

CHAPTER 13 – GENITOURINARY SYSTEM

First Nations and Inuit Health Branch (FNIHB) Pediatric Clinical Practice Guidelines for Nurses in Primary Care.

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INTRODUCTION

For more information on the history and physical examination of the genitourinary system in older children and adolescents, see the chapters, “Urinary

and Male Genital Systems” and “Women’s Health and Gynecology” in the adult clinical practice guidelines.

ASSESSMENT OF THE GENITOURINARY SYSTEM

The genitourinary (GU) system may be affected by congenital abnormalities, inflammation, infection, other body systems or diseases of the kidneys.

HISTORY OF PRESENT ILLNESS AND REVIEW OF SYSTEMS^{1,2}

Newborns and infants with urinary tract disorders and diseases may present with the following signs and symptoms:

- Pallor
- Fever
- Jaundice
- Seizures
- Dehydration
- Poor feeding
- Vomiting
- Excessive thirst
- Frequent urination
- Screaming on urination
- Poor urine stream
- Foul-smelling urine
- Enlarged kidney or bladder
- Persistent diaper rash
- Failure to thrive
- Rapid respirations (acidosis)
- Respiratory distress
- Spontaneous pneumothorax or pneumomediastinum

The following signs and symptoms are those most commonly associated with urinary tract infection (UTI) in children:

- Fever
- Enuresis (bed-wetting)
- Incontinence (new onset)
- Dysuria
- Hematuria
- Frequency
- Urgency

- Change in colour or cloudy, foul-smelling urine
- Abdominal, suprapubic, flank or back pain or tenderness
- Scrotal or groin pain
- Genital sores, swelling, discolouration
- Lack of circumcision
- Toilet-training problems
- Irritability
- Poor feeding

The following symptoms are associated with nephrotic syndrome and glomerulonephritis:

- Swelling (for example, ankles, around eyes)
- Headaches
- Nosebleeds (an occasional symptom of hypertension, but nosebleeds also occur frequently in normal children)
- Hematuria
- Smoky or coffee-coloured urine
- Decreased urinary output
- Pallor
- Weight gain

A complete history of the GU system should include questions related to:

- Sexual activity (for adolescents)
- Problems related to inappropriate touching by others (that is, sexual abuse)

Children must be asked such questions with sensitivity and without the use of leading questions. The parents or caregiver can be asked about these topics directly.

PHYSICAL EXAMINATION^{3,4,a,b}

VITAL SIGNS

- Temperature
- Heart rate
- Respiratory rate
- Blood pressure

URINARY SYSTEM (ABDOMINAL EXAMINATION)

For full details, see “Physical Examination” of the abdomen in the pediatric chapter “Gastrointestinal System”.

INSPECTION

- Abdominal contour, looking for asymmetry or distention (a sign of ascites)
- Abdominal pulsations
- Peripheral vascular irregularities
- Masses

PERCUSSION

- Determine organ size
- Liver span (may be increased in glomerulonephritis)
- Ascites (dull to percussion in flanks when child is supine; location of dullness shifts when child changes position)
- Tenderness over costovertebral angle

PALPATION

- Size of liver and any tenderness because of congestion
- Identify local areas of pain or mass lesions
- Kidneys are often palpable in infants, the right kidney being most easily “captured;” perform deep palpation to determine kidney size and tenderness (place one hand under the back and the other hand on the abdomen to try to “capture” the kidney between the hands)

GENITALIA

The clinician must be sensitive regarding the genitourinary examination of the child.

Infant and children should be examined with the parent, caregiver or the guardian present, unless their presence would interfere with the examination. In that case, a chaperone should be present.

Adolescents should be involved in the decision to have a chaperone present or not during the examination. This decision should be made once the reasons for the exam and the examination process have been explained by the clinician. If possible, the adolescent should choose the gender of the chaperone. If the adolescent declines the presence of the chaperone, this should be documented in the medical record.

At the onset of the examination, provide appropriate covering and explain to the patient why examination of the area is needed and how it will be performed and what instruments, if any, will be used.

Encourage the client to ask questions and assert their choices about how and whether the examination should proceed.

MALE GENITALIA

Perform examination with the child supine and, if possible, in the standing position.

Penis

Inspection:

- In the neonate, examination should focus upon possible congenital anomalies:
 - Penile length
 - Foreskin anatomy
 - Location of the urethral meatus
 - Scrotal anatomy (including rugae)
 - Presence and location of the testes
- Presence of abnormal scrotal or inguinal masses
- Position of urethra (for example, epispadias, hypospadias)
- Discharge at urethra (distinguish poor hygiene from urethritis)
- Inflammation of foreskin or head of penis (sign of balanitis)

Palpation:

- Foreskin adherent at birth normally
- In 90% of uncircumcised male children, the foreskin becomes partially or fully retractable by 12 years of age
- Inability to retract foreskin (phimosis)
- Inability of retracted foreskin to return to normal position (paraphimosis)

Scrotum and Testicles

Inspection:

- Scrotum may appear enlarged
- Check penile and scrotal skin for any unusual lesions
- Check for edema (a sign of glomerulonephritis), hydrocele (transillumination should be possible), hernia, varicocele or abnormal masses.

