

**Imaging recommendations in paediatric uroradiology: Minutes of the
ESPR workgroup session on urinary tract infection, fetal
hydronephrosis, urinary tract ultrasonography and voiding cysto-
urethrography
ESPR-Meeting, Barcelona/Spain, June 2007**

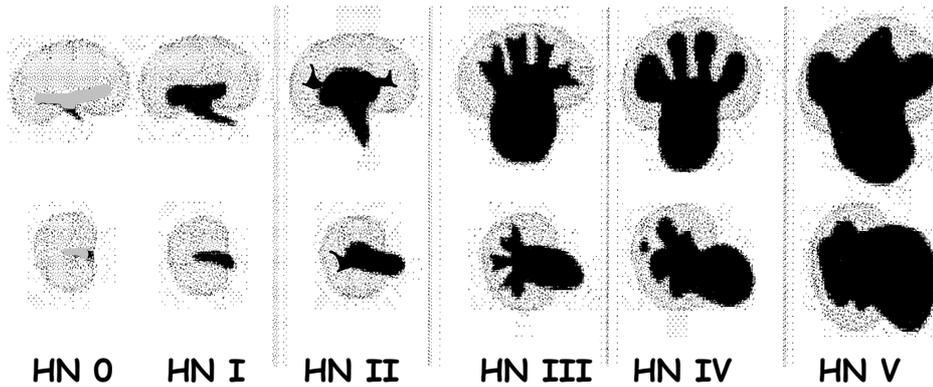
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ESUR Paediatric guideline subcommittee and ESPR paediatric uroradiology
work group

Tables

Table 1. Grading of Hydronephrosis (HN)

Neonatal / infantile hydronephrosis (HN) - US grading



- HN 0** = no or minimal collecting system visible, considered normal
- HN I** = just the renal pelvis visible with an axial diameter less than 5-7 mm, usually considered normal
- HN II** = axial renal pelvis diameter less than 5/7-10 mm
some calices with normal fonical shape visible
- HN III** = marked dilatation of the renal calices and pelvis larger than 10 mm
with reduced fornical and papillar differentiation
without parenchymal narrowing
- HN IV** = gross dilatation of the collecting system with narrowing of the parenchyma
- (HN V** = used in some places additionally, to communicate an extreme HN
with only a thin, membrane-like residual renal parenchymal rim)

Table 2

Procedural guideline: standard paediatric urosonography

well hydrated patient, full bladder, adequate equipment & transducer & training ...



urinary bladder: size (volume), shape, ostium, wall, bladder neck
include distal ureter & retrovesical space / inner genitalia



optional: CDS for urine inflow, perineal US, scrotal US ...



kidneys: lateral and / or dorsal, longitudinal and axial sections
parenchyma? pelvo-caliceal system?
standardised measurements in 3 axes & volume calculation
if dilated: + max. axial pelvis & calix, narrowest parenchymal width
+ uretero-pelvic junction



optional: (a)CDS & duplex-Doppler, ...



post void evaluation

bladder: residual volume, bladder neck, shape & configuration
kidneys: dilatation of pelvo-caliceal system / ureter changed?

optional: ce-VUS, 3DUS ...

Note: Cursory US of entire abdomen is recommended for 1st study, and in mismatch of findings and query

Abbreviations:

(a)CDS = (amplitude coded) colour Doppler sonography = power Doppler, ce-VUS = contrast-enhanced voiding urosonography, US = ultrasound, 3DUS = three-dimensional ultrasound

Table 3

Procedural guideline: contrast-enhanced voiding urosonography (ce-VUS)

No diet restriction or enema, urine analysis ...



Accepted indications: VUR-follow-up, girls, family screening, bedside
Catheterism: feeding tube, 4-8 french, or suprapubic puncture
anaesthetic lubricant or coated plaste
Latex precaution: neuro tube defect, bladder exstrophy

Standard US of bladder & kidneys (supine, ± prone)



Bladder filling with NaCl (only from plastic containers)

US contrast medium, e.g., Levovist® - 300 mg/ml, 5%-10% of bladder volume



slow, US-monitoring, potentially fractional administration

Peri-/ post-contrast US of bladder & kidneys



US modalities: fundamental, HI, CDS, dedicated contrast imaging
alternate scans of right & left side during & after filling

During + after voiding: US of bladder & kidneys

supine ± prone, sitting or standing

VUR diagnosis: echogenic micro-bubbles in ureters or renal pelves

Abbreviations:

CDS = colour Doppler sonography, aCDS = power Doppler, ce-VUS = contrast-enhanced voiding urosonography, HI = Harmonic Imaging, US = ultrasound, VUR = vesico-ureteral reflux

Table 4

Procedural guideline: voiding cystourethrography (VCUG)

Indications: febrile & recurrent UTI, particularly in infants, suspected PUV
UT-malformation, HN > II° or "extended criteria"

Preparations: no diet restriction or enema, urine analysis, after AB are completed ...

