

Evaluation and Management of the Pediatric Acute Scrotum for the Pediatrician



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Introduction

The late night call usually comes from the parent. “Doctor, Johnny says his left testicle hurts.” You quickly run through the usual scenarios; could this be torsion, an infection or just torsion of the appendix testis? What about trauma or referred pain? Or is there a more obscure cause? Can I rely on the parent’s history and description? What if it is torsion and I miss it? Do they have to go the hospital or can I see them tomorrow? What if I guess wrong?

Acute scrotal pain is a very common emergency call for the pediatrician and one of the riskiest as well. A missed torsion or delay in diagnosis may contribute to testis loss and is one of the most common sources of lawsuits. It is the third most common claim in closed cases involving children between 12-17 years.

Testicular torsion has many features that make it ripe for medico-legal risk: the need for a very prompt diagnosis, variability in presentation which at the same time shares a strong similarity with several competing common conditions. In addition there is often a delayed presentation, lack of definitive diagnostic tools, and a high psychological toll with loss of a testicle.

We will discuss the evaluation and management of the pediatric patient with an acute scrotum and the role of the pediatrician. Our primary goal is the prevention of the missed torsion.

Epidemiology

Acute scrotum is defined by the typical features of acute testicular pain, scrotal swelling and erythema. Three common conditions; testicular torsion, torsion of the appendix testis and epididymitis, represent the underlying etiology in 90% of patients with an acute scrotum. Testicular torsion represents only 10-20% of patients with an acute scrotum with an incidence of in 1/4000 boys.

In children with testicular torsion, one third will result in orchiectomy. The rate is primarily related to the duration of symptoms and it tends to be higher in young children, less than 9 years old. Despite what may appear initially as a successful rescue, many testes will still go on to exhibit future atrophy.

Other less common causes of an acute scrotum include: trauma, Henoch-Schonlein purpura, leukemia and lymphoma, incarcerated inguinal hernia, tumor, scrotal cellulitis, and idiopathic scrotal edema. (Table 1)

Presentation

The typical presenting symptoms of an acute scrotum include: testicular pain, scrotal swelling or edema, scrotal erythema, nausea, vomiting, and abdominal pain. Pain may be severe and acute in onset or insidious or even resolved at the time of evaluation. Symptoms that are more suggestive of testicular torsion are severe pain, pain less than 24 hours, and nausea and/or vomiting. A slow insidious onset is more suggestive of torsion of the appendix testis. The presence of fever and dysuria are uncommon but when present are much more suggestive of epididymitis than torsion. The degree of erythema or swelling is unreliable as a diagnostic aid to distinguishing torsion.

Evaluation

The evaluation begins with a careful history and physical exam. History should include a detailed description of the onset and characterization of the pain, sudden and severe versus slowly increasing. Is the pain at rest or only when the testis is touched or moved? Is it constant or intermittent? Is it only in the scrotum or does it radiate to the abdomen? And is there anything that relieves the pain, such as lying down or lifting up the scrotum? Attention should be paid to the presence of fever, dysuria, nausea and vomiting, trauma (including minor injuries), and systemic symptoms such as rashes or arthropathies.

Physical examination includes; position and orientation of the testis, testicular size, presence or absence of a cremasteric reflex, location of tenderness, scrotal color and texture, and presence of hernia, hydrocele or blue-dot sign.

Laboratory evaluation can be limited to urinalysis, with culture if suspicious, unless suspect systemic disease.

Imaging has assumed a very significant role in the evaluation of these patients. The mainstay of imaging has become the ultrasound with Doppler, replacing nuclear scintigraphy. It must be kept in mind that the exam is used both to diagnose torsion, absence of flow, as well as to try to exclude torsion, presence of normal flow, and prevent unnecessary exploration.

The sensitivity and specificity for diagnosing torsion is very high with reported rates above 95%. Conversely the color flow Doppler ultrasound has been showed to have outstanding negative predictive value making its use to exclude torsion very reliable. If there is normal intratesticular flow and a low level of clinical suspicion for torsion, surgery can be safely avoided. It is no longer the case that all children with an acute scrotum need exploration. However this is predicated on the ultrasound exam being preformed properly. It is important for the radiologist to document both arterial and venous wave forms from the center of the testis. There are several technical issues that can contribute to misleading results. Ultrasound can be less accurate in infants and very young children where documenting flow in even normal testes can be difficult. The children often are uncooperative adding motion artifact. Lastly, diminished flow should not be considered normal and may still be present in partial torsion that can progress with time.

