# *Testicular Torsion -*
## *Acute Painful Scrotum Guideline*



**Definition:**

Testicular torsion for the purpose of this guideline (which does not include neonatal or extravaginal torsion of the spermatic cord) occurs as an intravaginal rotation (most often medial) of the spermatic cord due to a presumed bell-clapper anatomy of the testis that results in loss of testicular blood flow and ischemia. This occurs predominantly in patients between 12-18 years of age (usual range age 3-20 years). There is a slight left-sided predominance and torsion can occur bilaterally. Torsion of the testis presents with severe pain and testicular tenderness and may be more difficult to diagnose in younger children. The pain is often associated with nausea and vomiting, and physical examination may reveal testicular tenderness, abnormal horizontal lie, higher position in the scrotal sac, scrotal redness or swelling, and absent cremasteric reflex. Prompt surgical intervention, within about **6 hours** of the onset of symptoms, is needed to have the best chance of testicular salvage.

**Incidence/Epidemiology:**

Torsion occurs in about 2 out of 100,000 people per year overall, with an incidence of approximately 10 out of 100,000 children, ages 1-19 years of age per year. Of children presenting to the emergency department with acute scrotal symptoms, approximately 10-15% are diagnosed with testicular torsion. Overall the incidence of testicular torsion is bimodal, with a peak in infancy (neonatal, extravaginal torsion) and adolescence.

**Differential Diagnosis:**

Differential diagnosis for children presenting with scrotal pain includes epididymitis, torsion of a testicular or epididymal appendage, testicular trauma, acute hydrocele, inguinal hernia, testis tumor, and Henoch-Schonlein purpura.

**Guideline Inclusion Criteria:**

Males presenting with scrotal swelling and/or scrotal pain. (Please consider male children that present w/abdominal pain)

**Guideline Exclusion Criteria:**

Infants less than 1 year of age.

**Diagnostic Evaluation:**

- STAT testicular US with doppler, TWIST score, and urinalysis/culture.
- Triage assessment (physical exam)
    - Palpation for the presence (or absence) of the testis and any associated pain
    - Assess the position of the testicle within the scrotum
    - Skin changes (swelling, scrotal wall edema)
    - Color changes
    - Check for the presence or absence of the cremasteric reflex
    - Evaluate for Prehn's sign (positive or negative)
    - Examine the inguinal canal (presence of hernia)
- Triage assessment including questions about testicular pain/redness/swelling with abdominal pain.
    - Timing and duration of signs and symptoms
    - Swelling and/or color changes
    - Pain (onset, duration, location, radiation)
    - Associated Symptoms(nausea, vomiting, dysuria, abdominal pain, fever)
    - Trauma (penetrating, blunt, straddle)
    - Physical Activity
    - History of similar episodes

➢ TWIST[1] (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

**Critical Points of Evidence** *This clinical standard specifically summarizes the evidence in support of or against specific interventions and identifies where evidence is lacking/inconclusive.*

***Evidence Supports*** *provides evidence to support an intervention*

***Ultrasound***

- Doppler ultrasound (DUS) has been considered the standard imaging tool for the assessment of TT with high sensitivity and specificity.[2]
- Using contrast-enhanced ultrasonography to assess the degree of acute testicular torsion: Contrast-enhanced ultrasonography can diagnose testicular torsion with high accuracy and can detect low-velocity blood flow and show microcirculatory blood perfusion in the testicular parenchyma. This

[1] Barbosa, J. A., Tiseo, B. C., Barayan, G. A., Rosman, B. M., Torricelli, F. C. M., Passerotti, C. C., Srougi, M., Retik, A. B., & Nguyen, H. T. (2013). Development and Initial Validation of a Scoring System to Diagnose Testicular Torsion in Children. Journal of Urology, 5, 1859–1864. https://doi.org/10.1016/j.juro.2012.10.056

[2] Abbas, Tariq O, Mohammed Abdelkareem, Abdelrahman Alhadi, Vishwanatha Kini, Prem Chandra, Abdulla Al-Ansari, and Mansour Ali. "Suspected Testicular Torsion in Children: Diagnostic Dilemma and Recommendation for a Lower Threshold for Initiation of Surgical Exploration." Research and reports in urology 10 (2018): 241–249.

