

Voiding Cystourethrogram VCUG

Joshua Rosengarten

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DII RAD 4001 elective

Reviewed By: Manickam Kumaravel

History

- 23 year old female from Kuwait with history of CKD G4 secondary to CAKUT
- Complaining of recurrent UTIs that present with fever and resolve with Abx
- Occasional SUI and ineffective emptying of bladder
- Prior UVJ stent was placed but now removed

PMH

- Fanconi Anemia
- Agenesis of thumbs
- Hypothyroid
- Developmental Delay

PE and Labs

- Vitals: Temp 97.6F; BP 131/80; Heart rate 76
- Physical exam was normal except for absent thumbs bilaterally
- Labs:
 - Cr 2.5
 - GFR 18
- PVR: 104

DIFFERENTIAL DIAGNOSIS: RECURRENT UTIS

- Vesicoureteral Reflux
- Chronic Pyelonephritis
- Cystitis
- Overflow Incontinence
- Stress Urinary Incontinence
- Mixed Incontinence

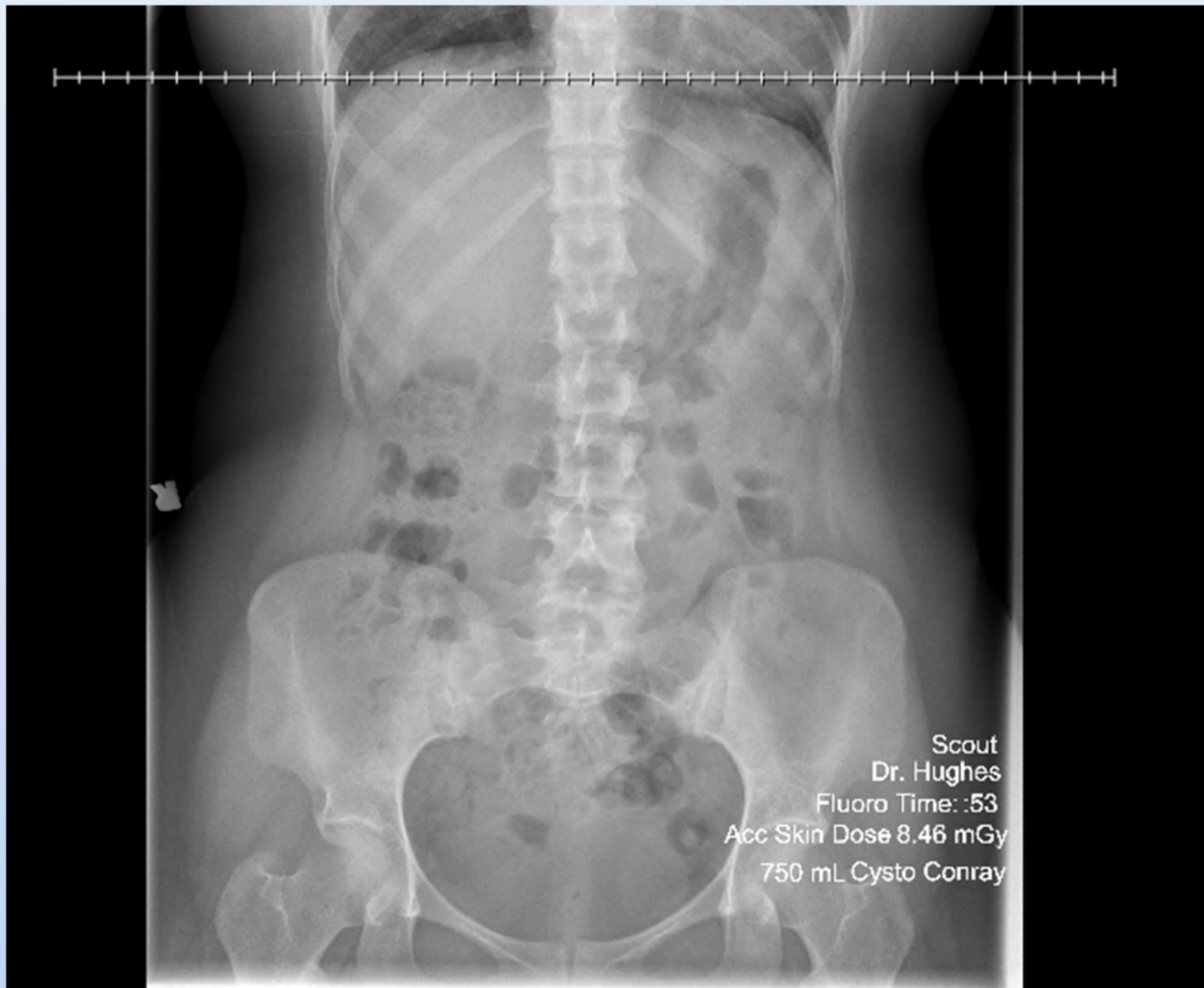
IMAGING: VOIDING CYSTOURETHROGRAM (VCUG)

