High Risk Emergency Medicine: "Time is Testicle"

Gary W. Tamkin, MD, FACEP
Vice President of Provider Development
Valley Emergency Physicians
Assistant Clinical Professor of Medicine
University of California San Francisco
Acute Scrotal Pain
• Differential Diagnosis
  – Testicular Torsion (~20%)
  – Epididymitis (~35%)
  – Torsion of the testicular appendage (~35%)
  – Orchitis
  – Testicular Tumor
  – Hydrocele
  – Hernia
  – Trauma
Testicular Torsion

• Once thought to be most common cause of scrotal pain (age<30yo)
• Peak incidence: 1yo and puberty
• Average age: 16yrs
• Salvageability: ~50%
Testicular Torsion

• Etiology (90%)
  – “Bell-clapper” deformity
    • Testicle is covered by tunica vaginalis
    • A potential space that encompasses anterior 2/3 of testicle
    • Tunica vaginalis attached to posterior lateral surface of testicle
    • Allows little movement of testicle
    • Inappropriately high fixation of tunica vaginalis
      – Inadequate fixation of the testis to the tunica vaginalis
  – Congenital abnormality 12% of males
    • 40% have same on contra-lateral side
Testicle: Development

- **28th week**: Descent through inguinal canal
- **32nd week**: Testes enters scrotum
  - Obliteration of processus
  - Tunica invests Testis (Except posteriorly)
Testicular Torsion

• Etiology
  – Un-descended testis (10%)
    • Neonatal/Extra-vaginal
    • Majority occur in utero (70%)
      – Increased intrauterine pressure in 3rd trimester
      – Not yet descended, not attached to tunica vaginalis
      – Thus mobility leads to torsion
      – Genetic predisposition
  – Usually detected at new born exam
    • Firm, small testicle
    • Discolored scrotum
Testicular Torsion

• Pathophysiology
  – Obstruction of venous return
  – Thrombosis of vein
  – Arterial thrombosis
  – Degree of Obstruction:
    Degree of Rotation
  – Duration of vascular obstruction
Testicular Torsion

• “Time is Testicle”
  – Detorsion < 6 hrs: 90-100% survival
  – Detorsion > 12 hrs: 20-50% survival
  – Detorsion > 24hrs: 0-10% survival
Testicular Torsion

• Clinical features
  – Acute onset
  – Constant (Unless torsing & detorsing)
  – Nausea & Vomiting (~90%)
  – Occurs during exertion or sleep (50%)
  – Absence of urinary symptoms
Testicular Torsion

- Uncommon Clinical features
  - Slow onset of pain
  - Abdominal pain (20-30%)
  - Fever (16%)
  - Urinary frequency (4%)
  - WBC in urine (30%)
  - Elevated CBC (60%)
Clinical Predictors for Testicular Torsion

- In one study ALL had one or more
  - Nausea or vomiting
  - Pain less than 24 hours
  - High position of the testis
  - Abnormal cremasteric reflex

Intermittent Testicular Torsion

- Severe testicular pain with spontaneous resolution
  - 40% of patients with torsion
  - Horizontal lie of the testicle
  - No damage from sub-acute episodes
Testicular Torsion

• Physical findings
  – Swollen, firm, tender hemiscrotum
    • Left > Right
    • Size of scrotal mass not helpful
    • High riding testis with transverse lie
    • Lack of findings in children
    • Loss of cremasteric reflex
    • No relief with elevation (Prehn sign)
Cremasteric Reflex

- Stroking of inner thigh
  - Results in brisk upward deflection of testicle (0.5cm)
- Twisted muscle dysfunctional
  - Positive Reflex: Unlikely torsion
  - False Positive: Wrinkling of skin
  - False Negative: Lack of reflex
Cremasteric Reflex

• Rosen’s Text Book of Emergency Medicine
  – Absence of the cremasteric reflex was present 100% of patients with torsion and only in 14% of patients with epididymitis., however, if the cremasteric reflex is present it is still possible to have testicular torsion.”