can avoid misdiagnosing incomplete testicular torsion as complete, thus averting unnecessary orchiectomy.[3]

- The presence of testicular blood flow by color doppler ultrasonography (CDUS) does not exclude testicular torsion. If testicular blood flow is detected by CDUS, the presence of abnormal testicular findings by physical examination, including testicular swelling, testicular tenderness, abnormal testicular position, and the absence of cremasteric reflex, is highly suspicious of testicular torsion.[4]

***Twist Score***

- The TWIST score could be used as part of a standardized approach for the evaluation of the pediatric acute scrotum to provide more efficient and effective care.[5]
- Implementing a scoring system can promptly guide non-urological and non-physician providers in the timely management of testicular torsion while also facilitating a more objective evaluation based on validated criteria.[8]
- The TWIST score by ED (or non-urologist) assessed before the urology consult proves to be reliable. Patients at low risk do not require US to rule out torsion, while high-risk patients can proceed directly to surgery, potentially bypassing ultrasound in over 50% of cases. ED triage personnel may be able to calculate TWIST score to guide radiological evaluation and immediate surgical intervention at initial assessment long before urological consultation.[6]

***Detorsion***

- The recommendation suggests that detorsion, both manual and ice-packing, can be beneficial between the time of diagnosis and surgery for testicular torsion. However, prompt surgical intervention remains crucial for minimizing gonadal loss, without delaying surgery for diagnostic imaging studies.[7]
- Manual detorsion is considered a potential treatment for testicular torsion outside the neonatal period, with success rates ranging from 68% to 86%. However, caution is advised due to the possibility of torsion occurring in a lateral direction, which may worsen with attempted detorsion. Incomplete untwisting of the cord is also a concern, as torsion may involve multiple revolutions. Therefore, manual detorsion should not replace surgical exploration and fixation. Utilizing ultrasound during manual detorsion is recommended for guidance on the direction of twist and confirmation of successful detorsion.[8]

  Time to Intervention
- Surgery within 6 hours of symptom onset is crucial for maximizing the chance of testicular salvage.[9]

***Evidence Lacking/Inconclusive*** *provides evidence against an intervention*

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[3] Zou B, Zeng F, Yang Y. Using contrast-enhanced ultrasonography to assess the degree of acute testicular torsion: a case series. BMC Med Imaging. 2022 Dec 17;22(1):220. doi: 10.1186/s12880-022-00953-9. PMID: 36528608; PMCID: PMC9759867.

[4] Kikkawa, Kazuro, et al. "Diagnosis of testicular torsion with preserved blood flow detected by color Doppler ultrasonography." Bulletin of the National Research Centre, vol. 47, no. 1, Dec. 2023, p. NA. Gale Academic OneFile, link.gale.com/apps/doc/A771881420/AONE?u=txshracd2598&sid=bookmark-AONE&xid=72bae89b. Accessed 16 Jan. 2024.

[5] Frohlich LC, Paydar-Darian N, Cilento BG Jr, Lee LK. Prospective Validation of Clinical Score for Males Presenting With an Acute Scrotum. Acad Emerg Med. 2017 Dec;24(12):1474-1482. doi: 10.1111/acem.13295. Epub 2017 Oct 16. PMID: 28833896.

[6] Kunj R. Sheth, et all. Diagnosing Testicular Torsion before Urological Consultation and Imaging: Validation of the TWIST Score Journal of Urology Vol 195, 1870-1876, June 2016 http://dx.doi.org/10.1016/j.juro.2016.01.101

[7] Lewis, A., Bukoski, T., Jarvis, P., Waksman, J and Sheldon, C. (1995) Evaluation of Acute Scrotum in the Emergency Department Journal of Pediatric Surgery, vol 30 (2), 277-282

[8] Yin, S. and Trainor, J. (2009). Diagnosis and Management of Testicular Torsion, Torsion of the Appendix Testis, and Epididymitis Clinical Pediatric Medicine 10:38-44 DOI: 10.1016/j.cpem.2009.01.010

