Percorsi pediatrici del Val di Noto 2020
Vittoria, 1 Febbraio 2020

UROPATIE DILATATIVE: clinica e follow-up

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UROPATIE DILATATIVE: incidenza

Introduction

Prenatal diagnosis of urinary tract (UT) dilation occurs in 1–2% of all pregnancies. Based on an estimated birth rate in the United States of 4 million per year [1], approximately 40–80,000 children are diagnosed annually with this condition. The prenatal sonographic identification of UT dila-


Journal of Pediatric Urology

Multidisciplinary consensus on the classification of prenatal and postnatal urinary tract dilation (UTD classification system)

would benefit from postnatal imaging. Evaluating every child with prenatal UT dilation results in the expenditure of significant healthcare resources and could cost over $90 million annually (1–3 prenatal US scans at $500; antibiotics at $25; 1–3 postnatal US scans at $400; 1 VCUG at $1200 per child). This does not factor in the cost associated with

UROPATIE DILATATIVE: cause

Table 1 Etiology of urinary tract dilation detected on antenatal ultrasound.

Etiology	Incidence (%)
Transient/physiologic	50–70
Ureteropelvic junction obstruction	10–30
Vesicoureteral reflux	10–40
Ureterovesical junction obstruction/megaureter	5–15
Multicystic dysplastic kidney disease	2–5
Posterior urethral valves	1–5
Ureterocele, ectopic ureter, duplex system, urethral atresia, Prune belly syndrome, polycystic kidney diseases, l cysts	Uncommon

Adapted from Nguyen et al. 2010 [16].

The Society for Fetal Urology consensus statement on the evaluation and management of antenatal hydronephrosis
Nguyen, Hiep T. et al. Journal of Pediatric Urology, Volume 6, Issue 3, 212 - 231

International Journal of Anatomy and Research,
Int J Anat Res 2018, Vol 6(4.2):5892-10. ISSN 2321-4287
DOI: https://dx.doi.org/10.16965/ijar.2018.370

Original Research Article

A HUMAN CADAVERIC STUDY ON INCIDENCE AND MORPHOLOGY OF ANATOMICAL VARIATIONS OF KIDNEY AND URETER WITH EMPHASIS ON ITS EMBRYOLOGICAL, GENETIC AND CLINICAL SIGNIFICANCE

Shweta B Shambharkar *[1], Shabana Borate [2], Suresh Gangane [3].

Congenital anomalies of kidney and urinary tract (CAKUT) are common findings on fetal ultrasound [1]. It is common in children and represent approximately 30% of all prenatally diagnosed malformations [2]. CAKUT play a major role in morbidity and mortality. It accounts for approximately 3.3 to 11.1% incidence in general population and about 50% of all congenital abnormalities [3]. It occurs at a

Insufficienza renale cronica: epidemiologia

Selected studies on the causes of chronic kidney disease in children

	Causes of CKD			Causes of ESRD			
Study (reference)	NAPRTCS [12]	Italian Registry [5]	Belgian Registry [13]	ANZDATA [17]	ESPN/ERA-EDTA Registry [18]	UK Renal Registry [19]	Japanese Registry [20]
Population	CKD (GFR < 75)	CKD (GFR < 75)	CKD (GFR < 60)	ESRD (RRT)	ESRD (RRT)	ESRD (RRT)	ESRD (RRT)
Age range	0–20	0–19	0–19	0–19	0–15	0–15	0–19
Patients	Registered 1994–2007	Incident 1990–2000	Incident 2001–2005	Incident 2005–2008	Incident 2008	Incident 2004–2008	Prevalent 1998
Number of cases	7,037	1,197	141	369	459	428	382
Etiology							
CAKUT	3,581 (48%)	689 (58%)	84 (59%)	127 (34%)	182 (40%)	184 (43%)	288 (76%)
Hypo/dysplasia + reflux nephropathy	1,947	516	66	93		135	166
Obstructive uropathy	1,434	173	18	32		49	50
Glomerulonephritis	993 (14%)	75 (5%)	10 (7%)	108 (29%)	76 (15%)	78 (18%)	130 (32%)
HUS	141 (2%)	42 (4%)	9 (6%)	9 (2%)	29 (6%)		13 (2%)
Hereditary nephropathy	717 (10%)	186 (15%)	27 (19%)		112 (25%)		89 (12%)
Congenital NS	71	11	1	7		15	34
Metabolic disease			3		37	38	
Cystinosis	184	22	2	4			2
Cystic kidney disease	368 (5%)	101 (8%)	13 (9%)	25 (7%)	59 (12%)	49 (12%)	35 (9%)
Ischemic renal failure	158 (2%)	46 (4%)	3 (2%)	8 (2%)	11 (2%)		11 (2%)
Miscellaneous	1,483 (21%)	122 (10%)	18 (7%)	93 (25%)	32 (10%)	19 (4%)	83 (14%)
Missing unknown	182 (3%)	46 (3%)		16 (4%)	17 (7%)	45 (15%)	44 (6%)

Epidemiology of chronic kidney disease in children; Jérôme Harambat & Karlijn J. van Stralen & Jon Jin Kim & E. Jane Tizard. Pediatr Nephrol (2012) 27:363–373 DOI 10.1007/s00467-011-1939-1

Cosa fare?

uropathies. The rationale of prenatal detection is to identify pathology prior to the development of complications such as urinary tract infection (UTI), urinary stone formation, and renal dysfunction. In the majority of the cases, the prenatal finding of UT dilation is transient or physiologic and has no clinical significance. In other cases, it represents obstructive conditions such as posterior urethral valves (PUV) that have significant morbidities and even mortalities

exposure. Alternatively, not evaluating any child with prenatal UT dilation could avoid these initial costs but might delay the diagnosis of significant uropathies such as PUV and consequently, incur higher long-term health and financial costs.

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child). This does not factor in the cost associated with travel, time off from work for the parents, unnecessary parental anxiety, childhood radiation, and antibiotic exposure.

Pediatr Radiol (2017) 47:1109–1115
DOI 10.1007/s00247-017-3883-0

CrossMark

PEDIATRIC ULTRASOUND

Classification of pediatric urinary tract dilation: the new language

Jeanne S. Chow[1,2] · Jeffrey L. Koning[2] · Susan J. Back[3] · Hiep T. Nguyen[4] · Andrew Phelps[5] · Kassa Darge[3]

ultrasound (US) examinations [1]. The presence and description of fetal urinary tract dilation are variably conveyed to those caring for the newborn. This lack of optimal communication is multifactorial: fetal health care professionals might not know which pediatricians and specialists ultimately assume care of the baby, postnatal providers might not have access to the reports or images from prenatal US examination, and imaging specialists' terminology to describe the urinary tract varies considerably.

