

Posterior Urethral Valve a Correlation between Role of Ultrasound and Micturating Cystourethrogram.



Medical Science

KEYWORDS : Comparison of ultrasonography with micturatingcystourethrography, as a diagnostic approach in patients with PUV.

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USG shows distended UB, increased UB wall thickness and dilated PU before voiding and dilated PU (more than 7 mm) during voiding. PUV appears as mobile linear hyperechoic structure in posterior urethra. And back pressure changes-hydronephrosis and hydroureter.

The key findings detecting PUV by MCU are dilated posterior urethra, wide bladder neck and 'spinnaker-sail' appearance of valves, presence of VUR either unilaterally or bilaterally.

Combined transabdominal and transperineal USG shows sensitivity of 100%, accuracy of 96.6% and negative predictive value of 100%.

DIAGNOSIS

ANTENATAL ULTRASONOGRAPHY

A good rule of thumb is that the menstrual age in week approximates the normal foetal kidney length in millimetres or twice the anteroposterior diameter in millimetres.

the cardinal signs of posterior valve urethral obstruction includes persistent dilatation of urinary bladder and proximal urethra and thickening of the urinary bladder wall.

Documentation of the **dilated proximal urethra, which resembles a keyhole** and extending from the bladder towards the foetal perineum, constitutes convincing evidence of urethral obstruction.

Reference: Barry s. Mohny

Figure 1 : HYDRONEPHROSIS AND PERINEPHRIC FLUID



Figure 2 :DILATED URINARY BLADDER AND PROXIMAL URETHRA



POST NATAL ULTRASONOGRAPHY

TRANSABDOMINAL SONOGRAPHY

With the bladder wall distended sonography can identify and evaluate the length of the sub mucosal segment of the intravesical ureter; recognised as small lucencies bridged by overlying bladder mucosa. On the longitudinal sonography the sub mucosal segments of the intravesical ureter appears as a defect in the bladder outline. Normally the diameter of this segment varies between 1 and 2mm, while the length varies between 6 and 16mm.

Any separation of renal sinus should be regarded with suspicion as this may be the only indicator of vesico-ureteric reflux in neonate. Separation of central sinus echoes by more than 100mm is reliably associated with obstruction.

The classic sonographic findings of PUV includes

Bilateral hydronephrosis with a wide open dilated pelviureteric junction and upper ureter seen well in prone view. Dilated lower ureter seen low down behind the bladder. This is well seen in transverse pelvic scan.

A thick walled bladder:

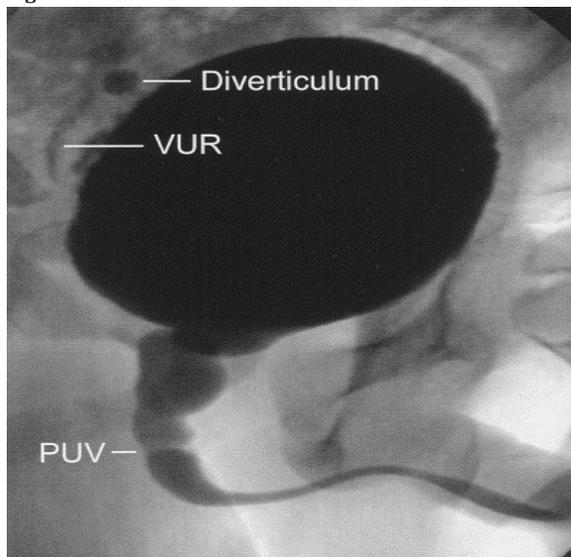
Dilatation of bladder neck or posterior urethral area: this is best seen in full bladder by

Patient is examined continuously until the bladder and posterior urethra are assessed both before and during voiding.

The Diagnostic Feature Of Puv Is The Detection Of A Dilated Posterior Urethra, Valve Appears As A Single Echogenic Line Which Runs Obliquely And Inferiorly.

Reference: Harshadajoshi, Vikrampatel

Figure 3:THE VOIDING CYSTOURTHROGRAPHY



THE VOIDING CYSTOURTHROGRAPHY

When the patient voids, the posterior urethra distends well and the valve bulges downwards and has the appearance of spinnaker sail.

