

JOHNS HOPKINS ALL CHILDREN'S HOSPITAL

Acute Scrotal Pain Clinical Pathway

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This pathway is intended as a guide for physicians, physician assistants, nurse practitioners and other healthcare providers. It should be adapted to the care of specific patient based on the patient's individualized circumstances and the practitioner's professional judgment.

Johns Hopkins All Children's Hospital

Acute Scrotal Pain Clinical Pathway

Rationale:

This clinical pathway was developed by a consensus group of JHACH physicians, advanced practice providers, nurses and pharmacists to standardize the management of children undergoing triage with Acute Scrotal Pain. It addresses the following clinical questions or problems:

1. When to evaluate for testicular torsion
2. When to consider admission for further evaluation and surgical intervention
3. When to consult Pediatric Urology or Pediatric Surgery
4. When to consider ruling out alternative diagnosis

Background:

The spectrum of conditions that affect the scrotum and its contents ranges from incidental findings to pathologic causes that require expeditious diagnosis and treatment (e.g., testicular torsion, testicular cancer). The most common causes of acute scrotal pain in children and adolescents include testicular torsion, torsion of the appendix testis, and epididymitis ([table 1](#)). In one review of 238 consecutive boys, ages 0 to 19 years, who presented with acute scrotal pain to a children's hospital over a two-year period, 16 percent had testicular torsion, 46 percent had torsion of the appendix testis, and 35 percent had epididymitis (Lewis et al., 1995).

Testicular torsion is the most important and potentially serious of the acute processes affecting the scrotal contents because it may result in the loss of the testicle. Intravaginal torsion results from inadequate fixation of the testis to the tunica vaginalis through the gubernaculum testis. The most common abnormality associated with testicular torsion is known as the "bell clapper" deformity where the testicle lacks the normal attachment to the tunica vaginalis (permitting increased mobility) and rests transversely within the scrotum. The bell clapper deformity may be bilateral and predisposes to testicular torsion.

If fixation of the lower pole of the testis to the tunica vaginalis is insufficiently broad-based or absent, the testis may torse (twist) on the spermatic cord. The twisting of the spermatic cord within the tunica vaginalis causes venous compression and subsequent edema of the testicle and cord with ultimate ischemia of the testicle caused by arterial occlusion.

Testicular torsion has two peak incidences: a small one in the neonatal period and a large one during puberty, but it can occur at any age. The incidence is estimated to be 1 in 4000 in males younger than 25 years old. Approximately 65 percent of cases occur in boys between the ages of 12 and 18 years (Bašković et al., 2019). The increased incidence during adolescence is thought to be secondary to the increasing weight of the testes during pubertal development.

Diagnosis

The diagnosis of testicular torsion can be made clinically. Thus, when clinical findings are strongly suggestive for testicular torsion (e.g., acute onset of severe testicular pain in association with nausea or vomiting with findings of absent cremasteric reflex, testicular tenderness with swelling and high-riding or transverse position), the clinician should promptly consult a surgeon with pediatric urologic expertise to evaluate the patient and plan regarding operative exploration and repair.

Observational studies suggest that clinical findings may reliably identify testicular torsion and can be used to make decisions regarding Doppler ultrasound imaging and surgical consultation. A single-institution prospective study of 338 children with an acute scrotum (Barbosa et al., 2013), resulted in the creation of the TWIST (Testicular Workup for Ischemia and Suspected Torsion) score for testicular torsion:

- Nausea or vomiting: 1 point
- Testicular swelling: 2 points
- Hard testis on palpation: 2 points
- High-riding testis: 1 point
- Absent cremasteric reflex: 1 point

During derivation, a score ≥ 5 diagnosed testicular torsion with 76% sensitivity, 100% specificity, and 100% positive predictive value (PPV) (prevalence of torsion, 15% → *what does this mean in this context?*). A score ≤ 2 excluded testicular torsion with a 100% sensitivity, 82% specificity, and a 100% negative predictive value (NPV) (95% CI 98-100 percent → *what does this mean?*). The prediction model had an area under the curve (AUC) for the receiver-operator curve (ROC) of 0.98 (implying a near perfect test performance). Similar results were noted in a retrospective score validation at a different institution evaluating 116 boys for an acute scrotum. Moreover, two subsequent prospective validations of the TWIST score (nearly 400 males assessed) continued to report high discrimination (AUC 0.82 - 0.95). In a study performed in a pediatric tertiary care emergency department, the TWIST score was most accurate in pubertal patients (Tanner stage ≥ 3). (Sheth et al., 2016)

Taken together, these studies support the practice of early surgical consultation for children in whom testicular torsion is strongly suspected based upon history and physical examination rather than imaging (e.g., high TWIST score of ≥ 5). Although TWIST score has demonstrated the ability to predict testicular torsion with a high NPV, further prospective studies are needed before it is exclusively used to diagnose testicular torsion (Bašković et al, 2019).