A single grading system that can be used across the prenatal and postnatal time period to describe UT dilation would be beneficial to promote communication between different specialists. In the majority of the cases, oral

images are often not available. Developing a common grading system would allow for information transfer without the ambiguities of interpretation by different providers. Additionally, by having a consistent grading

providers. Additionally, by having a consistent grading system utilized in both the prenatal and postnatal evaluation, more rigorous outcomes research could be per-

Journal of Pediatric Urology (2014) 10, 982–999

ELSEVIER

Journal of Pediatric urology

Multidisciplinary consensus on the classification of prenatal and postnatal urinary tract dilation (UTD classification system)

Hiep T. Nguyen [d,f,*], Carol B. Benson [b,a], Bryann Bromley [b], Jeffrey B. Campbell [d,f], Jeanne Chow [g], Beverly Coleman [e,h], Christopher Cooper [d,f], Jude Crino [e], Kassa Darge [g], C.D. Anthony Herndon [d,f], Anthony O. Odibo [e], Michael J.G. Somers [c], Deborah R. Stein [c]

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[h] Society of Radiologists in Ultrasounds (SRU), Reston, VA, USA

Recommendations

Recommendation #1: terminology

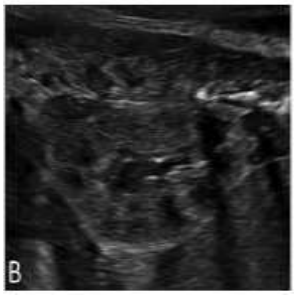
ness or prominence, and pelvic fullness). The panel recommends the consistent use of the term "UT dilation."

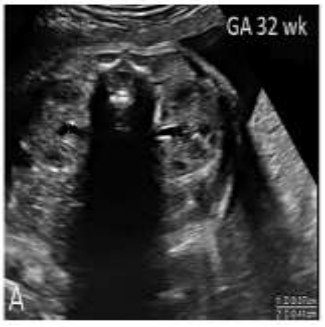
Table 2 US parameters included in the Urinary Tract Dilation Classification System.

US parameters		Measurement/findings	Note
Anterior-Posterior Renal Pelvic Diameter (APRPD)		(mm)	Measured on transverse image at the maximal diameter of intrarenal pelvis
Calyceal dilation	Central (major calyces)	Yes/No	
	Peripheral (minor calyces)	Yes/No	
Parenchymal thickness		Normal/Abnormal	Subjective assessment
Parenchymal appearance		Normal/Abnormal	Evaluate echogenicity, corticomedullary differentiation, and for cortical cysts
Ureter		Normal/Abnormal	Dilation of ureter is considered abnormal; however, transient visualization of the ureter is considered normal postnatally
Bladder		Normal/Abnormal	Evaluate wall thickness, for the presence of ureterocele, and for a dilated posterior urethra

Recommendation #2: consultation and communication of information

Communication of prenatal findings to physicians taking care of the infant postnatally is essential for clinical care as well as for future outcomes research. The sonographic





images should be included with the final US report. The panel recommends that when it is feasible, the parents of fetuses with prenatal UT dilation and/or the eventual primary care provider should be provided with the actual US images. When this is not practical, the panel recommends

Recommendation #3: classification system

The panel concluded that the following sonographic features are important factors in characterizing the severity of the UT dilation (Table 2). The ideal technique for APRPD measurement is based on images of the kidney obtained with the fetus or the child in an anterior-posterior plane.

Table 2 US parameters included in the Urinary Tract Dilation Classification System.

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Prenatal imaging

In the United States, US evaluation is routinely performed during pregnancy with an average of two scans for low-risk patients and four scans for high-risk patients [10]. National practice guidelines for obstetrical imaging include evaluation of the fetal kidneys and bladder as a required component of a complete survey [11]. The kidneys and bladder can be reliably seen on US by the end of the first trimester [12]. The incidence of detecting UT dilation

Table 3 Normal values for Urinary Tract Dilation Classification 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
Calyceal dilation			
Central	No	No	No
Peripheral	No	No	No
Parenchymal thickness	Normal	Normal	Normal
Parenchymal appearance	Normal	Normal	Normal
Ureter (s)	Normal	Normal	Normal
Bladder	Normal	Normal	Normal
Unexplained oligohydramnios	No	No	NA

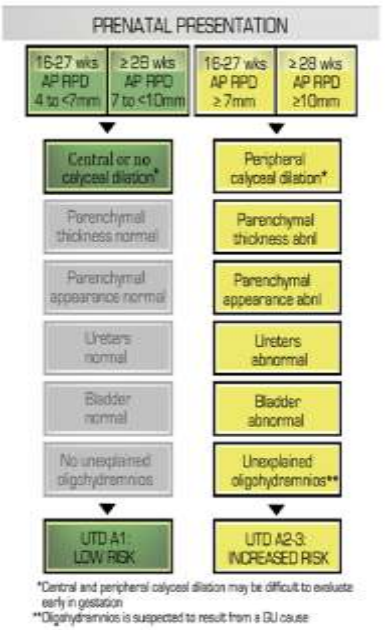


Figure 3 Urinary Tract Dilation (UTD) Risk Stratification - Prenatal Presentation for UTD A1 (low risk) and UTD A2–3 (increased risk). Note: Classification is based on the presence of the most concerning feature. For example, a fetus with an anterior-posterior renal pelvis diameter (ARPRD) within the UTD A1 range but with peripheral calyceal dilation would be classified as UTD A2–3 (as illustrated in Fig. 5C and D).

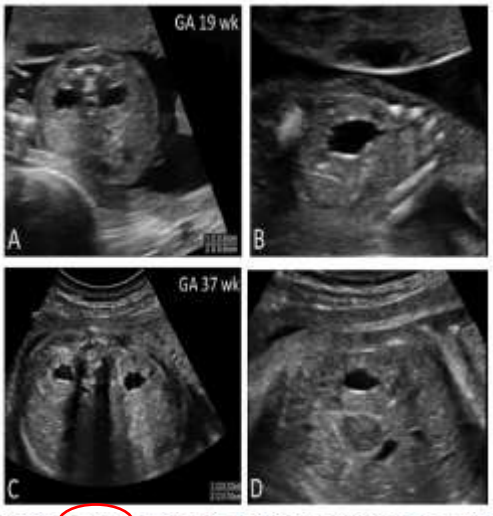
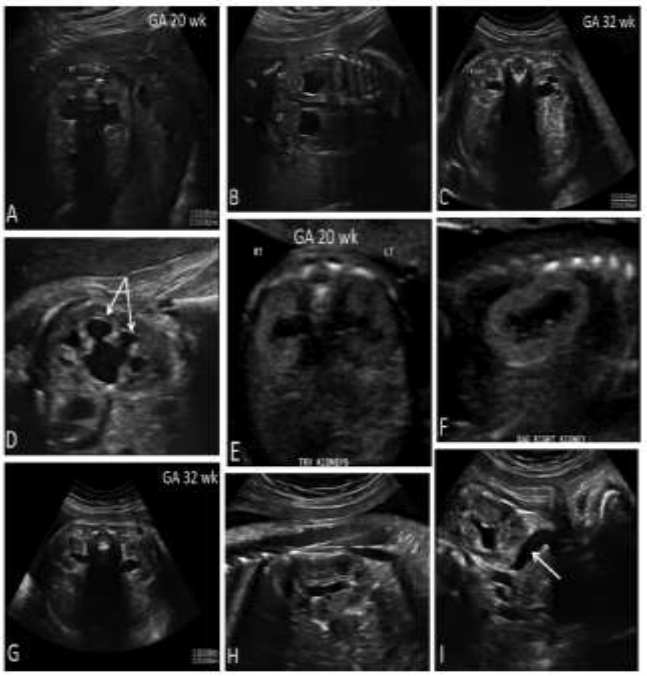
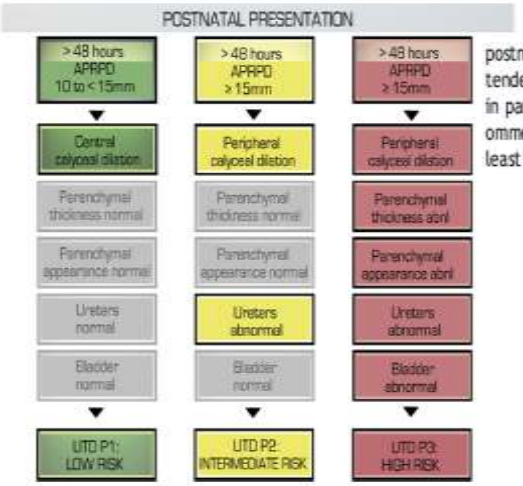