• Tintinelli: “The cremasteric reflex is typically absent”

• American Journal of Emergency Medicine
  May, 2001:
  – Case Report Normal Cremasteric Reflex in Testicular Torsion
Testicular Torsion: “The Diagnostic Workup”

• “Castration by Procrastination”
  – Dr. Doug Lindsay, University of Arizona

• Diagnostic testing ONLY for the EQUIVOCAL Case!
  – Do so after the urologist has been consulted
Testicular Torsion: “The Diagnostic Workup”

• Castration by Procrastination
  – Testicular torsion is a **clinical diagnosis**
  – Imaging studies are usually not necessary
  – Definitive treatment is emergent urologic consultation for surgical management
  – If history and physical suggest testicular torsion: the next step is to the OR
Testicular Torsion: Diagnostics

• Ancillary studies
  • UA: Negative
  • CBC: Negative leukocytosis
Indication for Doppler Ultrasound

- Scrotal pain with **equivocal features**
  - No clinical findings of torsion
  - No history of previous episodes separated by pain free intervals
  - No pathognomonic findings of another diagnosis
  - No clinical diagnosis of epididymitis
  - Scrotal trauma
Evaluation of Acute Scrotal Pain

Perform history and physical examination.

Consistent with torsion AND pain < 6 hours: immediate surgical exploration

Questionable diagnosis OR pain > 6 hours: perform Doppler ultrasonography.

Normal or increased blood flow in symptomatic testis

- Inflammation (orchitis, epididymitis) or torsion of the appendix testis
  - No further testing

Absent or relatively decreased blood flow in symptomatic testis

- Testicular torsion
  - Immediate surgery
Testicular Torsion: Diagnostics

• Color Doppler Ultrasound
  – Sensitivity: ~94%
  – Specificity: ~96%
  – Accuracy: ~96%
  – Positive predictive value: ~89%
  – Negative predictive value: ~98%
Testicular Torsion: Diagnostics

• Color Doppler Ultrasound
  – **False Negatives**
    • Intermittent torsion
    • Early torsion when only venous flow is obstructed
  – **False Positives**
    • Blood flow not detected in smaller prepubescent testicle
Testicular Torsion: Diagnostics

• Color Doppler Ultrasound
  – The detection of Doppler signal in a patient presenting with the clinical features suggestive of testicular torsion does not absolutely exclude torsion
  • Pre-test probability
  • Doppler ultrasound is not 100% sensitive
Testicular Torsion: Diagnostics

- **Radioisotope scan**
  - **Torsion**: Absence of blood flow
  - **Epididymitis**: Hypervascularity
    - Sensitivity: 80-100%
    - Specificity: 89-100%
  - Limited availability
  - Isotope requires time for preparation
  - No anatomic information provided
Testicular Torsion: Definitive Care

• Definitive Surgical Care!
• Testicular Manipulation
  – A “temporizing technique”
  – Attempt while preparing for surgery
  – Earlier presentation: Greater Success
Manual Detorsion of the Testes

• Torsion
  – Internal Rotation: 90%
  – Rotate the testicle outward 180 in medial to lateral direction
  – Average # of twists: (2 X 360)

• Rotation of testes Outward
  – Success (30-80%):
    • Decreased pain
    • Confirm with doppler
    • Continue to OR!
Spermatic Cord Nerve Block

• Prep skin at external ring
• Grasp cord between thumb and forefinger
• Directly inject 10cc of 1% lidocaine
When *not* to believe your Urologist

• “He’s too far out now to do anything about it!”
  – There are no clinical or laboratory parameters to judge accurately the degree or duration of ischemia.
When *not* to believe your Urologist

- “He’s too old to have a torsion!”
When *not* to believe your Urologist

• “It’s bilateral!!: It can’t be a torsion!!
When not to believe your Urologist

- “It can’t be a torsion!!: I fixed it the last time!
Misdiagnosis of Testicular Torsion

Misdiagnosis of Testicular Torsion

  — HSP: Systemic vasculitis can cause scrotal pain

Epididymitis

• Etiology
  – Most common cause of scrotal swelling
    • 600,000 ED visits per year
      – Al Qaida’s “secret weapon”
    – Most common misdiagnosis for testicular torsion
Epididymitis

• Etiology
  – Sexually active men
    • C. trachomatis (75%)
    • N. gonorrhoeae (25%)
      – Retrograde ascent of or urethral pathogens
  – Older/Wiser population
    • E. Coli
      – Underlying urologic pathology
      – GU tract manipulation
Epididymitis

- Clinical features
  - Gradual onset
  - UTI symptoms
  - Average age: 25 years
  - Fever is common: (95%)
    - Average temp: 100.4F (38c)
    - 20% of torsion have low grade fever
Epididymitis

• Physical findings
  – Pain in scrotum and groin
  – Epididymal swelling
  – Epididymis may be indistinguishable from testis
  – Scrotal skin erythematous and warm
  – Phren’s sign (Unreliable)
Epididymitis

• Ancillary testing
  – CBC: Leukocytosis is suggestive
  – UA: Suggestive (50%)
  – Urethral swab
  – Color Doppler Ultrasound: NL
Diagnostic Criteria for Epididymitis