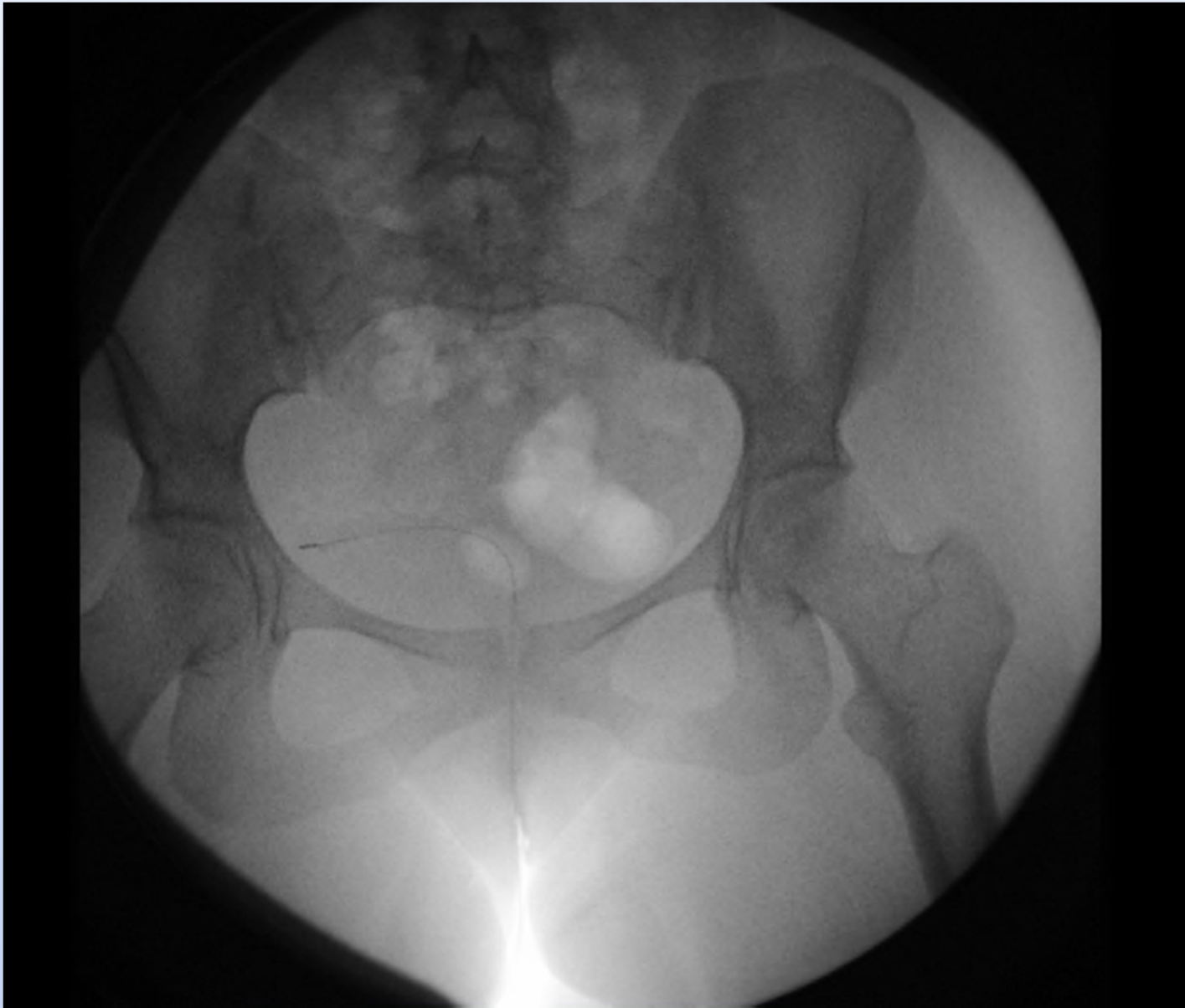
NORMAL VCUUG

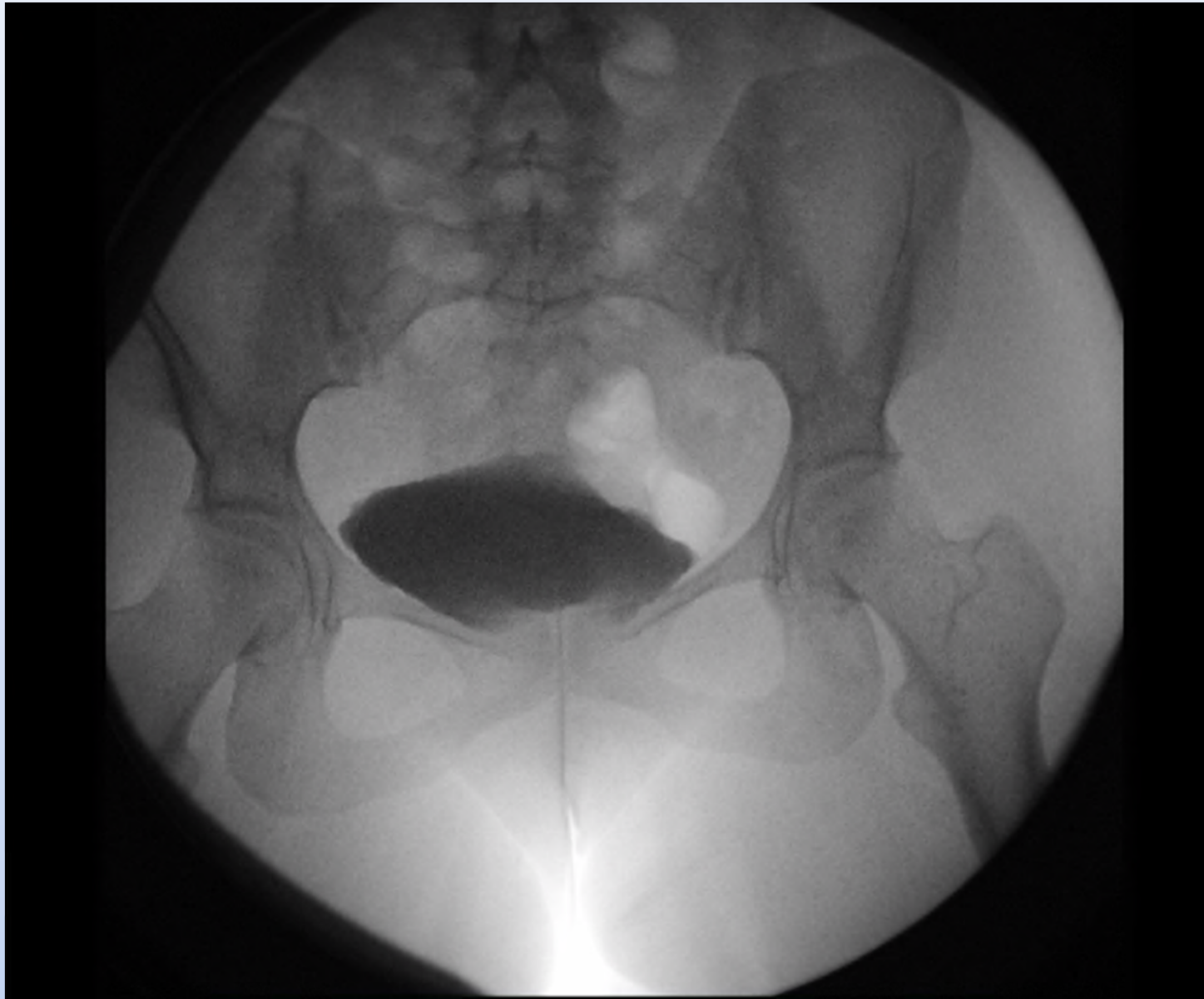