Figure 4 Ultrasound appearance of UTD A1. A and B: Fetal kidneys at 19 weeks gestation. A: Imaging in the transverse plane demonstrates an anterior-posterior renal pelvis diameter (APRPD) measuring less than 7 mm, which is within the UTD A1 range for this gestational age. B: Imaging in the sagittal plane demonstrates normal appearing parenchyma and no peripheral calyceal dilation. C and D: Fetal kidneys at 37 weeks gestation. C: Imaging the transverse plane demonstrates an APRPD measuring less than 10 mm, which is within the UTD A1 range for this gestational age. D: Imaging in the sagittal demonstrates normal appearing parenchyma and no peripheral calyceal dilation. In each case, the bladder is normal, and the ureters are not visualized (not illustrated).





postnatal US is important. Up to 48 h after birth, there is a tendency to underestimate the severity of hydronephrosis, in part because of dehydration [41,42]. It is generally recommended that the first postnatal US be delayed for at least 48 h after birth, except for cases of oligohydramnios,

Figure 6 Urinary Tract Dilation (UTD) Risk Stratification – Postnatal Presentation for UTD P1 (low risk), UTD P2 (intermediate risk), and UTD P3 (high risk). Note: Stratification is based on the most concerning ultrasound finding. For example, if the anterior-posterior renal pelvis diameter (APRPD) is in the UTD P1 range, but there is peripheral calyceal dilation, the classification is UTD P2. Similarly, the presence of parenchymal abnormalities denotes UTD P3 classification, regardless of APRPD measurement.

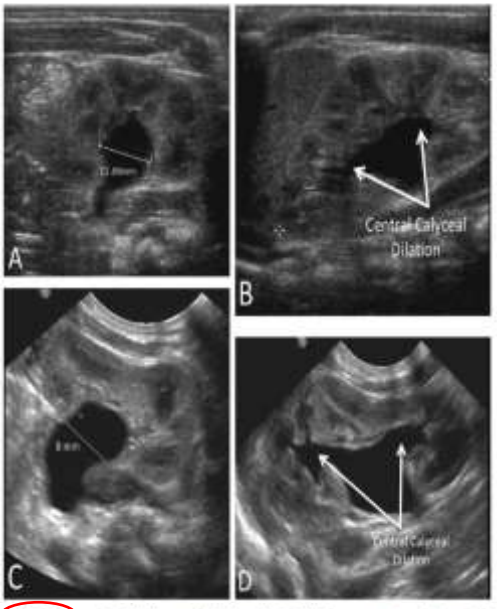


Figure 7 Appearance of UTD P1 on postnatal ultrasound. A: Imaging in the transverse plane demonstrates an anterior-posterior renal pelvis diameter (APRPD) 10 to <15 mm. B: Imaging in the sagittal plane demonstrates central but no peripheral calyceal dilation. The renal parenchyma is otherwise normal. The bladder is normal (not shown), and the ureters are not visualized. Another example of UTD P1 on postnatal US. C: Imaging in the transverse plane demonstrates an APRPD <10 mm. D: However, imaging in the sagittal plane demonstrates central calyceal dilation.

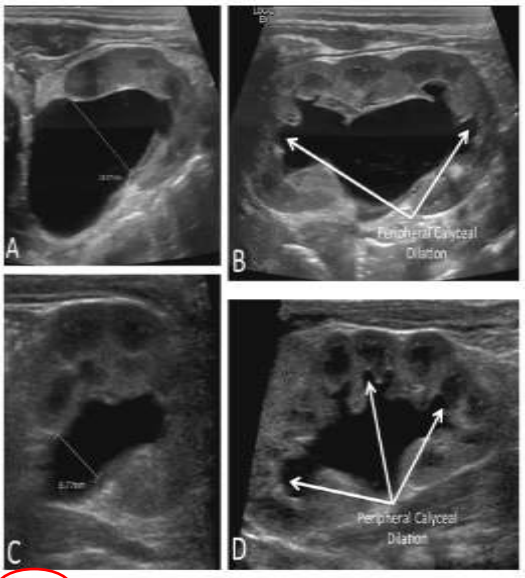


Figure 8 Appearance of UTD P2 on postnatal ultrasound. A: Imaging in the transverse plane demonstrates an anterior-posterior renal pelvis diameter (APRPD) ≥15 mm. B: Imaging in the sagittal plane demonstrates peripheral calyceal dilation but normal renal parenchymal thickness and appearance. In addition, there are no bladder abnormalities (not shown). Another example of UTD P2 on postnatal US. C: Imaging in the transverse plane demonstrates an APRPD <10 mm. D: However, imaging in the sagittal plane demonstrates peripheral and central calyceal dilation.

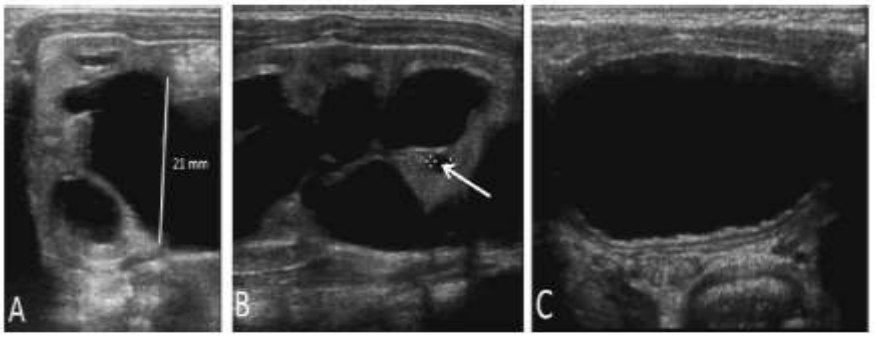
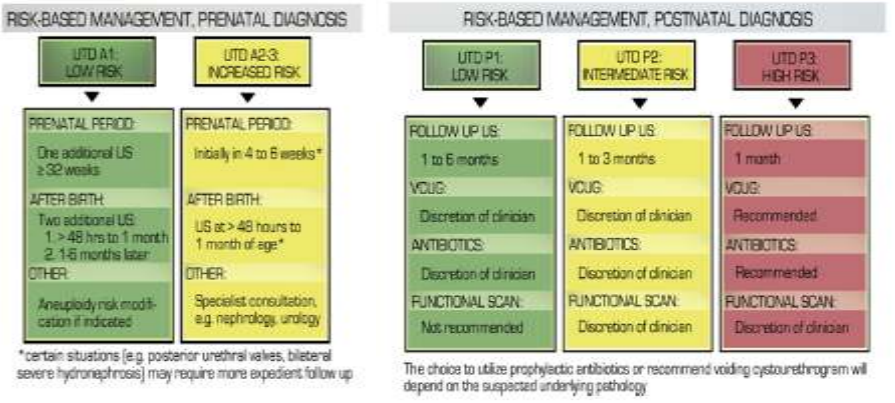