Palpation:

- Cremasteric reflex (absent in testicular torsion)
- Testicular size, position, consistency, shape and descent into scrotum
- Testicular tenderness: consider torsion or epididymitis (pain is actually in the epididymis, not the testicle)
- Swelling in inguinal canal: consider hernia or hydrocele of spermatic cord
- Mass in scrotum

For information about examining the adolescent male, see “Genitourinary and Male Genital Systems” in the adult clinical practice guidelines.

- Ulcerative or inflammatory lesions
- Urethral irritation (sign of UTI)
- Vaginal discharge
- Bleeding
- Enlargement of vaginal orifice
- History and observations should concur or may indicate sexual abuse

For information about examining the adolescent female, see “Assessment of the Female Reproductive System” in the adult chapter “Women’s Health and Gynecology”.

FEMALE GENITALIA

- Child should be in supine frog-leg position for examination
- Do not perform an internal vaginal examination in a prepubescent child or an adolescent who is not sexually active
- Spread labia by applying gentle traction toward examiner and slightly laterally to visualize the vaginal orifice

Inspection

- Vulvar irritation
- Erythema (in prepubescent girls, the labia normally appears redder than in adult women because the tissue is thinner)



Consult Physician/Nurse Practitioner when practice is outside legislated scope and without authorized delegation.

COMMON PROBLEMS OF THE GENITOURINARY SYSTEM**GLOMERULONEPHRITIS**, 5,6,c

Disease in which there is immunologic or toxic damage to the glomerular apparatus of the kidneys. It can occur acutely (acute glomerulonephritis) or it may have a chronic or insidious onset (chronic or progressive glomerulonephritis).

ACUTE POST-STREPTOCOCCAL GLOMERULONEPHRITIS

Acute post-streptococcal glomerulonephritis (APSGN) is caused by glomerular immune complex disease induced by specific nephritogenic strains

of group A beta-hemolytic Streptococcus. It is the most common of the noninfectious renal diseases in childhood. APSGN can occur at any age but primarily affects early school-aged children, with a peak age of onset of 6 to 7 years. It is uncommon in children under age 2.

CAUSES

- Usually secondary to previous streptococcal infection (for example, of the throat or skin)
- Follows pharyngitis or otitis by 1–3 weeks
- Lag time after skin infections is variable (can be up to 3 weeks)

HISTORY

- Acute onset
- Usually history of pharyngitis or impetigo about 10 days before the abrupt onset of dark urine
- Acute phase lasts about 1 week

SYSTEMIC SYMPTOMS

- Anorexia
- Periorbital edema
- Decreased urination
- Smoky or coffee-coloured urine
- Mild to severe hypertension
- Abdominal pain
- Fever
- Headache
- Lethargy
- Fatigue, malaise
- Weakness
- Rash, impetigo
- Joint pain
- Weight loss

PHYSICAL FINDINGS

The physical findings are variable and may include the following:

- Edema (in about 85% of cases)
- Hypertension (in about 80% of cases)
- Hematuria (30% of children have gross hematuria)⁶
- Proteinuria
- Oliguria
- Renal failure (to variable degree)
- Congestive heart failure
- Hypertensive encephalopathy (rare)

Edema, hypertension and hematuria are the most common and most worrisome symptoms.

DIFFERENTIAL DIAGNOSIS

- Other forms of glomerulonephritis, which have many similar features (distinguished by laboratory tests, renal biopsy and other diagnostic methods)
- Acute hemorrhagic cystitis (no edema, hypertension, renal failure; does involve dysuria, frequency, urgency)
- Acute interstitial nephritis
- Antiglomerular basement membrane disease
- Cryoglobulinemia
- Nephritis, lupus

COMPLICATIONS

- Acute renal failure
- Congestive heart failure
- Pulmonary edema
- Sepsis
- Hyperkalemia
- Severe hypertension
- Chronic renal failure

DIAGNOSTIC TESTS

The diagnosis is made on a clinical basis and is confirmed by the following tests:

- Urinalysis (hematuria, proteinuria)
- Hemoglobin decreased (mild anemia)
- WBC count increased
- BUN, creatinine, eGFR
- Recent throat swab positive for *Streptococcus A* infection

MANAGEMENT**Goals of Treatment**

- Prevent, if possible, by early treatment of all streptococcal infections (skin and pharyngeal)
- Prevent or treat complications

Appropriate Consultation

Consult a physician/nurse practitioner immediately if you suspect this disorder.