Differential diagnosis

- posterior urethral stricture
- prune belly syndrome
- ectopic ureter
- ectopic ureterocele

MATERIAL AND METHODS

A prospective study of the role of USG in detecting PU valve , in correlation with MCU

The study comprises thirty randomly selected boys with suspected PU valve. Pts whose routine antenatal scans show foetus with distended bladder with or without upper urinary tract dilatation are suspected of having PU valves and are taken for follow up postnatal study.

all patients are prospectively study with routine renal and pelvis USG performed through full bladder and transperineal USG performed in longitudinal plane and transverse plane.

. The renal and bladder areas are examined in longitudinal and transverse planes. Transperineal USG is performed.

All patients underwent MCU as the standard of reference for diagnosis of PUV.

OBESERVATION, ANALYSIS AND DISCUSSION

ANTENATAL DIAGNOSIS OF POSTERIOR URETHRAL VALVE

The study comprised of thirty patients with suspected PUV . Antenatal history of 12 patients is unavailable. The mother of remaining 18 boys has at least one ultrasound scan during pregnancy.

The mother of 18 boys has at least 1 ultrasound scan during pregnancy, of these 13 has first ultrasound before 24 weeks of gestation and 5 has first ultrasound scan after 24 weeks. Out of those 13 who has first ultrasound before 24 weeks, 5 were scanned after 24 weeks due to obstetric indication and 2 for suspected uropathy, remaining 6 has no further scan.

NO			UB WALL	RENAL PELVIC				
1	Distended	+	3mm	'16mm	+	present	-	-
2	"	+	3mm	18mm	+	Present	-	-

3	"	+	6mm	15mm	+	Present	-	-
4	"	+	6mm	16mm	+	Present	--	-
5	"	+	5mm	17mm	+	Present	-	--
6	"	+	4mm	9mm	-	Present	-	-
7	"	+	4mm	7mm	-	-	-	-
8	"	+	7mm	12mm	-	-	-	--
9	"	+	3mm	11mm	-	-	-	-
10	"	-	11mm	7mm	-	-	+	-

Table 1 :FINDING ON ANTENATAL SCANS IN SUSPECTED CASES OF PU VALVES

- Out of 10 suspected patients of puv
- 9 shows distended bladder, all the 10 shows increased bladder wall thickened and dilated proximal urethra
- Mean thickness of UB wall=5.2mm
- 5 patients showscalyceal dilatation and mean renal pelvis diameter of 16.4 mm.
- 5 patient shows ureterectasis.
- 6 shows oligohydrannios
- Urinary ascites is present in one patient.
- None of the patient shows renal dysplasia

Remaining 8 patient non suspected of PUV

- 6 patients were scanned before 24 weeks and no second scan is performed in them.
- One of them is scanned at 30th week once only
- Remaining 1 is scanned twice, first at 16th week & second at 34th week,
- None of them shows pelvic calyceal dilatation/dilated posterior urethra.
- Posterior urethral valves: post natal diagnosis
- The study comprised of 30 boys suspected to have PUV, age ranged from 1 day to 8 years of life. 10 of them has antenatal diagnosis of suspected PUV and were followed after birth.
- OUT of 8 patients, 4 presented with UTI (50%) all 8 of these babies presents with in 1st 6 month of age
- Out of the 12 patients, main presenting symptoms is distended urinary bladder and dribbling.Nine out of 12 babies presented with in 1st 1 year of life. So, most of the babies with PUV presented within 1st year of life.

W.E. Budon

- Mode of presentation of 12 cases of PUV (without antenatal-USG)
- Distended bladder, decreased stream
- Palpable kidney
- Infection
- Renal failure
- Abdominal distention, dribbling

TRANSABDOMINAL SONOGRAPHY

ALL THE 30 PATIENTS ARE EXAMINED WITH REAL TIME MECHANICAL SCANNER USING A 3.5 MHz TRANSDUCER TRANSABDOMINALLY.

