

Urethral stricture disease

Altaf Mangera

Christopher R Chapple

Abstract

Urethral stricture disease affects many men worldwide. A number of options exist for the treatment of this disease ranging from the more simple intermittent self dilatation, urethrotomy and dilatation, to the more technically demanding anastomotic and substitution urethroplasty. We discuss the aetiology, presentation, investigation and management of this disease. With a better understanding of the underlying pathophysiology and by adequately investigating the patient an informed decision may be made leading to good patient satisfaction and surgical success rates.

Keywords Dilatation; flow rate; urethra; urethral stricture; urethroplasty; urethrotomy

Introduction

A urethral stricture, as the term implies, is a narrowing of the urethra. A 'true' stricture is the result of ischaemic spongiofibrosis manifesting as scar tissue in the spongy erectile tissue (corpus spongiosum). Contraction of this scar tissue leads to a decrease in the urethral calibre, which in turn leads to a reduction in flow of urine and difficulty voiding. This is in contradistinction to urethral distraction injuries that occur as a result of blunt trauma distracting the two ends of the urethra apart, which can also lead to similar symptoms.

Owing to the longer male urethra the vast majority of urethral strictures affect males, therefore we have concentrated upon these more and discussed female urethral strictures separately. With strictures, occasionally a specific cause may be identified; however, the majority are idiopathic. Specific causes related to urethral strictures include:

- **Congenital** – a 'cobb's collar' which is a rare congenital abnormality commonly found in the bulbar urethra. There is no involvement of the underlying corpus spongiosum or urethral sphincter.
- **Iatrogenic** – most commonly following instrumentation of the urethra. Approximately 20% of patients will have a stricture due to iatrogenic causes. However, the incidence of these cases is declining due to more sophisticated cystoscopes and fewer indications for performing cystoscopies in boys. Traumatic catheterization is a common cause and

this risk is reduced by ensuring a well lubricated urethra. Finally, surgical intervention in young patients (most commonly hypospadias repair) also predisposes to urethral stricturing later in life.

- **Infection** – genitourinary infections such as gonococcal urethritis are much less common than a few decades ago due to greater awareness of sexually transmitted diseases and the successful use of antibiotics.
- **Inflammation** – lichen sclerosis (previously called balanitis xerotica obliterans) is a progressive inflammatory condition thought to have an autoimmune basis. The lesions occur as plaques on the prepuce or glans and may extend to affect the entire anterior urethra.
- **Trauma** – urethral trauma is relatively rare, and can range from mild contusion with preservation of epithelial continuity to a partial tear of the urethral epithelium, or full urethral transection, possibly combined with transection (e.g. pelvic fracture urethral distraction injuries). Urethral injuries are associated with pelvic fractures and caution should be applied when catheterizing such patients, especially if resistance is experienced or there is the presence of blood at the external urethral meatus. Urethral injuries in females are very rare owing to the short and mobile female urethra having no significant attachments to bone.

Anatomy and development of the urethra

The urethra develops from the hindgut. The terminal portion of the hindgut (cloaca) is subdivided posteriorly into the anorectal canal and anteriorly into the urogenital sinus by the formation of the urogenital septum. The definitive urogenital sinus develops into the prostatic, membranous and penile urethra distal to the entrance of the mesonephric ducts.

The urethra commences at the bladder neck and extends to the external urethral meatus (Figure 1). In the male, the 'posterior' urethra is approximately 5 cm long and includes the prostatic and membranous urethra. The distal urethral sphincter lies between the membranous and bulbar urethra. The anterior urethra is approximately 15 cm long and includes the bulbar and penile urethra. Commencing at the inferior surface of the perineal membrane, the corpus spongiosum is enlarged forming a 'bulb'. Having pierced the perineal membrane the urethra enters this bulb and immediately changes direction almost 90° degrees from downwards to forwards. This 90° bend is a common place for a catheter to get stuck and create a false passage. Also a straight cystoscope will flatten this bend and risks causing a stricture due to pressure. The bulb narrows back to normal forming the corpus spongiosum on the ventral aspect of the penis. The urethra opens at the external urethral meatus at the tip of the glans penis.

The calibre of the urethra and the configuration of the corpus spongiosum varies along its length; the bulbar urethra is the widest portion (33–36 French) and the narrowest part of the urethra is the external urethral meatus (21–27 French), with a pre-terminal dilation at the navicular fossa. The corpus spongiosum is thickest in the bulbar urethra and thinnest in the penile urethra.

The anterior urethra has a segmental blood supply arising chiefly from the internal pudendal arteries and dorsal arteries of the penis, and venous drainage is likewise to the internal pudendal veins and dorsal penile veins. Lymphatic drainage occurs

Altaf Mangera MB ChB(Hons) MRCS is a Urology Specialist Registrar in the Department of Urology Research, Sheffield Teaching Hospitals NHS Trust, Royal Hallamshire Hospital, Sheffield, UK. Conflicts of interest: none declared.

Christopher R Chapple BSc MD FRCS is visiting Professor of Urology at Sheffield Hallam University and Consultant Urological Surgeon at the Royal Hallamshire Hospital, Sheffield, UK. Conflicts of interest: none declared.

