Pediatric urology: UreteroPelvic Junction obstruction (UPJO) and vesicoureteral reflux (VUR)

許竣凱

Learning objects

- clinical significance of urinary tract dilation(UTD)
  - UPJO
  - VUR
- Differential diagnosis and survey
- Treatment

clinical significance

- Obstruction and reflux both may cause urinary tract dilation
- **urinary tract dilation and pyelonephritis may cause renal damage**
- Renal damage may increase hypertension and renal insufficiency

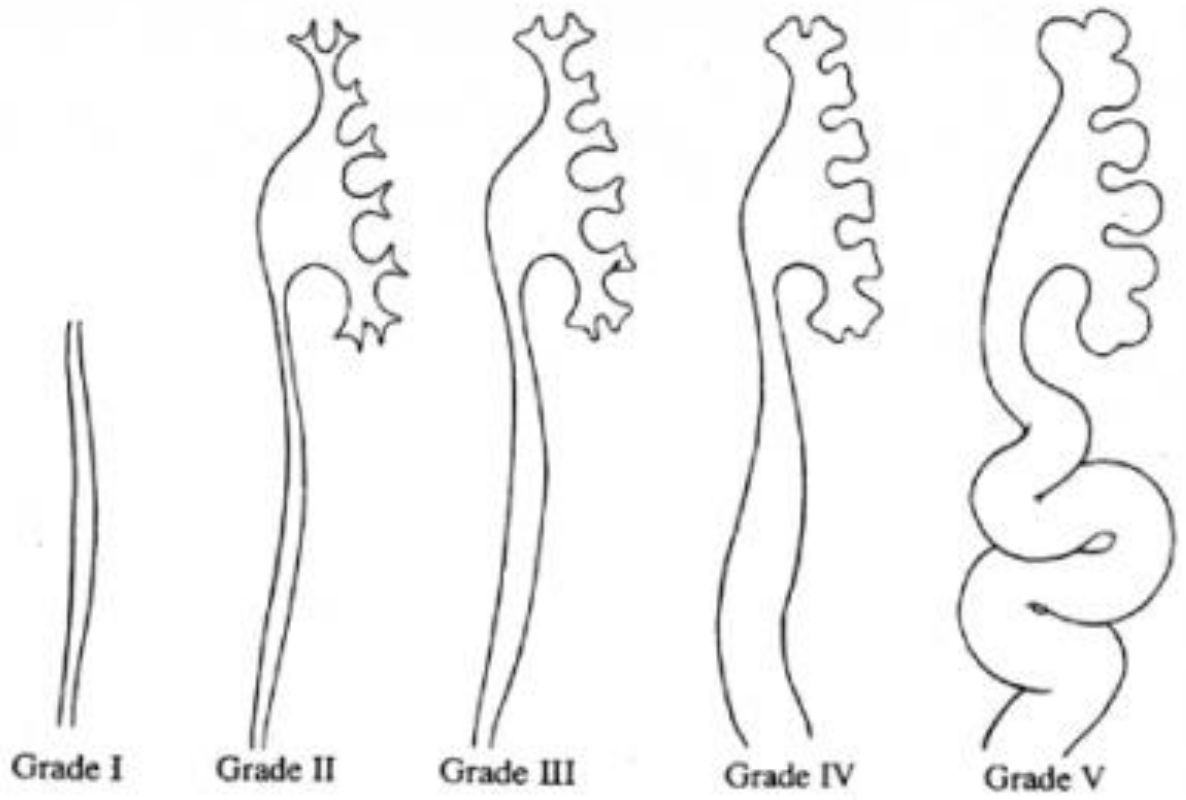
Vesicoureteral Reflux (VUR)

