

Dysurea

HISTORY

- Dysurea: symptom of burning or pain upon urination

Important points in history:

- Associated urinary symptoms: urgency, discharge, hematuria, frequency, fever, abdominal pain,
- Family history of stones, dietary habits
- History of vaginal itching and discharge

History of UTI

- Bladder diary of voided volume as: frequency, urge incontinence, voided volume, holding maneuver
- Bowel Habits: frequency & consistency
- History of previous UTI
- Relation of UTI to toilet training

Physical exam

- temp, renal angle and suprapubic tenderness
- Genital exam: vulvitis, discharge, mental stenosis, labial adhesions
- Back for sacral dimple-->indicate bladder dysfunction

Ddx

- infections of genitourinary tract (pyelonephritis, cystitis, urethritis)
- Vulvovaginitis: infectious
- chemical irritation (soap, hygiene, wiping)
- Stones: hypercalcaemia, hyperoxaluria, hyperuricosuria
- Labial adhesions, sexual abuse, pinworms, trauma, masturbation

Classification

- Cystitis: urinary symptoms, Low grade fever
- Pyelonephritis: Loin pain, high grade fever, raised inflammatory markers
 - DMSA is gold standard, shows decreased uptake
- Asymptomatic bacteriuria: 1-2 % of school age
 - children has no pyuria but positive culture, no treatment, normal in children with neurogenic bladder

Symptoms

- In neonates: fever, sepsis, hypoactivity, Failure to thrive, prolonged jaundice
- In children: fever, vomiting, abdominal pain
- Urinary symptoms: dysuria, frequency, urgency, new onset day or night time incontinence, hematuria, smelly urine

Diagnosis

- Diagnosis: urine culture and microscopy,
 - Simple urine analysis:**
 - Pyuria is more than 5 cells per HPF
 - Pyuria isn't specific may be found in febrile children, vaginitis, Kawasaki
 - Microscopic hematuria is common, macroscopic seen in 25%
 - Urine gram stain of bacteria is most sensitive and specific
 - Negative analysis with symptoms doesn't rule out UTI
 - Automated urine analysis**
 - Pyuria is more than 10 cells/ul
 - Dipstick for LE (not specific)
 - Dipstick for nitrite (specific but not sensitive), if negative doesn't rule out UTI
 - CRP, ESR, WBC, indicate pyelonephritis

Types of flora

- 80% caused by E. coli, other org (Klebsiella, Enterobacter, enterococcus, Proteus, Pseudomonas)
- Pathogenesis: E. coli has strong adhesive capacity
- Bacteria usually comes from bowel, from under foreskin in boys
- Ways of collection: SPA, cath, clean catch, midstream
- Bag not used has a high false positive result

Complications

- Bacteremia in 4-9%
- Acute lobar nephronia
- Renal or perirenal abscesses
- decreased acid excretion,
- impaired urine concentrating ability
- secondary transient pseudohypoaldosteronism

Scarring

Pathogenesis

- 10-40% have scarring
- Scarring leads to: proteinuria, hypertension, CKD and PET
- Detected by DMSA scan 4 months after UTI

Risk Factors

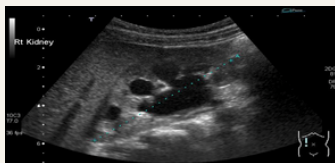
- Young age, but some studies found older age
- High grade VUR
- Delayed treatment of UTI
- Bowel and bladder dysfunction
- Recurrent UTI
- Bacterial virulence: non E-coli organisms higher risk

Risk factors for recurrence

- Age less than 6 m
- High grade VUR
- Obstructive uropathy
- Dysfunctional voiding
- Constipation
- Detrusor overactivity

Imaging

- 34% of child with UTI has VUR
- Febrile infants with UTIs should undergo renal and bladder ultra- sonography (RBUS)



- VCUG should not be performed routinely after the first febrile UTI
- VCUG is indicated if RBUS reveals hydronephrosis, scarring, or other findings that would suggest either high-grade VUR or obstructive uropathy, atypical or complex clinical circumstances



NICE recommendations for investigating children following febrile UTI

Table 6.13 Recommended imaging schedule for infants younger than 6 months

Test	Responds well to treatment within 48 hours	Atypical UTI ^a	Recurrent UTI ^a
Ultrasound during the acute infection	No	Yes ^c	Yes
Ultrasound within 6 weeks	Yes ^b	No	No
DMSA 4–6 months following the acute infection	No	Yes	Yes
MCUG	No	Yes	Yes

Table 6.14 Recommended imaging schedule for infants and children 6 months or older but younger than 3 years