Nonpharmacologic Interventions

While awaiting transfer:

- Bed rest
- Fluid restriction based on discussion with physician/nurse practitioner
- Sodium-restricted diet
- Correction of electrolyte imbalance

Pharmacologic Interventions

None, unless complications develop. Treat complications **only** on physician/nurse practitioner's instruction.

In patients with evidence of persistent infection (that is, those with positive cultures), the underlying streptococcal infection can be treated with penicillin or erythromycin.

Monitoring and Follow-Up while Awaiting Transfer

- Fluid restriction based on consultation with physician/nurse practitioner

- Monitor blood pressure and vital signs
- Daily weight
- Respiratory status
- Renal function
- Monitor intake and output
- Watch for major life-threatening problems, such as acute renal insufficiency with electrolyte abnormalities, fluid overload, pulmonary edema, congestive heart failure, acute hypertension

Monitoring and Follow-Up over the Long Term

- Will depend on cause and type of condition
- Post-streptococcal glomerulonephritis usually has no long-term sequelae, but other types of glomerulonephritis may have long-term complications, including recurrence and chronic renal failure
- Consulting specialist will provide instructions for surveillance

Referral

Medevac.

CHRONIC OR PROGRESSIVE GLOMERULONEPHRITIS

Chronic glomerulonephritis (CGN) is characterized by irreversible and progressive glomerular and tubulointerstitial fibrosis, ultimately leading to a reduction in the glomerular filtration rate and retention of uremic toxins. In cases where CGN is not associated with other diseases, it may go undetected for years and be relatively asymptomatic until kidney destruction produces a marked reduction in kidney function. Consequently, the disease is more common in adolescents than in younger children.

HYDROCELE (PHYSIOLOGIC) 7.8.d

A hydrocele is a collection of peritoneal fluid between the parietal and visceral layers of the tunica vaginalis testis or along the spermatic cord.

Hydroceles are the most common cause of scrotal swelling and are relatively common in newborns, appearing in approximately 6% of full-term male neonates. They rarely occur in infant girls, in which they would present as a firm swelling in the groin.

Hydroceles may be communicating or noncommunicating.

CAUSES

Communicating Hydroceles

- Usually develop as a result of failure of the processus vaginalis to close during development; the fluid around the scrotum is peritoneal fluid

Noncommunicating Hydroceles

- Fluid accumulation may be caused by infection, trauma, tumour, an imbalance between the secreting and absorptive capacities of scrotal tissues or an obstruction of the lymphatic or venous drainage in the spermatic cord
- This leads to a displacement of fluid in the scrotum, outside the testes
- Subsequent swelling leads to reduced blood flow to the testes

HISTORY

- Painless swelling in scrotum
- Congenital or acquired
- Hydroceles that are present in newborns, whether communicating or non-communicating, usually resolve spontaneously by the first birthday, unless they are accompanied by an inguinal hernia
- Swelling may fluctuate in size

PHYSICAL FINDINGS

- Should be able to palpate an upper border of the swelling
- Soft, nontender fullness within the hemiscrotum
- Transillumination of the swelling should reveal a homogenous glow without internal shadows
- Inguinal hernia may also be present
- Examination of patients with hydroceles should include palpation of the entire testicular surface for findings of epididymitis, orchitis, testicular torsion, torsion of the appendix testis or appendix epididymis, trauma or tumour as the primary etiology

Hydrocele of the spermatic cord may also be seen:

- Painless cystic swelling along the inguinal canal
- Swelling may transilluminate

DIFFERENTIAL DIAGNOSIS

- Varicocele
- Testicular torsion
- Orchitis
- Epididymitis
- Spermatocele (cystic swelling of the epididymitis)
- Enlargement of groin node
- Trauma
- Hematoma
- Neoplasm

COMPLICATIONS

- Slight increase in risk of inguinal hernia
- Testicular atrophy
- Epididymitis

DIAGNOSTIC TESTS

- The diagnosis of hydrocele can be made by physical examination and transillumination of the scrotum demonstrating a cystic fluid collection

MANAGEMENT**Goals of Treatment**

- Observe until condition resolves spontaneously or surgical referral becomes necessary

Appropriate Consultation

Consult physician or nurse practitioner

Nonpharmacologic Interventions

- Scrotal elevation
- Explain to parents or caregiver the pathophysiology of the defect
- Reassure the parents or caregiver
- Advise parents or caregiver to return to the clinic if the mass enlarges

Monitoring and Follow-Up

Reassess every 3 months until resolution occurs or referral becomes necessary

Referral to a physician/nurse practitioner may be necessary if there are signs of complications (for example, if there is an associated inguinal hernia, discomfort, secondary infection) or resolution does not occur when expected (by 1 year of age).