Figure 9 Appearance of UTD P3 on postnatal ultrasound. A: Imaging in the transverse plane demonstrates an anterior-posterior renal pelvis diameter (APRPD) ≥15 mm with peripheral calyceal dilation. B: Imaging in the sagittal plane demonstrates parenchymal thinning and cysts (arrow). C: Imaging of the bladder demonstrates increased wall thickness.

Recommendation #4: proposed management scheme

Based on the suggested UTD classification system's risk stratification, the panel proposed a follow-up management scheme. For UTD A1 diagnosed before 32 weeks, a follow-



Journal of Pediatric Urology (2018) 14, 354–360

Significance of third trimester ultrasound in detecting congenital abnormalities of kidney and urinary tract—a prospective study

M. Arora [a], A. Prasad [b,*], R. Kulshreshtha [c], A. Baijal [d]

Conclusion

All cases of antenatal hydronephrosis should be followed up with a repeat scan in the third trimester.

If RPD is more than 10 mm in the third trimester ultrasound scan, then the possibility of CAKUT postnatally is 85%. The third trimester scan is more reflective of postnatal outcome.

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ORIGINAL ARTICLE

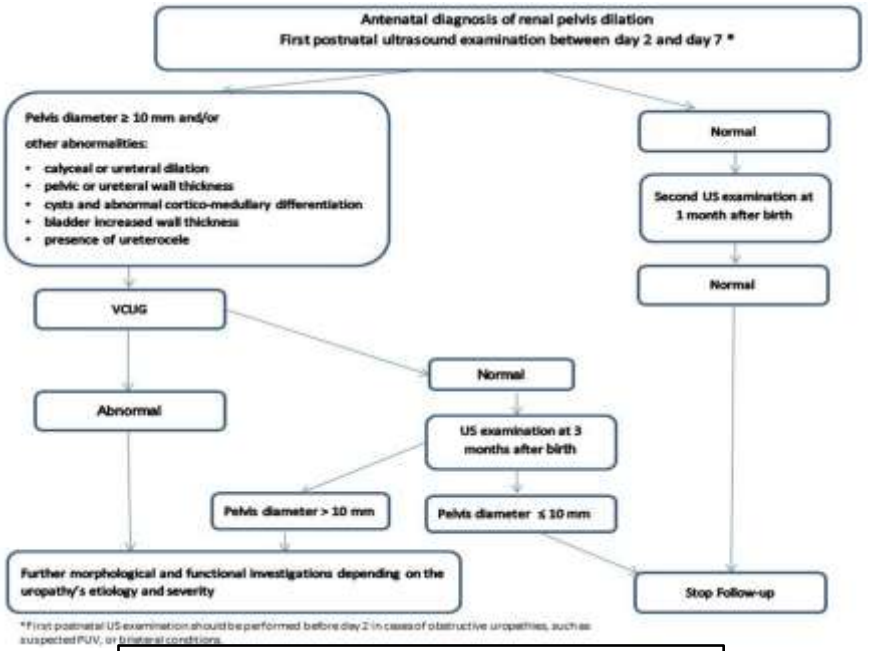
Should prenatal hydronephrosis that resolves before birth be followed postnatally? Analysis and comparison to persistent prenatal hydronephrosis

Patrick L. Scarborough · Elizabeth Ferrara · Douglas W. Storm

Results

A total of 165 patients were evaluated. Of these, 72 children (44 %) were found to have RPH while 93 (57 %) were found to have PPH. As shown in Table 1, the maternal ages were

Postnatal hydronephrosis characteristics	PPH	RPH	*p* value
Median age at first postnatal ultrasound (days)	25 (3–78)	29 (5–307)	0.01
Number of patients with new/continued hydronephrosis on first postnatal ultrasound	70 (78 %)	32 (44 %)	<0.001
SFU grade on first postnatal ultrasound			
Grade I	21 (30 %)	18 (56 %)	0.02
Grade II	44 (63 %)	14 (44 %)	
Grade III	5 (7 %)	0	
Grade IV	0	0	



Front Pediatr. 2019 Mar 29;7:103. doi: 10.3389/fped.2019.00103. eCollection 2019.
Clinical Outcome of Children With Antenatally Diagnosed Hydronephrosis.
Chiodini B1, Ghassemi M2, Khelif K3, Ismaili K1.

PEDIATRICS INTERNATIONAL
Pediatrics International (2019) 61, 271–277 doi: 10.1111/ped.13788

Original Article

Value of renal pelvic diameter and urinary tract dilation classification in the prediction of urinary tract anomaly

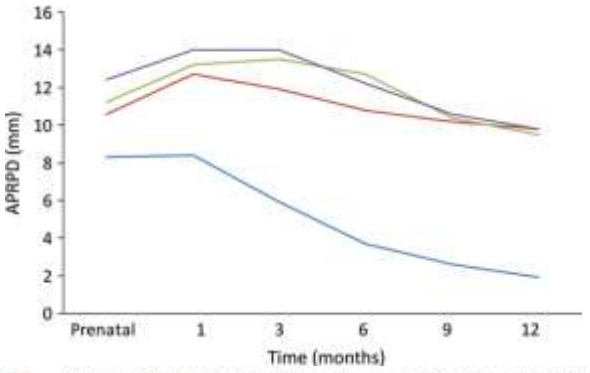


Fig 1 Change in anteroposterior renal pelvic diameter (APRPD) according to diagnosis. (—) Transient dilatation; (—) ureteropelvic junction obstruction; (—) ureterovesical junction obstruction; (—) vesicoureteral reflux.

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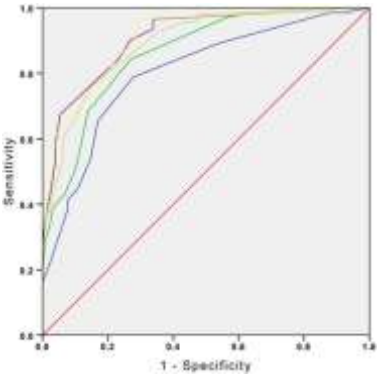


Fig 2 Receiver operating characteristic curve of anteroposterior renal pelvic diameter (APRPD) for the diagnosis of urinary tract anomalies. (——) 1 month postnatal APRPD; (——) 3 month postnatal APRPD; (——) 6 month postnatal APRPD; (——) 9 month postnatal APRPD; (——) 12 month postnatal APRPD; (——) reference line.