Test	Responds well to treatment within 48 hours	Atypical UTI ^a	Recurrent UTI ^a
Ultrasound during the acute infection	No	Yes ^c	No
Ultrasound within 6 weeks	No	No	Yes
DMSA 4–6 months following the acute infection	No	Yes	Yes
MCUG	No	No ^b	No ^b

Table 6.15 Recommended imaging schedule for children 3 years or older

Test	Responds well to treatment within 48 hours	Atypical UTI ^a	Recurrent UTI ^a
Ultrasound during the acute infection	No	Yes ^{b,c}	No
Ultrasound within 6 weeks	No	No	Yes ^b
DMSA 4–6 months following the acute infection	No	No	Yes
MCUG	No	No	No

Table 3 Recommended imaging schedule for infants younger than 6 months

Test	Responds well to treatment within 48 h	Atypical UTI ^a	Recurrent UTI
Ultrasound during the acute infection	No	Yes [‡]	Yes
Ultrasound within 6 weeks	Yes [†]	No	No
DMSA 4–6 months following the acute infection	No	Yes	Yes
MCUG	No	Yes	Yes

*See box for definition.

†If abnormal consider MCUG.

‡In an infant or child with a non-*E coli*-UTI, responding well to antibiotics and with no other features of atypical infection, the ultrasound can be requested on a non-urgent basis to take place within six weeks.

Table 4 Recommended imaging schedule for infants and children 6 months or older but younger than 3 years

Test	Responds well to treatment within 48 h	Atypical UTI ^a	Recurrent UTI
Ultrasound during the acute infection	No	Yes [‡]	No
Ultrasound within 6 weeks	No	No	Yes
DMSA 4–6 months following the acute infection	No	Yes	Yes
MCUG	No	No [†]	No [†]

*See box for definition.

†While MCUG should not be performed routinely it should be considered if the following features are present: dilatation on ultrasound; poor urine flow; non-*E coli*-infection; family history of VUR.

‡In an infant or child with a non-*E coli*-UTI, responding well to antibiotics and with no other features of atypical infection, the ultrasound can be requested on a non-urgent basis to take place within six weeks.

Box: Definition of atypical UTI

Atypical UTI includes:

- seriously ill
- poor urine flow
- abdominal or bladder mass
- raised creatinine
- septicaemia
- failure to respond to treatment with suitable antibiotics within 48 h
- infection with non-*E coli* organisms

TREATMENT

Notes:

- Initiating treatment orally or parenterally is equally efficacious.
- The clinician should base the choice of agent on local antimicrobial sensitivity and should adjust the choice according to sensitivity testing of the isolated uropathogen

Antimicrobial Agent
Amoxicillin-clavulanate
Sulfonamide
Trimethoprim-sulfamethoxazole
Sulfisoxazole
Cephalosporin
Cefixime
Cefpodoxime
Cefprozil
Cefuroxime axetil
Cephalexin

Ceftriaxone
Cefotaxime
Ceftazidime
Gentamicin
Tobramycin
Piperacillin

Notes:

- Studies showed a benefit on prevention of UTI but none on scarring
- Circumcision
- increased fluid intake, treatment of constipation
- Treatment of bladder dysfunction as regular voiding, pelvic floor relaxation, double void

Prophylactic Abx

Table 2 Properties of an ideal prophylactic agent

- Active against uropathogenic bacteria
- Enteric uptake in the small intestine leading to minimal activity against bacteria in the colon and the periurethral area
- Adequate urine concentration
- Few short- or long-term adverse effects
- Low selection of resistant bacteria
- Available in formulas suitable for children
- Good taste
- Easily degradable to minimize negative environmental effect

Table 11 Prophylactic antimicrobial agents

Antibiotic	Dose
Trimethoprim (TMP)-sulfamethoxazole	2 mg TMP/kg/day daily
Nitrofurantoin	1–2 mg/kg/dose daily
Cephalexin	10 mg/kg/dose daily
Amoxicillin	10 mg/kg/dose daily

Notes:

- For Pyelonephritis: third generation cephalosporin as ceftriaxone, ampicillin and aminoglycoside
- If previous cultures or ESBL bcateria used carbapenem or aminoglycosides
- For cystitis: second or third generation cephalosporin as cefuroxime, cefixime, or amoxicillin-clavulanic acid
- After empirical treatment,can change antibiotics according to sensitivities
- RCT showed no difference between IV antibiotic followed by oral with oral in treatment of pyelonephritis in:
 - 1-Time to fever resolution
 - 2-Recurrent UTI
 - 3-Renal parenchymal defects

Course of disease

- Patients usually afebrile after 48 hour
- If still febrile consider upgrading antibiotics due to resistant strains or complications
- No need to repeat the culture
- Can continue oral antibiotics after intravenous

