



**BMUS Guidelines for
postnatal ultrasound referrals
for follow-up of antenatally
detected renal pelvic dilatation**

Produced by the British Medical Ultrasound Society

Paediatric Clinical Interest Group

January 2025

The purpose of this document is to provide guidance for managing appropriate referrals for postnatal imaging of renal pelvic dilatation detected during antenatal ultrasound examinations scans. A brief comment is made regarding timing of initial post-natal follow up of other antenatally detected congenital renal anomalies, as these are too extensive to cover fully in this document.

Introduction and Clinical Background

Antenatal renal pelvic dilatation refers to pelvic or pelvicalyceal dilatation of the kidney(s) diagnosed prior to delivery. The estimated incidence is approximately 0.5 to 1%.¹ It is usually diagnosed on routine antenatal ultrasound scanning and is normally most frequently identified at the time of the routine mid trimester anomaly scan performed at 20 weeks. However, the normal appearance of one or both renal pelves at the routine anomaly scan does not preclude renal pelvic dilatation developing later in gestation (i.e. any scans done in the third trimester). The dilatation may be transient and resolve or progress prior to birth.^{2,3}

Risk factors for pathology antenatally include bilaterality, abnormal echogenicity of the kidneys, ureteric dilatation, abnormality of the bladder (including over distention), and abnormal volume of amniotic fluid (oligohydramnios or polyhydramnios).

Postnatal follow up is performed to confirm the presence of renal pelvic dilatation and to further characterise this, in addition to identifying any potential other abnormalities of the urinary tract. Currently there is no national guidance for management of renal pelvic dilatation.

Differential Diagnosis

There are multiple possible causes of antenatal renal pelvis dilatation including transient dilatation, obstructive uropathy e.g. at the pelvico-ureteric junction or vesico-ureteric junction, ectopic ureters, or posterior urethral valves in boys, and non-obstructive uropathies e.g. vesico-ureteric reflux, multicystic dysplastic kidneys or megaureter.

Indication for Postnatal Ultrasound Referral

- Unilateral renal pelvis dilatation > 7 mm at 20 weeks gestation (even if not present on any subsequent antenatal scans)
- Unilateral renal pelvic dilatation > 10 mm in the third trimester
- Bilateral renal pelvic dilatation > 7 mm at any gestation
- Suspicious features in addition to renal pelvic dilation (See table below)
-

Suspicious features

- Calyceal dilatation
- Ureteric dilatation
- Solitary kidney
- Abnormality of the renal parenchyma e.g. abnormal echogenicity, cysts.
- Abnormality of the urinary bladder e.g. dilated, thick walled, ureterocele
- Abnormal volume of amniotic fluid.

Suggested Scan Timing / Urgency & Follow-Up

Postnatal ultrasound scan at 24-72 hours is indicated for the following antenatal findings (allowing for adequate hydration of the baby, and for more accurate assessment).

- Bilateral renal pelvis dilatation > 7 mm at any gestation
- Isolated unilateral renal pelvis dilatation with any suspicious renal features present antenatally

Routine Outpatient ultrasound scan ideally within 2-4 weeks for the following antenatal findings:

- Isolated unilateral renal pelvis dilatation with no suspicious renal features
- Antenatally suspected congenital renal anomaly e.g. duplex kidney

Scanning Protocol

Urinary tract ultrasound can be performed with a curvilinear or linear array transducer. Given the small size of the patients, a high frequency transducer of either type should be utilised (8-15MHz) with B-mode imaging. Colour Doppler imaging can be useful to assess for any renovascular issues and distinguish pelvic and ureteric dilatation from adjacent vascular structures.

The patient should be positioned comfortably and be scanned ideally in both supine and prone positions. Prone positioning removes overlying bowel gas, and allows more accurate assessment of the renal size, and renal pelvic diameter ⁴.

The use of warm sonographic gel is also favourable and may improve patient cooperation.

Images of the kidneys should be obtained in longitudinal and transverse sections including of the renal hilum/pelvis.

If a dilated ureter is seen this should be imaged in both longitudinal and transverse sections, with attempt to trace to the VUJs to see if there is an ectopic insertion.

The bladder should be imaged in both longitudinal and transverse sections.

The clinical preset used for the scan should display the appropriate thermal index (TIS), depending on the anatomy within the scan plane and ultrasound beam focus. Further details on the appropriate thermal index can be found in the BMUS guidelines for safe scanning ⁵. For all scans ALARA (as low as reasonably achievable) principles should be followed.