- Gradual onset of pain
- Dysuria, discharge, or recent instrumentation
- History of genitourinary abnormality
  - UTI, neurogenic bladder, hypospadias, etc.
- Fever > 101F (38.3C)
- Tenderness and induration at epididymis
- Abnormal UA (10 WBC or RBC/HPF)
Epididymitis

• Antibacterial Therapy
  – Sexually acquired
    • GC & Chlamydia coverage
      – Ceftriaxone 250mg IM + Doxy 100mg PO BID x 10 days
      – Levaquin 500mg po q day X 10days
  – Older/Wiser men
    – Cover the the urine bugs
    – Levaquin 500mg po q day X 10 days

  » Scrotal support, analgesics
Torsion of Testicular Appendage

- Normal vestigial appendages (~0.3cm)
- Appendages can undergo torsion leading to painful mass (ages 7-12)
- Sxs usually less severe than torsion
- Normal cremasteric reflex
- Transillumination:: blue/black dot
- Ultrasound: lesion of low echogenicity
- Excision Vs. Observation
  - Calcification and degeneration is the rule
## Distinguishing Historical Features

<table>
<thead>
<tr>
<th></th>
<th>Testicular torsion</th>
<th>Torsion of appendage</th>
<th>Acute epididymitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Incidence</td>
<td>Perinatal &amp; puberty</td>
<td>Prepubertal</td>
<td>&lt; 2 years &amp; postpubertal</td>
</tr>
<tr>
<td>Onset of pain</td>
<td>Usually sudden</td>
<td>Usually sudden</td>
<td>Usually gradual</td>
</tr>
<tr>
<td>Duration of pain</td>
<td><strong>Usually&lt;12 hrs</strong></td>
<td>Usually &gt;12 hrs</td>
<td>Usually &gt; 24hrs</td>
</tr>
<tr>
<td>Previous episodes</td>
<td>Typical</td>
<td>Unusual</td>
<td>If previous episode</td>
</tr>
<tr>
<td>Nausea/Vomiting</td>
<td><strong>Common</strong></td>
<td>Uncommon</td>
<td>Uncommon</td>
</tr>
<tr>
<td>Fever</td>
<td>Unusual</td>
<td>Unusual</td>
<td><strong>Common</strong></td>
</tr>
<tr>
<td>History of trauma</td>
<td>Occasional</td>
<td>Unusual</td>
<td>Unusual</td>
</tr>
<tr>
<td>Dysuria/Discharge</td>
<td>Rare</td>
<td>Rare</td>
<td><strong>Common</strong></td>
</tr>
</tbody>
</table>
# Distinguishing Physical Findings

<table>
<thead>
<tr>
<th></th>
<th>Testicular torsion</th>
<th>Torsion of appendage</th>
<th>Acute epididymitis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suggestive Findings</strong></td>
<td>Bell-clapper</td>
<td><strong>Palpable Blue Dot</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>Cremasteric reflex</strong></td>
<td><strong>Usually absent</strong></td>
<td>Usually present</td>
<td>Usually present</td>
</tr>
<tr>
<td><strong>Tenderness</strong></td>
<td>Testicular then diffuse</td>
<td>Appendage then testis</td>
<td>Epididymis then diffuse</td>
</tr>
<tr>
<td><strong>Scrotal erythema/Edema</strong></td>
<td>Common &gt; 12hrs</td>
<td>Common &gt; 12hrs</td>
<td>Common &gt;12hrs</td>
</tr>
</tbody>
</table>
# Distinguishing Laboratory Tests

<table>
<thead>
<tr>
<th></th>
<th>Testicular torsion</th>
<th>Torsion of appendage</th>
<th>Acute epididymitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyuria</td>
<td>Unusual</td>
<td>Unusual</td>
<td>Common</td>
</tr>
<tr>
<td>Positive smear/culture</td>
<td>No</td>
<td>No</td>
<td>Often</td>
</tr>
<tr>
<td>Leukocytosis</td>
<td>Common</td>
<td>Uncommon</td>
<td>Common</td>
</tr>
</tbody>
</table>
# Distinguishing Laboratory Tests

<table>
<thead>
<tr>
<th></th>
<th>Testicular torsion</th>
<th>Torsion of appendage</th>
<th>Acute epididymitis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Color Doppler</strong></td>
<td><strong>Decreased</strong></td>
<td>Normal or Increased</td>
<td>Normal or Increased</td>
</tr>
<tr>
<td><strong>Radionuclide</strong></td>
<td><strong>Decreased</strong></td>
<td>Normal or Increased</td>
<td>Normal or Increased</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Orchitis

