

# Vesicoureteral Reflux

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9/18/2019

DII RAD 4001 elective

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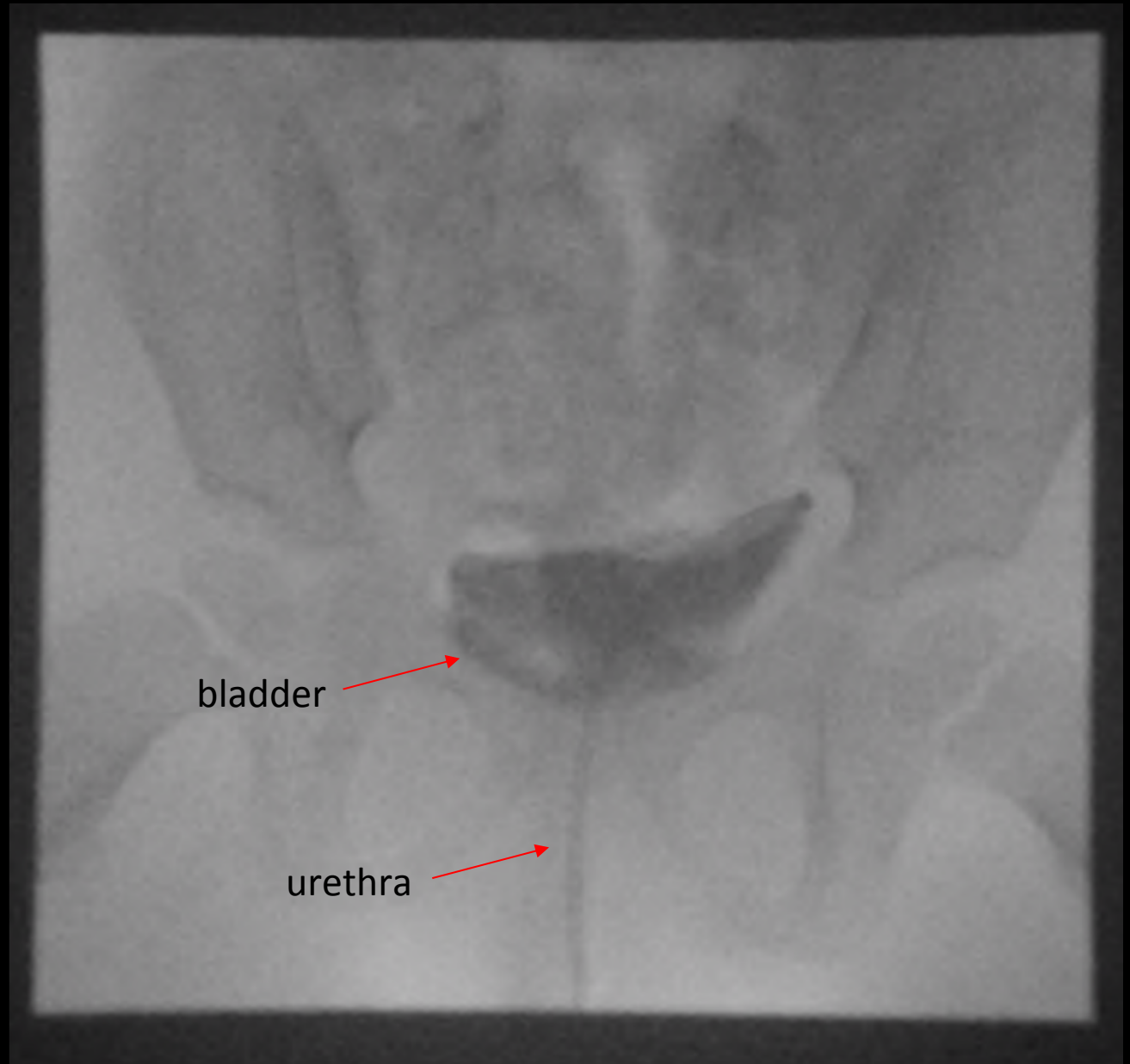
# Clinical History

- 2 year old female with UTI
- History of closed myelomeningocele s/p repair
- Past renal ultrasounds normal, asymptomatic at birth
- Prior consults indicated voiding cystourethrogram (VCUG) with new UTIs