I: 逆流到輸尿管

II: 逆流到腎臟

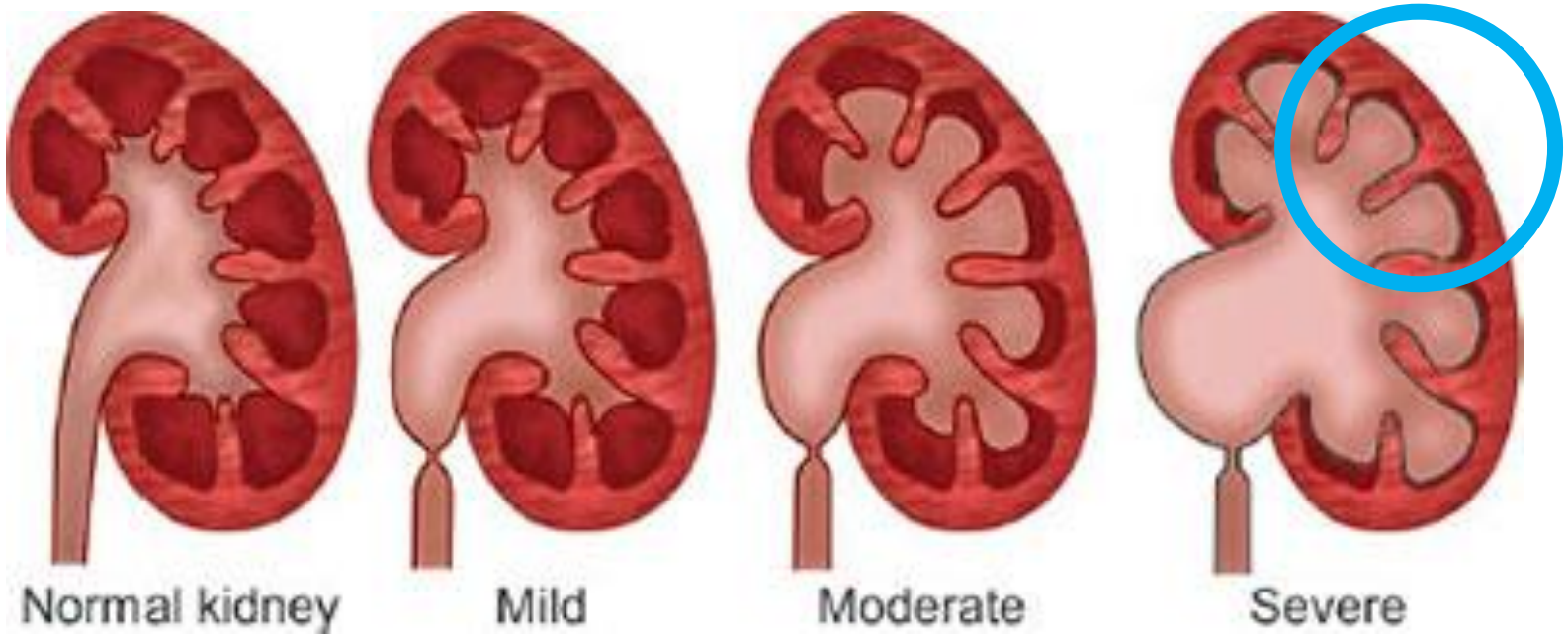
IV : calyces blunting

V: 輸尿管要彎彎曲曲



UreteroPelvic Junction obstruction (UPJO)

- 嚴重度示意圖



Evaluation tool for hydronephrosis

- Ultrasound
- CT/MRI

- MAG3, ERPF, DTPA
- Whitaker test

- Voiding cystourethrogram(VCUG)
- Bladder sono

Initial screening→ antenatal evaluation

- Maternal-Fetal Ultrasound
- GA 18-20周 (ACOG recommendation)
- Sensitivity=89%
- **Amniotic fluid index (AFI)**

AFI

- Normal :

8-18

- Oligo:

< 5 或 <6

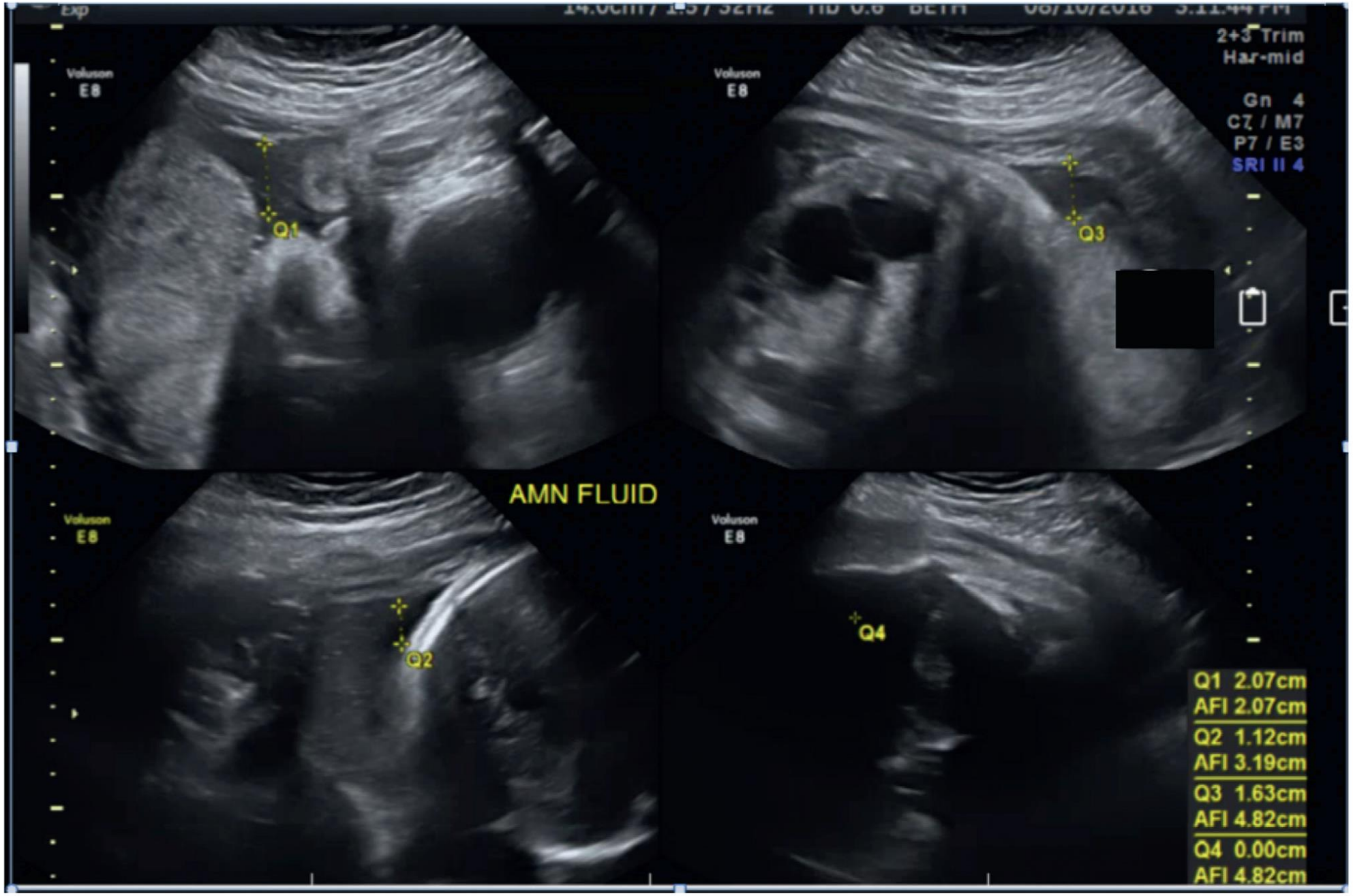


Fig. 22.1. The amniotic fluid index *(AFI)* is calculated by measurement of the four largest pockets of amniotic fluid.

Antenatal hydronephrosis

- Anterior-posterior diameter (APD) system
  - Anterior-posterior renal pelvic diameter (APRPD) system
- 最常見的錯誤: 量 sagittal kidney (應量transverse plane)

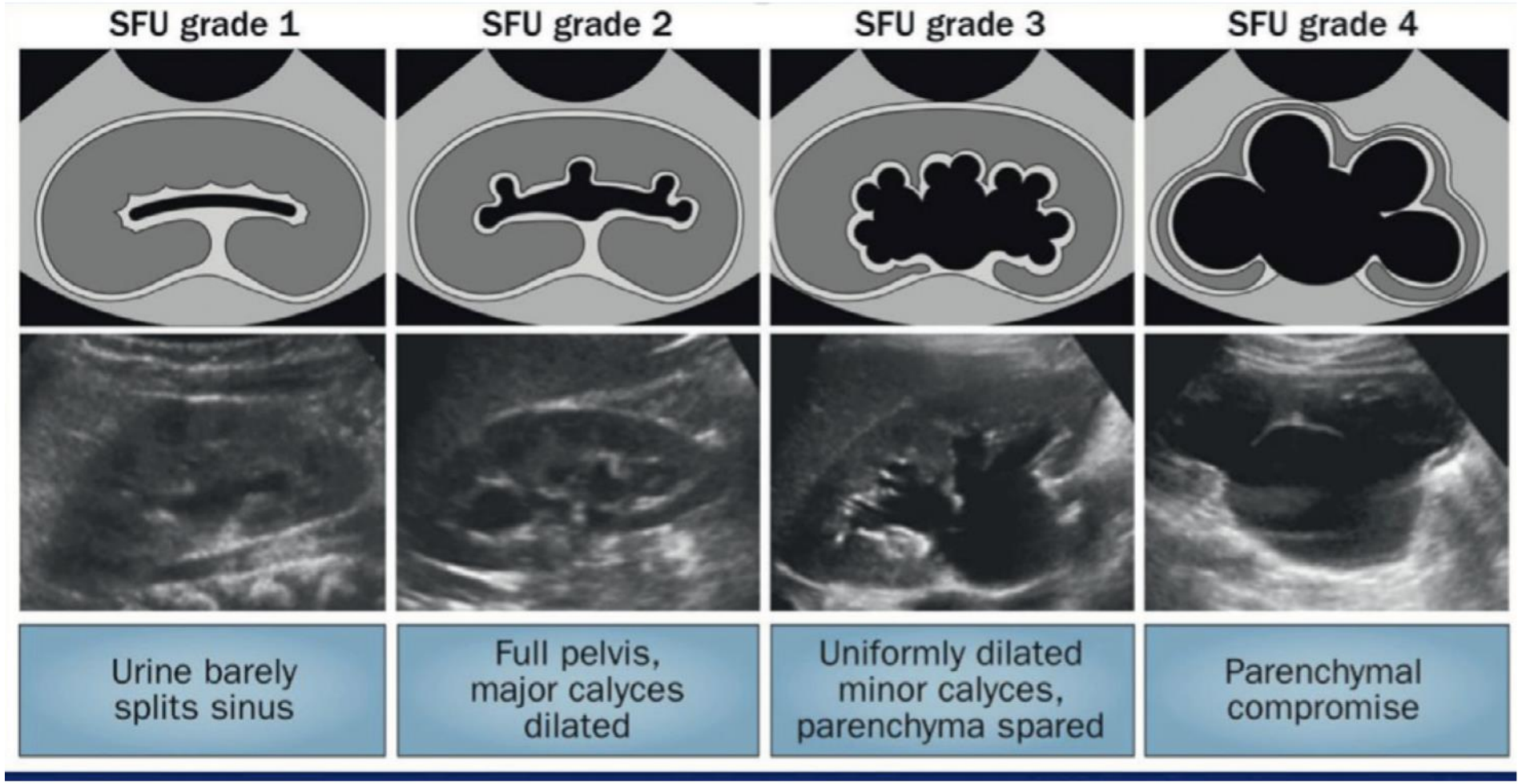
TABLE 22.2 Definition of Antenatal Hydronephrosis by Anteroposterior Diameter and Estimated Severity Percentage Range

	ANTEROPOSTERIOR DIAMETER		
DEGREE	SECOND TRIMESTER	THIRD TRIMESTER	SEVERITY
Mild	4 to <7 mm	4 to <9 mm	56.7%–88.0%
Moderate	7 to ≤10 mm	9 to ≤15 mm	10.2%–29.8%
Severe	>10 mm	>15 mm	1.5%–13.4%

