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This is a text version of a podcast from Pedscases.com on “Urologic Emergencies.” These podcasts are designed to give medical students an overview of key topics in pediatrics. The audio versions are accessible on iTunes or at www.pedcases.com/podcasts.

Pediatric Urologic Emergencies

Developed by Mark Assmus and Dr. Peter Metcalfe for PedsCases.com.
June 29, 2014.

Hello, my name is Mark Assmus and I am a 3rd year medical student at the University of Alberta. Today I will be discussing 8 key pediatric urologic emergencies.

In this session we will **review the most common urologic emergencies** seen in infancy and childhood, which will be presented from major to mild significance based on both urgency and frequency. Each problem will be supplemented with a brief summary of their presenting signs and symptoms, key differential diagnoses, and an approach to the proper diagnostic work-up leading to appropriate therapeutic management.

To start off with the first high significance emergency I present a diagnosis that should always be at the forefront of the clinicians mind when evaluating an acute scrotal condition: testicular torsion.

The annual incidence of **testicular torsion** in boys younger than 18 years has been reported to be 3.8 per 100,000. These cases can present with sudden onset unilateral scrotal pain that is often associated with nausea. There may be associated trauma, or a prior history of episodes with spontaneous resolution of the pain. On palpation there may be tenderness with the affected testicle riding higher than the contralateral testis with a transverse lie. The absence of a cremasteric reflex is a classic finding that should increase your suspicion of torsion. The differential diagnosis of the acute scrotum includes torsion of the testicular or epididymal appendix, epididymitis/orchitis, incarcerated hernia/hydrocele, trauma, tumor, or vasculitis such as Henoch-Schonlein purpura. Since the treatment of a true testicular torsion requires prompt surgical exploration (significant ischemic damage occurs after 4-8hrs), in cases with a high index of suspicion, immediate surgical exploration should not be delayed for radiographic investigation. In the case where there is a long duration of symptoms (>24 hours) or a decreased clinical suspicion, a color Doppler ultrasonography can be ordered to look for decreased or absent blood flow suggesting the need for further surgical exploration.

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Intraoperatively, the ipsilateral testicle will be identified and the spermatic cord torsion will be released and observed for return of blood flow. If the testis appears salvageable, testicular fixation is performed to prevent any further episodes is performed. If the testis is not salvageable, an orchiectomy is performed. Examination of the contralateral testis is also done and a prophylactic fixation is usually performed. This is because the contralateral testicle is also likely to be anatomically prone to torsion. This anatomic abnormality is referred to as a "bell-clapper" abnormality.

Next we will discuss the infant who presents with **paraphimosis**, which occurs in 1% of uncircumcised males, typically during early adolescence. Paraphimosis occurs when the retracted foreskin cannot be returned back to its normal position resulting in edema and further difficulty returning to its anatomic position. Extreme cases may result in ischemic injury to the glans, but this is very uncommon. Symptoms and signs include a visible band of retracted foreskin tissue proximal to the glans, an extremely swollen foreskin, inability to urinate, penile pain, erythema and tenderness. The differential diagnosis includes: balanitis, posthitis, hair tourniquet and insect bites. Manual reduction of the foreskin with or without local anesthesia (penile block) or surgical dorsal division of the phimotic ring +/- circumcision may be required

Blunt abdominal trauma is very common, and 10% of cases will have renal involvement. Initially the ABC's and extra-renal injuries of the child will be assessed. Following the initial emergency assessment a focused urologic history should include any congenital renal anomalies (UPJ obstruction, solitary kidney or renal ectopia). On physical examination the following symptoms and signs may suggest renal involvement: hematuria, flank pain, flank ecchymoses, flank abrasions, fractured ribs, abdominal distension, abdominal mass or abdominal tenderness. It is important to remember that physical abuse should be on your differential of abdominal injury in a young child. , Hemoglobin and creatinine should be assessed. Infants with gross hematuria and trauma, flank pain, or bladder outlet obstruction need to be assessed immediately with abdominal imaging; often ultrasonography or CT, providing they are hemodynamically stable. Most renal injuries will be successfully managed conservatively with bed rest, blood transfusion as required, and serial measurement of hemoglobin. Immediate surgical intervention with a trauma laparotomy is required for hemodynamic instability, while a slow, persistent drop in hemoglobin can be successfully treated by angioembolization and a persistent or expanding urinoma may benefit from an indwelling stent or nephrostomy tube.