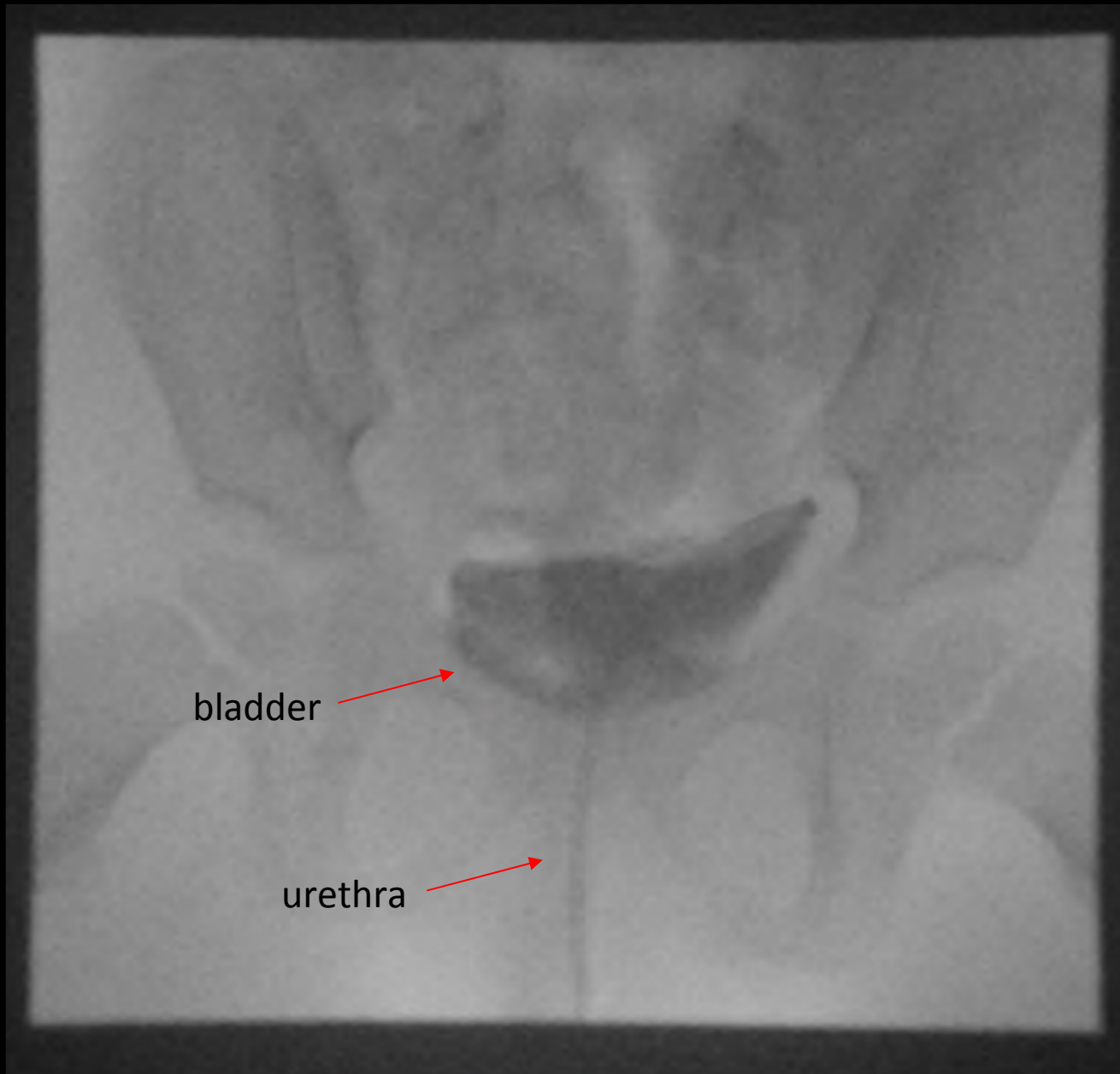
# Voiding Cystourethrogram (VCUG)

8/7/19

- Fluoroscopic examination of bladder and urinary tract
- Test of choice for VUR
- ~\$1,000