分級的目的

- 決定是否需要手術
- 越嚴重的 prenatal hydronephrosis
  - Obstruction 越嚴重 (UPJO, post urethral valve
  - 但和VUR沒有相關性

Postnatal evaluation
Society for Fetal Urology (SFU) grade system



分級也是為了預測未來

- SFU優點: 簡單/易學, 可以預測腎功能 & 是否需手術介入
- SFU grading越高→ early surgical intervention 機會越高

- SFU缺點: 整體主觀; 只評估腎盂, 缺乏膀胱和 輸尿管

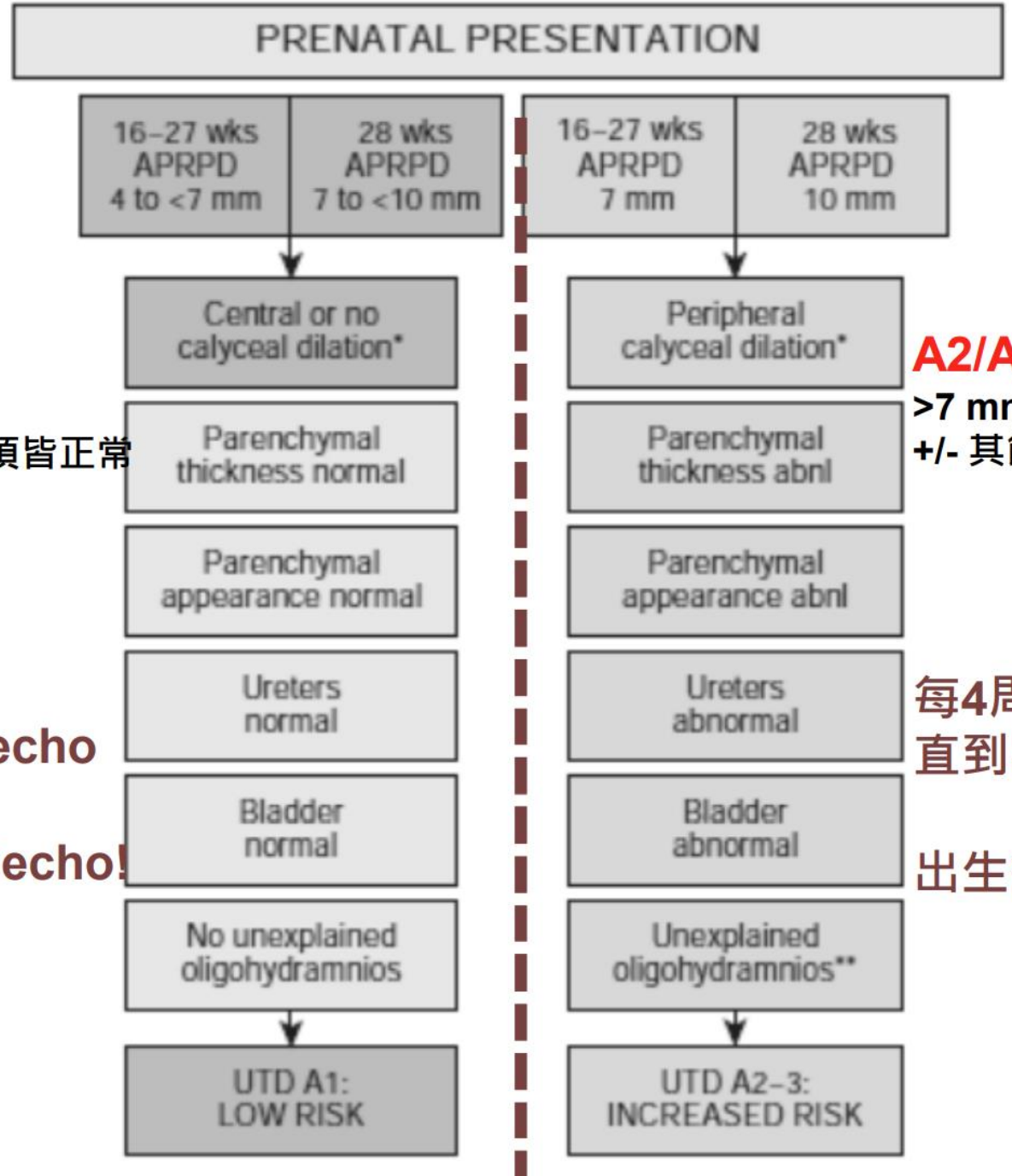
UTD system

Ultrasound findings	Time at presentation		
	16–27 weeks	28 weeks	Postnatal (>48 h)
Anterior-posterior renal pelvis diameter (APRPD)	<4 mm	<7 mm	<10 mm

A1 (low risk) : **4-7 mm** **7-10 mm**
除了calyceal 外, 其餘五項皆正常

A2/A3 (increased risk) : **>7 mm** **>10 mm**
+/- 其餘五項有不正常

Calyceal dilation			
Central	No	No	No
Peripheral	No	No	No
Parenchymal thickness	Normal	Normal	Normal
Parenchymal apprearance	Normal	Normal	Normal
Ureter(s)	Normal	Normal	Normal
Bladder	Normal	Normal	Normal
Unexplained oligohydramnios	No	No	NA



A1 (low risk) :

4-7 mm 7-10 mm

除了calyceal 外, 其餘五項皆正常

28周前的A1 UTD

→ 32周要再做一次echo

出生後48小時: 要做echo!

