

JOHNS HOPKINS ALL CHILDREN'S HOSPITAL

Acute Scrotal Pain Clinical Pathway

Johns Hopkins All Children's Hospital

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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.

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Acute Scrotal Pain Clinical Pathway

Rationale:

This clinical pathway was developed by a consensus group of Johns Hopkins All Children's Hospital (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 diagnoses

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 acute process affecting the scrotal contents, as it may result in testicular loss. 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 predispose 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 patients with testes younger than 25 years old. Approximately 65% of cases occur in boys aged 12-18 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 of 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 guide decisions regarding Doppler ultrasound 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%). A score ≤ 2 excluded testicular torsion with a 100% sensitivity, 82% specificity, and a 100% negative predictive value (NPV) (95% CI 98-100%). The prediction model had an area under the curve (AUC) for the receiver-operator curve (ROC) of 0.98 (indicating a near-perfect test performance). Similar results were observed in a retrospective score validation at a different institution, evaluating 116 boys with acute scrotum. Moreover, two subsequent prospective validations of the TWIST score (nearly 400 patients with testes 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 the TWIST score has demonstrated the ability to predict testicular torsion with a high NPV,

further prospective studies are needed before it is used exclusively 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 should be 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 can also 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 detecting testicular torsion range from 69% to 100% and 77% to 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/or orchiopexy. For these reasons, Doppler ultrasound has supplanted the nuclear scan as the test of choice for testicular torsion.

Laboratory Tests:

Obtain urinalysis (UA), urine culture, and Gonorrhea/Chlamydia (GC-CT) testing.

Radiology Studies:

Obtain a STAT testicular Doppler ultrasound (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 viable torsed testicle 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 the duration of torsion. Some patients with prolonged symptoms may have had intermittent or partial torsion, with testicles that are salvageable.

Pharmacologic Considerations:

Pain management should be provided at the discretion/guidance of the Emergency Center (EC) provider.

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Emergency Center Acute Scrotal Pain Clinical Pathway

Outside Hosp Transfer:

Transfer Center (TC) receives call:

- TC contacts on-call Urologist (MD to MD report)
- Urologist accepts patient to EC
- Urologist may coordinate with OR to schedule
- TC coordinates method of transport
- Pt placed on EC Tracking Board
- EC Team updated via secure messaging

Inclusion Criteria:

- Acute onset of scrotal pain
- intermittent scrotal pain
- acute or intermittent abdominal pain
- testicular trauma: blunt or penetrating,
- non-verbal with testicular swelling

Exclusion Criteria:

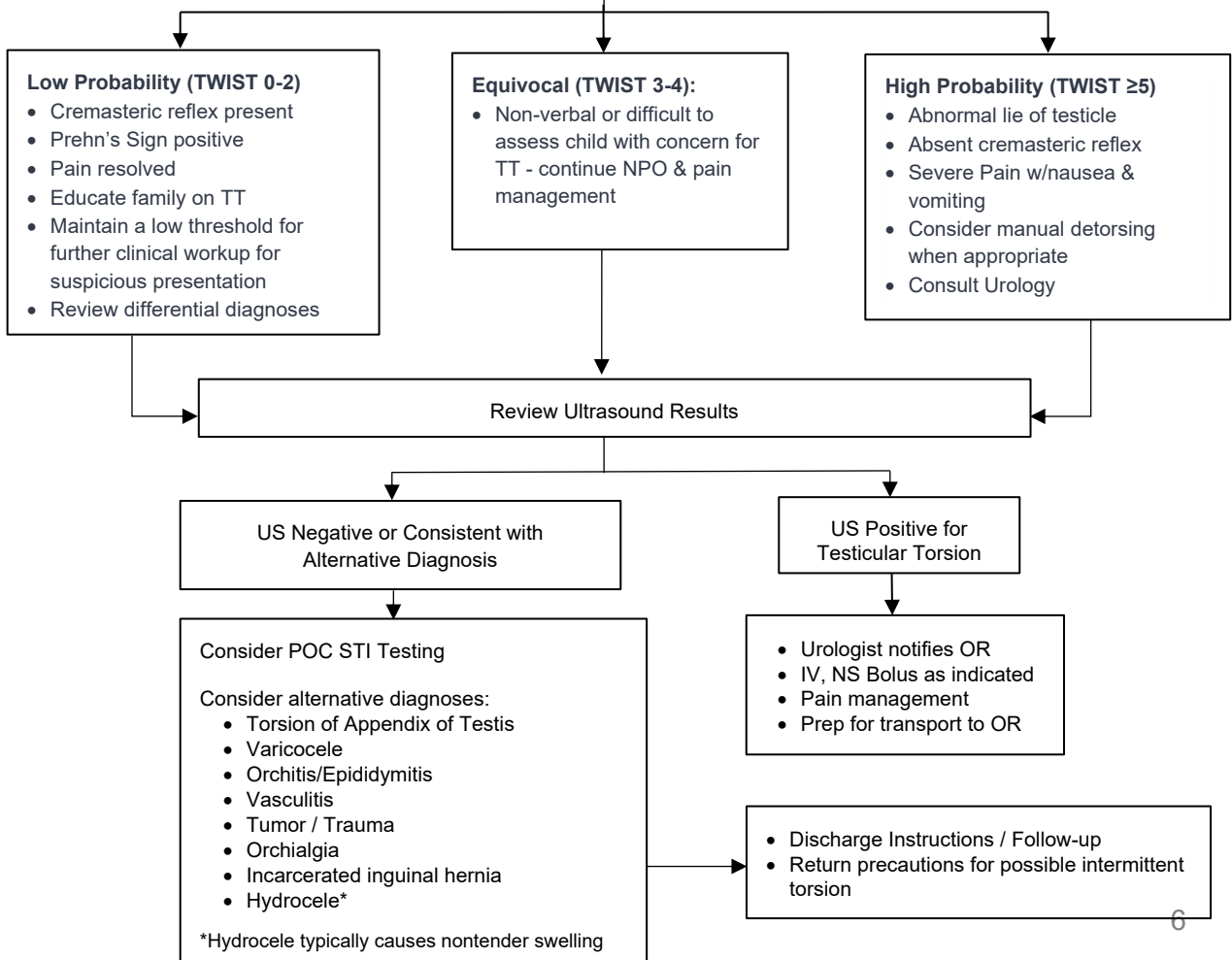
- Patient with painless scrotal swelling

Suspicion for Testicular Torsion:

- Triage as ESI Level 2
 - If age is less than 30 days old and/or trauma, consult Urology
- Nursing Protocol:
 - Place NPO
 - Obtain UA and urine culture
 - If appropriate, consider GC/Chlamydia PCR
 - Order STAT testicular Doppler US
 - May repeat if a transport/transfer patient
 - STAT US is read by VRad or a radiologist
- Complete H&P
- Review pertinent risk factors
- Complete TWIST scoring*

*TWIST Scoring Tool:

Findings	Points
Hard testis	2
Swelling	2
Nausea/vomiting	1
Absent cremasteric reflex	1
High-riding testis	1



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 twisted and detorsed. A typical presentation in children is a patient who is awakened 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 patients 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 patients with testes and 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 may also be absent in patients without torsion, particularly those younger than 6 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, the Prehn sign is not a reliable distinguishing feature between torsion and other diagnoses in children.

Admit to Operating Room (OR):

- Admission criteria include positive results for testicular torsion (*admit to OR*) per the Urologist.
- If the patient requires multiple doses of analgesics and will be admitted, place the patient 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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Acute Scrotal Pain Clinical Pathway
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Disclaimer:

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 diagnosing, managing, or preventing specific diseases or conditions. The ultimate judgment regarding the care of a particular patient must be made by the physician in light of the patient's individual circumstances.

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Appendix A: Distinguishing Features of Conditions Associated with Testicular Pain in Children and Adolescents

Table 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 exists. When testicular torsion cannot be excluded, surgical consultation is advised.

¶ Color Doppler ultrasound is the preferred perfusion study.

Adapted from:

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