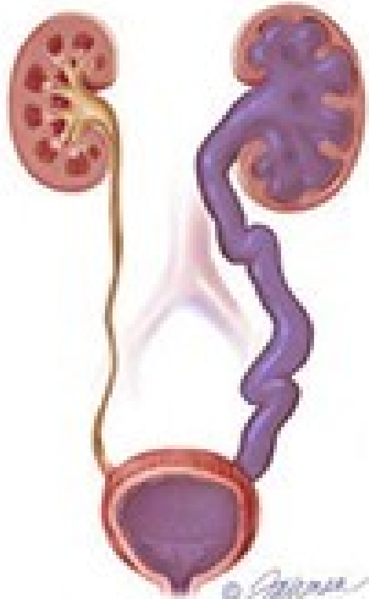
Vesicoureteral Reflux



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Definition and epidemiology

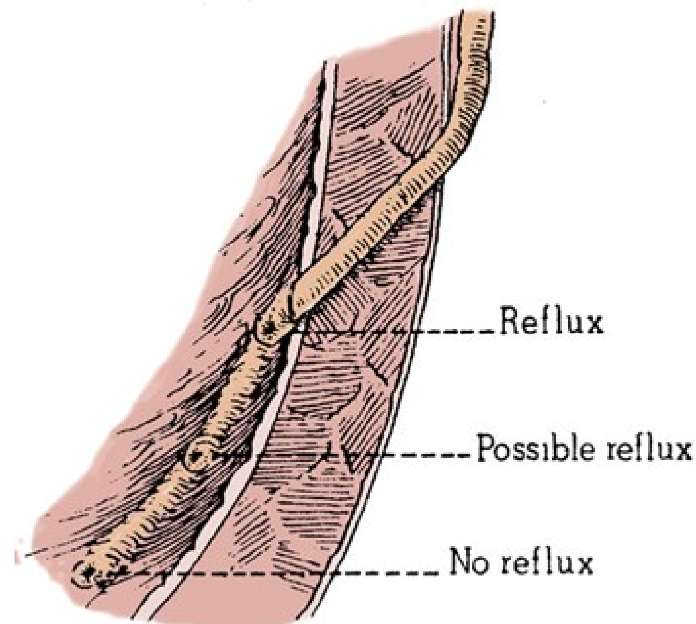
- vesicoureteral reflux (VUR) represents the retrograde flow of urine from the bladder to the upper urinary tract.
- it is responsible for pyelonephritic scarring and can be associated with congenital renal dysmorphism.

- *Prevalence* : In contrast, reflux may be present in up to 70% of infants who present with UTI .
- Gender: smaller than 1 year male>female
- 1 y < female >male

- Inheritance and Genetics : The latter finding undeniably supports the notion that VUR can be an inherited condition
- Age: As stated previously, because the natural history of reflux involves spontaneous resolution over time .

Pathophysiology

- : 1- the length of intramural portion of ureter that travels within the detrusor muscle(normal 1.5- 2 cm)
- 2- peristaltic activity of ureter



Etiology of Vesicoureteral Reflux

- **Primary** VUR: reflux is considered primary if the main reason for it is a fundamental deficiency in the function of the UVJ antireflux mechanism while remaining factors (bladder and ureter) remain normal
- **Secondary** VUR : Secondary reflux, then, implies reflux caused by overwhelming the normal function of the UVJ. Bladder dysfunction of a congenital, acquired, or behavioral nature is often the root ary reflux.

Lower Tract Urinary Tract Infection and Reflux

- *Reflux is not a general cause of UTI*.
- In the absence of bladder symptoms or inflammation, reflux is most readily considered a clinical accelerant of bacteriuria by mechanically delivering infected urine to the renal pelvis.

Diagnosis and Evaluation of Vesicoureteral Reflux

- **Confirmation of Urinary Tract Infection:** Because preventable reflux nephropathy is predicated on the combined effects of UTI and reflux, confirming and documenting true UTI is paramount in the appropriate management of the patient with reflux.
- In patients who can void spontaneously, a clean voided midstream catch specimen is preferred.
- In patients who cant void spontaneously : urinary catetherization in females and suprapubic aspiration in males is prefered .

