

RADY 401 Case Presentation

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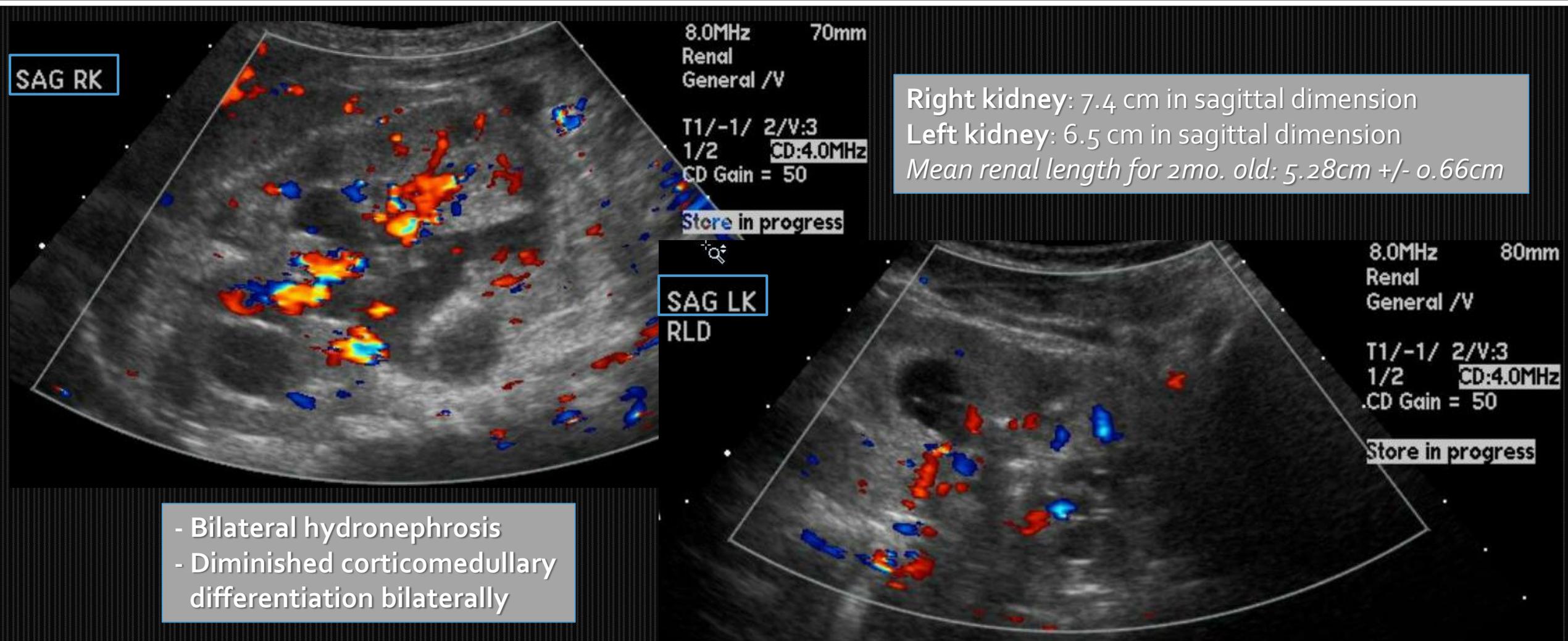
Focused patient history and workup

- 2-month-old male, former term infant, born via NSVD, presented w/ 5 day hx of fever
- Was seen by PCP and was found to have a UA with 15 WBC's, no RBC's. Was given one shot of IM Ceftriaxone (Rocephin)
- Patient returned to his PCP and had labs drawn which showed a potassium of 7.2, BUN of 39 and creatinine of 5.2. Parent's described infant as being "puffy"
- Was seen in outside ED, received IV Ceftriaxone (Rocephin) and Sodium Polystyrene Sulfonate (Kayexalate) for hyperkalemia, and then was transferred to UNC