Pediatrics International, Volume: 61, Issue: 3, Pages: 271-277, First published: 13 January 2019, DOI: (10.1111/ped.13788)

Journal of Pediatric Urology (2019) 15, 341.e1–341.e6

The association of postnatal urinary tract dilation risk score with clinical outcomes

C.P. Nelson [a,*], R.S. Lee [a], A.T. Trout [b], S. Servaes [c], K.H. Kraft [d], C.E. Barnewolt [e], T. Logvinenko [a], J.S. Chow [e]

Table 2 Clinical outcomes among subjects in the UTD cohort (composite outcome includes any of the following: UTI, VUR > grade II, UPJO [MAG3 halftime >20 min or function < 40%], NRM [ureteral diameter > 7m or "moderate" dilation, in absence of VUR], BOO, ureterocele, or CKD.

Characteristic	Overall	UTD P0 (normal)	UTD P1 (low risk)	UTD P2 (intermediate risk)	UTD P3 (high risk)	p-value
Composite outcome	138/494 (27.9%)	13/116 (11.2%)	14/131 (10.7%)	34/116 (29.3%)	77/131 (58.8%)	<0.001
UTI[a]	51/494 (10.3%)	8/116 (6.9%)	8/131 (6.1%)	14/116 (12.1%)	21/131 (16.0%)	0.030
Febrile UTI[a]	41/46 (89.1%)	8/8 (100.0%)	7/8 (87.5%)	10/12 (83.3%)	16/18 (88.9%)	0.702
VUR > grade II diagnosis	60/494 (12.1%)	5/116 (4.3%)	9/131 (6.9%)	14/116 (12.1%)	32/131 (24.4%)	<0.001
UPJO diagnosis	31/494 (6.3%)	0/116 (0%)	0/131 (0%)	5/116 (4.3%)	26/131 (19.8%)	<0.001
NRM diagnosis	38/494 (7.7%)	1/116 (0.9%)	0/131 (0%)	9/116 (7.8%)	28/131 (21.4%)	<0.001
Ureterocele diagnosis	7/494 (1.4%)	0/116 (0%)	0/131 (0%)	1/116 (0.9%)	6/131 (4.6%)	0.004
BOO diagnosis	3/494 (0.6%)	1/116 (0.9%)	0/131 (0%)	0/116 (0%)	2/131 (1.5%)	0.325
CKD diagnosis	13/494 (2.6%)	0/116 (0%)	0/131 (0%)	2/116 (1.7%)	11/131 (8.4%)	<0.001
Resolution of UTD	204/494 (41.3%)	88/116 (75.9%)	65/131 (49.6%)	35/116 (30.2%)	16/131 (12.2%)	<0.001
Median time to resolution (months)	10.1 (IQR: 1.8–21.1)	2.2 (IQR: 1.0–9.4)	13.9 (IQR: 8.8–23.6)	20.9 (IQR: 9.6–28.3)	15.4 (IQR: 5.3–23.8)	<0.001

UTD, urinary tract dilation; UTI, urinary tract infection; VUR, vesicoureteral reflux; UPJO, ureteropelvic junction obstruction; NRM, non-refluxing megaureter; BOO, bladder outlet obstruction; CKD, chronic kidney disease; IQR, interquartile range.
[a] UTI occurred in 30/130 females (23%), 6/185 circumcised males (3%), and 13/77 uncircumcised males (17%) ($p < 0.001$). Circumcision status was available for 262/364 (72%) males in the study.
[b] Fever status unknown in 5 patients, and 6 patients were on prophylaxis at the time of the febrile UTI.

Journal of Pediatric Urology (2019) 15, 341.e1–341.e6

The association of postnatal urinary tract dilation risk score with clinical outcomes

C.P. Nelson [a,*], R.S. Lee [a], A.T. Trout [b], S. Servaes [c], K.H. Kraft [d], C.E. Barnewolt [e], T. Logvinenko [a], J.S. Chow [e]

However, among those who had VCUG performed, the prevalence of VUR was essentially the same across all UTD grades. This suggests that diagnosis of VUR in this population may be driven primarily by VCUG utilization and not necessarily by underlying differences in risk of pathology between the UTD grades. As such, the decision to obtain a VCUG should not be based on UTD score in most cases, because patients with higher UTD scores are not significantly more likely to have VUR. Although extreme cases of severe

Conclusion

Higher UTD risk scores are strongly associated with genitourinary diagnoses during the first two years of life, although ascertainment bias may influence some of the differences in outcomes. There is no significant difference in outcomes between patients with UTD P0 versus P1, suggesting that the P1 category could be eliminated.

Journal of Pediatric Urology (2018) 14, 334–340

Significance of third trimester ultrasound in detecting congenital abnormalities of kidney and urinary tract—a prospective study

M. Arora [a], A. Prasad [b,*], R. Kulshreshtha [c], A. Baijal [d]

Table 1 Correlation of left antenatal hydronephrosis in >32 weeks scan with final postnatal diagnosis.

Diagnosis	Left-sided hydronephrosis in >32 week scan				P value
	No dilatation	<7 mm	7–10 mm	>10 mm	
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	
Diverticulum in posterior urethra	–	–	1 (1.8%)	–	<0.001
UPJ obstruction	–	–	3 (5.5%)	29 (42.0%)	
Lt UPJ obstruction + PUV	–	–	–	1 (1.4%)	
PUV	–	–	3 (5.5%)	13 (18.8%)	
Reflux	–	–	5 (9.1%)	8 (11.6%)	
Lt Reflux + Rt UPJ	1 (0.9%)	–	1 (1.8%)	–	
Reflux + PUV	–	–	1 (1.8%)	5 (7.2%)	
Rt Reflux + lt VUJ	1 (0.9%)	–	–	–	
Transient	112 (98.2%)	12 (100%)	40 (72.7%)	9 (13.0%)	
Ureterocoele	–	–	–	1 (1.4%)	
Lt VUJ	–	–	1 (1.8%)	3 (4.3%)	
Total	114 (100%)	12 (100%)	55 (100%)	69 (100%)	

Table 2 Correlation of the right antenatal hydronephrosis in >32 week scan with final postnatal diagnosis.