- radiographic investigation **for VUR has generally been directed to children younger than 5 years old with a febrile UTI, and any male with a UTI regardless of age or fever, unless sexually active.**
- **Assessment of the Lower Urinary Tract :**
- **1- Cystographic Imaging :** The voiding cystourethrogram (VCUG) constitute the present-day gold standard approache to reflux detection.
- 2- radionuclid cystography
- 3- ultrasonography

Grading of Reflux

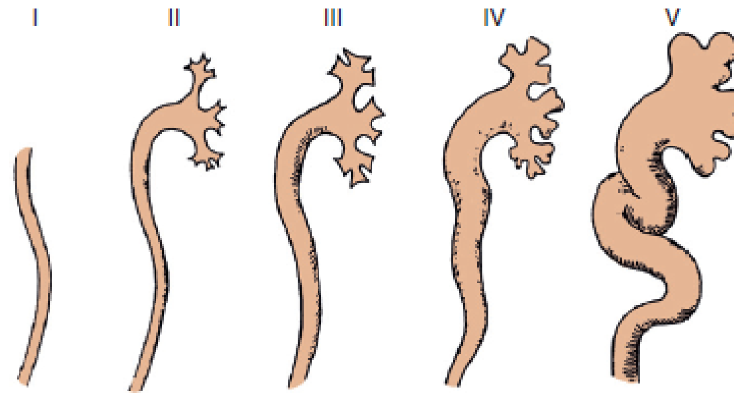


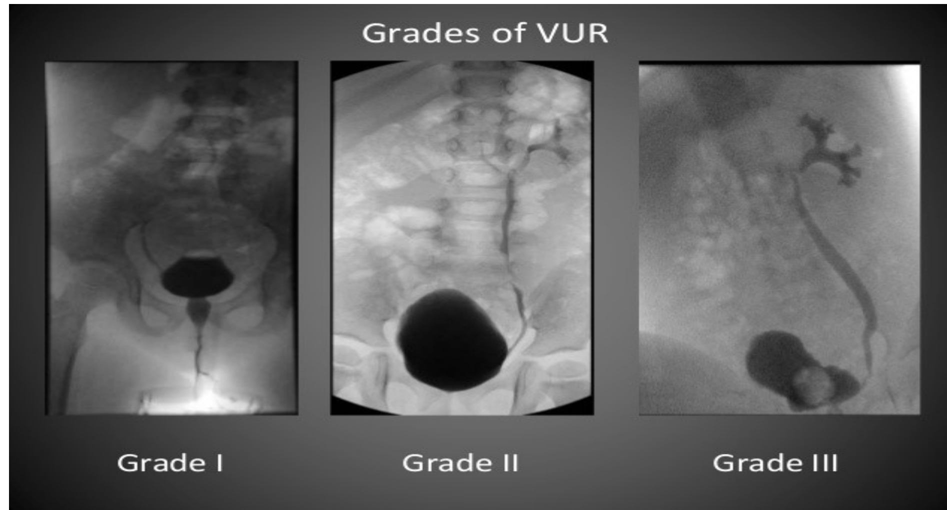
Figure 122–3. International classification of vesicoureteral reflux.

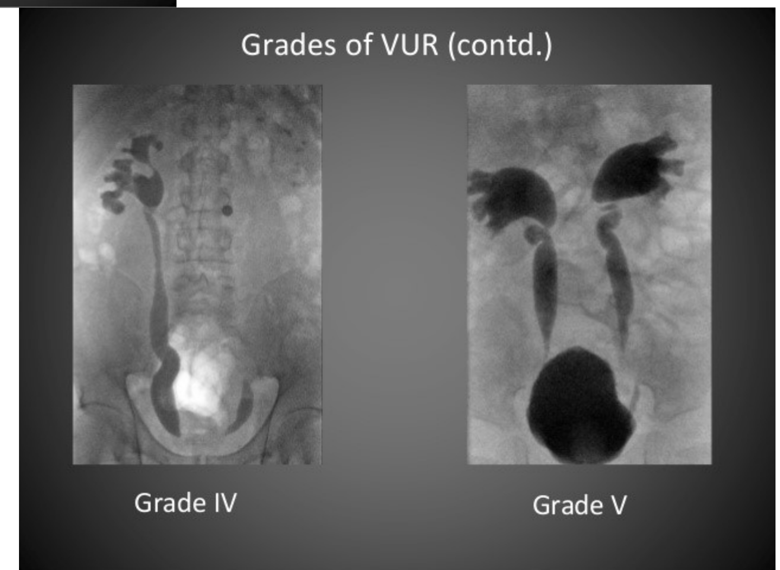
Table 122–3.