Thus the best role of the ultrasound is to use normal flow to avoid an exploration in the child where your clinical suspicion of torsion is low. The ultrasound should not prevent you from obtaining surgical consultation in a child where your clinical impression is highly suspicious. A negative exploration is far better than a missed torsion, and is not considered a complication in the setting of an equivocal ultrasound or highly suspicious clinical findings.

Making the diagnosis

When approaching the child with an acute scrotum it is reasonable to start with the idea that this episode represents either testicular torsion, torsion of the appendix testis, or epididymitis as this will encompass over 90% of patients.

True bacterial epididymitis in the pre-pubertal child is quite rare. Most cases of true epididymitis are due to an STI. However there can be clinical situations where children can be at risk of a bacterial infection of the epididymis. Prior to making this diagnosis one would want to be able to identify features of an acute infection, such as fever, pyuria or dysuria. Also one would want to have a reason why this child would have an infection, such as, history of recent instrumentation, prior infections, neurogenic bladder, or history of urethral disease such as stricture or repaired hypospadias. Rare anatomic abnormalities such as an ectopic ureter to the vas can present as epididymitis. Less commonly children have been reported with viral epididymitis or a chemical epididymitis due to urine forced retrograde via the vas. However in general these are diagnoses of exclusion. In the absence of these features one should be very cautious of this diagnosis and avoid the use of unnecessary antibiotics. Frequently the radiologist will interpret the inflammation of the epididymis associated with torsion of the appendix testis as epididymitis leading to children being prescribed antibiotics including those recommended for STIs. This should be avoided.

The real challenge is to differentiate true testicular torsion from torsion of the appendix testis. While the history can be similar, in general the pain with testicular torsion is more likely to be more severe, more acute with the pain being at full force immediately. The pain is also more likely to be continued even at rest and the child just cannot get comfortable. The testis may be high-riding or horizontal in lie and the pain central. Frequently the cremasteric reflex is absent. The scrotum is frequently erythematous and there is often a reactive hydrocele. The testis itself can feel quite hard. There is often a history of a preceding minor trauma though it may also awaken a child from sleep.

In torsion of the appendix testis the pain may be more insidious in onset, they may be comfortable when not touched or moving and on physical exam the testis is more likely to have a normal position and lie, and have a single spot where the pain is most intense in the groove between the head of the epididymis and the upper pole of the testis. The cremasteric reflex is frequently present and occasionally a dark spot, the blue dot sign, can be seen above the testis representing the ischemic appendage. The presence of a cremasteric reflex is reassuring and the finding of a blue dot is pathognomonic for torsion of the appendix testis.

For the majority of patients, if the findings are significant and there is any suspicion of torsion an ultrasound is a very helpful adjunct. If the suspicion is low, the presence of normal intratesticular flow with increased epididymal flow can be used to avoid an exploration. If the suspicion of torsion is high,

and care will not be unduly delayed, the finding of no flow can make it easier to counsel a reluctant parent as to the necessity of an emergency surgery. The presence of flow may cause a reevaluation but should not be used to trump clinical suspicion.

It should be kept in mind that undescended testes can also suffer torsion so groin pain in the setting of an empty hemiscrotum should trigger suspicion that this is a testicular torsion rather than an incarcerated hernia.

The presence of a rash, especially on the legs, or joint swelling should make one consider Henoch-Schonlein purpura.

Other rare causes can usually be suspected by history, such as trauma, ultrasound, such as a tumor, or history such as leukemia or lymphoma.

There has been effort to try to reduce the use of ultrasounds through the use of a clinical predictors. Factors such as absence of a cremasteric reflex, nausea/vomiting, duration of pain <24 hours, high position of the testis and scrotal skin changes have been associated with a higher likelihood of torsion. A scoring system has been reported that awarded two points for testicular swelling, or a hard testis, and one point for either absent cremasteric reflex, nausea/vomiting and high riding testis. The cut off for low risk was 2 and for high risk was 5. Ultrasound was only helpful for those between 2-5 (intermediate risk) which only represented just 20% of patients. Such systems hold the promise of decreasing cost and improving efficiency but they await further validation before they can be fully implemented in clinical practice.

Treatment

For the child with suspected torsion, or where torsion has not been ruled out with a combination of clinical and radiologic features, the treatment is emergent exploration. The likelihood of finding an unsalvageable testis is directly correlated with the time from onset of symptoms. Testicular injury can result from as little as 4 hours of torsion. Within 6 hours most testes can be salvaged. By 12 hours the rate of orchiectomy is 35%, by 24 hours it is 80% and by 36 hours essentially all testes are lost.