In most cases, the clinical findings will be equivocal for testicular torsion. In these patients, when available on-site, a color Doppler ultrasound of the scrotum should be obtained and emergency surgical consultation reserved for documented testicular torsion or continued diagnostic uncertainty (e.g., equivocal ultrasound findings). Demonstration of decreased testicular perfusion or twisting of the spermatic cord is consistent with testicular torsion. Decreased testicular perfusion also can be seen in some patients with a large hydrocele, abscess, hematoma, or scrotal hernia. A negative ultrasound (i.e., normal or increased testicular flow) may rarely occur in patients eventually diagnosed with testicular torsion, usually due to spontaneous detorsion and/or partial or intermittent torsion.

The Doppler ultrasound can discern testicular and epididymal size, scrotal fluid, scrotal wall thickening, enlarged appendix testis, twisting of the spermatic cord, and arterial flow in the testis and epididymis. The reported sensitivity and specificity of Doppler ultrasound in the detection of

testicular torsion ranges from 69-100% and 77-100%, respectively. The usefulness of Doppler ultrasound is limited in small prepubertal testes with lower blood flow.

An additional radiographic adjunct, is a nuclear scan which measures testicular perfusion. The reported sensitivity and specificity of scintigraphy are 100% and 97%, respectively. However, a nuclear scan takes several hours to perform and is typically not available quickly enough to permit timely operative detorsion and orchiopexy. For these reasons, Doppler ultrasound has supplanted the nuclear scan as the test of choice for testicular torsion.

Lab tests:

Urinalysis

Urine Culture

GC/Chlamydia

Radiologic studies:

STAT / Testicular Doppler US

Clinical Management

The diagnosis of testicular torsion, whether made clinically or radiographically, requires immediate consultation with a urologist followed by appropriate pain control. The treatment for a torsed testicle that remains viable involves surgical detorsion and fixation (orchiopexy). Orchiectomy is performed if the testicle is nonviable. The viability of a torsed testicle is dependent upon the duration and completeness of torsion. Typical rates of viability according to duration of torsion have been described as follows:

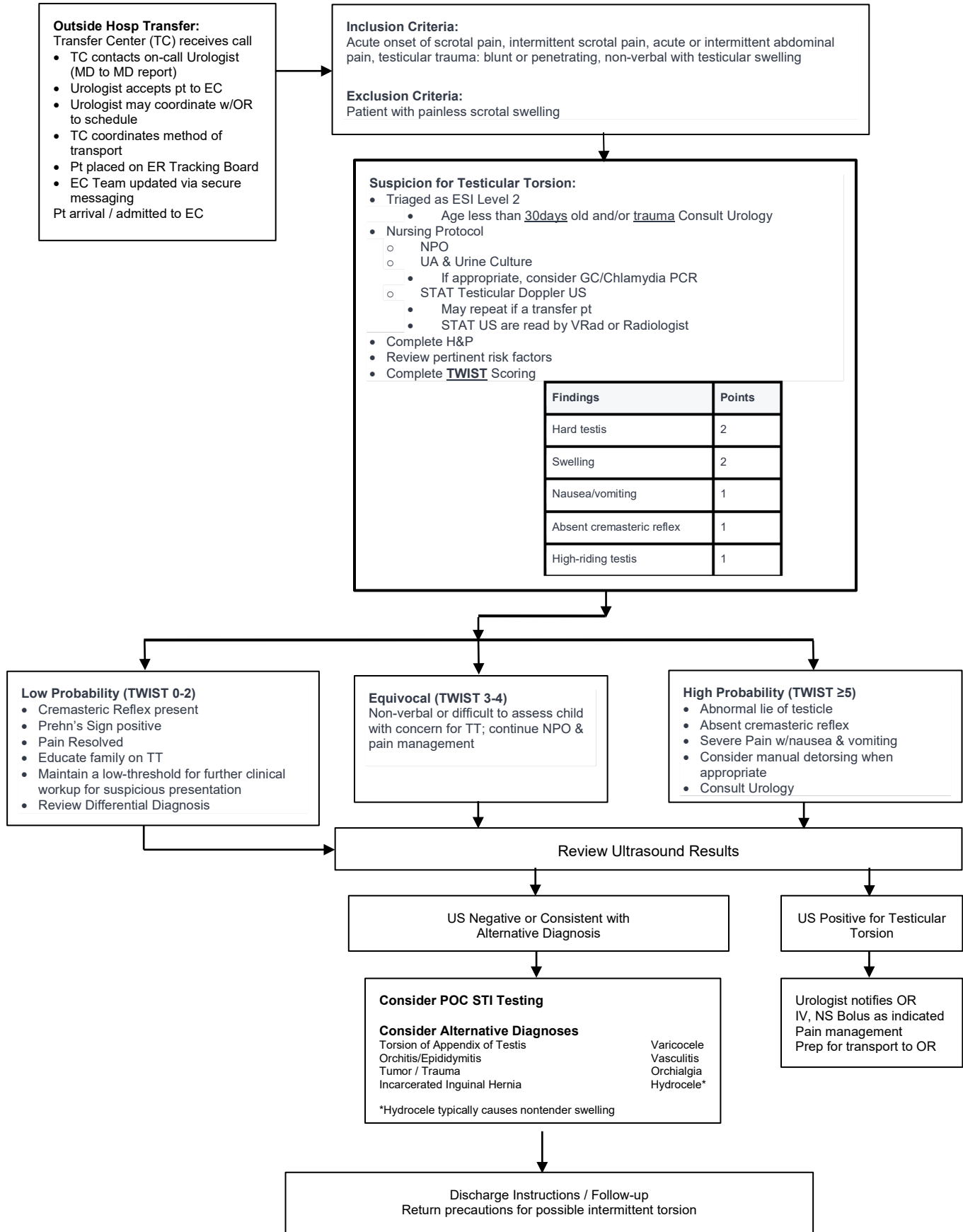
- Detorsion within 4 -6 hours: 97-100% viability
- Detorsion after 12 hours: 20-61% viability
- Detorsion after 24 hours: 0- 24% viability