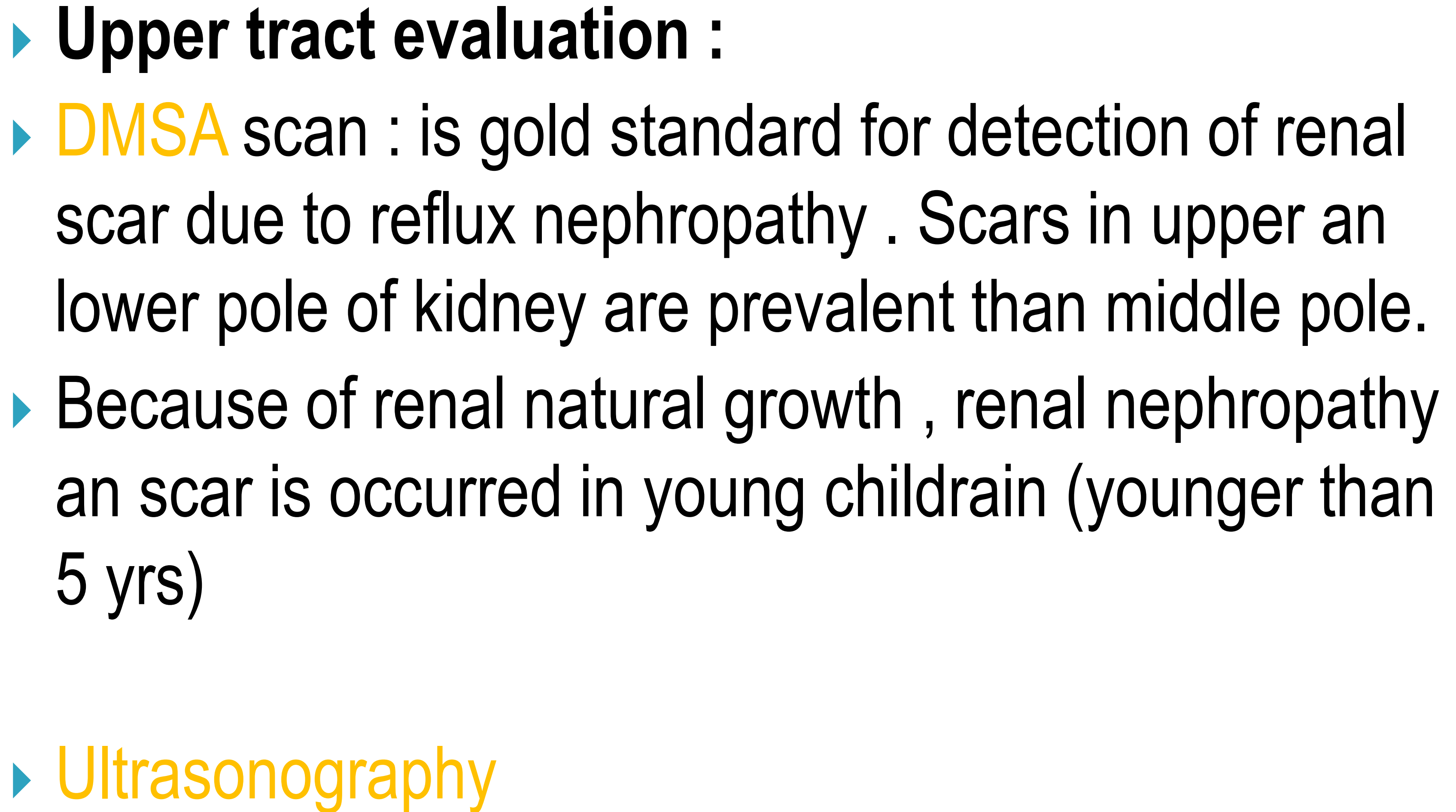
International Classification of Vesicoureteral Reflux

