the absence of contrast material in the posterior urethra (proximal to the stent). In VCUG (b) there is opacification of anterior urethra, although with decreased caliber and passive dilatation up to distal limit of the stent.

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Fig. 8: Expanded scrotum (a) and scrotal skin graft (b). (c), (d) Surgical removal of the urethral stent (arrows).

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Fig. 9: Removal (a) of urethral stent. Note the lumen obliteration (b), (c) due to tissue hyperplasia.

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**Fig. 10:** VCUG post-urethroplasty after removing obliterated stent. There is a correct permeability with clinical improving of the patient.

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Fig. 6: (a) Apparently normal RU. After correcting oblique position, a bulbous stricture (yellow arrow) is depicted in RU (b) and VCUG (c). VCUG also demonstrates bladder diverticulum (blue arrow).

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Fig. 15: (a) Meatal stenosis in a 77 year-old patient. VCUG through suprapubic catheter (b) shows global dilatation of the urethra due to meatal stenosis.

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Fig. 16: (a) Forearm graft for prepuce reconstruction (b). Urethral reconstruction was made with buccal mucosa. (c) VCUG (suprapubic filling) after reconstruction shows elimination through meatus. Biopsy result was Lichen Sclerosus et Atrophicus

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Fig. 17: A similar case in a 24 year-old male with antecedent of acute urine retention. (a) VCUG (intravenous filling) demonstrates stenosis of meatus/navicular fossa and secondary global dilatation of the retrograde urethra. (b) Physical examination showed lichenification of the meatus. (c) Urethral reconstruction with buccal mucosa was made.

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Fig. 12: RU (a) and VCUG (b) in a 23 year-old patient with bulbous stricture (arrows). It was treated with endoscopic urethrotomy but stricture reappeared 6 months later.

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Fig. 13: Given that it was a short and a recurrent stricture it was treated with end-to-end anastomosis. (a) Lumen stenosis. (b) Image after urethrectomy. (c) and (d) Images after finishing anastomosis.

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**Fig. 14:** RU after anastomosis (a) showed a doubtful recurrence, not clearly seen in VCUG (b). Urethroscopy ruled out stricture. Note the different endoscopic image of the stricture before (c) and after (d) treatment.

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**Fig. 18:** Patient with multiple strictures (arrow) in bulbous and penile urethra. BAES flap reconstruction was decided to be the treatment of this case.

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**Fig. 19:** (a) Scrotum before expansion. (b) Scrotum with cutaneous expansion. (c) and (d) tissue expanders.

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Fig. 20: After cutaneous expansion in permanently epilated scrotum, biaxial Epilated Scrotal Flap is obtained (a, b and c).

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Fig. 21: Urethroplasty procedure (a). (b) Exposure of urethra. (c) Urethral reconstruction with the flap. (d) Final result in scrotum.

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Fig. 22: After BAES reconstruction, urethroplasty (arrows) has a pseudo-diverticulum appearance.

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Fig. 24: Patient with an antecedent of urethral stricture at penoscrotal junction treated with BAES flap reconstruction. Note the saccular morphology of the urethroplasty.

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**Fig. 23:** 67 year-old patient with antecedent of transurethral bladder tumor resection. RU (a) and VCUG (b) showed bulbous stricture (yellow arrows) and pendulous irregularity (red arrows). Bulbous stenosis was treated with BAES flap reconstruction and penile irregularity with a graft (c). Note the keel-shaped urethroplasty (blue arrow).

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**Fig. 25:** Stenosis (arrow) between two urethroplasty segments.

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Fig. 26: Patient with antecedent of TURP with bulbomembranous stricture (a). RU (b) demonstrates marked distention (yellow arrow) of urethroplasty (ptosis). It was repaired with mesh-graft urethroplasty (blue arrow).

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Fig. 27: Patient with history of complex urethral stenosis. It was repaired with BAES flap reconstruction. Eight years later, a calcification within the urethroplasty was seen in cystoscopy which could also be seen in pelvic x-ray (arrow). In RU (b) it appeared as a filling defect. At surgery, it corresponded to mesh-graft calcification. It was replaced with a new urethroplasty.

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Fig. 28: Two different patients with posterior urethral valves (arrows) seen as an abrupt change in caliber at bulbomembranous junction. In the first case (a) there is bladder wall irregularity while in (b) there is also secondary megabladder and megaureter. Both images are courtesy of Dr. Ribó from Hospital Sant Joan de Déu d’Esplugues.