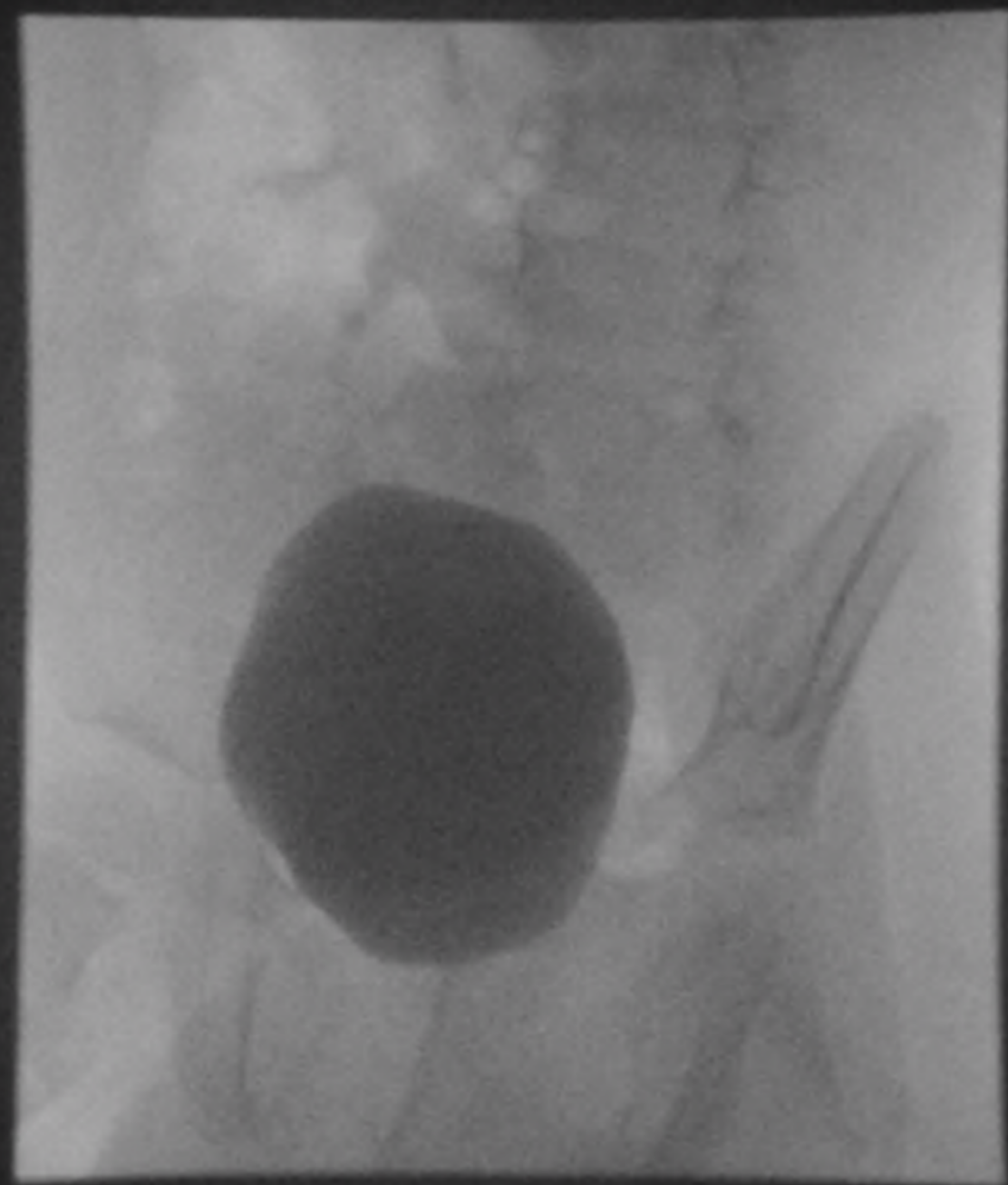


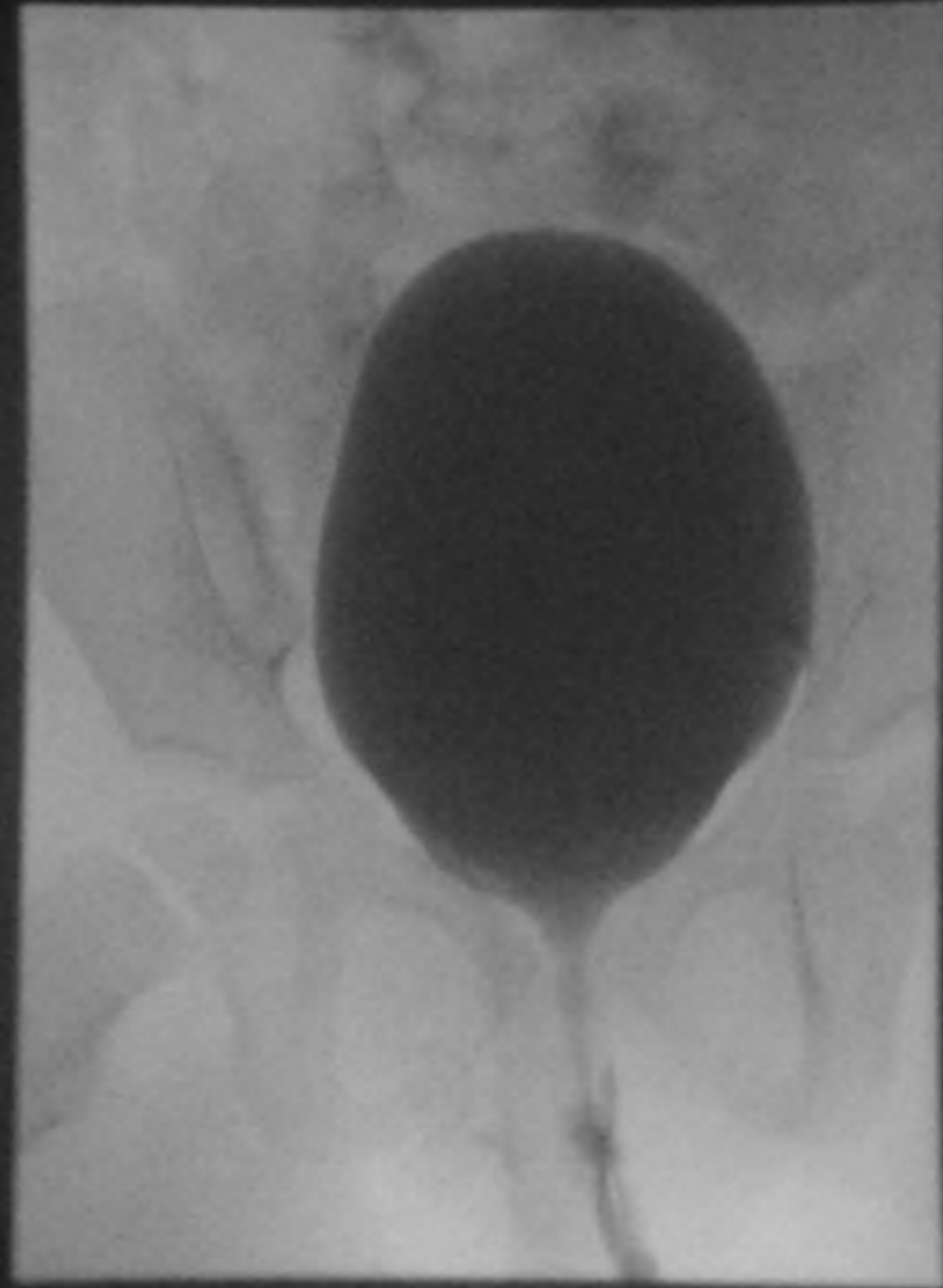


bladder

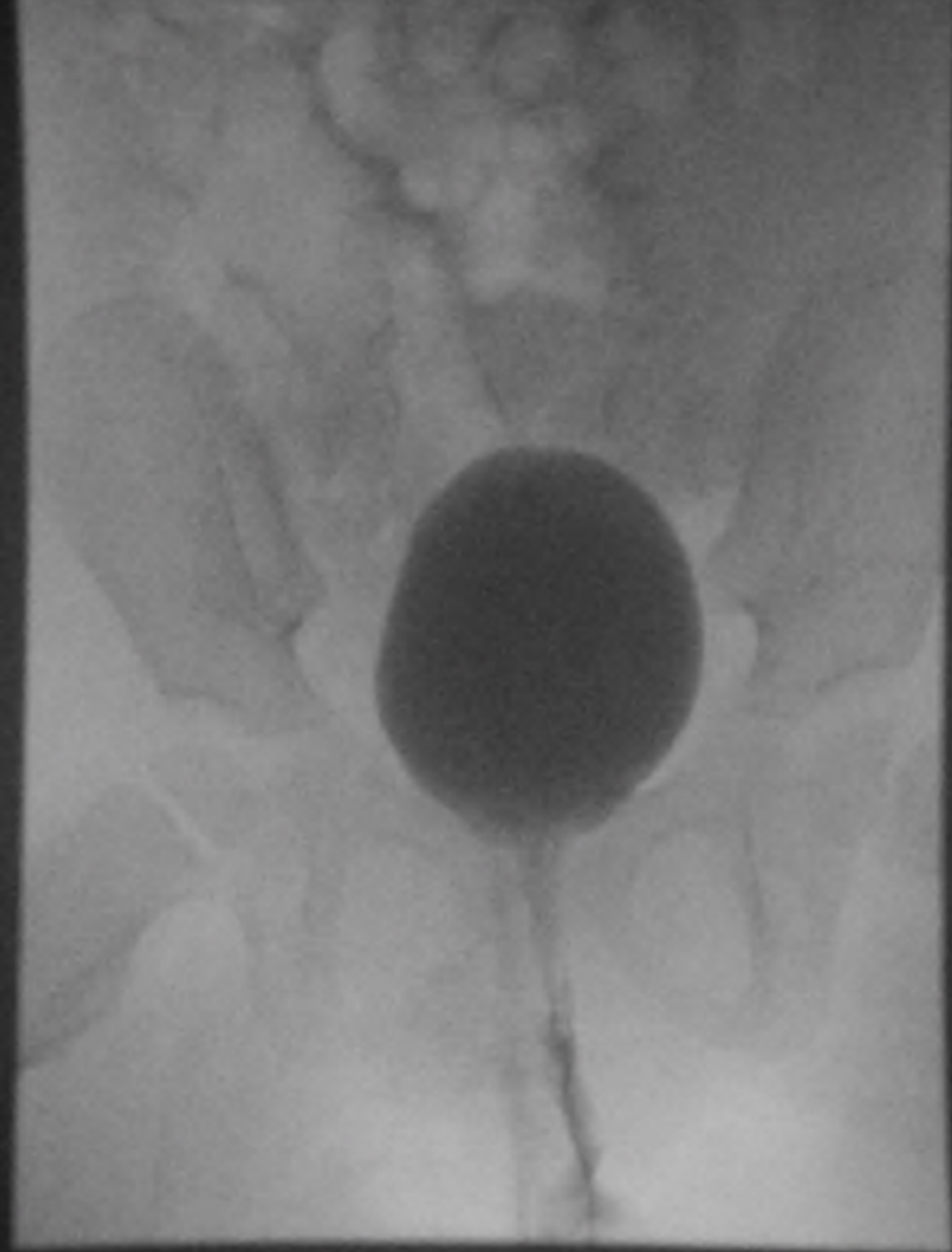
urethra

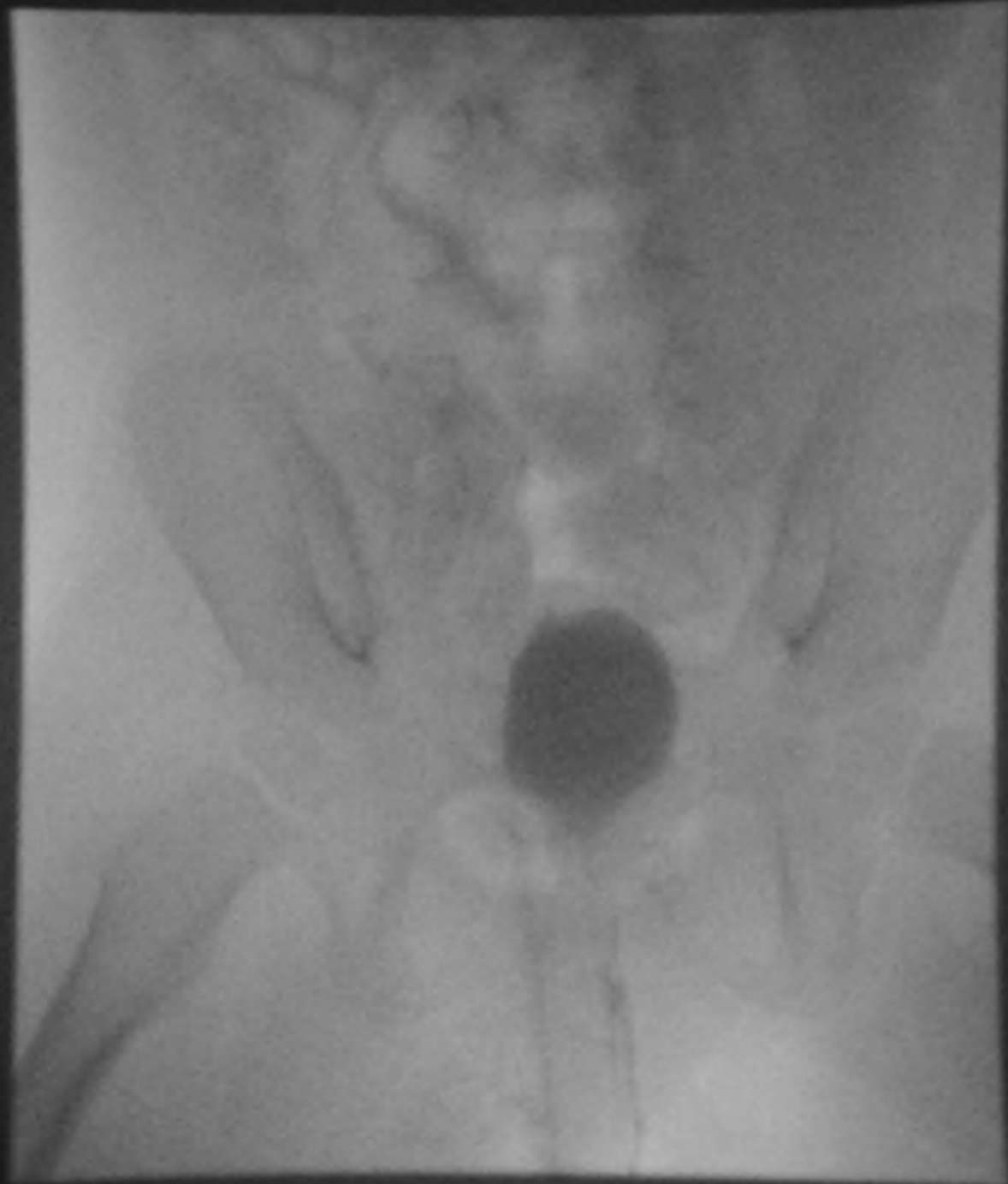