GRADE	DESCRIPTION
1	Into a nondilated ureter
2	Into the pelvis and calyces without dilatation
3	Mild to moderate dilatation of the ureter, renal pelvis, and calyces with minimal blunting of the fornices
4	Moderate ureteral tortuosity and dilatation of the pelvis and calyces
5	Gross dilatation of the ureter, pelvis, and calyces; loss of papillary impressions; and ureteral tortuosity

VUR grade on VCUG

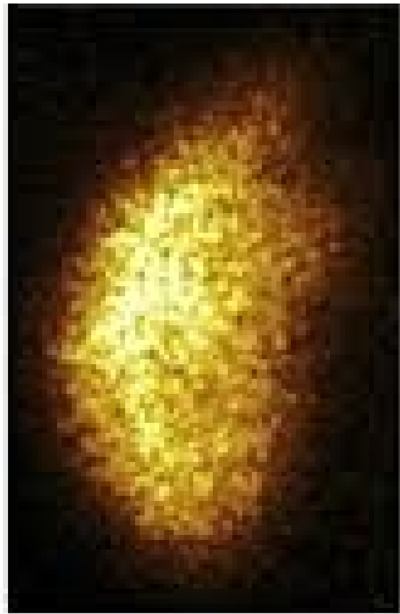




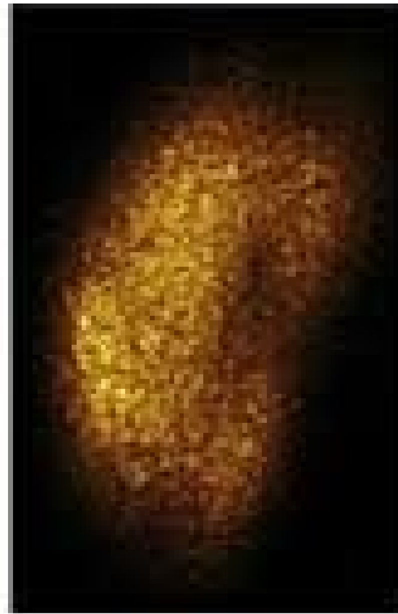

Upper tract evaluation :
DMSA scan : is gold standard for detection of renal scar due to reflux nephropathy . Scars in upper an lower pole of kidney are prevalent than middle pole.
Because of renal natural growth , renal nephropathy an scar is occurred in young childrain (younger than 5 yrs)
Ultrasonography

Upper evaluation with DMSA

DMSA 0
normal



DMSA 1
minimal



DMSA 2
moderate

DMSA 3
severe

Associated Anomalies and Conditions

- **Ureteropelvic Junction Obstruction:** The incidence of VUR associated with UPJO ranges from 9% to 18%. high-grade reflux being five times more likely to be associated with UPJO than lower grades of reflux .
- **Ureteral Duplication**
- **Bladder Diverticula**
- **Renal Anomalies :** MCDK and renal agenesis

Natural History and Management

- **Resolution by Grade**
- Most cases(60-80 %) of low-grade reflux (grade 1 and 2) will resolve
- Grade 3 reflux will resolve in approximately 50% of cases
- Very few cases of highergrade reflux (grades 4 and 5, and bilateral grade 3) will resolve spontaneously.
- **Resolution by Age**
- VUR in neonates and young children, will demonstrate the greatest tendency to resolve .

Management

- **Medical Management:**
- a core principle of medical management of VUR is prevention and treatment of UTI .
- Often, antibiotics are given as oral suspensions once per day and preferably at night.
- For children younger than 2 months of age, the most commonly used medications is amoxicillin.
- After 2 months of age, the antibiotic of choice becomes trimethoprim-sulfamethoxazole .

- Patients on medical treatment must follow with urine analysis and culture. If pyelonephritis occure , VCUG should be done.