[9] Ibid (Lewis, A., Bukoski 1995)

***Time to Intervention***

- Our review of the literature confirms that testicular survival after torsion is quite variable and that significant numbers of testes can survive even after 24 hours or longer of apparent torsion. Although it should be acknowledged that the incidence of testicular atrophy and compromised function will increase with the duration of torsion.[10]
- Testicular survival after a torsion event can be expected after longer periods of torsion than commonly recognized and traditionally taught; longer than 6-8 hours.[11]

***Alternative Diagnostic Tests***

- Alternative diagnostic tests such as nuclear scintigraphy, magnetic resonance imaging, and near-infrared spectroscopy (NIRS) have not demonstrated additional benefits over high-resolution scrotal ultrasound with color Doppler for diagnosing testicular torsion. While NIRS shows promise in providing objective measures of tissue oxygenation, its efficacy in a large population is yet to be demonstrated. Further research is needed to establish the reliability and cost-effectiveness of NIRS in the management of acute scrotum.[12]

***TWIST Score***

- Although the TWIST score has demonstrated the ability to predict testicular torsion with a high negative predictive value (NPV), further prospective studies are needed before it is exclusively used to diagnose testicular torsion.[13]

***Evidence Against*** *indicates insufficient evidence to support or refute an intervention and no conclusion can be drawn from the evidence.*

***Evidence on the use of Doppler US alone***

- The use of Doppler ultrasound alone for diagnosing pediatric testicular torsion is not recommended due to potential limitations, including the possibility of misleading results in the early phase of torsion, dependency on the observer, variability in diagnostic performance based on technology, and the potential for unnecessary delays in critical treatment.[14]

## Practice Recommendations and Clinical Management

**Diagnosis:**

- Testicular torsion should be considered in males who present with scrotal swelling, redness, or pain, and in pre-adolescent or non-verbal males who present with abdominal pain.
- STAT testicular ultrasound with doppler
- Complete history (including TWIST score) physical examination and urinalysis should be obtained for diagnosis

[10] Mellick, Larry Bruce, James E Sinex, Robert W Gibson, and Kim Mears. "A Systematic Review of Testicle Survival Time After a Torsion Event." Pediatric emergency care 35, no. 12 (2019): 821–825.
[11] Ibid Mellick (2019): 821–825.
[12] Barbosa, JA, Denes, FT & Nguyen, H. (2016). Testicular Torsion-Can We Improve the Management of Acute Scrotum. Journal of Urology, vol 195, 1650-1651 http://dx.doi.org/10.1016/j.juro.2016.03.066
[13] Bašković, M., Župančić, B., Vukasović, I., Štimac-Rojtinić, I., & Ježek, D. (2019). Validation of a TWIST Score In Diagnosis of Testicular Torsion – Single-Center Experience. Klinische Pädiatrie, 04, 217–219. https://doi.org/10.1055/a-0826-4885
[14] Ibid. (Barbosa, JA, Denes, F & Nguyen, H., 2016)

**Laboratory Testing**
Urinalysis
Urine Culture

**Imaging**
Testicular ultrasound with doppler study

**Antibiotic Therapy**
Antibiotic therapy is dependent on urinalysis/culture results.

**Surgical Management**
Urgent surgical exploration with detorsion[15] and orchiopexy versus orchiectomy and contralateral orchiopexy.

**Pain Management**
Intravenous pain medication is appropriate before surgical intervention. Postoperative analgesia recommendations provided by the surgeon.

**Consults/Referrals:**
Urology (urgent)

**Admission Criteria**
Monitoring of symptoms and physical examination to confirm diagnosis
Medically complex patient

**Discharge Criteria**
Outpatient surgery discharge criteria

**Follow-Up Care**
Post-operative examination at 2-4 weeks, and visit with testicular ultrasound with doppler study at 6 months post-surgery.