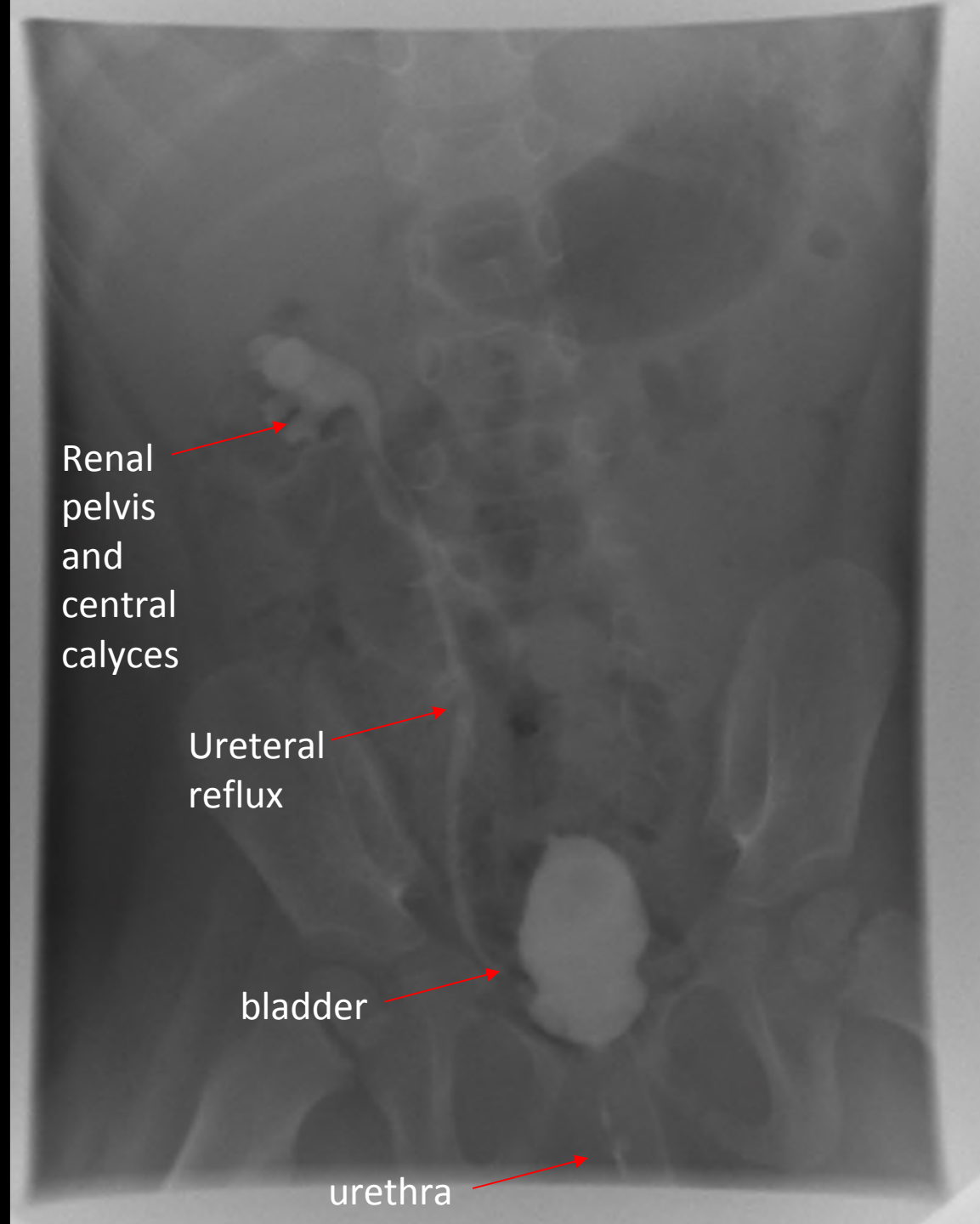








But then...



Renal  
pelvis  
and  
central  
calyces

Ureteral  
reflux

bladder

urethra