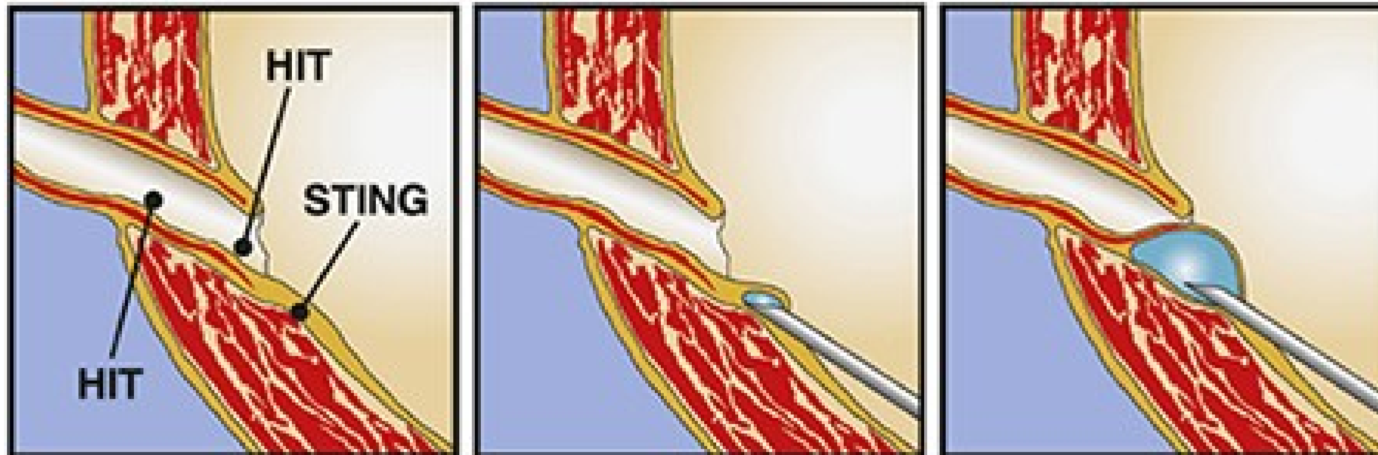
- Standard treatment (full dose antibiotic) for febrile UTI should be advised , followed by prophylactic single dose at day .

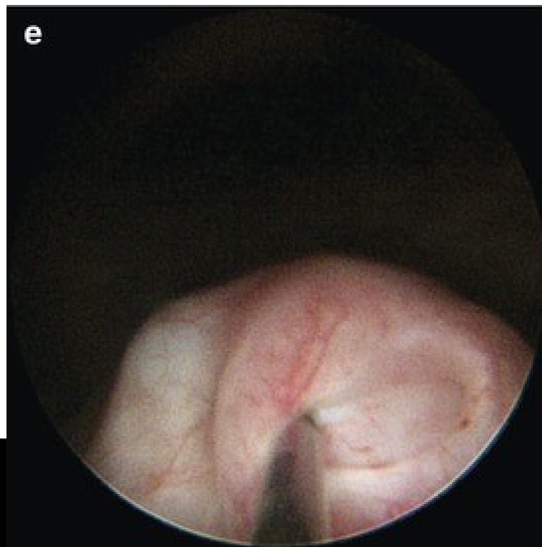
Surgical Management

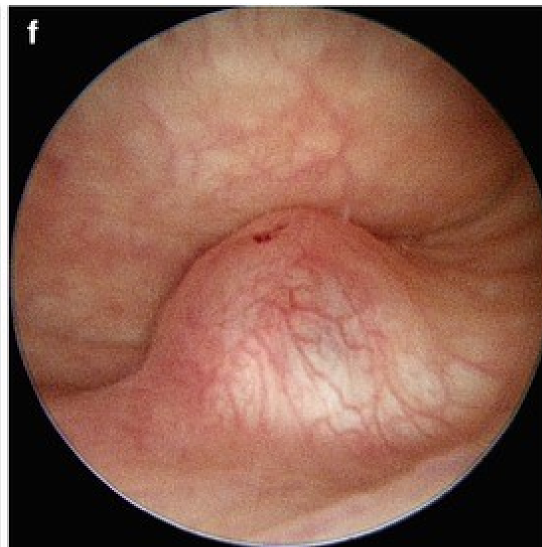
- Indications :
- 1- medical treatment failure
- 2- develop of new scar
- 3- develope of HTN nd reflux nephropathy
- 4- Anatomical anomaleis such “hutch divericulum
- 5- persistance of VUR over 5 years (contraversial)

- **Surgical management** approaches :
- **Endoscopic** : injection of bulking agents ito the ureteral hiatus submucusa
- **Open repair** is based on lenghtening of intramural ureter and change of uretero vesical junction position .