**Prevention**
There are no known measures to prevent torsion of the testis

**Outcome Measures**
Testicular salvage rate versus orchiectomy rate
Testicular size/viability at 6 months follow-up ultrasound with doppler

[15] Lewis, A., Bukoski, T., Jarvis, P., Waksman, J and Sheldon, C. (1995) Evaluation of Acute Scrotum in the Emergency Department Journal of Pediatric Surgery, vol 30 (2), 277-282

## Methods

**Existing External Guidelines/Clinical Pathways**

| Existing External Guideline/Clinical Pathway | Organization and Author | Last Update |
|---|---|---|
| Acute Scrotal Pain Clinical Pathway | HopkinsMedicine.org | 2022 |
| Acute Painful Scrotum | Agilemd.com | 2021 |
| | | |

Any published clinical guidelines have been evaluated for this review using the **AGREE II criteria**. The comparisons of these guidelines are found at the end of this document. **AGREE II criteria** include evaluation of Guideline Scope and Purpose, Stakeholder Involvement, Rigor of Development, Clarity of Presentation, Applicability, and Editorial Independence.

**Review of Relevant Evidence: Search Strategies and Databases Reviewed**

| Search Strategies | Document Strategies Used |
|---|---|
| Search Terms Used: | Testicular Torsion, spermatic cord torsion, testicle torsion, torsed testicle, orchiectomy, orchiopexy |
| Years Searched - All Questions | 2000-2024 |
| Language | English |
| Age of Subjects | 0-18 years old |
| Search Engines | PubMed, Google Scholar |
| EBP Web Sites | https://childrensnational.org/<br>https://texaschildrens.org<br>https://chop.edu |
| Professional Organizations | |
| Joint Commission | |
| Government/State Agencies | None |
| Other | |

**Evidence Found with Searches**

| Check Type of Evidence Found | Summary of Evidence – All Questions |
|---|---|
| X | Systematic Reviews |
| ☐ | Meta-analysis articles |
| ☐ | Randomized Controlled Trials |
| ☐ | Non-randomized studies |
| ☐ | Review articles |
| ☐ | Government/State agency regulations |
| ☐ | Professional organization guidelines, white papers, ect. |

**Evaluating the Quality of the Evidence**

The GRADE criteria were used to evaluate the quality of evidence presented in research articles reviewed during the development of this guideline. The table below defines how the quality of evidence is rated and how a strong versus a weak recommendation is established.

| Recommendation | |
|---|---|
| **Strong** | Desirable effects clearly outweigh undesirable effects or vice versa |
| **Weak** | Desirable effects closely balanced with undesirable effects |
| **Type of Evidence** | |
| **High** | Consistent evidence from well-performed RCTs or exceptionally strong evidence from unbiased observational studies |
| **Moderate** | Evidence from RCTs with important limitations (e.g., inconsistent results, methodological flaws, indirect evidence, or imprecise results) or unusually strong evidence from unbiased observational studies |
| **Low** | Evidence for at least 1 critical outcome from observational studies, from RCTs with serious flaws or indirect evidence |
| **Very Low** | Evidence for at least 1 critical outcome from unsystematic clinical observations or very indirect evidence |

## *References*

Abbas, Tariq O, Mohammed Abdelkareem, Abdelrahman Alhadi, Vishwanatha Kini, Prem Chandra, Abdulla Al-Ansari, and Mansour Ali. "Suspected Testicular Torsion in Children: Diagnostic Dilemma and Recommendation for a Lower Threshold for Initiation of Surgical Exploration." Research and reports in urology 10 (2018): 241–249.

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Barbosa, J. A., Tiseo, B. C., Barayan, G. A., Rosman, B. M., Torricelli, F. C. M., Passerotti, C. C., Srougi, M., Retik, A. B., & Nguyen, H. T. (2013). Development and Initial Validation of a Scoring System to Diagnose Testicular Torsion in Children. Journal of Urology, 5, 1859–1864. https://doi.org/10.1016/j.juro.2012.10.056

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Frohlich LC, Paydar-Darian N, Cilento BG Jr, Lee LK. Prospective Validation of Clinical Score for Males Presenting With an Acute Scrotum. Acad Emerg Med. 2017 Dec;24(12):1474-1482. doi: 10.1111/acem.13295. Epub 2017 Oct 16. PMID: 28833896.