- All the 30 patients shows distended urinary bladder:
- 6mm is the mean bladder wall thickness of the 27 patients, who shows increase in wall thickness.
- Remaining 3patients shows normal bladder wall thickness.
- Out of 30 patients, 28 shows dilated posterior urethra.
- B/L hydronephrosis is present in 6 patients and unilateral hydronephrosis in 6 patients.
- Remaining 16 patients has normal kidney.
- Hydroureter is present in 13 patients, 7 of them shows on both sides and 6 shows on one side.
- Ascites is present in 1 of them.
- None of the patient shows renal dysplasia and urinoma,
- One of the patient shows an echogenic mass arising from the bladder base s/o rhabdomyosarcoma.

TRANSPARINEAL ULTRASONOGRAPHY

- Appearance and width of posterior urethra noted, before and during voiding.
- Out of 30 patients of suspects PUV, in 17 pt's PUV is depicted clearly as a mobile hyperechoic structure in posterior urethra

- Out of 30 patients, 27 shows PU diameter of more than 7 mm during voiding, diagnostic of PUV.

MICTURATING CYSTOURETHROGRAPHY

- All the 30 patients underwent the micturatingcystoyrethrography as the standard of reference for diagnosis of PUV.
- Out of 30 patients, 26 shows dilatation of posterior urethra and presence of posterior urethral valves suggested by fine filling defects sweeping towards and laterally from the verumontanum or as a thicker transverse line.
- Trabeculation of bladder is evident in 14 patients.
- Vesico-ureteric reflux noted on both sides in 4 patients, and unilaterally in 8 patients.

Reference: **Francis F. Bostone**

4 PATIENTS ON MCU WHICH DID NOT DEMONSTRATES PUV

- 2 patients shows dilatation of posterior urethra and stricture just below the verumontanum s/o stricture urethra.
- 1 patient shows well defined filling defect at the base of bladder s/o mass arising from bladder base.
- 1 patient shows bladder neck obstruction.

CORRELATION OF MCU WITH ULTRASONOGRAPHY

- Out of the 30 patients study, 26 were 'true positive' on both MCU and postnatal ultrasonography. No signs suggestive of PUV, 'true negative' is found in four patients in MCU, out of which 3 also shows no signs suggestive of PUV on sonography but one patient shows signs of PUV on USG which is finally negated on MCU suggesting that through ultrasonography is 100% sensitive but specificity is a bit lower.
- Of the 30 patients, 4 did not have posterior urethral valve (normal posterior urethra at MCU) and 26 has PUV as confirmed by finding of a PUV at MCU and USG.
- During voiding use of threshold PU diameter of at least 7 mm to diagnosis, PUV yield a sensitivity of 100% and specificity of 75%.
- In 17 of the 26 pts with PUV< the abnormality is clearly

demonstrated at transperineal USG in both the longitudinal and transverse planes as a hyperechoic linear structure is the dilated posterior urethra.

SUMMARY AND CONCLUSION

- A prospective study of the role of ultrasound in diagnosis of PUV is conducted with 30 patients. All these patients underwent MCU as the standard of reference for diagnosis.
- Combined transabdominal and transperineal USG shows sensitivity of 100%, accuracy of 96.6% and negative predictive value of 100%.
- Antenatal sonography shows sensitivity of 58.8% and accuracy of 61%.
- The key findings detecting PUV by MCU are dilated posterior urethra, wide bladder neck and 'spinnaker-sail' appearance of valves, presence of VUR either unilaterally or bilaterally.
- Antenatal USG shows distended UB in male fetus with increased UB wall thickness and back pressure changes-renal pelvic and ureterectasis. Oligohydramnios may be present.
- Post natal combined transabdominal and transperineal USG shows distended UB, increased UB wall thickness and dilated PU before voiding and dilated PU (more than 7 mm) during voiding. PUV appears as mobile linear hyperechoic structure in posterior urethra. And back pressure changes- hydronephrosis and hydroureter.
- When examining the patients with a suspected diagnosis of PUV, the USG of the urethra during voiding should be first line of investigation. In pt's in whom the voiding PU diameter is at least 7 mm, especially when a PUV can be clearly seen and there is associated non-distended of anterior urethra and bladder wall thickening, the MCU is not required to confirm the diagnosis.
- Thus ultrasonography definitely proves to be the imaging modality which is universally available, cheap, non-invasive, without the hazards of radiation and contrast media is the diagnosis of PUV and its complication.

REFERENCE

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