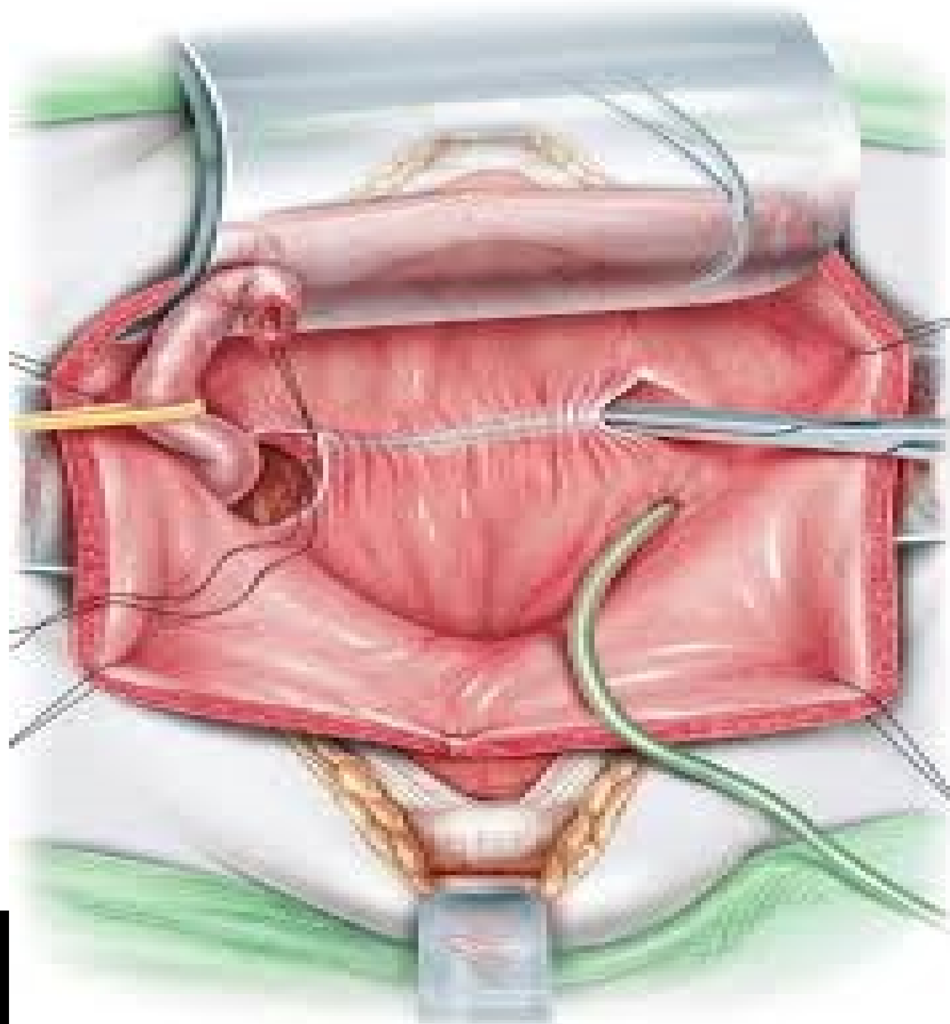
VUR Endoscopic surgery







VUR Open surgical repair



Treatement by grading

- Grade 1&2 :medical treatment
- 3 : medical and surgical
- 4&5 surgery
- very young infants (younger than 1 yr) with VUR will manage medicaly regardless of grade of VUR

Screening siblings for vesicoureteral reflux

- The mean incidence of reflux in siblings in all studies was 32%