Scan Assessment

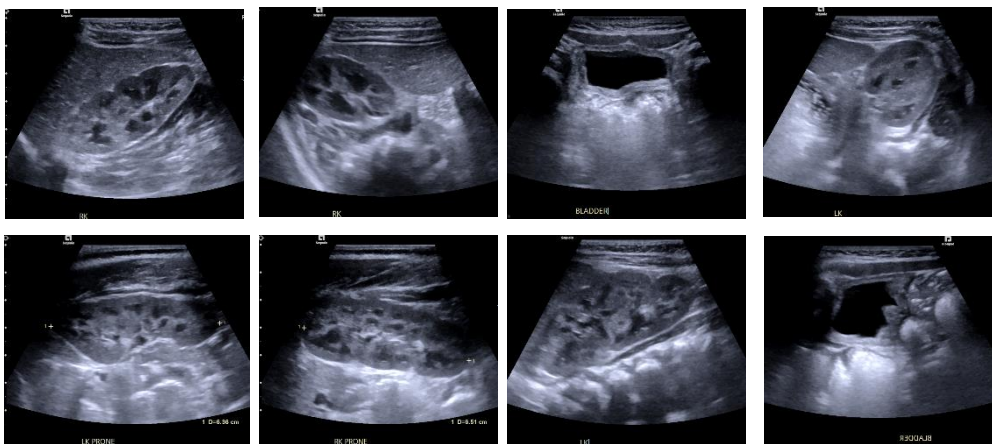
The urinary tract should be scanned in a systematic manner. The following should be assessed:

- *Kidneys*: Location, morphology, size (document if undertaken prone or supine to allow correlation of any follow up scans), parenchyma including echogenicity, presence of cysts, perinephric collection or free fluid.
- *Pelvic/alyceal system*: presence of dilatation of the renal pelvis +/- calyces. If dilatation present measurement of the anterior posterior diameter of the renal pelvis obtained in transverse plane, see section below on how to measure the pelvic diameter. Presence of urothelial thickening.
- *Ureters*: presence of dilatation (with measurements if present), presence of urothelial thickening, insertion point e.g. at VUJ or ectopic, presence of ureterocele.

- **Bladder:** volume (adequately filled or not), wall thickness, outline, if micturition occurs.
- **Urethra:** if visualised and confident to assess the urethra: the presence of dilation- particularly in boys with bilateral pelvic dilatation may indicate posterior urethral valves.

Standard Images

- Representative labelled images of the ultrasound examination should be stored onto local storage (PACS). Images saved should include both longitudinal and transverse sections of the kidneys and urinary bladder. If abnormalities present representative images should be recorded with appropriate measurements.
- The following shows an example of some standard images that are recommended to acquire during the ultrasound examination.



How to measure the anteroposterior renal pelvis diameter:

The renal pelvis should be measured from the inner anterior wall to the inner posterior wall at the widest point by the renal cortex on the transverse plane. Distal to this is the extrarenal pelvis, measurement of the extrarenal pelvis if dilated should be taken using the same technique. If possible, assessment of the diameter is performed in prone position (see scanning protocol section).

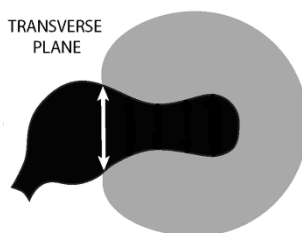


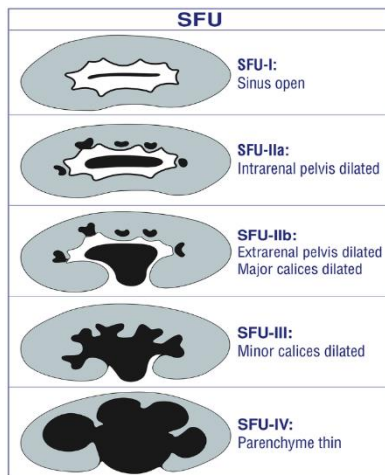
Image adapted from Nguyen et al. 2021 update on the urinary tract dilation (UTD) classification system: clarifications, review of the literature, and practical suggestions.⁵

Reporting

A descriptive report with comment on the appearances of all the assessed structures, including renal size measurement (with correlation for age), renal pelvis +/- ureter measurement if dilatation, as well as presence of any other abnormal findings is sufficient.