• Infection involving testicle only
  – Rare w/out preceding epididymitis
  – Bacterial/ Viral

• Mumps
  – 20-30% of post-pubertal boys with mumps
    » Testicular pain 4-6 days S/p psrotitis
    » Unilateral (70%)
    » Supportive therapy w/resolution 4-5 days
    » Atrophy (50%) / Infertility (30%)
Testicular Tumor

- Most common malignancy in young males
- Painless/Gradual onset
  - Sudden pain due to hemorrhage (10%)
  - Intra-testicular mass
  - UA: NEG.
  - Misdiagnosed as Epididymitis (6-16%)
Variocele

• Common cause of painless swelling
• Poor drainage of pampiniform plexus
• Dilated veins superior and posterior
• Conservative therapy
Hydrocele

• Cystic scrotal mass (Painless)

• Fluid in the tunica vaginalis of the testis
  – Patent processus vaginalis
  – Communication with peritoneal cavity

• Reducible

• Increased in the day: Decreased W/ recumbency

• Transilluminate

• Children: Spontaneous Resolution

• Adults: Surgical Correction
Inguinal Hernia

• Failure of Processus to obliterate
• Present as scrotal mass
  – Non-painful fullness in inguinal area
  – Exam reveals testis separate from hernia
  – Some transilluminate
• Incarceration needs to be ruled out
  – 5-10%
  – Should be easily reducible
  – Inguinal herniopathy
Differential diagnosis of painless scrotal mass in children

<table>
<thead>
<tr>
<th>Mass</th>
<th>Palpation</th>
<th>Transilluminates</th>
<th>Increased with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumor</td>
<td>Firm</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Varicocele</td>
<td>Fluid-filled</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Noncommunicating hydrocele</td>
<td>Fluid-filled</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Spermatocele</td>
<td>Fluid-filled</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Trauma

- Contusion of scrotum
- Fracture/Rupture of testicle
- Hx. Of trauma to the testicle may be present in torsion (~20%)
  - Pain should not last greater than one hour
- Imaging to rule out torsion
How do smart people miss testicular Torsion?

–(AKA: We all have Doppler ultrasound!)
Missed Testicular Torsion: Case #1 1998

- 16yo male to ED with left groin, flank, testicle pain
- Mom states, “I think he has testicular torsion”
- No swelling or abnormality of testicle noted
- Kidney stone dxed
- Family refuses IVP
- Patient medicated with MSO4 4mg and D/Ced
- F/U with your PCP
Missed Testicular Torsion: Case #1
1998

• Patient sues for failure to diagnose & failure to provide adequate discharge instructions
• ED MD denies liability & states DC instructions were adequate.
  – The patient was at fault for not returning as instructed
• Hospital dismissed: Jury finds doc guilty
  – Awards $150,000.00, reduced to $105,000.00
Missed Testicular Torsion: Case #1
1998

• **Take Home Messages:**
  – Believe the patient: Go the extra mile
  – Beware the kidney stone DX in missed torsion
  – Don’t do out-patient work ups of acute scrotum
  – Examine your computerized D/C instructions carefully
  – Cross your T’s, Dot your I’s when it comes to AMAs

Missed Testicular Torsion: Case #2

1998

• Teenager to ED with severe abdominal pain
• ED dx of appendicitis
• Surgeon with questionable exam
• Pt. to ED with negative lap for appy
  – “small indentation over right testicle” noted
    • Thought to be small hernia that could be repaired later
• Increased pain & swelling over next several days
  – Multiple calls to surgeon’s office
  – Multiple increases in pain meds for post op pain
  – Never reevaluated by surgeon during this time
Missed Testicular Torsion: Case #2 1998

- Patient presents to ED and DX of Necrotic Testicle
- Family sues surgeon
  - Negligence for never having done testicular exam
- Surgeon argues:
  - Testicular exam was done when mother not present
  - It was normal, just not documented.....
- The mother dies during litigation!
- Jury finds in favor of the surgeon!
Missed Testicular Torsion: Case #2
1998

• Next Day: Pt’s testicle purple & swollen
• Pt. sees PCP the day after that
• PCP suspects testicular torsion
• PCP arranges for urology apt. for later that day
• Urologist considers Torsion vs. Epididymitis
• Urologist treats for Epididymitis (too late if torsion)
• Eventually D/Xed with torsion
• Testicle removed four days later
Missed Testicular Torsion: Case #2
1998

• **Take Home Message:**
  – You can’t predict this shit!
  – Unbelievable they found physician not guilty!
    • No exam documented
    • No search for cause of pain after negative lap
    • Multiple calls should have prompted re-evaluation
  – Get an Experienced Mal Attorney!
  – Always address testicle in young male with abd. Pain
    • Appy
    • Nephrolithiasis
Missed Testicular Torsion: Case #3 2005

• 3yo male to ED by mother for swollen testicle
• ED doc notes normal exam
  – “Return if condition worsens”
• Mother goes to urgent care next day
  – This UC doc notes swollen testicle
  – Discharges with urology follow up later that day
• Mother returns back to first ED for 3rd visit!
  – Patient unable to walk
  – Pt. Dxed with necrotic testicle
Missed Testicular Torsion: Case #3 2005

• Family sues (Slam dunk! – right?)