Catheterism: feeding tube, 4-8 french or suprapubic puncture
anaesthetic lubricant or coated plaster

Latex precaution: neuro tube defect, bladder exstrophy

↓
Fluoroscopic view of renal fossae & bladder, initial + early filling

Bladder filling with radiopaque contrast

gravity drip = bottle 30-40 cm above table, watch dripping, AB?

↓
Fluoroscopy: signs of increased bladder pressure, imminent voiding, urge
bilateral oblique views of distal ureters, include catheter
document VUR, include kidney (spot film, intra-renal reflux)

↓
When voiding: remove catheter, unless cyclic VCUG = 3 fillings, 1st y (s)
female: 2 spots of distended urethra (slightly oblique)
male: 2-3 spots during voiding (ap & high oblique / lateral)
include renal fossae during voiding, if VUR => spot film

↓
After voiding: ap view of bladder & renal fossae
assess contrast drainage from kidney if refluxed

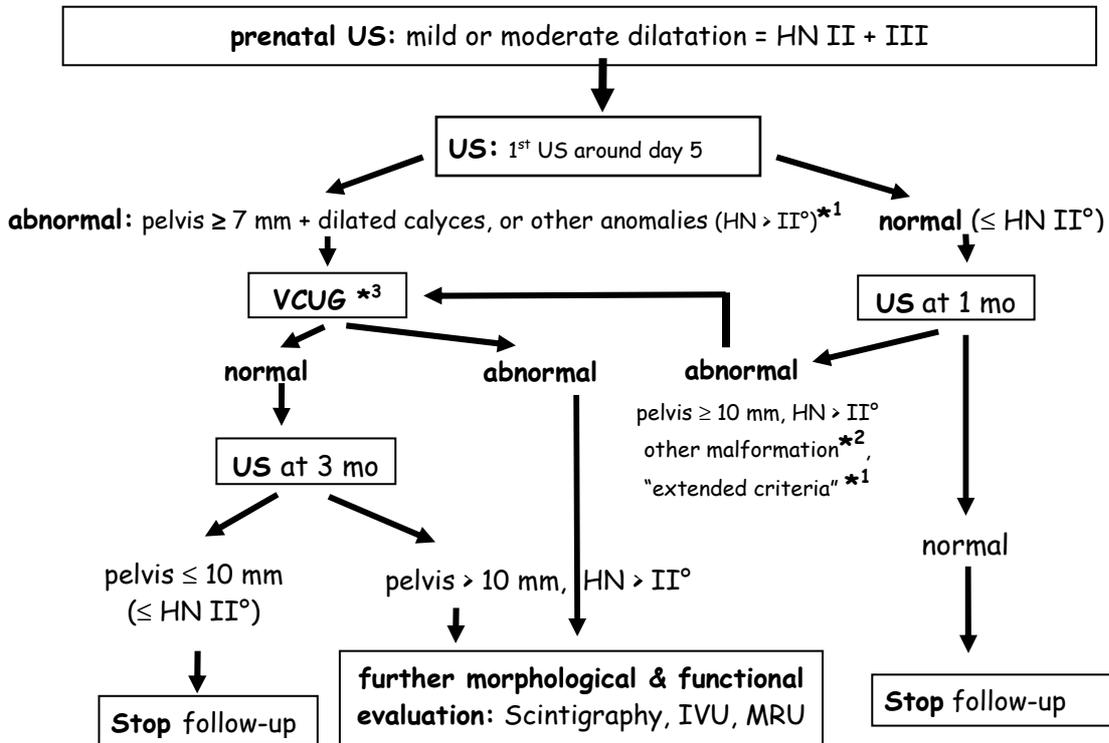
Note: VUR staging, minimise fluoroscopy time and spot films, no blind film

Abbreviations:

AB = Antibiotics, CM = contrast media, HN = hydronephrosis, PUV = posterior urethral valve, UT = urinary tract, UTI = urinary tract infection, VCUG = voiding cystourethrography, VUR = vesico-ureteral reflux

Table 5

Postnatal imaging algorithm in mild or moderate foetal hydronephrosis (HN)