Manual detorsion has very little practical role in management. It does not obviate the need for emergent exploration as it is impossible to know if the torsion is completely reversed. Further it obscures the diagnosis if the findings were equivocal or the detorsion was performed before surgical evaluation. The only legitimate role is in a child that is awaiting surgery but there will be an unavoidable delay in getting to the operating room.

Torsion of the appendix testis

Torsion of the appendage does not require any surgical intervention. Patients can simply be treated with an anti-inflammatory, such as an NSAID, and rest. It is important to counsel rest as continued activity can serve to prolong the clinical course.

Intermittent torsion

Intermittent torsion is very difficult to definitively diagnosis except in the setting where an initial ultrasound during a period of symptoms was abnormal and then normalized when the symptoms resolved. When diagnosed definitively or clinically, the treatment is the same as for torsion with the exception of being an elective procedure. Both sides should undergo orchiopexy in a formal fashion.

Epididymitis

When suspected the child can be treated with antibiotics based on their history or suspected pathogen. If no prior history or anatomic explanation, then a work up with renal bladder ultrasound, VCUG and possibly urodynamics should be performed once the acute infection is cleared to rule out an anatomic or neurologic abnormality.

The other rare causes can be treated specifically as called for by their primary disease.

The role of the pediatrician

The management of the pediatric acute scrotum is a team sport. Likewise the consequences of a bad outcome will fall on everyone involved in the child's care. However it can be hard to find the right balance between preventing a missed torsion and not overusing imaging and consultation for every child with any scrotal complaint. The best way to start is to consider any child with significant testicular pain as having torsion until proven otherwise. If torsion cannot be excluded on examination then one should have a low threshold for seeking surgical consultation. If available in your area, a pediatric urologist is typically the most experienced resource, though all competent urologists should be able to appropriately evaluate and treat most children with an acute scrotum.

During normal work hours it is typically appropriate to have the child examined or to examine them yourself prior to obtaining imaging. Many children with a complaint of testicular pain will in fact not have a testicular pathology at all and it will be clear on examination. However in the off hours it can be very difficult to adequately discriminate a true emergency on the phone. In this setting one should have a very low threshold to sending the family to a hospital emergency department. The ED, with it's access to imaging and consultants, is more efficient than an urgent care if in fact it is torsion. Time is always of the essence.

If there is going to be a delay in being able to see the surgeon, often the surgeon will ask you to obtain imaging first before they see the child. This is typically intended to assess the urgency of the situation and streamline their care if they need to be explored. However if there is time, an initial hands-on evaluation by the surgeon is preferred and can often allow the avoidance of an ultrasound.

Parents need to be reminded to not feed the child until a final decision is reached regarding surgery.

Conclusion

Testicular pain is a most common true emergency for the pediatrician. All efforts should be directed to accurately diagnosing and rapidly treating testicular torsion to prevent testicular loss. Fortunately this is the cause in only a minority of the children. Most children will have the more benign torsion of the appendix testis. True epididymitis is a rare event and should have some relevant history.

Most children can be discriminated by their history and physical findings. Ultrasound can be very helpful to confirm your clinical suspicion and guide your treatment decisions. But ultrasound should primarily be considered a tool to avoid surgery in those patients where you clinically suspect they do not have torsion. All children should be considered as torsion until proven otherwise recognizing that not all children present with classic features and even ultrasound can have false negatives. In the end clinical judgment and collaboration with a pediatric urologist is still the best guide.

Table 1

Acute Scrotum: Underlying disease

- Testicular Torsion
- Torsion of the Testicular Appendage
- Epididymitis
- Henoch-Schonlein purpura
- Trauma
- Leukemia and Lymphoma
- Incarcerated inguinal hernia
- Tumor
- Scrotal cellulitis
- Idiopathic scrotal edema.

Suggested Reading

DaJusta DG, Granberg CF, Villanueva C and Baker LA. Contemporary review of testicular torsion: new concepts, emerging technologies and potential therapeutics. J P Urol 9:723-730, 2013

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Altinkilic B, Pilatz A, Weidner W: Detection of normal intratesticular perfusion using color coded duplex sonography obviates need for scrotal exploration in patients with suspected testicular torsion. J Urol 189:1853-1858, 2013.