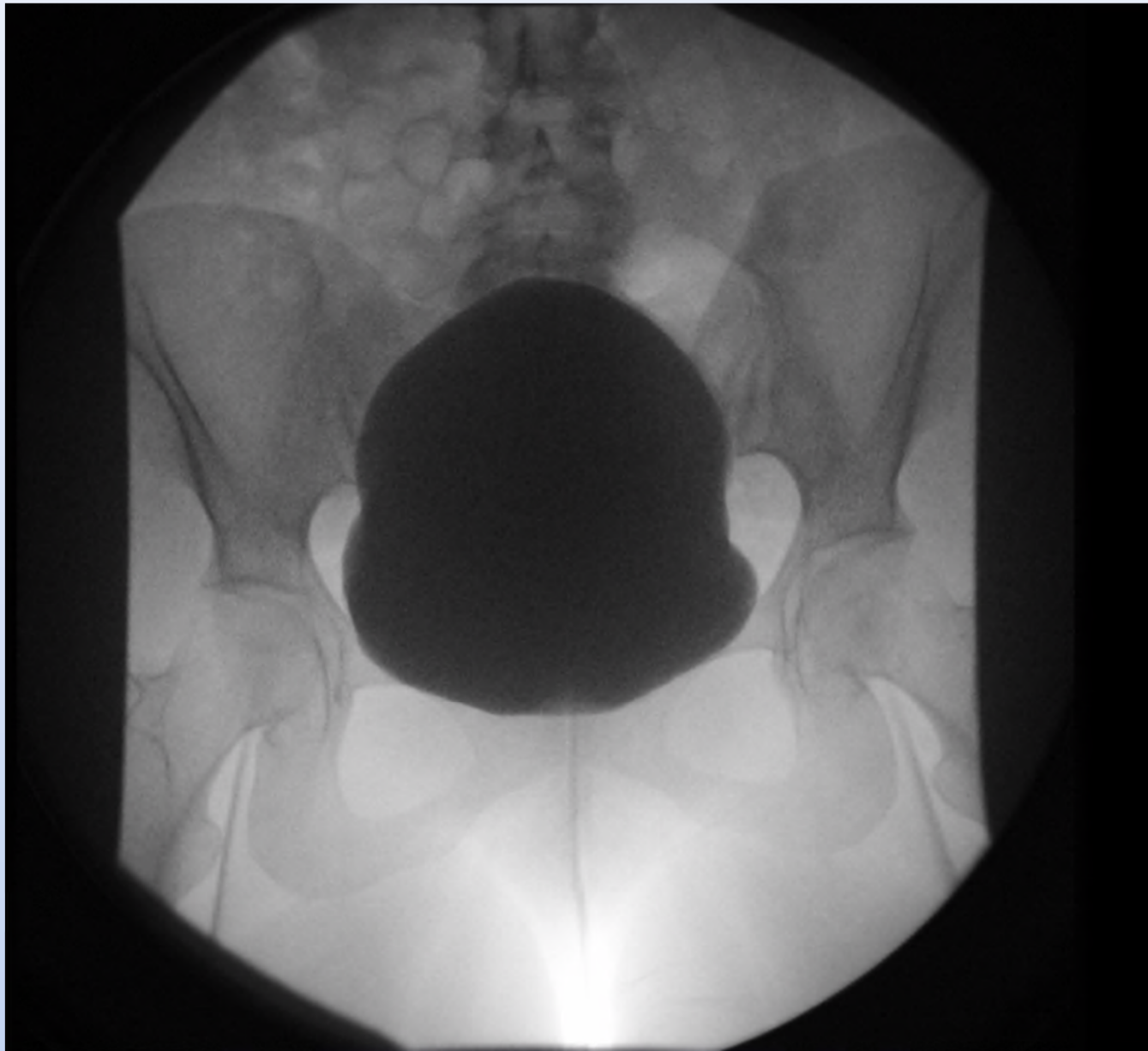
<https://radiopaedia.org/articles/voiding-cystourethrography-1?lang=us>