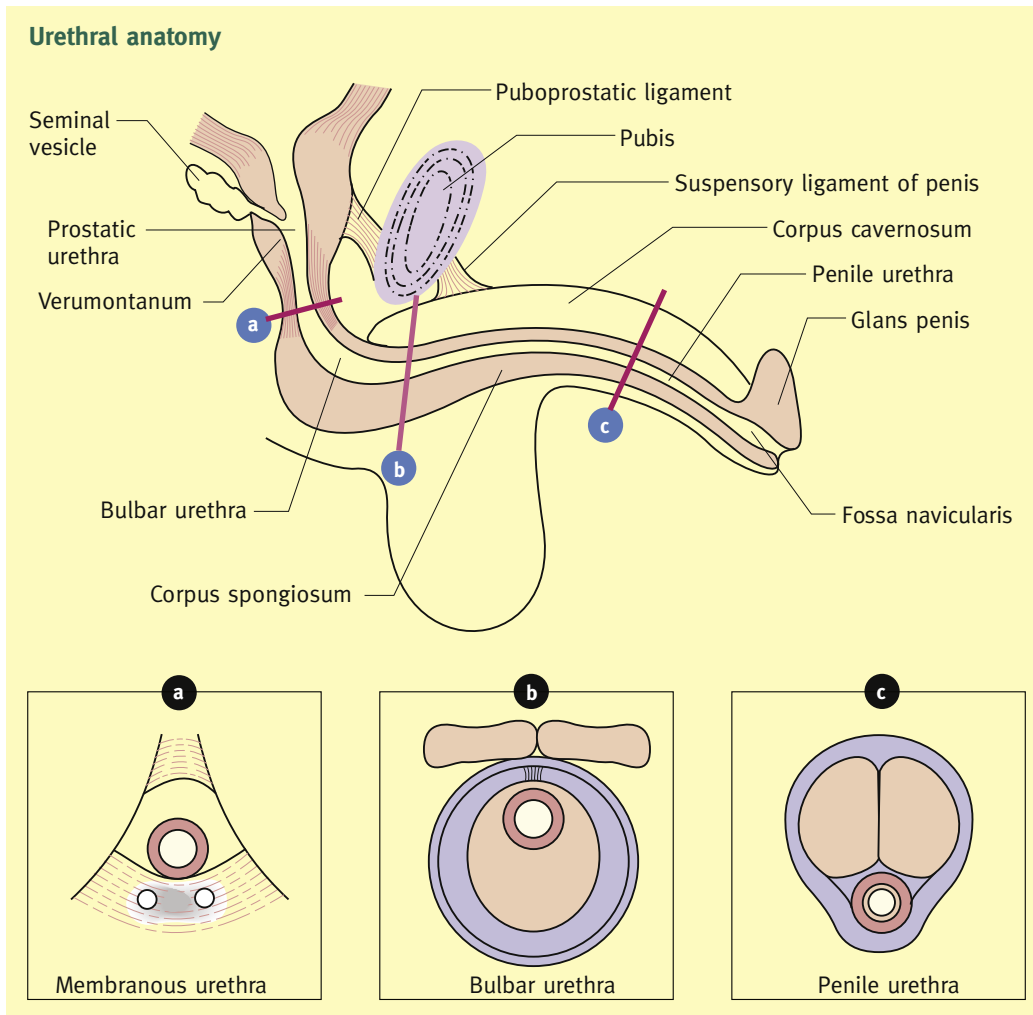


Figure 1

to the internal iliac nodes. The nerve supply originates from the S2–S4 level (Onuf's nucleus), and provides voluntary control of the external urethral sphincter, lying in the posterior urethra. The posterior urethra is lined by transitional epithelium and the anterior urethra by stratified columnar epithelium.

Clinical features

Patients with urethral stricture disease become symptomatic only after the urethral calibre falls below approximately 10 French. The presenting complaints are of poor flow, straining to void, incomplete bladder emptying, terminal dribbling, spraying of stream, urinary retention or recurrent urinary tract infections. History taking should include questions on previous trauma, catheterization and urethral instrumentation. In addition to this a sexual history may be valuable. Examination should include inspection of the external urethral meatus with the foreskin retracted, looking for a white thickened area (lichen sclerosis), palpation along the length of the urethra may identify areas of spongiofibrosis (firm palpable area), and digital rectal examination may reveal an enlarged prostate or identify co-existing inflammation (e.g. prostatitis – where the prostate is tender). A previous circumcision may indicate previous lichen sclerosis.

Investigations

The aim of investigations should be to shed light on a diagnosis, identify coexisting inflammation and help determine the location and extent of the stricture in order to aid in devising a management plan. The commonly used investigations are:

- **Urine dipstick and mid stream urine sample** – to rule out a urinary tract infection prior to commencement of treatment.
- **Urine flow rate** (Figure 2) – provides a useful non-invasive initial assessment of urine flow. A poor flow rate in a young individual will raise suspicion of a stricture. Although a normal flow rate does not exclude a urethral stricture as a stricture needs to be below 10 French to affect flow. Also the bladder may undergo compensatory hypertrophy thus maintaining the flow rate.
- **Flexible urethroscopy** – has simplified the evaluation of the urethra. It can be performed under local anaesthesia with minimal discomfort. The urethroscope is passed to the stricture and the urothelium examined visually. An ischaemic stricture looks white or grey. Occasionally the urethra may be too scarred or the fibrosis too dense to advance the flexible cystoscope (which is approximately 18 French).

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