Surgical treatment is considered in the following circumstances:

- No signs of resolution by age 1 year (surgery may be delayed until age 2 or 3 in some circumstances)
- Hernias are associated with the hydrocele

PREPUBESCENT VAGINAL DISCHARGE^{9, 10,e,f,g,h}

For vaginal discharge in adolescents, *see* “Vulvovaginitis” in the adult chapter “Communicable Diseases”.

DEFINITION

Physiologic discharge:

- Mucoïd
- Nonmalodorous
- Seen in newborns and premenarchal girls (*see* “Tanner stage II and III” in the chapter, “Adolescent Health”)
- Normal vaginal secretions are often increased midcycle in adolescents

Any other discharge is a symptom of underlying problems.

Vaginal discharge is uncommon in girls < 9 years old.

CAUSES AND ASSOCIATED ORGANISMS

- Poor hygiene (*Escherichia coli*)
- Moisture (especially resulting from synthetic fibre underwear, tight clothing, wet swimsuits, obesity)
- Chemical irritants (bubble baths), local trauma
- Poor estrogenization is a common factor that makes the vulvar tissues vulnerable to irritation and infection
- Autoinoculation from associated upper respiratory tract infection (URTI) (*Haemophilus influenzae*, group B *Streptococcus*) or skin infections (*Staphylococcus*)
- Pinworms (*E. coli*)
- Foreign body (associated with *E. coli*)
- Other skin diseases affecting the genital area (for example, eczema)
- Specific infection: *Candida*, *Chlamydia*, *Neisseria gonorrhoeae*, *Trichomonas* (uncommon), bacterial vaginosis

If *N. gonorrhoeae* or *Chlamydia* is the cause of the discharge and the child is underage for consensual sex (that is, < 16 years), sexual abuse must be considered—refer to Justice Canada for more information: <https://www.justice.gc.ca/eng/rp-pr/other-audre/clp/faq.html> and to chapter 5 on Child maltreatment

HISTORY

- Various degrees of perineal discomfort or itching
- Vaginal discharge – note onset, quantity, colour, type, odour, consistency and duration
- Dysuria
- Enuresis
- Frequency
- Recent medications, especially antibiotics

- Associated illnesses (for example, URTI, skin problems, pinworms)
- Hygiene
- Use of harsh soaps and bubble bath
- Tight-fitting or nylon underwear or clothing
- Possible sexual abuse

PHYSICAL FINDINGS

Inspect the genitalia but do not perform a vaginal speculum examination or restrain the child.

- Suboptimal general or perineal hygiene
- Signs of URTI or skin disease

Labial Irritation

- Consider problems with perineal hygiene or local chemical irritation (soaps, moisture)
- *Candida* infection
- Sexual abuse

Marked Erythema

Consider *Candida* infection

Vaginal Discharge

- May be nonspecific
- Thick, white, cheesy: possibly *Candida*
- Frothy, green: likely bacterial, *Trichomonas*
- Dark brown, foul smelling: possibly from a foreign body

Foreign Body

- May be visualized better if child is in knee-chest position
- May be palpated while doing a rectal examination

DIFFERENTIAL DIAGNOSIS

Noninfectious

- Poor hygiene
- Chemical irritation (for example, from bubble bath)
- Foreign body
- Trauma/sexual abuse
- Atopic dermatitis
- Psoriasis
- Seborrhea
- Labial adhesions
- Systemic diseases (for example, Kawasaki or Crohn's)

Infectious

- Group A *Streptococcus* infection
- Nonspecific bacterial infection
- Pinworms
- *Candida* (less common)
- Sexually transmitted infection (STI) (consider sexual abuse)

COMPLICATIONS

The complications depend on the underlying cause.

- Localized perineal irritation
- UTI
- Abdominal pain (with pinworms or UTI)
- Vaginitis
- Bleeding (from trauma)
- Labial adhesions
- Sexually Transmitted infections (STIs)

DIAGNOSTIC TESTS

If child is cooperative, attempt to swab vaginal orifice (using small, calcium alginate-tipped swab); avoid touching the hymenal edge. Swab for *Chlamydia*, *N. gonorrhoeae*, culture, sensitivity and hanging drop, in that order. Urine NAAT should also be collected for *Chlamydia* and *N. gonorrhoeae*

- Urine for routine and microscopic analysis
- Urine for culture and sensitivity
- pH of vaginal secretions

Hormonal levels may be indicated in females with dry vaginal orifice. Consult physician or nurse practitioner if this is a finding.

MANAGEMENT

Management depends on cause.