Diagnosis	Right-sided hydronephrosis in >32 weeks scan				P value
	No dilatation	<7 mm	7–10 mm	>10 mm	
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	
Diverticulum in posterior urethra	–	–	1 (1.6%)	–	<0.001
Duplex with ureterocoele	–	–	1 (1.6%)	–	
Duplex + Rt ectopic ureter + Rt Reflux	–	–	–	1 (2.2%)	
UPJ obstruction	–	–	–	10 (21.7%)	
Lt UPJ + PUV	–	–	1 (1.6%)	–	
PUV	–	1 (12.5%)	3 (4.7%)	12 (26.1%)	
VUR	–	–	7 (10.9%)	7 (15.2%)	
Lt Reflux + Rt UPJ obstruction	1 (0.8%)	–	–	1 (2.2%)	
VUR + PUV	–	–	2 (3.1%)	4 (8.7%)	
Rt VUR + Lt VUJ	–	–	–	1 (2.2%)	
Rt megaureter with Rt VUJ	–	–	–	1 (2.2%)	
Rt ureteric stricture	–	–	–	1 (2.2%)	
Transient	131 (99.24%)	7 (87.5%)	48 (75%)	7 (15.2%)	
Ureterocoele	–	–	–	1 (2.2%)	
VUJ	–	–	1 (1.6%)	–	
Total	132 (100%)	8 (100%)	64 (100%)	46 (100%)	

Ecografia renale post-natale:

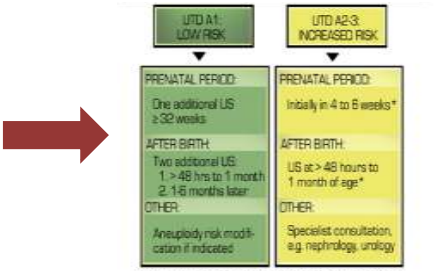
- Utile come screening?
- Quali indicazioni assolute ad eseguirla?

Ecografia renale post-natale:

Utile come screening?

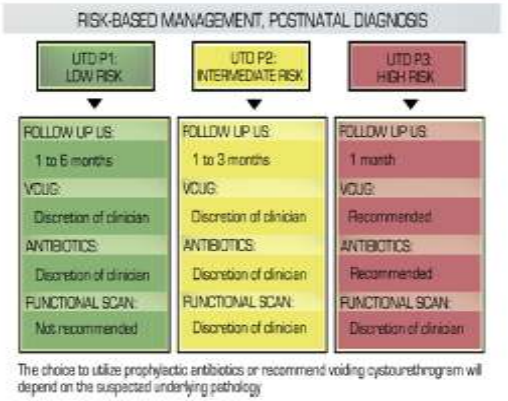
Ecografia renale post-natale:

Quali indicazioni assolute ad eseguirla



- **Oligoidramnios**
- **Altre malformazioni ad organi ed apparati**

Ecografia renale post-natale



Diagnostica strumentale renale di secondo livello nelle Uropatie Dilatative

- Cistografia minzionale
- Scintigrafia renale

Cistografia minzionale

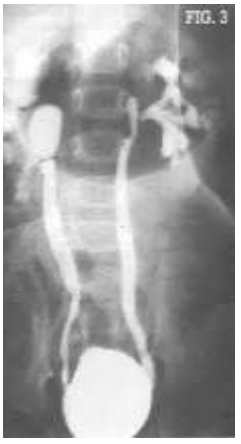
- Tecnica di elezione per lo studio del reflusso vescico-ureterale (RVU)

Cistografia minzionale

- Cistouretrografia minzionale (CUM)
- Cistoscintigrafia diretta
- Cistosonografia (CSG)

Cistouretrografia minzionale

- **Vantaggi:**
  - *Gold standard nella diagnostica del RVU*
  - *Precisione nella stadiazione del RVU*
  - *Ottimale per lo studio dell'uretra*
  - *Elevata sensibilità e specificità*
  - *Dettagli anatomici*
- **Svantaggi:**
  - *Elevata dose radiogena*

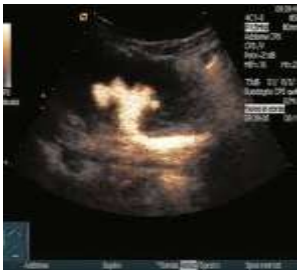


Cistoscintigrafia diretta

- **Vantaggi:**
  - *Bassa dose radiogena*
  - *Elevata sensibilità e specificità*
  - *Valutazione dinamica*
- **Svantaggi:**
  - *Assenza del dettaglio anatomico*
  - *Mancato studio dell'uretra*
  - *Stadiazione approssimativa suddivisa su 3°*

Cistosonografia

- **Vantaggi:**
  - *Assenza di dose radiogena*
  - *Elevata sensibilità e specificità*
  - *Valutazione dinamica*
  - *Precisione nella stadiazione*
  - *Studio dell'uretra (?)*
- **Svantaggi:**
  - *Assenza del dettaglio anatomico*
  - *Operatore dipendente*



PubMed
US National Library of MedicineNational Institutes of Health

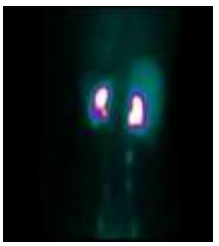
- Harmonic US imaging of vesicoureteric reflux in children: usefulness of a second generation US contrast agent.
  Ascenti G, Zimbaro G, Mazziotti S, **Chimenz** R., Fede C, Visalli C, Scribano E.
  Pediatr Radiol. 2004 Jun;34(6):481-7. Epub 2004 Apr 24.
  PMID: 15470205
- Vesicoureteral reflux: comparison between urosonography and radionuclide cystography.
  Ascenti G, Zimbaro G, Mazziotti S, **Chimenz** R., Baldari S, Fede C.
  Pediatr Nephrol. 2003 Aug;18(8):768-71. Epub 2003 Jun 11.
  PMID: 12802637
- Potential role of colour-Doppler cystosonography with echocontrast in the screening and follow-up of vesicoureteral reflux.
  Ascenti G, **Chimenz** R., Zimbaro G, Mazziotti S, Scribano E, Fede C, Ricca M.
  Acta Paediatr. 2000 Nov;89(11):1336-9.
  PMID: 11106046

Scintigrafia renale

- **Scintigrafia renale statica**
- **Scintigrafia renale sequenziale**

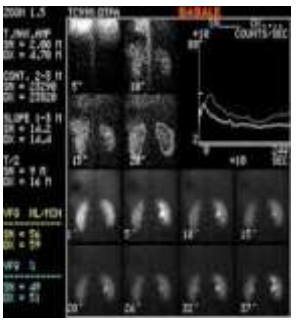
Scintigrafia renale statica

- Gold standard nella valutazione morfofunzionale del parenchima renale per slatentizzare *scars* renali, displasia renale



Scintigrafia renale sequenziale con test al Lasix

- Tecnica di elezione per valutare idronefrosi di grado severo e porre diagnosi di certezza se quadri ostruttivi (stenosi del giunto pielo-ureterale) o funzionali (idronefrosi funzionale)



Scintigrafia renale sequenziale con test al Lasix

- Scintigrafia renale con MAG3
- *Scintigrafia renale con DTPA*

Scintigrafia renale sequenziale con MAG3

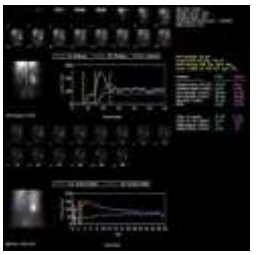
- **99mTc MAG3:**

Mercaptoacetiltriglicina eliminato per via tubulare per oltre il 90% con indice di estrazione di circa il 60 % la sua clearance esprime la velocità di estrazione tubulare ed è una stima del Flusso Plasmatico Efficace (moltiplicandone il valore per un fattore di correzione di 1,5)