A2/A3 (increased risk) :

>7 mm >10 mm

+/- 其餘五項有不正常

每4周做一次echo, 直到出生

出生後48小時: 要做echo!

什麼時候做reflux 檢查

- Voiding cystourethrography (VCUG)
  - PUV: bladder wall thickening, bilateral hydroureter
  - Hydronephrosis + dilated ureter

VCUG

- 放尿管 + 灌顯影劑
- 觀察逆流至哪個位置
  - Storage phase
  - Voiding phase

評估obstruction

- diuretic renography
- MAG3, ERPF, DTPA

- Curve
- T ½

diuretic renography

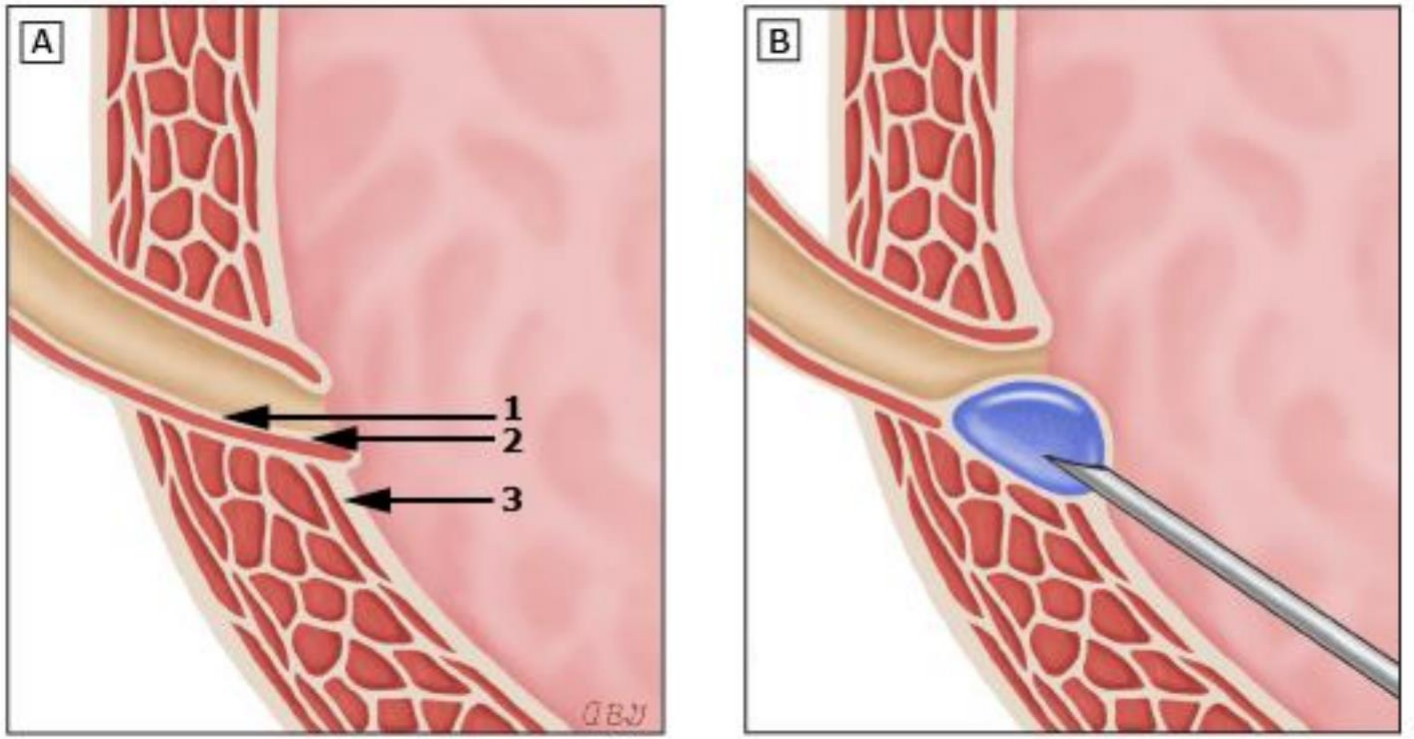
- 考慮手術介入的 indication:
  - decreased differential function 40:60
  - T ½> 20 min
  - significant retention on delayed upright imaging

Treatment of VUR

- Prophylactic antibiotics
    - Easterbrook et al., 2017: systematic review: failed to demonstrate a risk reduction with the use of PA 7.5% (95% CI, 6.4% to 8.6%) no prophylaxis versus 9.9% (95% CI, 8.4% to 11.4%) prophylaxis.
- Injection on UVJ
- Surgery repair