Goals of Treatment

- Identify and correct underlying cause

Appropriate Consultation

Consult a physician/nurse practitioner if the child is febrile or has abdominal pain, or if you suspect sexual abuse.

Consider sexual abuse if you suspect nonexploitative sexual activity with a partner ≥ 2 years older for 12 and 13 years old or with a partner ≥ 5 years older for 14 and 15 years old. Refer to <https://www.justice.gc.ca/eng/rp-pr/other-autre/clp/faq.html> and to the chapter “Child Maltreatment” for more information.

Nonpharmacologic and Pharmacologic Interventions

For poor hygiene

- Improve perineal hygiene
- Avoid bubble baths
- Wipe from front to back, but avoid scrubbing genitalia

For foreign body

In an older child who can cooperate, remove the foreign body if visible and within easy reach; otherwise consult a physician/nurse practitioner about options for removal and possible treatment with antimicrobial

For pinworms

See “Pinworms” in Chapter 18, “Communicable Diseases”.

For candidal infection

clotrimazole 1% cream PV qd x 7 days

For trichomonal infection

for age > 13 years, metronidazole (Flagyl), 2 g PO stat

for age < 13 years, consult a physician /nurse practitioner regarding dosage

For bacterial vaginosis

for age > 13 years

Preferred regimen:

metronidazole (Flagyl, generics), 500 mg PO bid x 7 days

Alternative regimen:

metronidazole (Flagyl, generics), 2 g PO stat

for age < 13 years, consult a physician /nurse practitioner regarding dosage

For STI

Consult a physician, a certified sexual health nurse or a nurse practitioner if you suspect an STI in a preadolescent child. Refer to and follow the “Canadian Guidelines on Sexually Transmitted Infections” (available at: <https://www.canada.ca/en/public-health/services/infectious-diseases/sexual-health-sexually-transmitted-infections/canadian-guidelines.html>)

If the cause of the discharge is uncertain, send samples for culture and sensitivity and consult a physician or nurse practitioner for therapeutic options.

Report as suspected sexual abuse all cases of gonorrhea and *Chlamydia* infection in children and adolescents where the legal definition of sexual abuse is met. Refer to “Child Maltreatment” for age-related definitions of child abuse. Other cases of vaginitis may be reportable, depending on the circumstance.

URINARY INCONTINENCE (ENURESIS) ^{11,12,l,j,k}

Urinary incontinence is the uncontrolled leakage of urine, which can be continuous or intermittent.

Incontinence is twice as common in boys as in girls.

Daytime urinary continence typically occurs by 4 years of age and night continence by 5–7 years of age.

- Primary enuresis is wetting in a child who has never been dry for at least 6 months
- Secondary enuresis is wetting that begins after at least 6 months of dryness
- Nocturnal enuresis is wetting that usually occurs during sleep. Diurnal enuresis is wetting when awake, also called daytime incontinence

CAUSES

Nighttime incontinence:

- Slower physical development
- Excessive output of urine during sleep
- Anxiety
- Genetics
- Urinary Tract Infection
- Other medical conditions (fecal incontinence or constipation, chronic kidney disease, obstructive sleep apnea, diabetes, seizures, ...)

Daytime incontinence:

- Overactive bladder
- Infrequent voiding
- Small bladder capacity
- Structural problems
- Anxiety-causing events
- Drinks and foods that contain caffeine

HISTORY

- Voiding schedule (frequency of voids, frequency of incontinence, estimates of volume of urine)
 - Symptoms of bladder dysfunctions (urgency, dysuria, dribbling, hesitancy, straining, intermittent or weak stream)
- Bowel habits (frequency, consistency, caliber, size, presence of constipation, incontinence or soiling, pain with defecation, stool withholding behaviors)

- Family history (kidney or urologic disorders including bladder dysfunction. Age that other family members achieved urinary continence)
- Perinatal and neonatal history (perinatal or neonatal insult such as anoxia or congenital infection)
- Fluid intake (amount and type of fluid)
- Previous urinary tract infections
- History of neurodevelopment delay or psychological disorders.
- Family or parent/caregiver stress or conflict
- Toilet training history

PHYSICAL FINDINGS

The physical examination is usually normal unless an underlying medical condition for enuresis is present:

- Poor growth and hypertension (renal disease)
- Tonsillar hypertrophy (obstructive sleep apnea)
- Palpation of stool in the abdomen (constipation)
- Urine in the underwear (daytime incontinence)
- Perianal excoriation (pinworms)
- Abnormalities of the lumbosacral spine or neurological exam (occult spinal cord abnormalities)
- Slow urinary stream, dribbling, distended bladder or incomplete emptying

DIFFERENTIAL DIAGNOSIS

- Urinary tract infection
- See *Causes* section

COMPLICATIONS

- There is a clear association between voiding dysfunction and urinary tract infection (UTI)
- Voiding dysfunction may predispose children to recurrent UTI and renal injury
- The risk of bladder colonization and UTI is increased in children with incomplete bladder emptying due to dysfunctional voiding or underactive bladder

