Urethral Stricture : Causes, Symptoms and Treatment

A **urethral stricture** is a pathological narrowing of the urethral lumen caused by fibrosis and scar tissue formation. This narrowing leads to partial or complete obstruction of urine flow, which can result in significant urinary tract symptoms and, if untreated, may cause upper urinary tract damage and renal impairment.

Etiology and Classification

Urethral strictures can be **congenital** or **acquired**. The majority of strictures are acquired and typically arise from:

- **Trauma:** Including blunt pelvic injury (often associated with pelvic fractures causing posterior urethral injury), or iatrogenic trauma such as catheterization, urethral instrumentation, transurethral surgeries (e.g., prostatectomy, TURP), or radiation therapy (brachytherapy).
- **Infections:** Chronic or untreated urethritis, especially from sexually transmitted infections like *Neisseria gonorrhoeae*, is a classical cause of anterior urethral strictures. Bacterial urethritis accounts for approximately 20% of strictures.
- **Inflammatory Disorders:** *Balanitis xerotica obliterans* (BXO), also known as lichen sclerosus, is a chronic inflammatory condition predominantly affecting the distal (penile) urethra and surrounding tissue, leading to stricture formation.
- **Idiopathic:** A subset of strictures has no identifiable cause.

Anatomical distribution:

- Bulbar urethra strictures (approximately 50%) — most common.
- Penile urethra strictures (~30%).
- Strictures at the navicular fossa (distal urethra) are less common.

The **bulbomembranous region** and **submeatal region** are the most frequent sites of stricture development.

Pathophysiology:
The urethra lies within the corpus spongiosum, and fibrosis often extends into the surrounding spongy tissue (spongiofibrosis), which can lead to extensive scarring and luminal obliteration.

Clinical Presentation

Patients typically present with:

- **Decreased urinary stream caliber and force** — early signs of significant luminal narrowing.
- **Obstructive urinary symptoms:** Prolonged urination time, weak stream, hesitancy, intermittent stream, and sensation of incomplete bladder emptying.
- **Irritative symptoms:** Increased frequency, urgency, and dysuria may also occur.

- **Acute urinary retention:** May be the first presentation in some patients.
- Compensatory **detrusor hypertrophy** can develop to overcome outlet resistance, sometimes visible as bladder wall thickening on ultrasound.

Diagnosis

A thorough **history and physical examination** are essential. Key diagnostic tools include:

- **Uroflowmetry:** Demonstrates a characteristic prolonged voiding time with a plateau-shaped low flow curve.
- **Retrograde urethrogram (RUG) / Ascending urethrogram:** The gold standard for diagnosis; it delineates the location, length, and severity of the stricture.
- **Cystourethroscopy:** Useful for direct visualization of the urethral lumen and to assess stricture characteristics.
- **Ultrasound:** May be used to evaluate spongiofibrosis and bladder wall thickness.

Management

General principles:

- Avoid blind transurethral catheterization in patients with suspected urethral strictures and urinary retention due to risk of urethral trauma and worsening fibrosis.
- In such cases, **suprapubic catheterization** is preferred for urinary drainage.

Definitive treatment options:

1. **Urethral Dilatation:**
    - Performed with graduated rigid or flexible dilators.
    - Can be done under direct visualization with a urethroscope or blindly by experienced clinicians.
    - Regular self-catheterization may be recommended to maintain urethral patency, typically once or twice weekly.
2. **Direct Visual Internal Urethrotomy (DVIU):**
    - Endoscopic incision of the stricture.
    - Most effective for short (<2 cm), primary strictures without extensive spongiofibrosis.
    - Limited success in recurrent or long strictures.
3. **Open Surgical Repair:**
    - **Excision and primary anastomosis:** Suitable for short bulbar strictures.
    - **Substitution urethroplasty:** Using grafts (buccal mucosa or skin) for longer or more complex strictures.
    - Recommended for recurrent or complex strictures to avoid repeated endoscopic failures.

Complications

- **Stricture recurrence** (re-stricturing) is common after dilatation or urethrotomy.
- **Bacteremia and urinary tract infections:** Can result from instrumentation; prophylactic antibiotics are advised before procedures.

- Typical prophylactic antibiotics include **gentamicin** and **amoxicillin-clavulanate** or tailored based on local resistance patterns.

Clinical Pearls

- **Bulbar urethral strictures are the most common type.**
- **Retrograde urethrogram is the diagnostic gold standard.**
- **Avoid blind urethral catheterization in urinary retention due to stricture; perform suprapubic cystostomy instead.**
- **Internal urethrotomy is only effective for short (<2 cm), first-time strictures.**
- **Repeated urethrotomy increases the risk of stricture lengthening; consider open surgery for recurrent strictures.**
- **Balanitis xerotica obliterans is a key inflammatory cause and should raise suspicion in distal strictures.**
- **Antibiotic prophylaxis before instrumentation reduces the risk of bacteremia.**