# Findings

- “On the final void, there is evidence of vesicoureteral reflux into a nondilated right ureter, pelvis and central calyces with preserved papillary impressions. Minimal post void residual.”

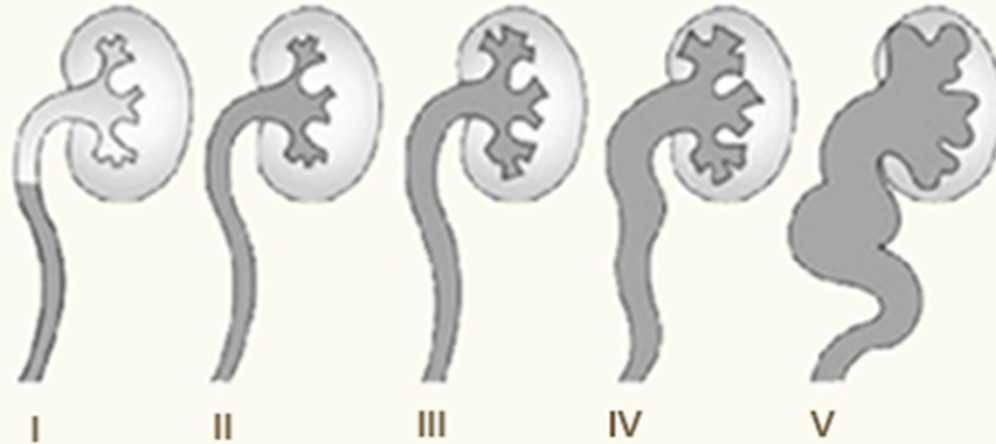
# Differential Diagnosis: Pediatric UTI

- Vesicoureteral Reflux
- Urinary obstruction
  - ureteropelvic junction obstruction, neurologic conditions (myelomeningocele), posterior urethral valves (males)
- Bladder and bowel dysfunction
  - abnormal elimination pattern, incontinence, withholding maneuvers