Surgery should never be delayed on the assumption of nonviability based upon a clinical estimate of duration of torsion. Some patients with a prolonged period of symptoms may have had intermittent torsion or a partial torsion and testicles that are salvageable.

Pharmacologic considerations:

Pain management will be provided at the discretion/guidance of the EC physician.

Johns Hopkins All Children's Hospital Emergency Center Acute Scrotal Pain Clinical Pathway



Emergency Center Management

Patients classically present with an abrupt onset of severe testicular or scrotal pain, usually of less than 12 hours duration. Nearly 90 percent of patients may have associated nausea and vomiting. The pain can be isolated to the scrotum or may radiate to the lower abdomen. The pain is constant unless the testicle is torsing and detorsing. A typical presentation in children is a patient who is awoken with scrotal pain in the middle of the night or in the morning. Many boys report a previous episode of pain. However, a significant minority of males with testicular torsion may present with abdominal pain and not initially report testicular pain. This presentation emphasizes the importance of a complete genitourinary examination in all males with abdominal pain.

On physical examination, the scrotum may be edematous, indurated and erythematous and the affected testis is usually tender, swollen, and slightly elevated because of shortening of the cord from twisting. The testis may be lying horizontally, displacing the epididymis from its normal posterolateral position. A reactive hydrocele may also be present.

The cremasteric reflex (elevation of the testis in response to stroking of the upper inner thigh) is absent in nearly all cases of torsion. However, this also may be absent in boys without torsion, particularly if they are younger than six months.

Prehn reported that elevation of the scrotal contents relieves the pain in patients with epididymitis and aggravates or has no effect on the pain in patients with testicular torsion. However, Prehn sign is not a reliable distinguishing feature between torsion and other diagnoses in children.

Admit to OR

- Admission criteria includes positive results for testicular torsion (Admit to OR) per Urologist.
- If the patient is requiring multiple doses of analgesics and will be admitted, place in observation.

Outcome Measures:

- Time from triage to OR for testicular torsion
 - Appropriate triage of acute scrotal pain
 - Triage to US
 - Triage to Surgical Intervention

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Disclaimer

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Clinical Pathways are intended to assist physicians, physician assistants, nurse practitioners and other health care providers in clinical decision-making by describing a range of generally acceptable approaches for the diagnosis, management, or prevention of specific diseases or conditions. The ultimate judgment regarding care of a particular patient must be made by the physician in light of the individual circumstances presented by the patient.

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Appendix A: Distinguishing Features Of Conditions Associated With Testicular Pain In Children And Adolescents

Fig. 1 - Distinguishing features of conditions associated with testicular pain in children and adolescents*

	Testicular torsion	Torsion of appendage	Acute epididymitis
Historical features			
Peak incidence	Perinatal and puberty	Prepubertal	<2 years and postpubertal
Onset of pain	Usually sudden	Usually sudden	Usually gradual
Duration of pain	Usually <12 hours	Usually >12 hours	Usually >24 hours
Previous episodes	Typical	Unusual	If previous episode
Nausea and vomiting	Common	Uncommon	Uncommon
Fever	Unusual	Unusual	Common
History of trauma	Occasional	Unusual	Unusual
Dysuria or discharge	Rare	Rare	Common
Physical findings			
Suggestive findings	Horizontal lie, high-riding testicle	Palpable nodule "blue dot"	None
Cremasteric reflex	Usually absent	Usually present	Usually present
Tenderness	Testicular initially, then diffuse	Appendage initially, then testis	Epididymis initially, then diffuse
Scrotal erythema or edema	Common >12 hours	Common >12 hours	Common >12 hours
Laboratory tests			
Pyuria	Unusual	Unusual	Common
Positive smear, culture, rapid molecular testing, or NAAT for STD	No	No	Often
Leukocytosis	Common	Uncommon	Common
Imaging			
Color Doppler ultrasound [¶]	Decreased blood flow, spermatic cord knot	Normal or increased	Normal or increased

NAAT: nucleic acid amplification testing; STD: sexually transmitted disease.

* In some boys with scrotal pain, significant overlap in history, physical examination, and diagnostic studies exist. When testicular torsion cannot be excluded, surgical consultation is advised.

¶ Color Doppler ultrasound is the preferred perfusion study.

Adapted from:

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