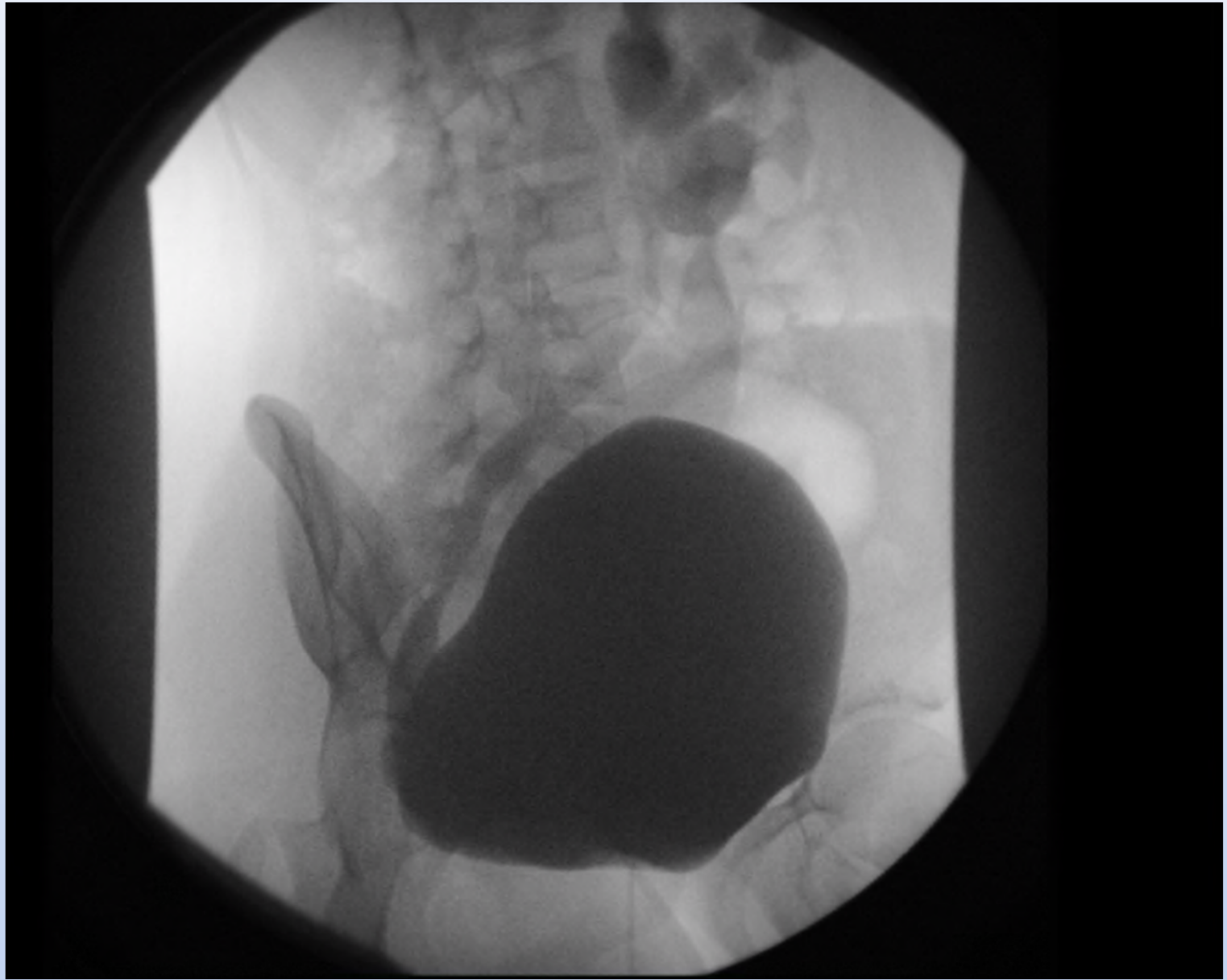
SCOUT

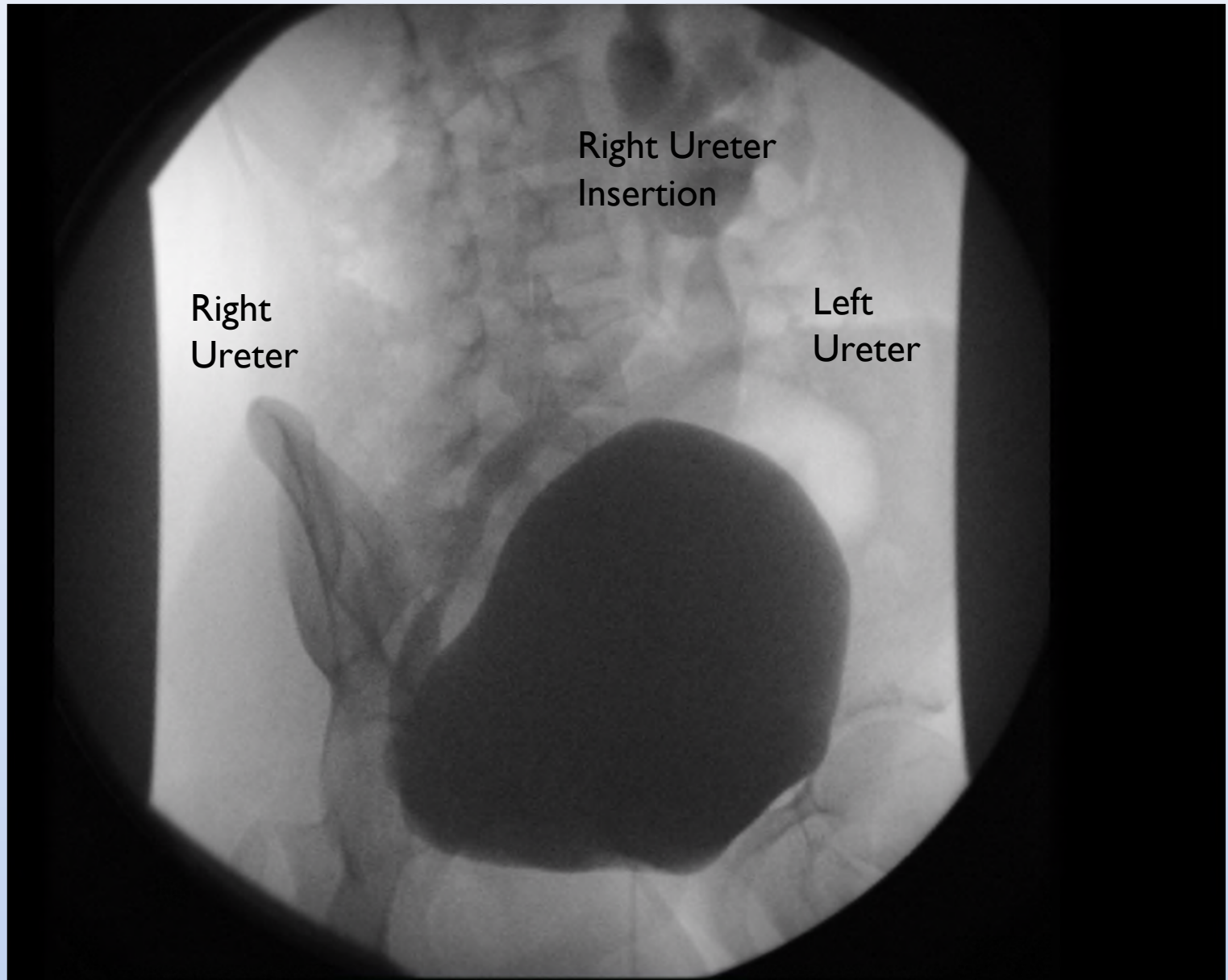




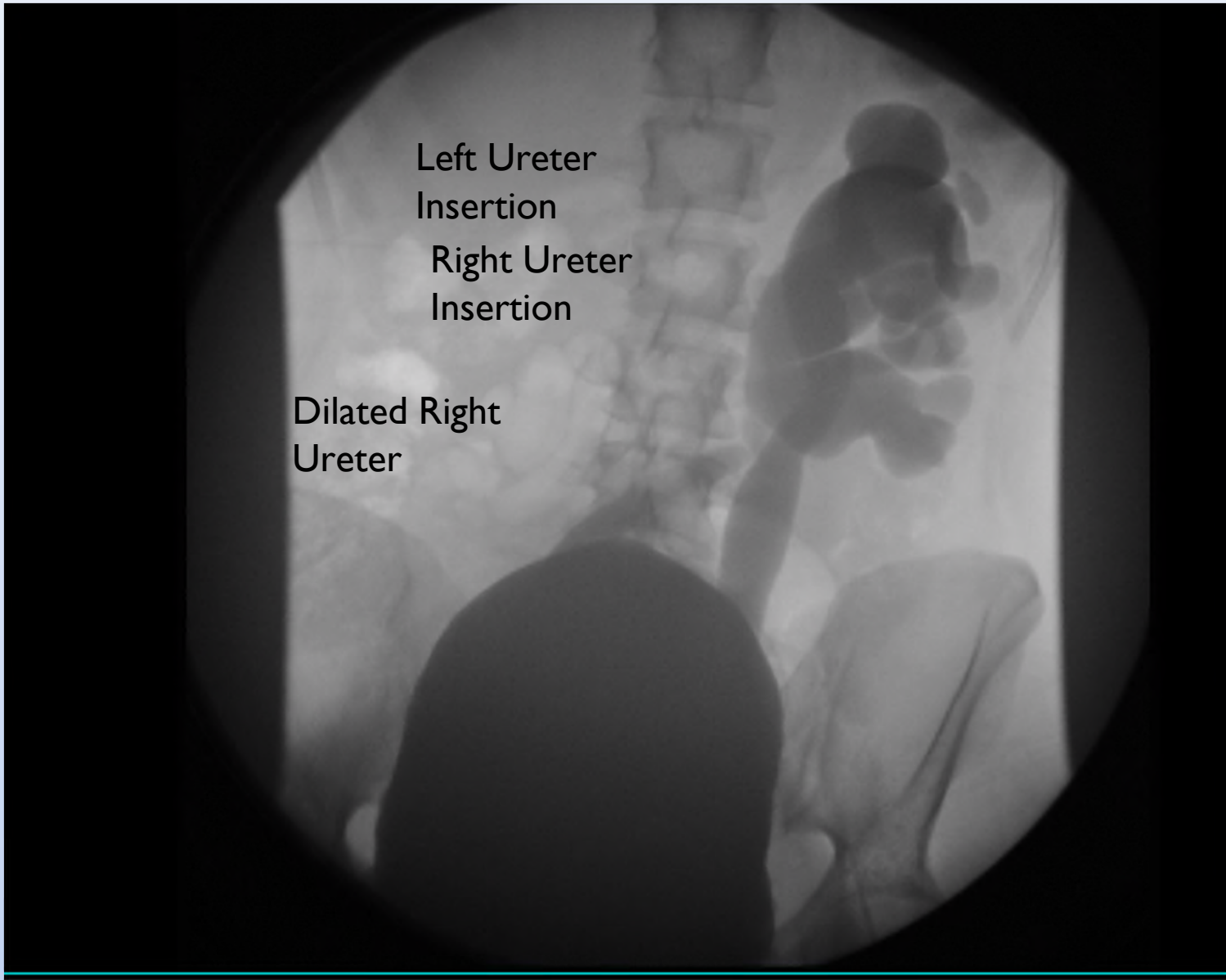












Left Ureter
Insertion

Right Ureter
Insertion