DIAGNOSTIC TESTS

- Urinalysis and urine culture

MANAGEMENT

Goals of Treatment

- Rule out other causes (for example, infection)

Nonpharmacologic Interventions

- Moisture alarms
- Bladder training and related strategies:
 - exercises for strengthening and coordinating muscles of the bladder and urethra
 - determining bladder capacity
 - drinking less fluid before sleeping
 - developing routines for waking up
 - urinating on a schedule (for example, every 2 hours)
 - avoiding caffeine or other foods or drinks that may contribute to incontinence

Pharmacologic Interventions

A complete urological review in consultation with a physician/nurse practitioner is required before medication is prescribed for urinary incontinence.

URINARY TRACT INFECTION,^{13,14,15,16,17,18,19,22,23,24,l,m,n,o,p}

See also “Commons Problems of the Urinary System” in the adult chapter “Urinary and Male Genital System”.

Bacterial invasion of the genitourinary (GU) tract with resulting infection.

- *Cystitis*: infection affecting only the lower GU tract (for example, the bladder)
- *Pyelonephritis*: ascending infection involving the upper GU tract (for example, the ureters and kidneys)

Urinary tract infection (UTI) is the most common genitourinary disease in children. The prevalence of UTI is highest in boys younger than 1 year and girls younger than 4 years. Uncircumcised male infants, when presenting with fever, have a four- to eight-fold higher prevalence of UTI than circumcised male infants. Female infants have a two- to four-fold higher prevalence of UTI than male infants. This has been presumed to be the result of the shorter female urethra. As for uncircumcised male infants, the higher incidence is thought to be related to the mucosal surface of the uncircumcised foreskin being more likely to bind uropathogenic bacteria. In uncircumcised boys, a possible partial obstruction of the urethral meatus by a tight foreskin may be the explanation for the higher incidence of UTI. An increased incidence of UTI is observed in adolescents, notably in those who are sexually active.

CAUSES

Bacterial invasion by one of the following organisms:

- *Escherichia coli* in over 80% of cases
- *Staphylococcus aureus*

- *Enterococcus* spp.
- *Klebsiella* spp.
- *Proteus mirabilis*
- *Pseudomonas* spp.
- *Haemophilus* spp.
- Coagulase-negative staphylococci

Predisposing factors:

- Congenital GU tract abnormalities, for example, vesicoureteral reflux, short urethra (however, most children with UTI have a normal GU tract)
- Perineal fecal contamination because of inadequate hygiene
- Infrequent voiding or urinary stasis
- Perianal infections
- Sexual activity

HISTORY

The history depends on the child's age.

Neonates and Infants

- Primarily nonspecific, non-urinary symptoms
- May present with septicemia
- Fever
- Irritability (“colic”)
- Poor feeding
- Vomiting
- Loose stools
- Jaundice (particularly in neonates)
- Hypothermia
- Failure to thrive
- Decreased activity, lethargy

Younger Children (≤ 3 Years Old)

- Abdominal complaints including pain
- Suprapubic tenderness
- Fever – infants and children younger than 2 years can present with fever as the sole manifestation of UTI
- Frequency, urgency, dysuria, enuresis
- Urinary retention
- Lack of circumcision in boys

Older Children (>3 Years)

- May present with chronic urinary symptoms incontinence, lack of proper stream, frequency, urgency, withholding maneuvers

- Chronic constipation
- History of previous UTI
- Fever
- Dysuria
- Flank or back pain
- In sexually active girls, barrier contraception with spermicidal agents predisposes to UTI

PHYSICAL FINDINGS

- Fever (may be absent in simple cystitis)
- Suprapubic tenderness (in cystitis)
- Tenderness of abdomen, flank and costovertebral angle (more likely with pyelonephritis)
- Hematuria

Be sure to assess hydration status.

DIFFERENTIAL DIAGNOSIS

Distinguish between cystitis and pyelonephritis.

Infection of the Lower GU Tract (Cystitis)

- Urethral irritation (for example, bubble bath, scented soaps or powders)
- Urethral trauma
- Urethritis secondary to sexually transmitted infection
- Diabetes mellitus
- Masses adjacent to bladder

Infection of the Upper GU Tract (Pyelonephritis)

- Gastroenteritis
- Pelvic inflammatory disease (PID) (Chandelier sign with bimanual examination)
- Tubo-ovarian abscess
- Appendicitis
- Ovarian torsion

COMPLICATIONS

- Recurrent UTI
- Sepsis, especially in neonates and infants < 6 months of age
- Renal damage leading to adult hypertension, renal failure

DIAGNOSTIC TESTS

Urinalysis for routine and microscopic examination (midstream specimen for toilet trained children, catheter specimen for infants).