Infants born with a **disorder of sexual differentiation** require emergent, multidisciplinary evaluation before a gender of rearing is assigned. Signs of ambiguous

genitalia include the absence of one or both testicles in what appears to be the scrotum, microphallus sometimes with a proximal urethral opening (hypospadias), cliteromegaly, labial fusion or masses within the fused labia. The differential diagnosis for disorder of sexual differentiation includes hypogonadism, hypopituitarism, congenital adrenal hyperplasia(CAH) and a number of genetic deficiencies such as 5-alpha-reductase or 3-beta-hydroxysteroid dehydrogenase. In the newborn period the child requires consultation with pediatric urology, pediatric endocrinology, and perhaps genetics. Immediate investigations include: karyotype and laboratory evaluation of serum electrolytes, 17-OH progesterone, testosterone, luteinizing hormone and follicle stimulation hormone levels. The first radiologic evaluation should be an ultrasound to assess Mullerian structures and gonads within the inguinal region. It is key to detect CAH in a patient with salt wasting which may be life threatening. If CAH is suspected the infant should not be discharged before the appropriate testing is completed. If the 17-OH progesterone level is elevated, then CAH exists and appropriate management of glucocorticoid, testosterone/estrogen and mineralcorticoid levels should be pursued immediately. In some situations once the genetic sex of the infant is determined and the underlying cause of the ambiguous genitalia is identified, the parents' may have the choice of surgically correcting the genitalia to either female or male, which will have huge social and psychological impacts on the child's future.

A milder pediatric urologic emergency is seen in patients with **nephrolithiasis**. Although nephrolithiasis itself does not represent a surgical emergency certain signs and symptoms can suggest the need for a more acute urologic evaluation. Pediatric patients may not complain of pain to the same degree as adults, and nausea is usually a more prominent complaint. Patients with obstruction of a solitary kidney, UTI, renal insufficiency, immunosuppression, uncontrollable pain or the inability to tolerate oral intake need to all be evaluated emergently. Investigations include CBC, metabolic panel, urinalysis, blood and urine culture and abdominal imaging (renal and bladder US or CT). It is important to detect an infected obstructive ureteral calculus that can result in urosepsis and death. Treatment in the case of urosepsis involves hemodynamic/respiratory and metabolic stabilization along with administration of broad-spectrum IV antibiotics with decompression of the obstructed kidney with either an indwelling stent placed endoscopically or a percutaneous nephrostomy tube placed by the interventional radiologists.

Another mild urologic problem occurs when **antenatal hydronephrosis** is detected on prenatal US screening. In the newborn period, if the renal and bladder ultrasounds demonstrate bilateral hydronephrosis, solitary kidney or thickened bladder wall, the child should be evaluated in hospital. This is especially true in male infants, as a VCUG is required to rule out posterior urethral valves. It is not acceptable to observe voiding and

decide valves are not present, as this could be overflow with very high bladder pressures overcoming the fixed urethral obstruction. The differential diagnosis for antenatal hydronephrosis includes UPJ obstruction, vesicoureteral reflux, ectopic ureter, ureterocele, UVJ obstruction, multicystic dysplastic kidney, or prune belly syndrome.. Common investigations to follow these infants include repeat US, renal scan and VCUG with most of the infants going on to do well without the need for surgical intervention.

The remaining low-significance clinical urologic emergencies are hernia/hydroceles as well as other congenital abnormalities. The reported incidence of pediatric hernias and hydroceles ranges from 1-5% and is one of the most common pediatric urologic finding. Preterm neonates with inguinal hernias should be corrected before they are discharge from the NICU, while infant hernias are corrected semi-urgently.

It is important to pick up on an **incarcerated inguinal hernia**, many of which will require surgical intervention. Signs of an incarcerated hernia are a painful firm bulge in the inguinal or scrotal region, or a fussy child who is unwilling to feed and inconsolably crying. On physical exam the area around the bulge may be edematous, erythematous or discolored. If the infant has no signs of systemic toxicity from a strangulated hernia with intestinal perforation then manual reduction can be attempted. If the infant appears toxic, emergent surgical exploration is an appropriate next step.

Most **hydroceles** are asymptomatic and will resolve on their own early in infancy. One of the signs that differentiate a hydrocele from most hernias is the ability to transilluminate the scrotal swelling with a flashlight. The pathophysiology is the same as a pediatric hernia, and is due to a patent processus vaginalis. However, instead of bowel contents, only abdominal fluid is able to travel back and forth. There is a very high rate of spontaneous correction, so surgical intervention is only considered after 12-24 months of age.

Finally, patients with **major abdominal birth defects** such as bladder or cloacal exstrophy will require admission and immediate surgical planning. Provided the patients anatomy and it is clinically appropriate, most urologists will close a bladder exstrophy in the first week of life. Cloacal exstrophy is associated with many significant defects and closure of the different organ systems is often staged and requires multiple surgical specialties

To summarize, we have highlighted a number of pediatric urologic emergencies that require urgent assessment. Key signs and symptoms of testicular torsion, paraphimosis, renal trauma and congenital adrenal hyperplasia have been outlined. Management and

assessment of milder emergencies like nephrolithiasis, congenital defects, hernia/hydroceles and ANH were also discussed.

References

References available upon request.