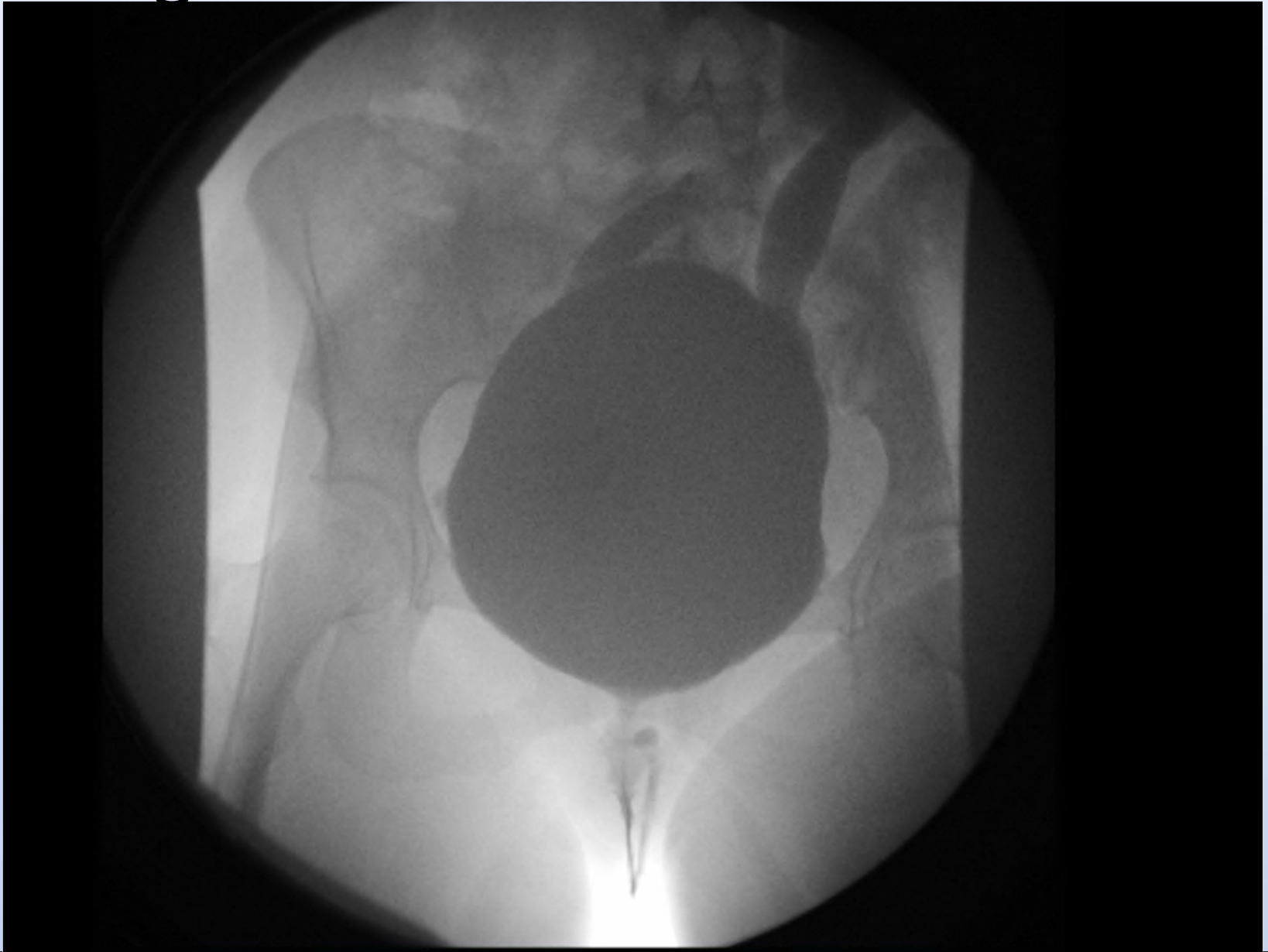
Dilated Right
Ureter

Fused kidney

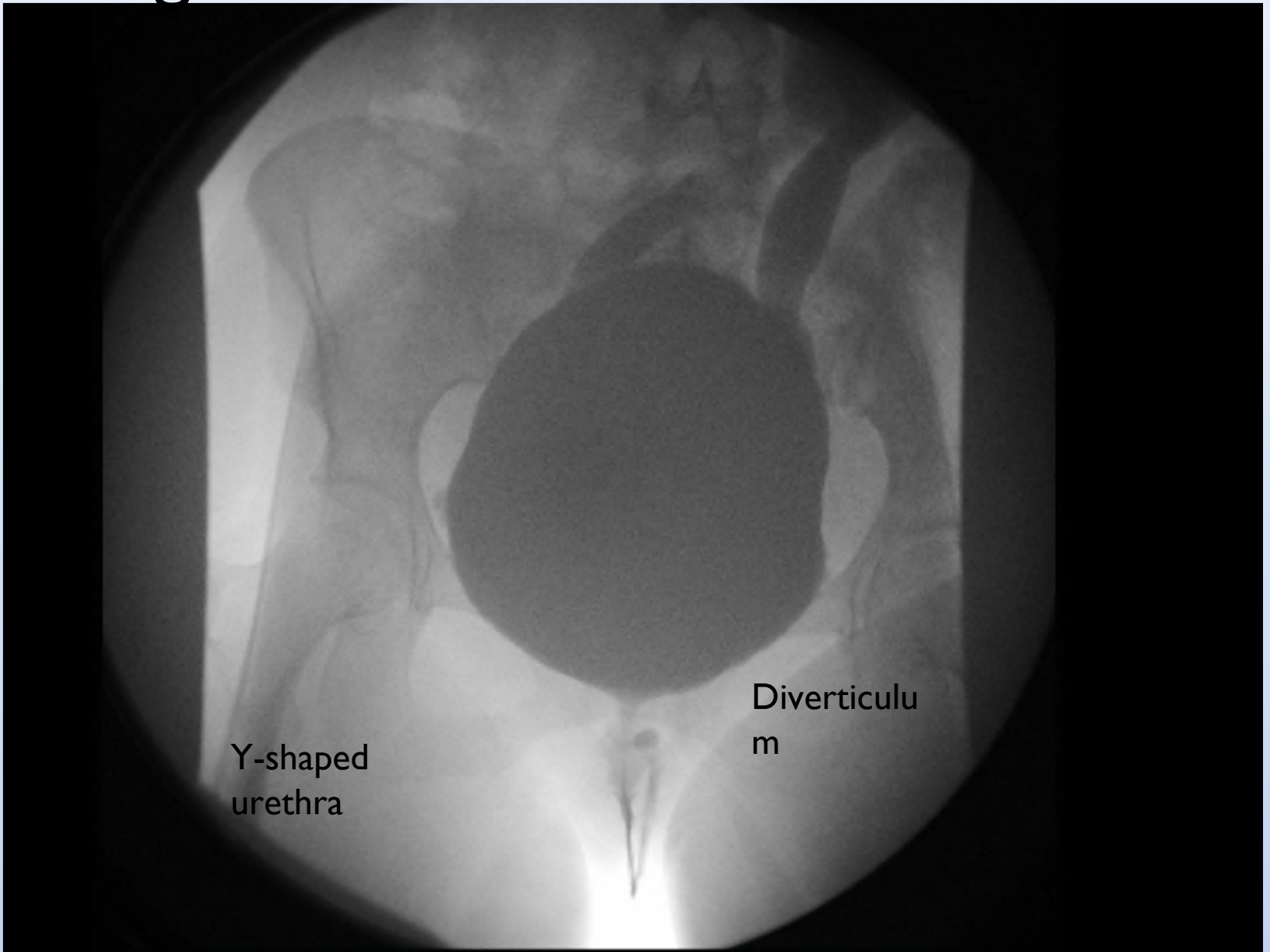
Hydronephrosis
and blunted
calyces

Dilated Left
Ureter

Voiding Phase



Voiding Phase



IMPRESSION

- I. “Grade 5 reflux with configuration suggestive of cross fused ectopia with the right renal moiety being positioned inferior to the left moiety on the left.”

- I. “On catheter insertion, the urethra appeared to have a septation. During the voiding portion of the exam, a Y-shaped configuration of the urethra is seen with concerns for an incomplete urethral duplication.”

DISCUSSION

Vesicoureteral Reflux (VUR):

