Vesicoureteral Reflux

Vesicoureteral Reflux (VUR): Retrograde urine flow from bladder into the upper urinary tract (UT). It is a structural or functional abnormality that can predispose patients to renal scarring in the setting of UTI.

Clinical Relevance

While not always clinically significant, VUR accompanied by UTIs, can result in **renal scarring** and **potentially progress to reflux nephropathy.**

Presentation

- May be asymptomatic or have lower/upper UTI (non-specific symptoms & can be hard to elicit in infants; consider fever, irritability, dysuria, etc.)
- VUR may be identified after investigation of antenatal hydronephrosis or febrile UTIs

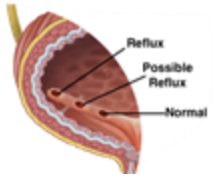
History

- **Recurrent febrile or non-febrile UTI**
- **Family history of VUR**
- Bladder/bowel dysfunction
- Hydronephrosis (found incidentally on pre or postnatal renal U/S, raising suspicion for VUR)

Pathophysiology

Primary VUR

Inadequate closure of the ureterovesical junction (UVJ), due to a short intravesical ureter



Secondary VUR

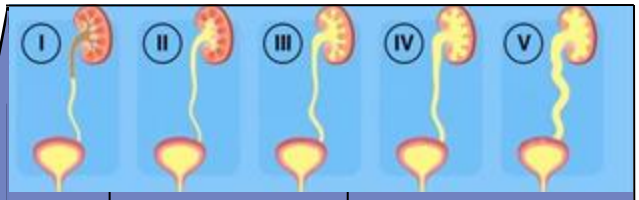
High voiding pressure in the bladder resulting in failure of UVJ closure during bladder contraction

Examples include:
- Posterior Urethral Valves
- Neurogenic Bladder
- Bowel/Bladder Dysfunction

Diagnosis

Voiding Cystourethrogram (VCUG)

- Gold standard for diagnosing/grading VUR
- Utilizes urethral & bladder fluoroscopy with contrast
- Allows direct visualization of UT anatomy & urine flow directionality
- Requires catheter insertion, can be uncomfortable for kids



Grade	Ureteral Dilation	Renal Pelvis Dilation
I	None	None
II	None	None
III	Mild/Moderate	Moderate
IV	Moderate	Moderate
V	Gross with kinking	Severe

* Orange boxes indicate extent of urine reflux

Primary VUR Management

Based on presentation severity, age, extent of renal scarring, and VUR grade.

Conservative Approach

Prompt treatment of culture proven UTIs based on sensitivity. Low grade VUR often spontaneously resolves.

Antibiotic Prophylaxis

Used in the setting of recurrent UTI or high-risk patients with concerns of renal scarring. TMP-SMX/nitrofurantoin commonly chosen. Amoxicillin for 2 months old or less.
Duration should be limited due potential risks including resistant organisms and medication side effects.

Endoscopic or Open Surgical Correction

Reserved for patients with unresolved VUR experiencing recurrent UTI after failing antibiotic prophylaxis.

Antibiotic Treatment of UTI

1. Empiric Tx if positive urinalysis & UTI symptoms.
2. Then tailer choice based on culture/sensitivities.

PO: TMP-SMX, 2nd/3rd generation cephalosporins (eg. Cefixime) or amoxicillin-clavulanate
IV*: 3rd generation cephalosporins (eg. Ceftriaxone)

*for example: bacteraemic/septic patients, age < 2 months, unable to tolerate to oral abx, etc.

Secondary VUR Management

Treat underlying cause. Anatomic abnormalities may be treated surgically. Patients may require intermittent catheterization to treat retention and reduce bladder pressures.

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