Scintigrafia renale sequenziale con DTPA

- **99mTc DTPA:**

acido dietilenaminopentacetico
escreto per filtrazione glomerulare
indice di estrazione del 20%
la sua clearance esprime la
Velocità di Filtrazione Glomerulare



Prospettive: UroRMN dinamica

- **Studio morfologico di reni e vie urinarie**
- **Studio funzionale renale**
- **Diagnosi di patologia ostruttiva**

Dzananovic A, Begic A, Pokrajac D. Evaluation of Congenital Hydronephrosis with Static and Dynamic Magnetic Resonance Urography in Comparation to Dynamic Renal Scintigraphy. *Acta Inform Med*. 2019;27(3):181–185. doi:10.5455/aim.2019.27.181-185

Prospettive: UroRMN dinamica

- **Vantaggi:**
  - ❖ **Assenza di dose radiogena**
  - ❖ **Migliore dettaglio anatomico**

- **Svantaggi:**
  - ❖ **Necessità di sedazione**
  - ❖ **Disponibilità dell'apparecchiatura**
  - ❖ **Costi**

Dzananovic A, Begic A, Pokrajac D. Evaluation of Congenital Hydronephrosis with Static and Dynamic Magnetic Resonance Urography in Comparation to Dynamic Renal Scintigraphy. *Acta Inform Med*. 2019;27(3):181–185. doi:10.5455/aim.2019.27.181-185

Caso clinico: Giuseppe di mesi 2...

- Nato a 32 w di gestazione da TC d'urgenza per PROM, Apgar 8-9, PN 2.160 Kg
- Ricovero presso UTIN per prematurità
- Ad un mese di vita febbre, comparsa di pallore, suzione torpida

⬇

Sepsi? → **RICOVERO**:

- **Esami ematochimici**: PCR e procalcitonina aumentati,
- **Esame urine**: leucocituria, piuria, batteriuria; urinocoltura positiva per E.coli
- **Ecografia renale:** idronefrosi bilaterale di grado medio (DAP 14 mm)

⬇

Diagnosi: ***IVU febbrile in paziente con idronefrosi*** → Antibioticoterapia

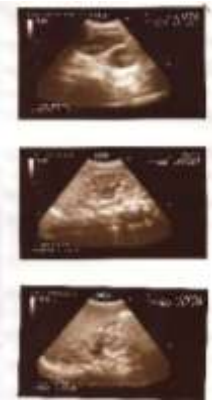
⬇

Inviato alla nostra osservazione

Trasferimento presso il nostro centro:

- Cistosonografia

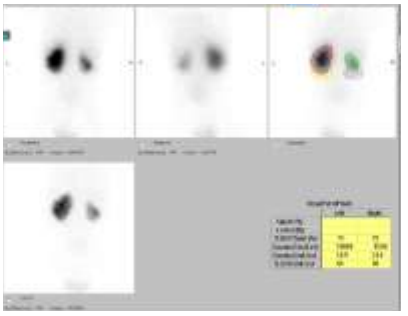
Lo studio cistografico previa somministrazione per via retrograda di Sonovue (0.5 cc), diluito in soluzione fisiologica, documenta, a piccolo riempimento vescicale, reflusso di contrasto di III grado lungo gli ureteri e nelle cavià escretrici renali bilateralmente. Nelle fasi più tardive dell'esame, a grande riempimento vescicale, si documenta RVU di V grado a destra e di IV grado a sinistra.



- Scintigrafia

Ridotta ed irregolare fissazione del tracciante caratterizza un rene destro di dimensioni contenute, nettamente inferiori al controlaterale: nel suo contesto sono presenti zone di corticale "ipoattiva", più estese a livello dei poli ed in particolare del superiore che risulta "assottigliato".
Distribuzione della funzione: Rene Destro: 21 % (36 %*) - Rene Sinistro: 79 % (64 %*).
Quadro scintigrafico compatibile con esiti di patologia flogistica bilaterale ma con franco maggior interessamento del rene destro:

DIAGNOSI: RVU bilaterale con danno renale bilaterale



Diagnostica strumentale Idronefrosi

Idronefrosi di grado medio-grave, con visualizzazione dell'uretere e/o con storia di IVU

↓

Cistosonografia

↓

Scintigrafia renale statica a sei mesi

↙ ↘

RVU con o senza displasia — **No - RVU**

↘ ↙

Follow-up Nefrologico Pediatrico

Caso clinico: Marco di mesi 3 ....

- Nato a 38 w di gestazione da TC, PN 3.260 Kg

- Ecografia morfologica in utero: Idronefrosi bilaterale di 7 mm

- All'ecografia renale di screening: …bilateralmente conservato lo spessore corticale, cosi come la differenziazione cortico-midollare. Pielectasia bilaterale variabile con i gradi di riempimento della vescica. In fase di massimo riempimento vescicale la pielectasia è di circa 5-6 mm. In fase di massimo riempimento è osservabile distensione degli ureteri fino al segmento prevescicale (5 mm). Dopo svuotamento vescicale la distensione della pelvi renale raggiunge i mm 9.8 a destra e 7.5 mm a sinistra. Invariata la distensione degli ureteri

⇩

Diagnosi: *Idroureteronefrosi*

⇩

Inviato alla nostra osservazione

➢ Cistosonografia

Precoce reflusso vescico-ureterale sinistro con discreta dilatazione delle cavità escretrici e dell'uretere (IV grado). Tardivo reflusso vescico-ureterale destro in fase di massima replezione vescicale, senza significativa dilatazione delle vie urinarie (III grado)

➢ Scintigrafia

Si segnala mal definita ipofissazione del tracciante al polo superiore del rene destro (esito di pregresso processo flogistico-infettivo). Non si rilevano ulteriori alterazioni dei contorni dei due organi, che appaiono netti e definiti.
Rene Destro: 40% (totale) - 49% (per unità di volume);
Rene Sinistro: 60% (totale) - 51% (per unità di volume)".
Quadro scintigrafico compatibile con esiti di patologia flogistica a carico del rene dx

DIAGNOSI: RVU bilaterale con scar renale monolaterale

Diagnostica strumentale Idronefrosi

Idronefrosi di grado lieve, con visualizzazione dell'uretere e/o storia di IVU

↓

Cistosonografia

↓

Scintigrafia renale statica a sei mesi

↙ ↘

RVU con o senza displasia — **No - RVU**

↘ ↙

Follow-up Nefrologico Pediatrico

Caso clinico: Maria di mesi 2...

- Nata a 36 w di gestazione da TC, PN 2.960 Kg

- Ecografia morfologica in utero: Idronefrosi sn di 10 mm

- Ad una ecografia renale di screening: "…Vescica scarsamente repleta, transonica, mal valutabile. Ureteri iuxtavescicali non visualizzati. Rene destro con scarsa differenziazione cortico-midollare. DL di circa 53 mm, senza dilatazione calico-pielica. Rene sinistro con DL di circa 63 mm, idronefrosi di II-III grado con prevalente dilatazione del calice inferiore; spessore corticale 6 mm".