Bagged urine specimens are of no value in diagnosing a UTI in infants, even if positive.

- White blood cells (WBCs)
- Bacteriuria
- Hematuria (blood in urine)
- Positive for nitrates (although UTI can occur with organisms that do not produce nitrate)

Urine for culture and sensitivity:

- Preferably a first morning specimen; in infants, use a clean catheter specimen
 - If multiple organisms present on culture, suspect contamination, not true infection
- Complete blood count, serum creatinine and blood cultures should be obtained if the child is febrile and systemically unwell

RADIOLOGIC EVALUATION

Children <2 years of age should be investigated with a renal and bladder ultrasound after their first febrile UTI to identify renal abnormalities and vesicoureteral reflux.

Other indications for radiologic evaluation include:

- Recurrent febrile UTIs
- A child with UTI and family history of renal or urologic disease
- A child with a UTI and poor growth or hypertension
- A child with a UTI who does not respond adequately to appropriate antimicrobial therapy.

MANAGEMENT

Lower GU infections (for example, cystitis) are generally less severe and usually managed on an outpatient basis. Pyelonephritis is more severe and may require hospital care for intravenous (IV) antibiotics. The decision about hospitalization depends on the child's age and the severity of the clinical condition.

Goals of Treatment

- Eradicate infection
- Prevent recurrence
- Identify underlying factors

Appropriate Consultation

Consult a physician/nurse practitioner for any of the following:

- Recurrent urinary tract infections where imaging (renal ultrasound or scan, voiding cystourethrogram) may be required

- Neonatal infections, for which medevac is required; these are often associated with bacterial sepsis and require IV treatment
- Suspected pyelonephritis, for which child may be admitted to hospital (depends on age and severity of illness)

CYSTITIS

Nonpharmacologic Interventions

- Increase rest if febrile
- Increase oral fluids to promote urine flow

Pharmacologic Interventions

Do not treat as UTI unless results of appropriately collected urine specimens support the diagnosis (for example, positive for nitrates or WBCs).

Antibiotics:

Aligning with the Canadian Pediatric Society's recent recommendations, it is suggested that while waiting for antibiotic susceptibility results for the likely bacterial pathogen, clinicians should make an empirical choice of antibiotics based on local susceptibility patterns.

Cefixime is a common choice for a first cystitis pending susceptibilities

For older children with no fever and presumed cystitis:

Cefixime 8 mg/kg po once daily for 2 – 4 days

Febrile child and presumed cystitis:

Cefixime 8 mg/kg po once daily for 7 to 10 days

Trimethoprim- sulfamethoxazole may be used empirically if cefixime is not an option and local resistance pattern supports its use.

trimethoprim-sulfamethoxazole (TMP-SMX, Septra and generics)

The dose is calculated on the basis of the trimethoprim component not sulfamethoxazole

Suspension contains TMP 40 mg / SMX 200 mg per 5 mL

trimethoprim-sulfamethoxazole: 5–10 mg TMP/kg per day divided bid, PO for 7–10 days

Consult a physician/nurse practitioner if child is allergic to the antibiotic of choice.

The efficacy of long-term antibiotic prophylaxis of recurrent UTI in children is not established.

Client Education: mal

UTI can be prevented by:

- Proper toileting (wipe from front to back) Drinking plenty of fluids each day
- Encouraging cranberry juice to prevent urinary tract infections. Cranberry juice is not effective for the treatment of UTI
- Urinating when the urge is felt, not holding it in
- Emptying the bladder after intercourse (sexually active teenagers)

PYELONEPHRITIS (SUSPECTED)

Adjuvant Therapy

- IV therapy with normal saline may be necessary for children with pyelonephritis (before transfer)
- Run at a rate sufficient to maintain hydration

Pharmacologic Interventions

IV antibiotics may be started before transfer, on the advice of a physician/nurse practitioner:

ampicillin and gentamycin are often prescribed in combination

Monitoring and Follow-Up

- If treating as an outpatient, follow up in 24–48 hours. Review sensitivity of organisms to antibiotics when the results of urine cultures are available
- If there is no response to oral antibiotics within 48–72 hours or if symptoms are deteriorating, consult with a physician/nurse practitioner about changing the antibiotic or the need for IV antibiotic therapy

Referral

- Medevac all infants under 4 months of age, and those who appear acutely ill (at risk of sepsis), dehydrated or who are unable to tolerate oral medications or fluids
- Older infants and children with suspected pyelonephritis may require medevac, depending on their clinical condition (for example, acute illness [sepsis], dehydration or if unable to tolerate oral medications or fluids)
- Refer to a physician/nurse practitioner (for evaluation) any child with culture-proven UTI who has been treated on an outpatient basis

EMERGENCY PROBLEMS OF THE MALE GENITAL SYSTEM

TESTICULAR TORSION^{25, 26 27,28,29,30,d}

Abnormal twisting of spermatic cord and testis, which compromises blood supply to these structures and results in ischemic injury and pain. Acute, severely painful condition.