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Kunj R. Sheth, Melise Keays, Gwen M. Grimsby, Candace F. Granberg, Vani S. Menon, Daniel G. DaJusta, Lauren Ostrov, Martinez Hill, Emma Sanchez, David Kuppermann, Clanton B. Harrison, Micah A. Jacobs, Rong Huang, Berk Burgu, Halim Hennes, Bruce J. Schlomer and Linda A. Baker*,† Diagnosing Testicular Torsion before Urological Consultation and Imaging: Validation of the TWIST Score Journal of Urology Vol 195, 1870-1876, June 2016 http://dx.doi.org/10.1016/j.juro.2016.01.101

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# Testicular Torsion Management Pathway

## Evidence Based Outcome Center

**EXCLUSION CRITERIA**

Infants less than 1 year of age

**GUIDELINE INCLUSION CRITERIA**

Males presenting with scrotal swelling and/or scrotal pain.

Patient with painless scrotal swelling

Acute onset of scrotal pain, intermittent scrotal pain, testicular trauma (blunt or penetrating), non-verbal with testicular swelling

Torsion should be considered in males presenting with abdominal pain including triage questions

(may also require a prompt testicular exam)

Suspect Testicular Torsion?

Testicular salvage rates are the highest when surgical intervention occurs within 6 hours of onset of symptoms.

Triage as ESI Level 2
Protocol:
- NPO
- UA and urine culture
- STAT Testicular doppler US – may repeat if a transfer patient

Complete H&P
Review pertinent risk factors
Complete **TWIST Scoring** in Compass❷

**!**
**ALERT**
Patients aged 15 and above with acute emergencies and no comorbidities should be treated at the presenting site unless care capabilities are exceeded.

Review Ultrasound Results

Negative

Positive

**Manual Detorsion**
- US before and after manipulation to document restoration of blood flow
- Patient will still require orchiopexy of both testicles
- Consider manual detorsion in cases with anticipated transport delay

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Consider Alternative Diagnosis
- POC STI Testing
- Torsion of Appendix of Testis
- Orchitis/Epididymitis
- Tumor/Trauma
- Incarcerated Inguinal Hernia
- Varicocele
- Vasculitis
- Orchialgia
- Hydrocele (typically causes non tender swelling)

Consult Urologist Immeditely
- Urology Consult complete within 1 hr of call
- IV,NS Bolus as indicated
- Pain Management
- Prep for transport to OR

Urologist notifies OR
- Taken to OR within 30 min

**Outside Hospital Transfer (patient < 15 years)**
- Communicate with OSH:
  - NPO
  - Bring Disk
  - Urgency of transport
- Upload disk STAT, no radiology read needed if there is a definitive diagnosis
- Patient has a confirmed torsion → ED notifies Urologist by phone (not Voalte)
- No imaging or US equivocal → repeat US → follow algorithm at "Review Ultrasound Results"

Testicular Torsion Review: **TWIST SCORE** (5 variables: Score 0-7 Points)

**Presence of Testicular Swelling** = 2 points
**Presence of Hard Testicle** = 2 points
**Absence of Cremasteric Reflex** = 1 point
**Presence of High Riding Testicle** = 1 point
**Presence of Nausea/Vomiting** = 1 point

TWIST 0-2 Low Risk
- Cremasteric Reflex Present
- Prehn's Sign positive
- Patient denies pain
- Consider alternate diagnosis

TWIST 3-4 Intermediate Risk
- Non-verbal or difficult to assess child with concern for TT – continue NPO and pain management

TWIST ≥ 5 High Risk
- Abnormal lie of testicles
- Absent cremasteric reflex
- Severe pain w/nausea and vomiting
- Consider manual detorsing when appropriate❶
- Consult Urology

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# Testicular Torsion Management Pathway

## Evidence Based Outcome Center

Revision History
Date Approved: 2024
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Revision History: March 2024 – New Guideline published to EBOC site

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