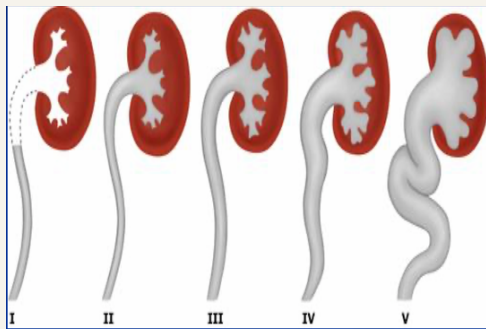
Table 1. AAP Clinical Practice Guideline on UTI in Febrile Infants and Young Children: Key Updates

Area of management	Updates from the 1999 guideline
Diagnosis	Both an abnormal urinalysis result and a positive urine culture result are needed to confirm inflammation A positive culture result is defined as at least 50,000 colony-forming units per mL, rather than the previous criterion of at least 100,000 colony-forming units per mL Guidance is added for using clinical criteria to establish a threshold to decide whether to obtain a urine specimen
Treatment	Oral treatment is as effective as parenteral treatment
Imaging	Voiding cystourethrography is not recommended routinely after the first febrile UTI; ultrasonography should include the bladder and the kidneys
Follow-up	Emphasis is on urine testing with subsequent febrile illnesses, rather than on regularly repeated urine cultures after treatment

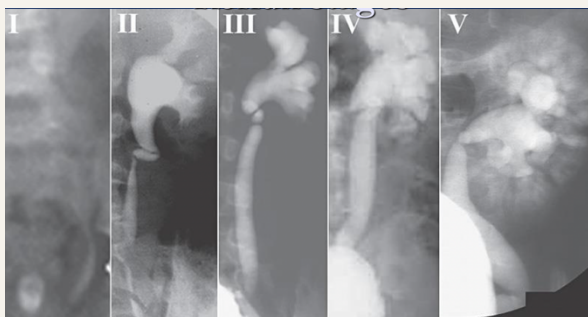
VUR

- Causes: Primary or secondary to PUV,neurogenic bladder
- Associated with renal agenesis, ectopia, lower pole of duplex kidney
- 33% of UTI cases have VUR
- Incidence of reflux in siblings 27-45 %

Classification of VUR



Reflex stages



Rate of resolution of VUR over 5 years	
Grade 1	82%
Grade 2	80%
Grade 3	46%
Grade 4	30%
Grade 5	11%

Edema

- Onset
- Distribution: periorbital,abdomen,leg
- Associated symptoms
 - 1.cardiac as dyspnea to rule out heart failure
 - 2.jaundice to look for liver disease
 - 3.chronic diarrhea to look for protein losing enteropathy
 - 4.urine output ,red urine, frothy urine

Laboratory result

1. electrolytes
 2. urea, creatinine
 3. albumin
 4. urine analysis for protein
 5. liver function test
- Normal protein is less than 4 mg/m2.hour

NEPHROTIC SYNDROME

- Nephrotic range proteinuria, (>40mg/m2/hour), (> 50mg/kg/day), urine to protein creat ratio (>2mg/mg), +3-4 on dipstick
- Hypoalbumenia (<2.5g/dl)
- Hyperlipidemia
- edema
- Prevalance 2/100000
- M:F 2:1, 80% <6 years

History and examination

- Periorbital swelling mistaken as allergy
- Increase in weight, abdominal distention ascitis
- Scrotal and sacral edema, pleural effusion
- Abdominal pain due to hypovolemia, peritonitis
- Decrease in urine output
- Symptoms preceded by URTI
- Blood pressure normal or high

DD OF proteinurea

1. tubular : fanconi syndrome, drugs, ATN
2. glomerular ; could be with GN
3. transient: fever, infection, exercise
4. glomerular

Laboratory investigation

- Electrolytes: low Na, low albumin and calcium
- ANA,C3,C4, hepatitis B, C
- Hemoglobin high,platlet high
- Urine Na less than 10
- Urine analysis: proteinuria, microscopic hematuria
- Urine protein/creatinine more than 2 mg/mg
- Elevated cholesterol and triglycerides

Examination

1. look for periorbital swelling, redness
2. examine for ascites
3. examine for lower limbs edema
4. look for sacral edema

COMPLICATIONS

- 1-Infections: losses of IgG in urine, abn T cell function, low factor B (C3 proactivator), steriod use,impaired opsonization
-Encapsulated bact streptococcus
-pneumonia,staph,Ecoli
-Primary bacterial peritonitis
-Immunization against pneumococcus,varicella
- 2-Thromboembolism: inc clotting factors, fibrinogen, low AT3, plat aggreg, hyperviscosity
Venous, RVT, sagital sinus, veins of legs
- 3.ARF