Torsion can occur at any age; however, it is most common in adolescence, with a peak at 14 years of age.

Testicular torsion is a medical emergency. If the blood supply to the testis is cut off for more than about six hours, permanent damage to the testis is likely to occur.

PARTIAL OR INTERMITTENT TESTICULAR TORSION

Torsion is not an all-or-nothing phenomenon. It can be complete (usually twisting > 360°), incomplete or intermittent.

Some boys and men have occasional warning pains in a testis before developing full-blown torsion. These episodes occur suddenly, last a few minutes, and then remit suddenly. The pain occurs if a testis twists a little, and then returns back to its normal place on its own.

Incomplete or partial testicular torsion is difficult to diagnose because of its subacute presentation with nonspecific symptoms and signs.

CAUSES

- Torsion is usually spontaneous and idiopathic (often occurs during sleep)
- Predisposing structural (genetic) defect (for example, inadequate fixation of testis to tunica vaginalis, bell clapper deformity)
- Occasionally caused by minor trauma to the groin.

- Strenuous physical activity
- Sexual activity or arousal
- Undescended testicle
- Testicular tumour

HISTORY

- Sudden onset of severe, constant, unilateral pain in scrotum or testicle, usually for < 12–24 hours
- Prior episodes of intermittent testicular pain may be reported (torsion and then detorsion)
- Pain may radiate to lower abdomen
- May be described as abdominal or inguinal pain by the embarrassed child
- Pain made worse by elevation of scrotum
- Pain not relieved by lying down
- Decreased appetite, nausea and vomiting may be present
- Urinary frequency may uncommonly occur
- “Causes” as listed above

For intermittent torsion:

- Intermittent sharp testicular pain (resolves within seconds to minutes)
- Long periods without symptoms
- Number of occasions it occurred

PHYSICAL FINDINGS

- Temperature usually normal
- Heart rate elevated
- Blood pressure mildly elevated (because of pain)
- Client in acute distress
- Client bent over or unable to walk
- Unilateral scrotal swelling and redness
- Testis acutely tender, may be warm
- Testis swollen and found higher up (retracted) in the scrotal sac than expected on affected side
- Slight elevation of the testis increases or has no effect on pain
- Testis might be lying horizontally (epididymis not posterolateral)
- Hydrocele and scrotal skin erythema may be present (often a later finding)
- Cremasteric reflex (elevation of testis after stroking the upper, inner thigh on the same side) almost always not present

For intermittent torsion, in addition to the above, the following may also be present:

- Very mobile testes
- Bulky spermatic cord

- Normal examination

DIFFERENTIAL DIAGNOSIS

- Epididymitis
- Orchitis
- Trauma
- Hernia
- Hydrocele
- Incarcerated or strangulated inguinal hernia
- Torsion appendix testis
- Acute varicocele
- Testicular tumour
- Scrotal abscess
- Testicular infarction
- Henoch-Schönlein purpura
- Appendicitis

COMPLICATIONS

- Testicular atrophy
- Infarction of testicle
- Infection
- Abnormal spermatogenesis
- Infertility

DIAGNOSTIC TESTS

- Doppler ultrasonography helps distinguish testicular torsion from strangulated hernia, undescended testes or epididymitis
- If testicular torsion is present, a slight elevation of the testis increases pain whereas in epididymitis it relieves pain

MANAGEMENT

Goals of Treatment

- Relieve pain
- Prevent complications

Appropriate Consultation

If you suspect a testicular torsion, initiate a consultation with a physician/nurse practitioner **immediately**. This is a medical emergency; prompt diagnosis and surgical referral is critical to a satisfactory outcome.

If intermittent torsion is suspected, consult a physician/nurse practitioner.

Nonpharmacologic Interventions

- Nothing by mouth before surgery
- Bed rest
- Promote the patient’s comfort

Adjuvant Therapy

- Start intravenous (IV) therapy with normal saline
- Adjust IV rate according to age and state of hydration

Pharmacologic Interventions

Analgesia:

An opioid analgesic such as morphine may be ordered.

Monitoring and Follow-Up

If intermittent testicular torsion is suspected and the examination was normal, follow up in 7 days (sooner if the pain recurs) and do another complete examination.

Referral

Medevac as soon as possible. This is a surgical emergency.

For those with suspected intermittent testicular torsion, refer to a physician/nurse practitioner as a urology referral is often warranted.

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