Bulking agent injection on UVJ

- Durability
- Adverse event of obstruction

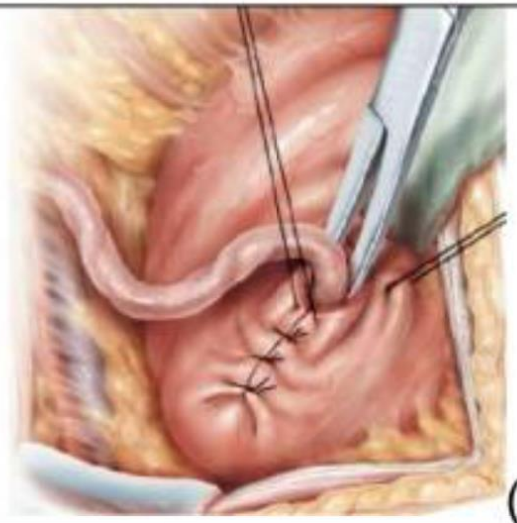
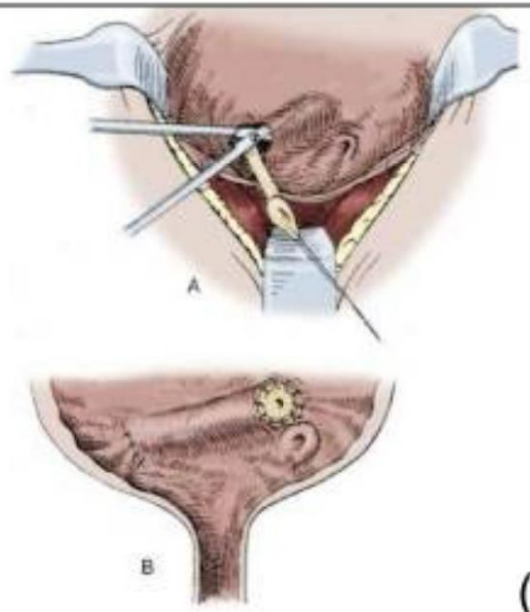


VUR 需考慮手術的時機

- Grades IV and V reflux.
- Persistent reflux despite medical therapy
- Breakthrough UTIs in patient who are receiving antibiotic prophylaxis.
- Lack of renal growth.
- Multiple drug allergies that preclude the use of prophylaxis.

Surgical repair for VUR

- Extravesical
- intravesical

Lich-Gregoir 1961, 1964	 (24)	Bladder is not opened Decreased postoperative hematuria/bladder spasm
Cohen 1975	 (30)	Avoids ureteral kinking Longer tunnel length