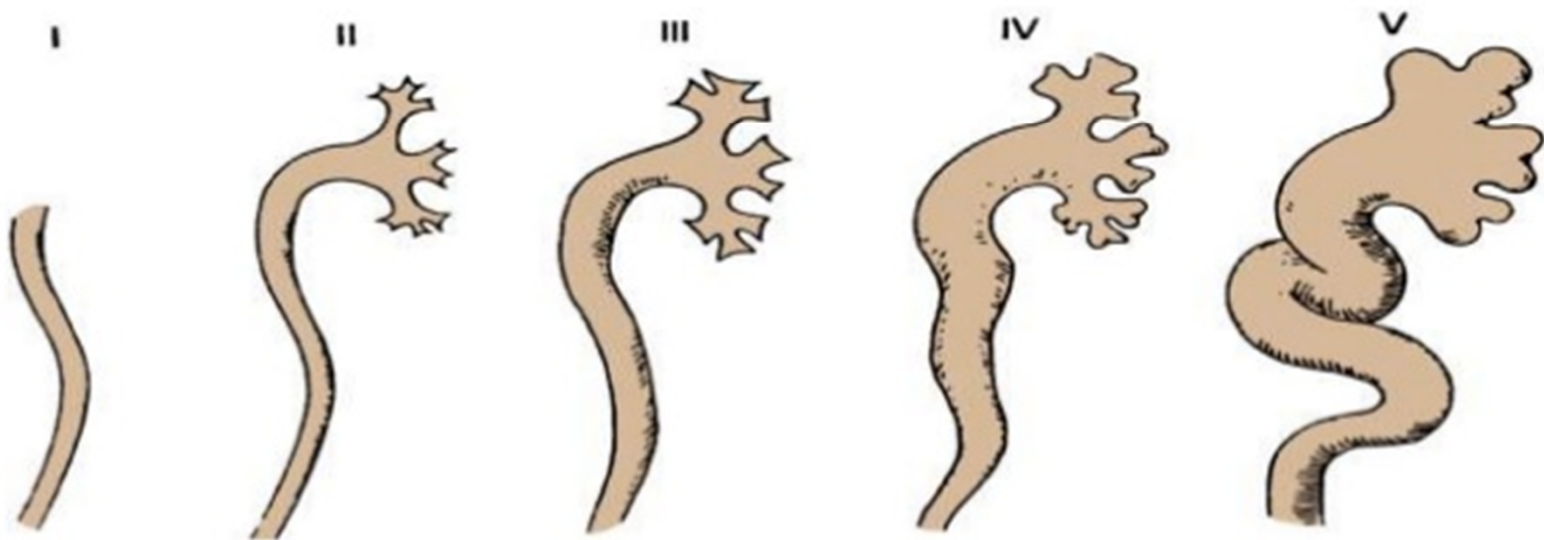
- Retrograde passage of urine from the bladder into the upper urinary tract.
- Most common urologic finding in children, occurring in approximately 1% of newborns
- Females twice more likely to have reflux than males
- Presentation: most commonly recurrent UTIs
- VCUG is test of choice to establish the presence and degree of VUR
 - Demonstration of reflux of urine from the bladder to the upper urinary tract
 - Cost ranges from \$264-\$837.
 - Radionuclide cystogram (RNC) is an alternative modality.
- VUR predisposes patients to acute pyelonephritis and recurrent urinary tract infection
 - Can lead to renal scarring, hypertension, and end-stage renal disease (ESRD)
- Treatment:
 - Watchful waiting
 - Prophylactic Abx (Grade III-IV)
 - Surgery (Grade IV-V)

Cross Fused Ectopy

- Ectopic kidney and ureter cross midline and fuse with contralateral kidney
- Ureter of the ectopic kidney maintains its normal insertion into the bladder.

International classification(VCUG)

Grade	Description
I	Into a nondilated ureter
II	Into the pelvis and calyces without dilatation
III	Mild to moderate dilatation of the ureter, renal pelvis, and calyces with minimal blunting of the fornices
IV	Moderate ureteral tortuosity and dilatation of the pelvis and calyces
V	Gross dilatation of the ureter, pelvis, and calyces; loss of papillary impressions; and ureteral tortuosity



https://www.google.com/search?q=blunted+calyces+vcug&rlz=1C5CHFA_enUS705US705&source=Inms&tbm=isch&sa=X&ved=0ahUKEwi67Mbyq4rkAhUHM6wKHc0iBjAQ_AUIESgB&biw=1440&bih=705#imgrc=fgu-YdnelxqPrM:

FINAL DIAGNOSIS

Grade 5 Vesicoureteral
Reflux
Cross Fused Ectopy

ACR APPROPRIATENESS CRITERIA

Clinical Condition: Recurrent Lower Urinary Tract Infections in Women

Variant 2: “Complicated,” or patients who are nonresponders to conventional therapy, get frequent reinfections or relapses, and have known underlying risk factors. (See [Appendix 1.](#))

Radiologic Procedure	Rating	Comments	RRL*
CT abdomen and pelvis without and with IV contrast	7	CT urography protocol is preferred. If enterovesical fistulas are suspected, consider enteric and/or rectal contrast.	☼☼☼☼
MRI pelvis without and with IV contrast	6	Consider this procedure for suspected diverticulum or prolapse. This procedure is favored for patients who require repeated imaging examinations.	0
MRI pelvis without IV contrast	4		0
Voiding cystourethrography	4	Consider this procedure for reflux, bladder or urethral fistula, or prolapse.	☼☼
CT abdomen and pelvis with IV contrast	4	If urinary stone is not suspected or previously excluded, this procedure can be used for assessment of all other etiologies.	☼☼☼☼
CT abdomen and pelvis without IV contrast	4	Consider this procedure when urolithiasis is suspected as the principal etiology. May use as CT cystogram for suspected fistula.	☼☼☼☼
US kidneys and bladder retroperitoneal	3		0
X-ray intravenous urography	3	This procedure has limited use (or alternative) in young patients if MRI is unavailable or not possible.	☼☼☼
X-ray urethrography double balloon	2		☼☼
X-ray abdomen	2		☼☼
X-ray IV contrast enema	2	This procedure may be useful for vesicoenteric fistula.	☼☼☼
X-ray cystography	2	This procedure may be useful for vesicoenteric fistula.	☼☼☼
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

TAKE HOME POINTS

Recurrent UTIs Think VUR

Vesicoureteral Reflux:

- Retrograde passage of urine from the bladder into the upper urinary tract.
- VCUG is test of choice to establish the presence and degree of VUR
- Complications: Renal scarring, hypertension, and end-stage renal disease

Voiding Cystourethrogram:

- Fluoroscopic study of the lower urinary tract in which contrast is introduced into the bladder via a catheter.
- Assesses the bladder and urethral anatomy as well as micturition to determine presence or absence of bladder or urethral abnormalities, including VUR

REFERENCES

- First Aid for the USMLE Step 1
- First Aid for the USMLE Step 2 CK
- <https://acsearch.acr.org/docs/69491/Narrative/>
- <https://radiopaedia.org/?lang=us>
- <https://www-uptodate-com>