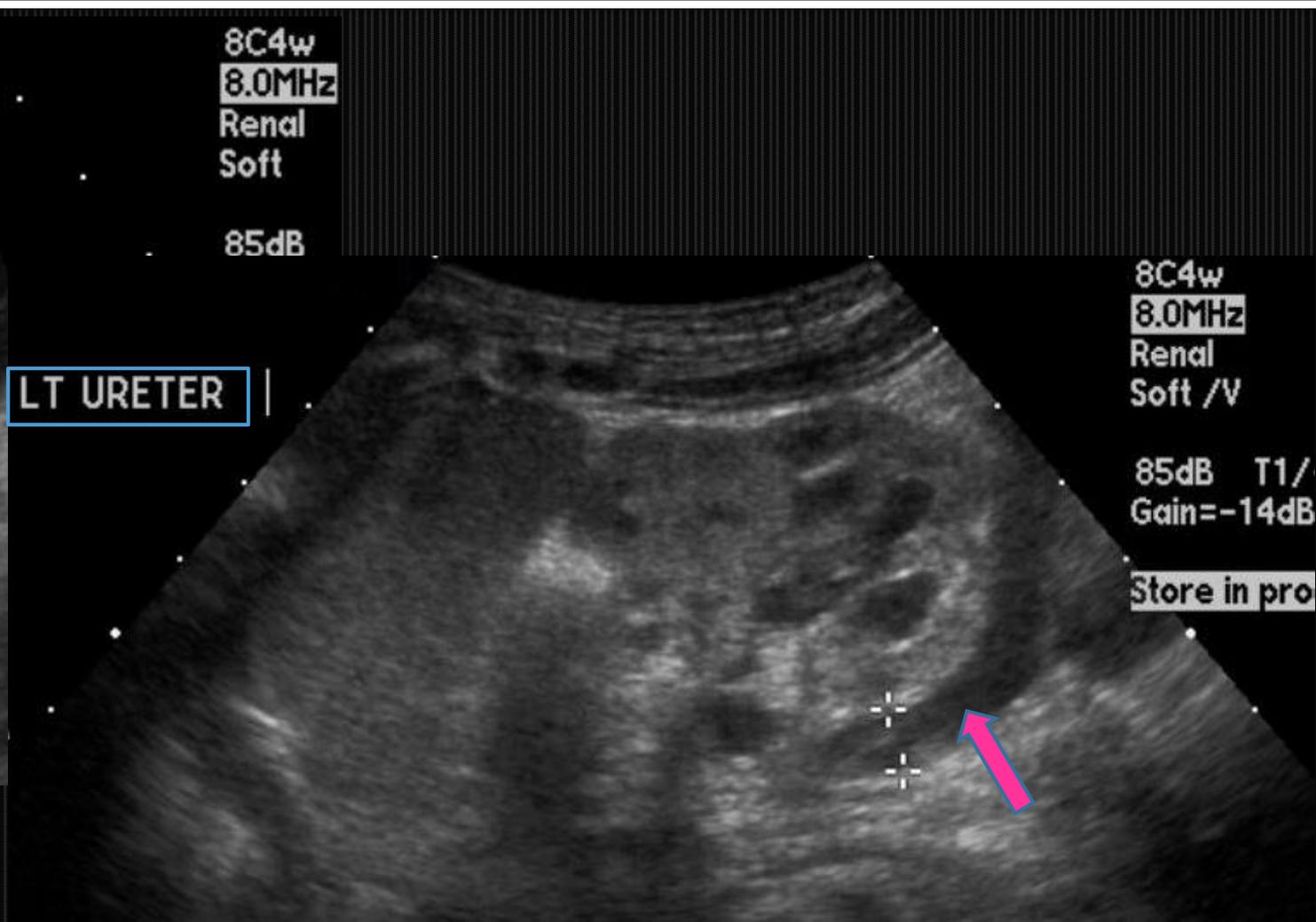
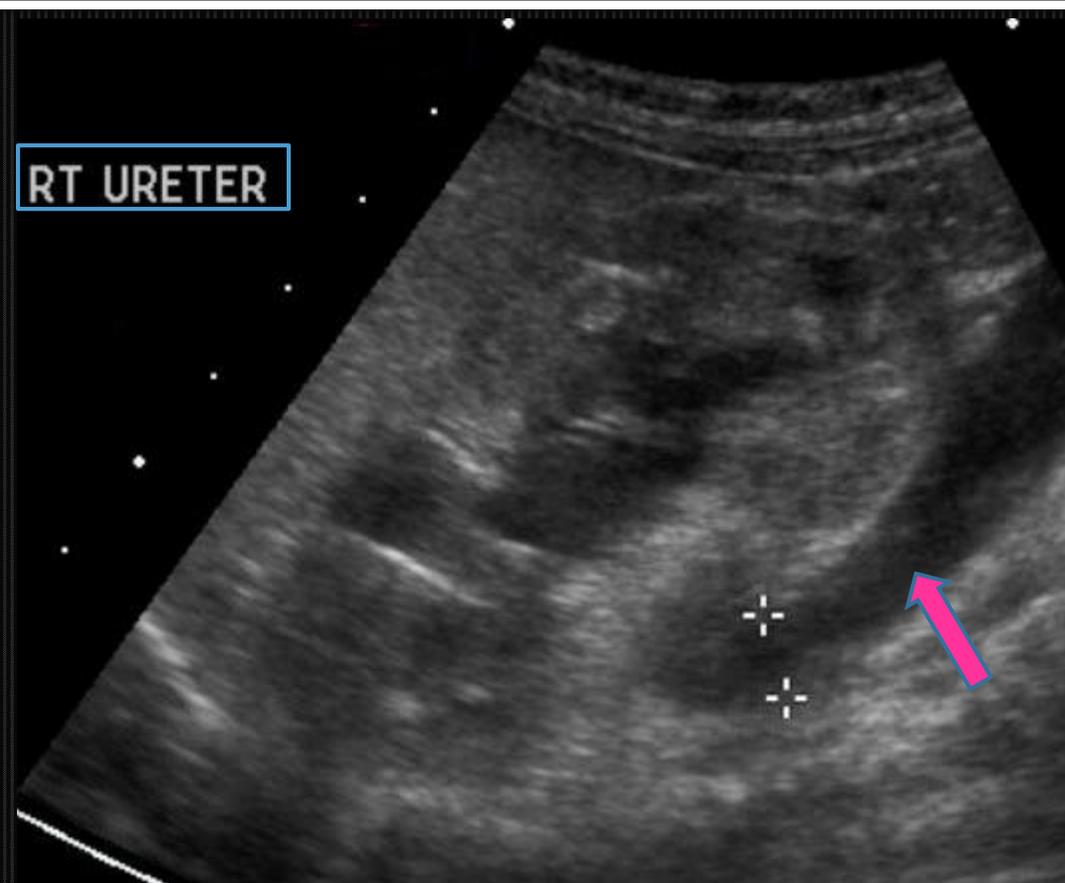
List of imaging studies