UPJO 需考慮手術的時機

- Increased APD
- Serial sonography皆UTD
- Decreased differential function

UPJO surgical repair

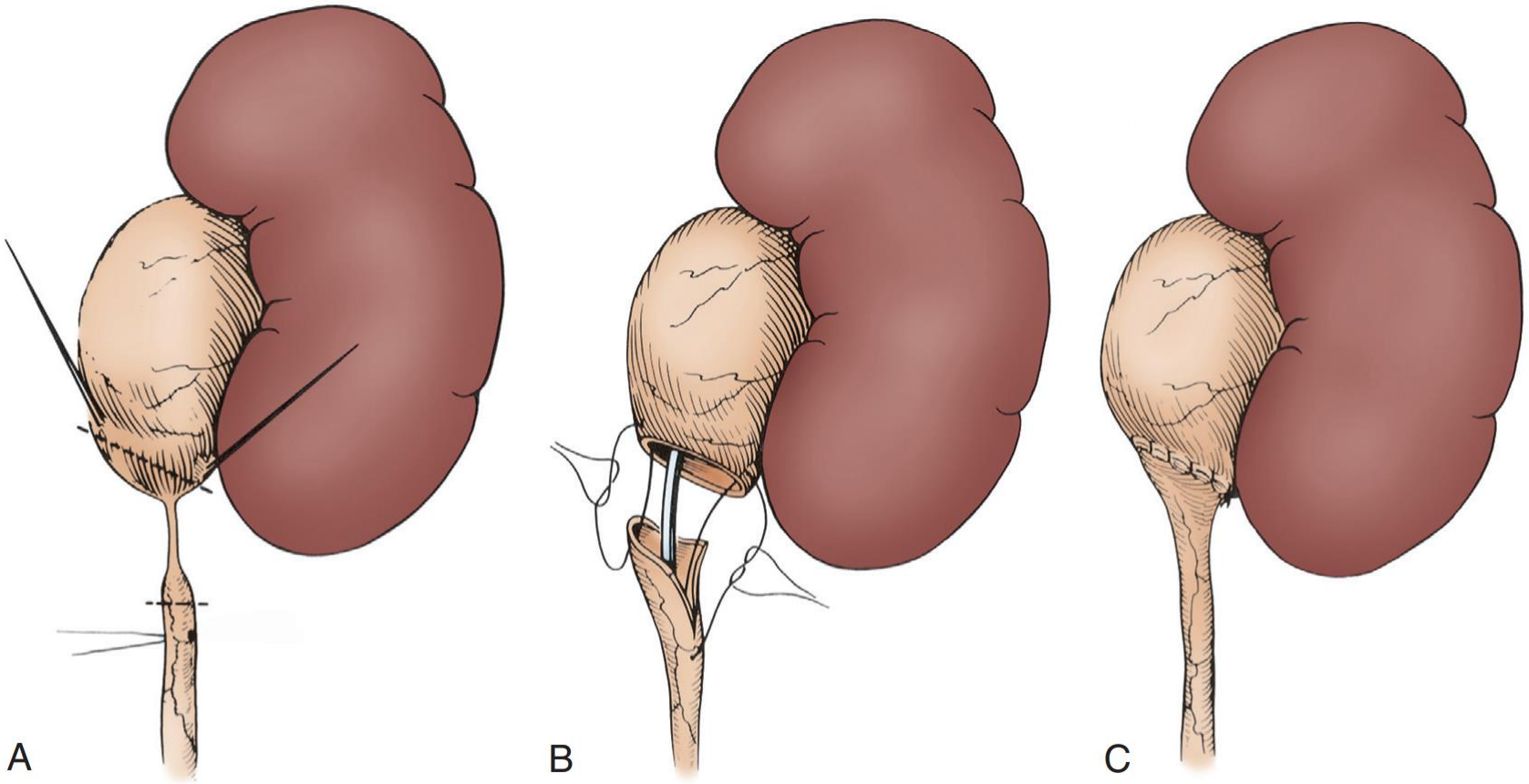
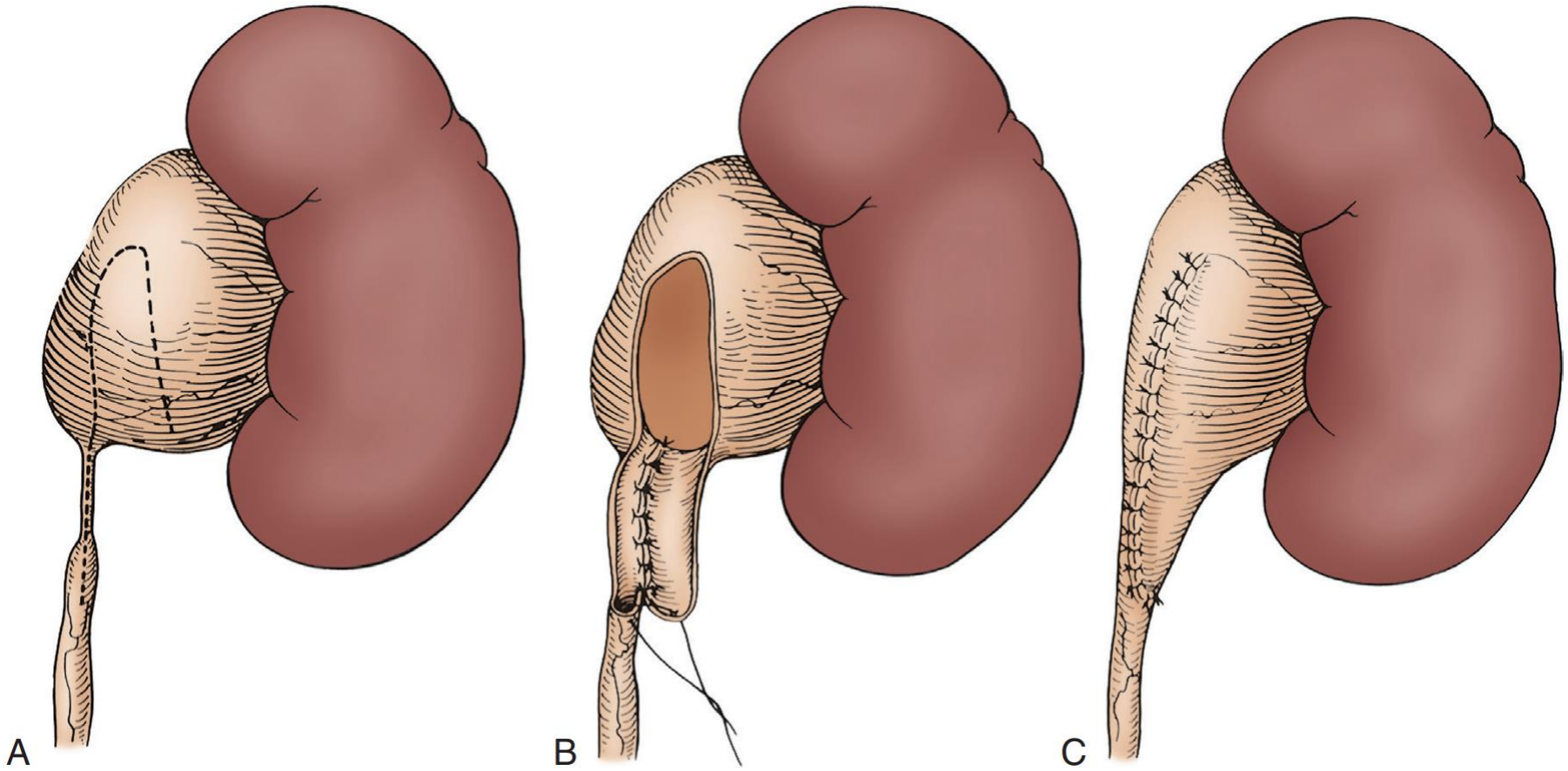
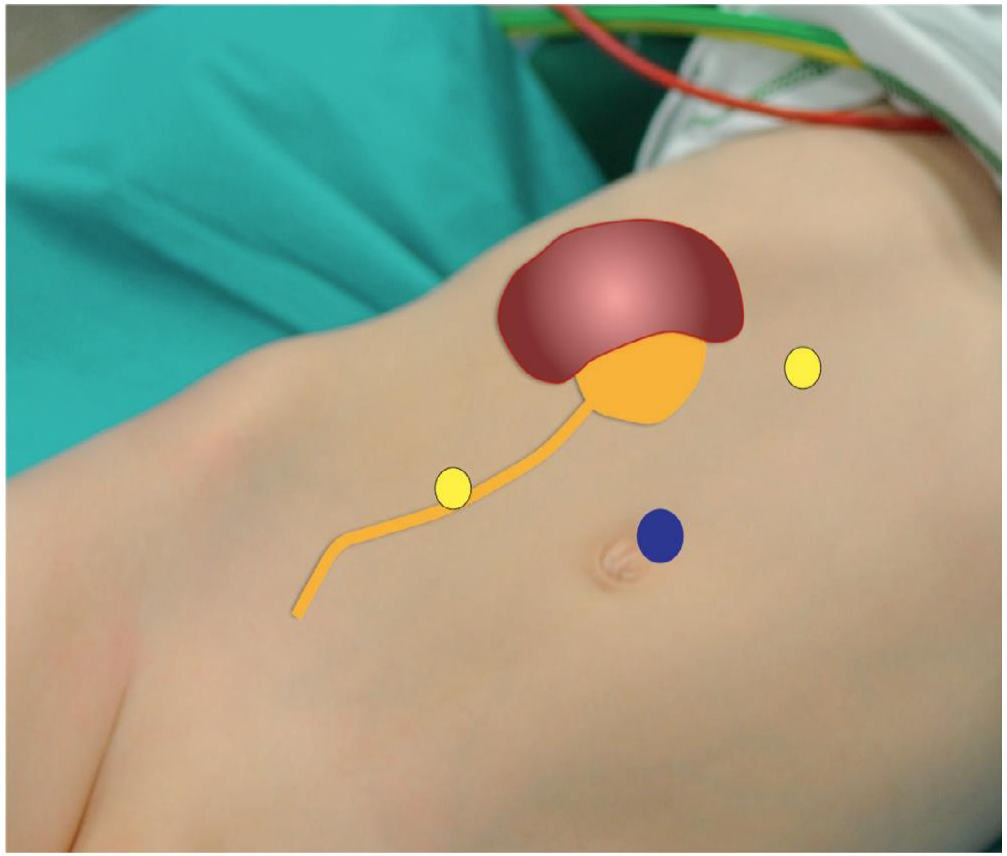