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**Fig. 29:** 39 year-old patient that suffered a straddle pelvic injury when he was 8 years old. When he was 18, he had occasional hematuria. In his first RU (a) in 1999, a penoscrotal junction stricture (yellow arrow) was depicted. It was treated with urethrotomy and posterior dilatations. In 2008 (b), a bulbous stricture (yellow arrow) is seen in a new RU. He underwent BAES flap reconstruction, but stenosis of the proximal anastomosis appeared in another VCUG (blue arrow).

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**Fig. 30:** Patient with iatrogenic bulbous stricture (arrows) seen in RU (a) and VCUG (b), which was treated several times with urethrotomy and surgery at other institution. BAES flap reconstruction was performed at our hospital. VCUG (intravenous filling) showed correct permeability of urethroplasty without contrast agent leaks (c).

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Fig. 31: 56 year old patient with history of abdominoperineal resection for rectal cancer. During the postoperative period, abdominal CT was performed due to pelvic abscess suspicion. In the first CT (a) a few amount of gas was located behind bulbous urethra (yellow arrow). Few days later, in a new CT, there was found slightly more gas at the same location (yellow arrow). Note that a few quantity of contrast agent can be seen in this cavity. The patient was re-operated and, in another CT (axial in c and sagittal in d), bulbous urethral damage was more evident (red arrow).

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**Fig. 32:** The same image with conventional cystography. It is difficult to say where is the communication, as it seems a bladder damage, but the communication is located in bulbous urethra (arrow).

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Fig. 33: (a) VCUG through suprapubic permanent catheter in a 47 year-old patient, showing panurethral stenosis, with probable gonococcal etiology. (b) BAES reconstruction was performed. Lots of years after using a suprapubic catheter, he had a permeable urethra.

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**Fig. 34:** Another probable case of gonococcal stricture. (a) RU depicts a panurethral and irregular stenosis. (b) In VCUG, an image in penile urethra suggestive of fistula, is seen (arrow).

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**Fig. 35:** 25 year-old patient with dysuria. At physical examination, condylomas were present in prepuce. In VCUG (intravenous filling) and cystoscopy, stenosis in penile urethra was seen. Urethral condylomas could not be demonstrated.

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Fig. 36: 25 year-old patient with history of urethral catheterization for arthroscopy. He later presented meatal stenosis with lichenification of the meatus.

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Fig. 37: Bulbomembranous urethral traumatic injury due to pelvic fracture with contrast material extravasation seen at UR (a) and VCUG through suprapubic catheter (b). It was treated with end-to-end anastomosis but a stricture appeared later, so temporary prosthesis was placed (c).

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Fig. 38: Pelvic x-ray showing pelvic fracture (a). Once at our institution, a RU (b) was performed to this patient, demonstrating marked dilatation of penile urethra without opacification of the rest of the tube. VCUG through suprapubic catheter (c) shows no flow beyond prostatic urethra.

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Fig. 39: Surgical reconstruction of the urethra (a). An absence of bulbar urethra is confirmed. VCUG after urethroplasty (b).

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**Fig. 40:** In a VCUG (a) and RU (b) some years later, the images showed ptosis of the urethroplasty.

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**Fig. 41:** 80 year-old patient with traumatic urethral injury with pelvic fracture. VCUG through suprapubic catheter (a) depicts an absence of bulbomembranous urethra segment. It was repaired with urethroplasty (b) which later showed stenosis in VCUG (c) confirmed with cystoscopy.

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**Fig. 42:** Incidental finding in abdominal CT (a) consistent of hypodense image adjacent to bulbous urethra. RU (b) showed no pathologic findings.

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Fig. 43: Later, in VCUG (a) an image suggestive of urethral diverticulum was seen (arrow) in bulbous segment. It was confirmed with MR, as a periurethral image, highly hyperintense in T2-weighted images.

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Conclusion

Urethral pathology affects mainly adult males. Nowadays, iatrogenic causes are the most frequent etiology. It is important to be familiarized with normal anatomy and pathologic imaging manifestations to be able to detect abnormalities. In addition to this, therapeutic options must be known in order to recognize imaging findings related to treatment.