- Renal ultrasound
- Fluoroscopic voiding cystourethrogram (VCUG)

Imaging studies: Renal and Bladder Ultrasound

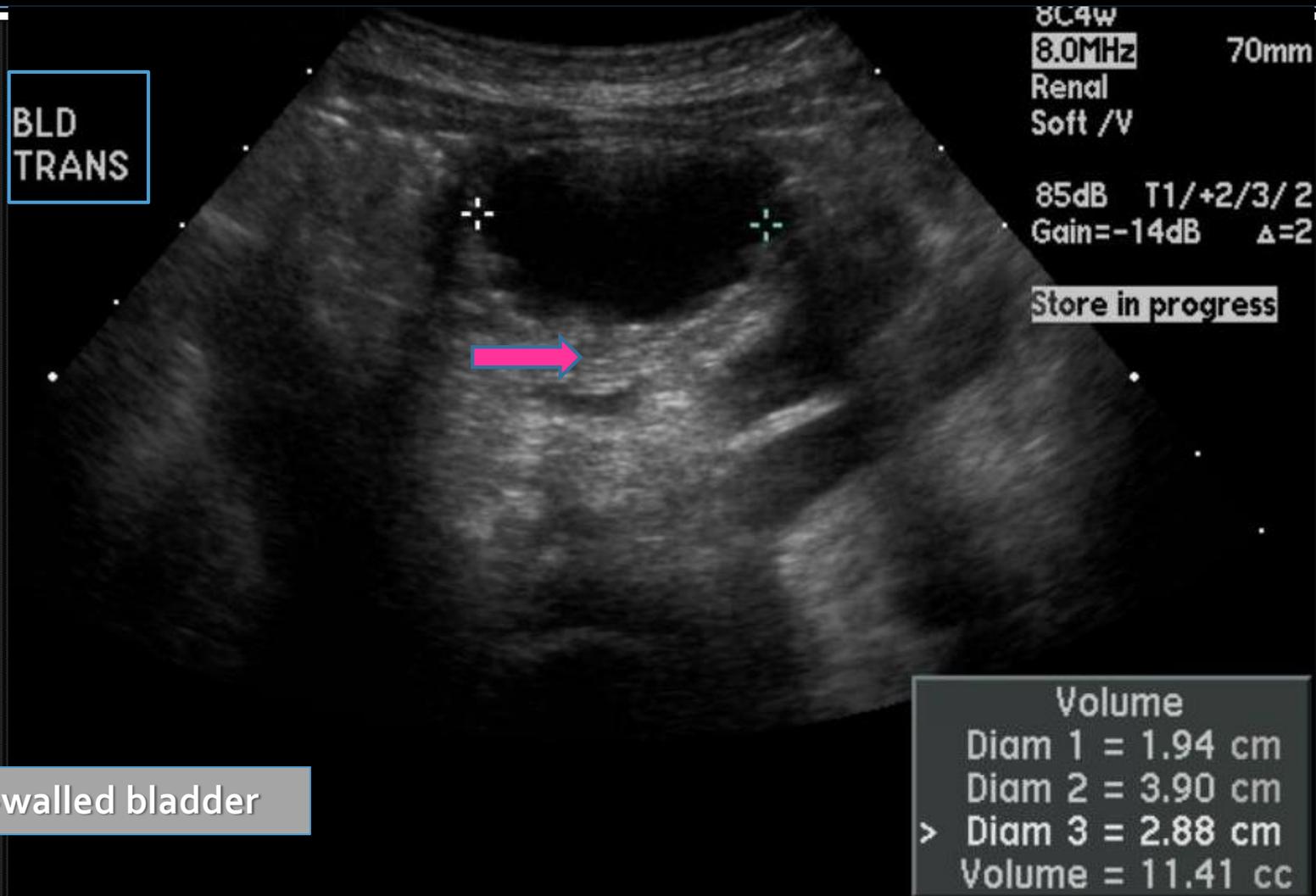


Imaging studies: Renal and Bladder Ultrasound



- Bilateral hydroureters

