Vesicoureteral Reflux

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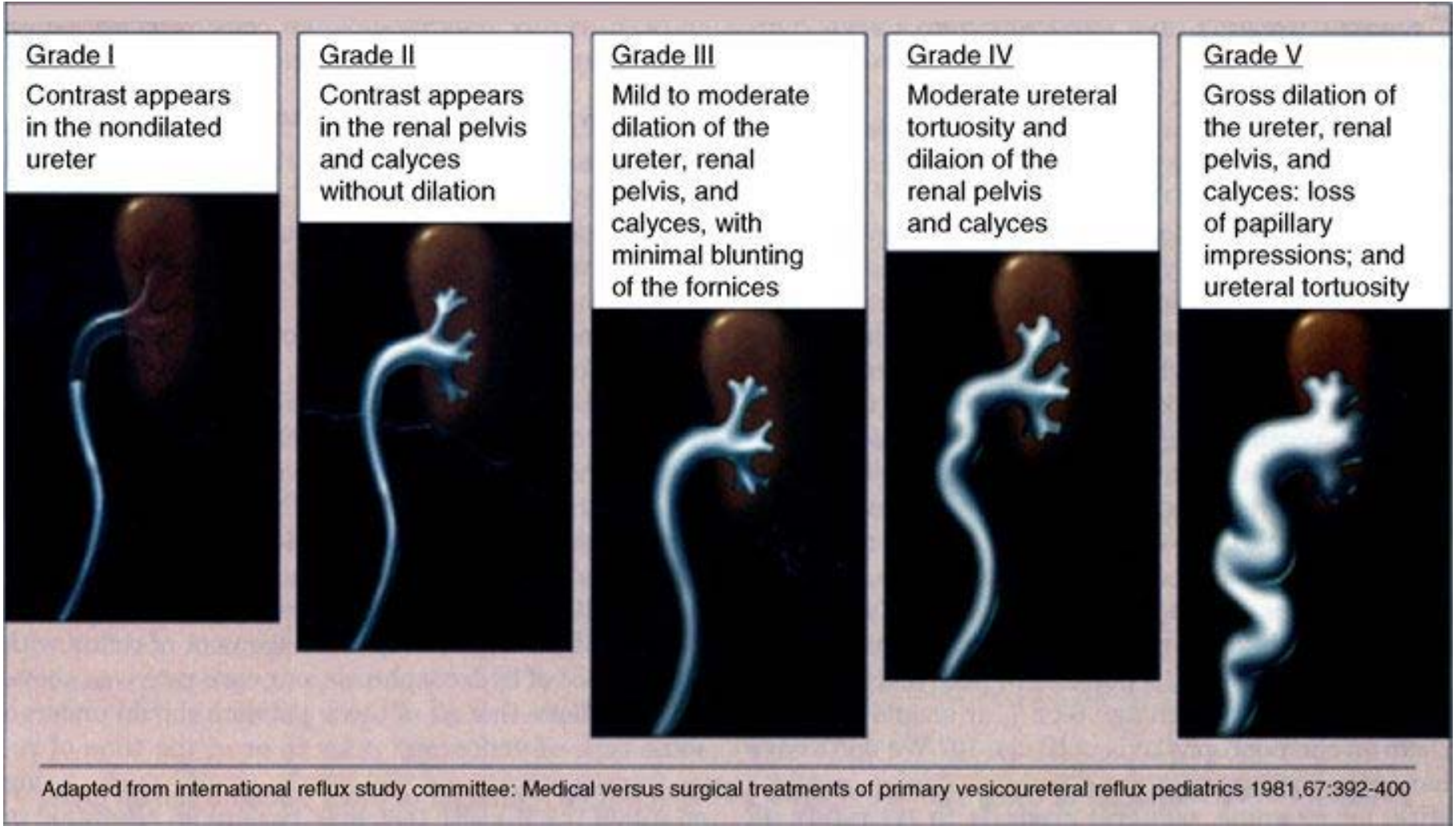
What is reflux?

- Retrograde flow of urine from the bladder upwards toward the kidney
- Anatomical or functional abnormality
- If there is infection reflux from from bladder to kidney→ pyelonephritis (infection of kidneys) and susceptibility to recurrent UTI → renal scarring → ESRD

How do you diagnose reflux?