Inviata alla nostra osservazione

⬇

-**Ecografia renale:** < Il rene sinistro presenta dimensioni aumentate rispetto al controlaterale (DL=73 mm); si documenta quadro di idronefrosi di IV grado senza immagini da riferire a calcoli. Spessore parenchimale: 3 mm al polo superiore, 2 mm in sede mesorenale, 3,5 mm al polo inferiore. Non identificabile l'uretere prossimale >.

-**Esame urine**: Nella norma

-***Diagnosi: Idronefrosi sn di grado severo***

➢ **Scintigrafia**

Il trasporto intraparenchimale è prolungato. In fase di eliminazione si rileva progressivo accumulo dell'urina marcata nelle cavità escretrici, che non tende a ridursi in modo significativo dopo test diuretico. La curva nefrografica relativa presenta un andamento continuo ascendente che non tende a deflettere dopo somministrazione di furosemide, mantenendo un decorso "in plateau".

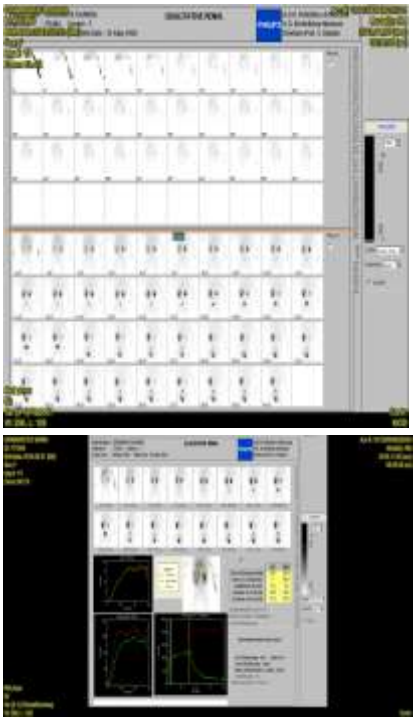
Distribuzione della funzione:

Rene Destro: 46% (totale) - 63% (per unità di volume)
Rene Sinistro: 54% (totale) - 37% (per unità di volume)
Buona funzione del rene destro che presenta una fase escretiva rallentata ma responsiva allo stimolo diuretico, da rivalutare a distanza. **Segni di sofferenza parenchimale a carico del rene sinistro, che presenta un pattern escretivo non responsivo al test diuretico.** La partizione della funzione per unità di volume è asimmetrica, per ridotto apporto del rene sinistro.

DIAGNOSI: Stenosi giuntale sn

↓

TERAPIA: Correzione chirurgica (inviata all'urologo pediatra)



Diagnostica strumentale Idronefrosi

Idronefrosi di grado medio-grave, senza visualizzazione dell'uretere

↓

Scintigrafia sequenziale con Test al Lasix

↙ ↘

Idronefrosi ostruttiva (Stenosi giuntale)

↓

Urologo Pediatra

Idronefrosi funzionale

↓

Follow-up Ecografico

Caso clinico: Akram di mesi 2...

- Nato a 34+4 w di gestazione, PN 2.460 Kg

- Ecografia morfologica in utero: **pielectasia dx, anidramnios**

- Alla nascita riscontro laboratoristico di **insufficienza renale** (creatinina 1.43 mg/dl, azotemia 49 mg/dl)

- Eseguita cistosonografia: non segni di reflusso vescico-ureterale

Inviato alla nostra osservazione

⬇

- **Scintigrafia renale statica con DMSA**: I reni sono in sede e risaltano poco rispetto a un persistentemente elevato background ematico. I contorni dei due organi appaiono, pertanto, poco definiti. Per quanto possibile valutare, la morfologia del rene sinistro pare regolare; a destra sembra apprezzarsi una irregolarità del profilo inferiore, di dubbio significato. Partizione dell'attività corticale: Rene destro= 58%. Rene sinistro= 42%. Conclusioni: Quadro scintigrafico verosimilmente indicativo di insufficienza emuntoria, in accordo con i dati clinico-anamnestici.

Caso clinico: Akram di mesi 2...

- Nuovo ricovero per ***vomito ricorrente***

- Escluse cause nefrologiche

- **Consulenza gastroenterologica** che, tenendo conto del quadro clinico e dell'età del piccolo paziente, ha dato indicazione ad effettuare uno studio del transito esofago-gastro-duodenale, mettendo in evidenza la presenza di gastrectasia. Non si è ritenuto opportuno avviare NE con sondino naso-gastrico, ma ha avviato terapia con simeticone per ridurre la gastrectasia. Per persistenza della sintomatologia avviata successivamente terapia con antiacido. Rimodulato diario alimentare;

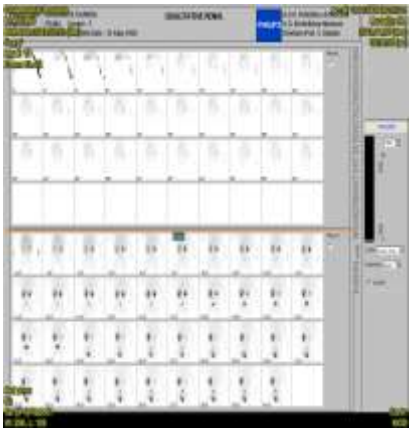
⬇

- Persistenza ***vomito ricorrente***

- ***Consulenza Gastroenterologica:*** *«……..esclude che il sintomo vomito*
- *sia ascrivibile alla problematica gastroenterologica»*

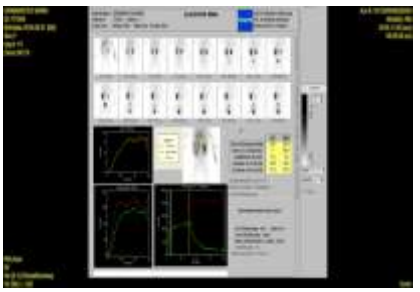
➢ Ecografia

Reni in sede, con dimensioni ridotte. Rene DX: DL= 38 mm. Rene SN: DL= 37 mm. Entrambi i parenchimi renali presentano marcato incremento dell'ecogenicità parenchimale, con conservata differenziazione cortico-midollare. A destra si rileva discreta dilatazione del bacinetto renale (max 15 mm), del tratto prossimale e in parte del tratto intermedio dell'uretere (max 5 mm), che presentano pareti lievemente ispessite, come da condizione di flogosi.



➢ Scintigrafia renale sequenziale con MAG3 e Test al Lasix

Il rene di destra appare in sede, di dimensioni ridotte rispetto al controlaterale e di aspetto grossolanamente conservato. L'accumulo corticale di radiofarmaco è lento e finemente disomogeneo. Il trasporto intrarenale del tracciante è rallentato. In fase di eliminazione si osserva progressivo accumulo dell'urina marcata nella pelvi, che permane anche nonostante la somministrazione di diuretico.
Quadro compatibile con **nefrouropatia ostruttiva** a carico del rene di destra.



GRAZIE