Imaging studies: Renal and Bladder Ultrasound



- Small thick-walled bladder

Imaging studies: Voiding cystourethrogram (VCUG)



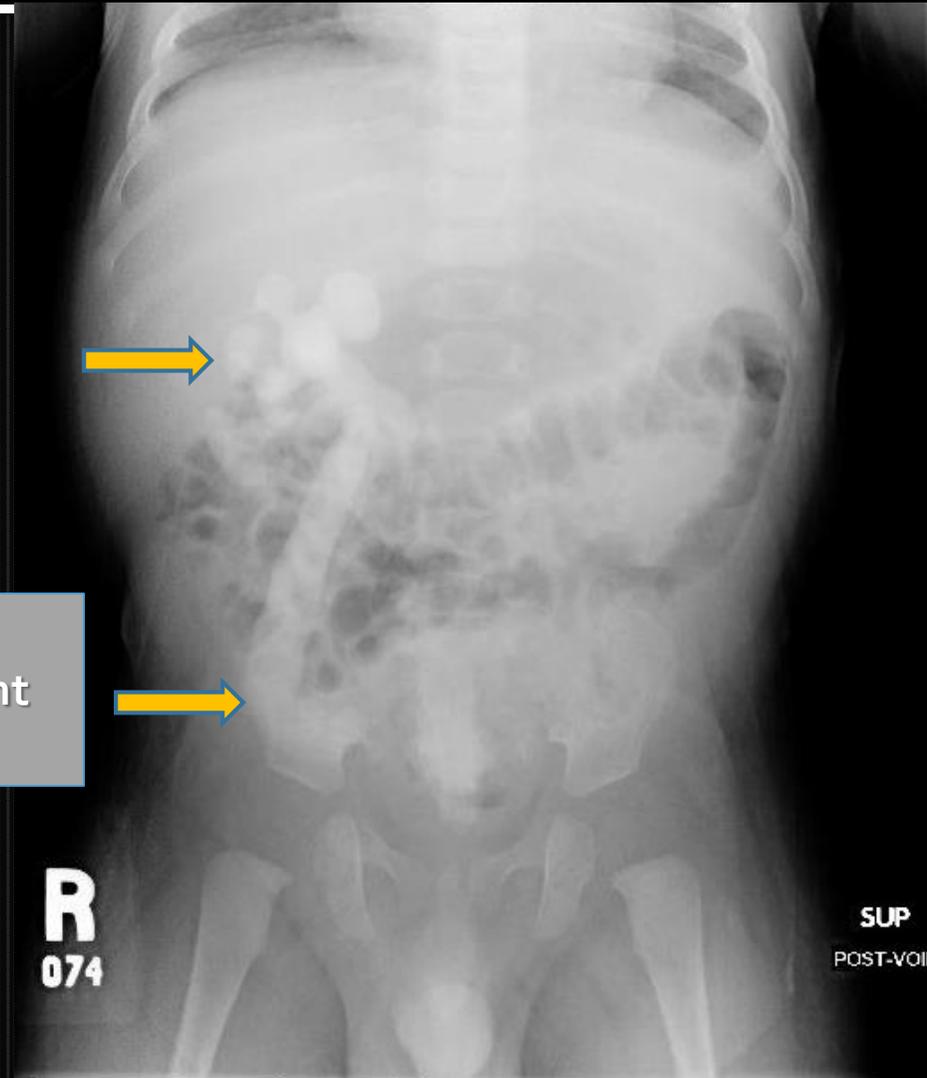
- Thickened, heavily trabeculated bladder wall
- Unilateral vesicoureteral reflux into right ureter