Depending on local policies classification systems may also be used to grade paediatric hydronephrosis. Two commonly used ones are the Society of Fetal Urology (SFU) grading, and the urinary tract dilation (UTD) classification.^{4,6}

SFU⁴



UTD⁵

Urinary Tract Dilatation (UTD) Classification

	Antenatal		Postnatal (>48h)		
	UTD A1	UTD A2-3	UTD P1	UTD P2	UTD P3
Anterior Posterior Renal Pelvic Diameter (APRPD)	4 - <7 mm (<28w) 7 - <10 mm (≥28w)	≥ 7 mm (<28w) ≥ 10 mm (≥28w)	10 - <15 mm	≥ 15 mm	≥ 10 mm
Calyces		OR Any Dilatation	OR Central Dilatation	OR Peripheral Dilatation	OR Any Dilatation
Ureter		OR Any Dilatation (with APRPD ≥ 4mm or calyceal dilatation)		OR ≥ 4 mm (with APRPD ≥ 10mm or calyceal dilatation)	
Parenchyma Abnl, Bladder Abnl, or Oligohydramnios		OR Yes (with APRPD ≥ 4mm or calyceal dilatation)			AND Yes

Parenchyma abnormalities: cortical thinning, hyperechogenicity, or cystic dysplasia; indistinct corticomedullary differentiation
Bladder abnormalities: wall thickening, ureterocele, dilated posterior urethra

Follow up of postnatal renal pelvic dilatation:

This may depend on local policies/guidelines and reference to these is advised. However, in general:

- Isolated unilateral renal pelvic dilatation ≤ 10 mm in a normal kidney – no follow up
- Bilateral renal pelvic dilatation +/- ureteric dilatation in a male- consider Micturating Cystourethrogram (MCUG)
- Renal parenchyma abnormalities +/- ureteric dilatation +/- abnormal bladder- consider MCUG
- Isolated unilateral renal pelvic dilatation > 10 mm - consider Nuclear Medicine renogram study (MAG3 scan).

Take Home Points

- Ultrasound is the initial modality for follow up of antenatally diagnosed renal pelvic dilatation.
- The timing of the postnatal ultrasound examination is dependent on the severity at antenatal imaging.
- Use a systematic approach and review the key anatomy of the urinary tracts to provide a descriptive report of the pertinent findings. Classifications systems can be used as per local preferences.
- Isolated unilateral renal pelvic dilatation ≤ 10 mm on the postnatal follow up scan in an otherwise normal kidney does not require ongoing follow up.

References

1. Sidhu G, Beyene J, Rosenblum ND. Outcome of isolated antenatal hydronephrosis: a systematic review and meta-analysis. *Pediatr Nephrol.* 2006 Feb;21(2):218-24. doi: 10.1007/s00467-005-2100-9. Epub 2005 Dec 17. PMID: 16362721.
2. BB Zia, A Godse, A Niyogi, 673 The Role of the First Postnatal Ultrasound Scan to Predict Outcome in Children with Antenatally Diagnosed Hydronephrosis. *British Journal of Surgery.* Volume 109, Issue Supplement 6. September 2022,
3. Donekal S, Somisetty SPO-0620 Antenatal Hydronephrosis – What Does It Mean Postnatally? *Archives of Disease in Childhood* 2014;99:A457.
4. Onen A. Grading of Hydronephrosis: An Ongoing Challenge. *Front Pediatr.* 2020 Aug 27;8:458. doi: 10.3389/fped.2020.00458
5. The British Medical Ultrasound Society. Guidelines for the safe use of diagnostic ultrasound equipment. 2009. <https://www.bmus.org/static/uploads/resources/BMUS-Safety-Guidelines-2009-revision-FINAL-Nov-2009.pdf>
6. Nguyen HT, Phelps A, Coley B, Darge K, Rhee A, Chow JS. 2021 update on the urinary tract dilation (UTD) classification system: clarifications, review of the literature, and practical suggestions. *Pediatr Radiol.* 2022 Apr;52(4):740-751. doi: 10.1007/s00247-021-05263-w. Epub 2022 Jan 4. PMID: 34981177.

Disclaimer

The British Medical Ultrasound Society produces recommendations and guidelines as an educational aid to inform safe practice. They offer models and pathways associated with established clinical imaging techniques and best professional practice, based on published evidence.

BMUS recommendations and guidelines are designed to inform local protocols issued by employers, but are not intended to be inflexible or prescriptive. Therefore, the choice of imaging examination and subsequent management of all patients is ultimately a local decision based on agreed schemes of work, the clinical information provided, and the ultrasound practitioner's professional judgement.

info@bmus.org

Office phone number : 02076363714

British Medical Ultrasound Society
Margaret Powell House
Milton Keynes
MK9 3BN