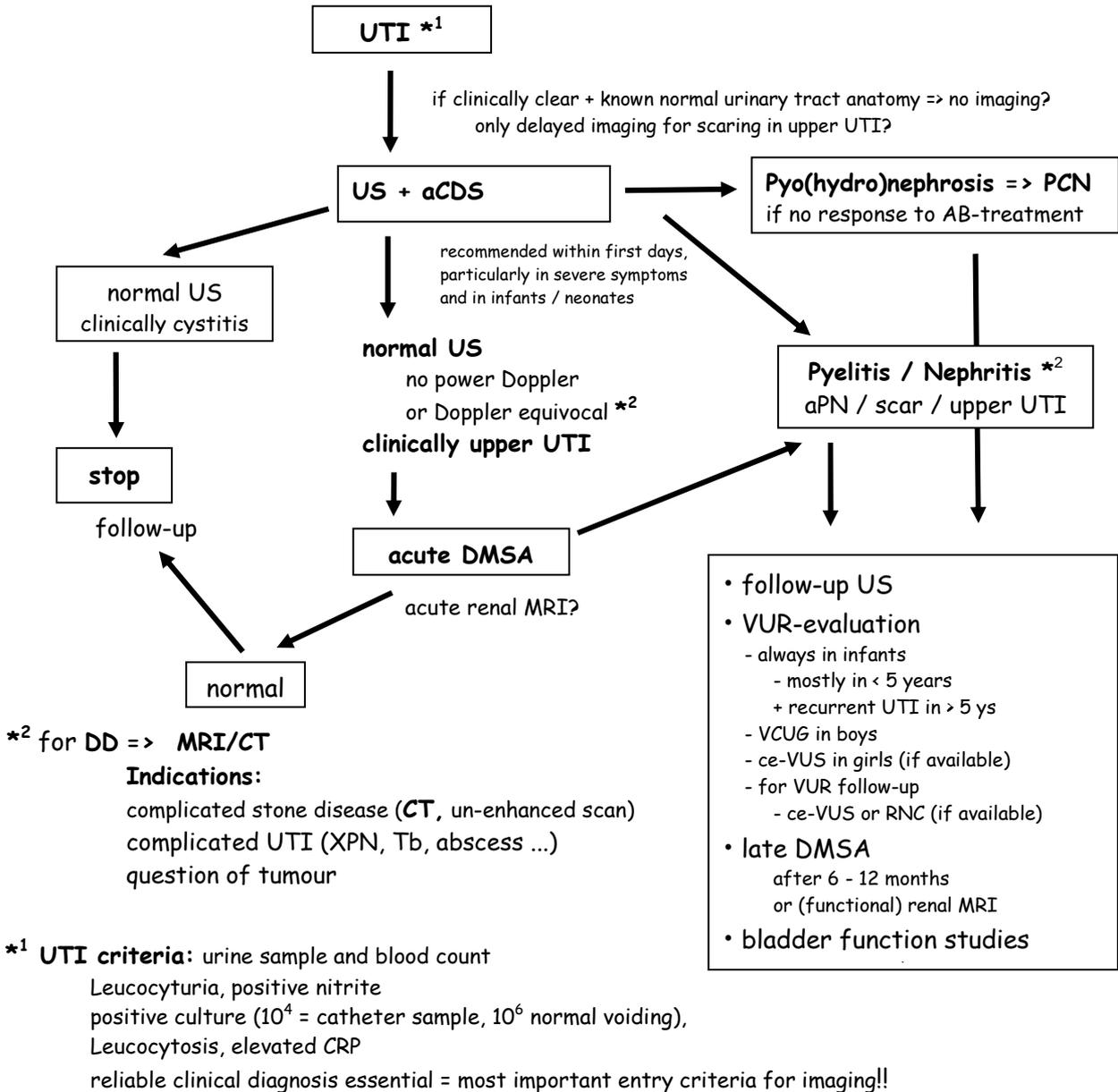
- *1 use extended US criteria considering urothelial sign, kidney size & structure, etc ...
- *2 US genitography: in all patients with single kidney, MCDK, ectopic kidneys etc ...
- *3 ce-VUS can be used in girls and for screening populations...

Abbreviations:

ce-VUS = contrast-enhanced voiding urosonography, HN = hydronephrosis, IVU = intravenous urography, MCDK = multicystic dysplastic kidney, MRU = magnetic resonance urography, US = ultrasound, VCUG = voiding cystourethrography

Table 6

Imaging algorithm in children with urinary tract infection (UTI)



Abbreviations:

(a)CDS = (amplitude coded) colour Doppler sonography = power Doppler, (a)PN = (acute) pyelonephritis, CRP = C-reactive protein, CT = computed tomography, DD = differential diagnosis, DMSA = static renal scintigraphy, ce-VUS = contrast-enhanced voiding urosonography, MRI = magnetic resonance imaging, PCN = percutaneous nephrostomy, RNC = radionuclide cystography, Tb = tuberculosis, US = ultrasound, UTI = urinary tract infection, VCUG = voiding cystourethrography, VUR = vesico-ureteral reflux, XPN = xanthogranulomatous pyelonephritis