- True way is via voiding study (Voiding cystourethrography: VCUG)
- Renal US does NOT diagnose reflux
- There is a grading system I-V
- Grade I- most minimal reflux
- Grade V- most severe
- Grade IV and V- dilating reflux → ureter, pelvic and calyces


Grade I
Contrast appears in the nondilated ureter
Grade II
Contrast appears in the renal pelvis and calyces without dilation
Grade III
Mild to moderate dilation of the ureter, renal pelvis, and calyces, with minimal blunting of the fornices
Grade IV
Moderate ureteral tortuosity and dilaion of the renal pelvis and calyces
Grade V
Gross dilation of the ureter, renal pelvis, and calyces: loss of papillary impressions; and ureteral tortuosity
Adapted from international reflux study committee: Medical versus surgical treatments of primary vesicoureteral reflux pediatrics 1981,67:392-400

Epidemiology

- 10% of patients evaluated postnatally for antenatally diagnosed hydronephrosis have VUR
  - Boys > girls
  - Mostly high grade
- Incidence of reflux among children evaluated because of UTI is 25-40%
- There is 30-50% chance of VUR if patient has a sibling with VUR
- Girls with VUR have 65% of having a kid with VUR
- More common in Caucasian

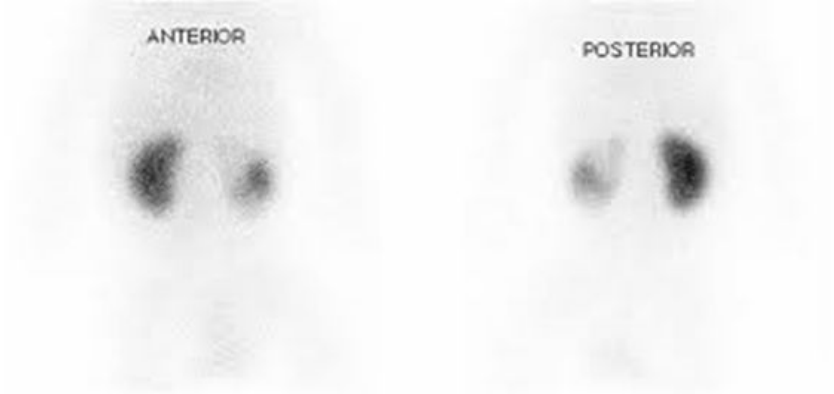
Pathogenesis

- Primary vs Secondary
- Primary reflux due to intrinsic anatomic abnormality in ureterovesical junction
- Secondary reflux due to overt bladder or outlet pathology such as neurogenic bladder or posterior urethral valve.
- High voiding pressures or high urinary storage pressures can result in reflux

Diagnosis

- If prenatally diagnosed → renal ultrasound and VCUG
- If febriles UTI
  - First episode→ renal US → if hydronephrosis → VCUG
  - Second episode→ VCUG
  - Always have high index of suspicion for UTI in febriles infants and toddlers
- 50% of kids with VUR III and IV → will have scarring at time of diagnosis
- DMSA scan is true way to see scaring:
  - Quantification of differential function of the kidney
  - Assessment for cortical defect
  - Acute infection/Pyelonephritis

DMSA scan



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- normal: homogenous uptake of the radioisotope throughout the kidneys with preservation of the renal contour
- with acute pyelonephritis or renal scarring: focal or diffuse areas of decreased uptake

Management

- Controversial
- Use to be antibiotic prophylaxis to prevent recurrent infection or until need for surgery or just continued nonoperatively to prevent scarring
- Antibiotics used for prophylaxis: Bactrim and Amoxicillin in neonate, Nitrofurantoin for older children
- Surgery for V reflux or if breakthrough UTI while on antibiotics
- However RIVUR study in 2014- showed that there was no difference between placebo group and prophylaxis group in terms of renal scarring
    - recurrence of UTIs in the prophylaxis group was less than placebo group
- So evaluation should be case by case basis; pre existing renal conditions, practitioner preference, history of UTIS alters the management.

References

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