Imaging studies: Voiding cystourethrogram (VCUG)



- Dilated and elongated posterior urethra
(known as the key hole sign)

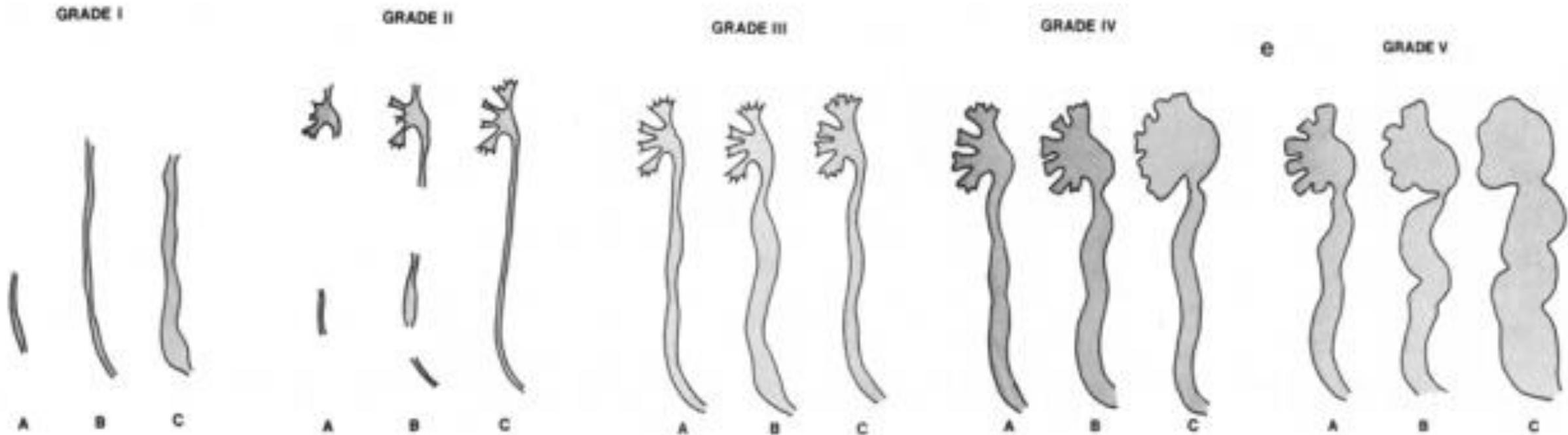
Imaging studies: Voiding cystourethrogram (VCUG)



Post-void x-ray:

- Grade IV to V reflux on the right
- No reflux seen on the left

International system of radiographic grading of vesicoureteral reflux



Diagrams illustrating variations within grades I to V vesicoureteric reflux

Source: Lebowitz et al

Patient outcome

- Patient underwent an **endoscopic incision of the posterior urethral valve**
- Afterwards he was continued on IV Ceftazidime for a total of 7 days during admission, then was transitioned to PO Bactrim (sulfamethoxazole and trimethoprim) for prophylaxis at discharge
- During admission, he was also noted to have elevated BP secondary to the acute renal failure, and thus was started on PO Labetalol
 - Admission BUN 39, Creatinine 5.2
 - Discharge BUN 30, Creatinine 0.6
- Six month f/u RBUS showed decreased size of the kidneys bilaterally with decreased calyceal dilatation, however, a VCUG showed persistence or regrowth of the PUV
 - He underwent a repeat PUV ablation

Discussion: Posterior Urethral Valves

- The most common cause of urethral obstruction in male infants, occurring in 1 to 5,000-8,000 pregnancies
- Caused by a disruption in the normal embryologic development of the male urethra between 9-14 weeks of gestation, leading to a persistent urogenital membrane
- In the developed world, about half of cases are identified by prenatal ultrasonography (may see findings of bilateral hydronephrosis, oligohydramnios)
- For those diagnosed postnatally, they usually present as a newborn or young infant with urinary tract symptoms, abdominal distension, or respiratory distress due to lung hypoplasia

Discussion: Posterior Urethral Valves, cont'd

- Prenatal diagnosis of PUV
 - Ultrasound
 - Findings: bilateral hydronephrosis, dilated or thickened bladder, dilated posterior urethra, oligohydramnios
 - Sensitivity: 93%
 - Specificity: 43%
 - *Based on a retrospective study published in 2009 in the journal of Ultrasound in Obstetrics and Gynecology*
 - Cost: \$109-\$674
 - Radiation dose: None



Ultrasound image of a dilated fetal bladder (B) with dilatation of the vesical neck (arrows).

Source: Bernardes et al

Discussion: Posterior Urethral Valves, cont'd

- Postnatal diagnosis of PUV
 - VCUG
 - Findings: dilated posterior urethra, valve leaflets, trabeculated bladder, vesicoureteral reflux
 - Sensitivity and Specificity: high
 - Cost: \$133-\$1,114
 - Radiation dose: 0.3-0.4mSv
 - *Other possible studies:*
 - Magnetic resonance urography
 - Contrast enhanced voiding urosonography



Source: Hodges et al

Discussion: Posterior Urethral Valves, cont'd

- Indications for a renal and bladder ultrasound:
 - Children ≤ 2 years old with a first febrile UTI
 - Children of any age with recurrent febrile UTI's
 - Children of any age with a UTI who have a family hx of renal or urologic disease, poor growth, or hypertension
 - Children who do not respond as expected to appropriate antimicrobial therapy
- Indications for a voiding cystourethrogram:
 - Children of any age with ≥ 2 febrile UTI's
 - Children of any age with a first febrile UTI and
 - Any anomalies on ultrasound, or
 - Temperature ≥ 39 C and pathogen other than *E. coli*, or
 - Poor growth or hypertension

Patient treatment

- Treatment:
 - Stabilize the patient by correcting any electrolyte abnormalities, particularly hyperkalemia
 - Place a catheter to drain the bladder
 - Perform cystoscopy to confirm the diagnosis and ablate the PUV
 - If patient is too small (<2,000 g) they may undergo a vesicostomy until they are large enough for definitive treatment
- Post-procedure management:
 - Treat any bladder dysfunction
 - Monitor renal function, and if necessary, manage the consequences of CKD

Patient outcomes

- After PUV ablation, patients may have delays in achieving daytime and nighttime urinary continence
 - Symptoms include: hesitancy, weak stream, incomplete emptying, urgency and stress incontinence
- Despite prenatal diagnosis and early intervention, a significant number of patients with PUV (15-20%) will develop end-stage renal disease:
 - Common because many patients have renal dysplasia and/or acquired renal injury due to infection or ongoing issues with poor bladder function

Wrap Up

- Urinary tract infections are the most common problem of the genitourinary system encountered in children
- The work-up for a child with a first febrile UTI typically involves a renal and bladder ultrasound +/- fluoroscopic voiding cystourethrogram
- The goals of these studies are to identify underlying congenital anomalies that predispose the child to UTI, such as posterior urethral valves in this child, identifying vesicoureteral reflux, and documenting any renal damage

References

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