# Discussion: Vesicoureteral Reflux (VUR)

- Retrograde passage of urine from the bladder to the upper urinary tract
- Primary VUR 1% of newborns
- Most common in white girls <2yo

# VUR Grades



## Grade

## Description

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





## Grade 3

- Mild dilation of ureter, renal pelvis, and calyces.
- Papillary impressions preserved.



# Management

- Screening and treatment of bowel and bladder dysfunction
  - Urge incontinence, infrequent voiding, recurrent UTI, dysuria, abdominal pain, soiling
- Watchful waiting w/ prompt treatment of UTIs/pyelonephritis
  - All patients
- Antibiotic prophylaxis
  - All patients
- Surgical correction
  - Grades III to IV: breakthrough infection
  - Grade IV to V: beyond 2-3yo

**Final diagnosis:**

**Grade 3 Vesicoureteral Reflux**

# ACR Appropriateness Criteria

## American College of Radiology ACR Appropriateness Criteria® Urinary Tract Infection–Child

**Variant 1:** Age <2 months, first febrile urinary tract infection.

Radiologic Procedure	Rating	Comments	RRL*
US kidneys and bladder	9		0
Voiding cystourethrography	6	Consider this procedure in boys and in the presence of sonographic abnormality.	☼☼
Tc-99m pertechnetate radionuclide cystography	5	Consider this procedure in girls.	☼☼
Tc-99m DMSA renal cortical scintigraphy	3	This procedure is not a first-line test. It could be used 4 to 6 months after UTI to detect scarring.	☼☼☼
<b><u>Rating Scale:</u> 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate</b>			<b>*Relative Radiation Level</b>

# ACR Appropriateness Criteria

**Variant 2:**

**Age >2 months and ≤6 years, first febrile urinary tract infection with good response to treatment.**

Radiologic Procedure	Rating	Comments	RRL*
US kidneys and bladder	7	This procedure has a low yield, especially if US in the third trimester is normal.	0
Voiding cystourethrography	4		☢☢
Tc-99m pertechnetate radionuclide cystography	4		☢☢
Tc-99m DMSA renal cortical scintigraphy	3		☢☢☢
<b><u>Rating Scale:</u> 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate</b>			<b>*Relative Radiation Level</b>



# Take Home Points

- Vesicoureteral Reflux
- VCUG
- Be aware of what your order

# References

1. <https://www.youtube.com/watch?v=Obg9tqm20U8>
2. [https://www.uptodate.com/contents/clinical-presentation-diagnosis-and-course-of-primary-vesicoureteral-reflux?search=vesicoureteral%20reflux&source=search\\_result&selectedTitle=1~103&usage\\_type=default&display\\_rank=1#H435183022](https://www.uptodate.com/contents/clinical-presentation-diagnosis-and-course-of-primary-vesicoureteral-reflux?search=vesicoureteral%20reflux&source=search_result&selectedTitle=1~103&usage_type=default&display_rank=1#H435183022)
3. [https://www.uptodate.com/contents/urinary-tract-infections-in-children-epidemiology-and-risk-factors?sectionName=RISK%20FACTORS%20FOR%20RENAL%20SCARRING&search=recurrent%20uti%20child&topicRef=6066&anchor=H20&source=see\\_link#H1](https://www.uptodate.com/contents/urinary-tract-infections-in-children-epidemiology-and-risk-factors?sectionName=RISK%20FACTORS%20FOR%20RENAL%20SCARRING&search=recurrent%20uti%20child&topicRef=6066&anchor=H20&source=see_link#H1)
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5. <https://www.radiologyinfo.org/en/info.cfm?pg=voidcysto>
6. <https://acsearch.acr.org/docs/69444/Narrative/>





Questions?