Fig. 42.4. Anderson-Hynes dismembered pyeloplasty. (A) Traction sutures are placed on the medial and

UPJO surgical repair



Minimal invasive approach



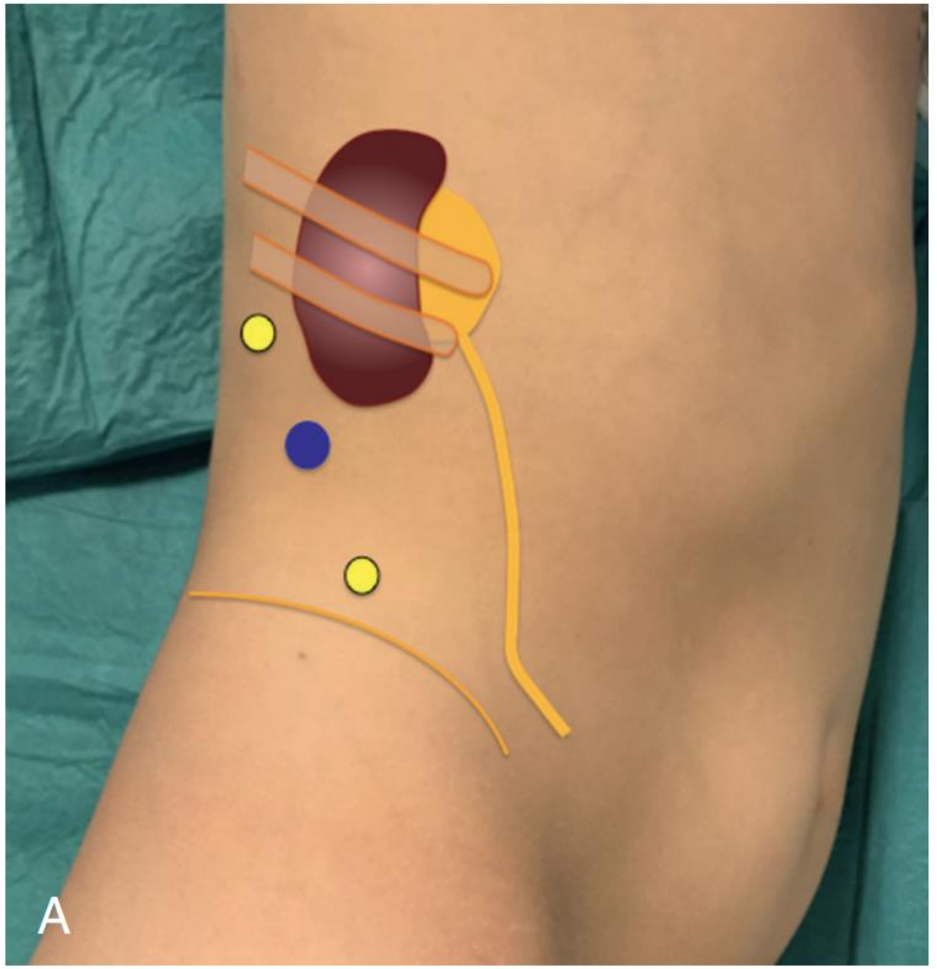


Fig. 42.12. Port placement in transabdominal laparoscopic or robotic-assisted pyeloplasty. *C,* Camera port; *I,* instrument ports.

Take home message

- Urinary tract distension may be obstruction or reflux
- UTI and UTD is related and will cause damage in kidney
- Start survey early and effective
- Obstruction is more dangerous than reflux
- Start treatment based on risk and benefit