• 1st ED doc argues pt had documented normal exam.
  – Must have been intermittent torsion

• Clinic doc argues he advised mother to be immediately transferred back to ED
  – But she refused
  – Clinic doc also argues testicle was already dead at time of his exam....

• Jury rules in favor of the physicians!
Missed Testicular Torsion: Case #3

2005

• **Take home messages:**
  – You can’t predict this shit!
    • Males < age 16yo with testicle complaint have torsion until proven otherwise
    • First physician likely had excellent documentation
    • Don’t do “out-patient” work ups of acute scrotum
    • Don’t forget the “Intermittent Torsion Defense”
      – Follow up for this visit was still less than ideal
    • Don’t forget the “Testicle was already Dead Defense”
Missed Testicular Torsion: Case #4 1995

• 12 yo presents to ED with swollen testicle & penis
• PA diagnoses groin strain
• Returns 2 days later W/ increased pain & swelling
• ED MD Dx testicular torsion
• Necrotic testicle removed that day
• Patient sues for failure to diagnose
Missed Testicular Torsion: Case #4 1995

• Crazy defense: torsed, detorsed, torsed again
• Arbitration awards $175,000.00
• Take Home Message:
  – Testicular pain appropriate PA case?
  – Admit mistake and settle

Missed Testicular Torsion: Case #5 2007

- 12 yo to pediatrician with complaints of L groin pain
- Reports pain S/P sliding into home base 6 days prior
- Pediatrician reports blood in scrotal sac
- Differential DX: Trauma vs. Torsion
- Pt. sent to ED
- Documentation reveals large left testicle
- No documentation of ecchymosis or actual swelling
Missed Testicular Torsion: Case #5
2007

- Ultrasound report:
  - “Testicular contusion with interstitial edema, a left epididymal head cyst, and a left hydrocele. The left testis showed vascularity but was slight decreased in the left upper pole”
  - Findings discussed with urologist.
  - Pt. D/Ced home with F/U follow-up ultrasound 2 weeks
  - Pt. returns to pediatrician 4 days later with firm painful left hemiscrotum
  - Pt. sent back to same ED
  - Necrotic Left testicle found and removed
Missed Testicular Torsion: Case #5 2007

- Patient sues and alleges negligence
- Failure to diagnose torsion at first visit
- All defendants and hospital deny negligence
- $662,500.00 settlement reached

**Take Home Message:**
- Hx. of trauma can be a “red herring”
- Castration by imaging
- Tamkin’s dictum:
  *“Testicular flow is either normal or NOT!”*
  
Missed Testicular Torsion: Case #6 2003

• Teenager brought to ED with severe groin pain
• ED nurse informed of prior history of testicular torsion
• Pt. evaluated 3.5 hours after arrival to ED
• Testicle found to be necrotic & required removal
• Patient sued: Delay in treatment lead to loss of testicle
• $200,000.00 settlement was reached
• Take Home Message:
  – “Time is Testicle!”
  – “Failure of Timely diagnosis and treatment”
Causes of Testicular Loss

– Delay in seeking care (58%)
– Incorrect initial diagnosis (29%)
– Delay in treatment at referral hospital (13%)
Take Home Messages

• Patients with scrotal pain less than the age of 16 have torsion until PROVEN otherwise.
• Patients greater than 18yo with testicular pain more commonly have epididymitis
• Testicular torsion tends to be acute in onset
• Scrotal pain with nausea & vomiting is specific for torsion
• Patients with epididymitis tend to be gradual in onset and accompanied by fever
Take Home Messages

• Beware of Uncommon Clinical Presentation of Testicular Torsion
  – Slow onset of pain
  – Abdominal pain (20-30%)
  – Fever (16%)
  – Urinary frequency (4%)
  – WBC in urine (30%)
  – Elevated CBC (60%)
Take Home Messages

• Patients with clinically suspected testicular torsion need to go directly to the OR
• Don’t let your urologist talk you out of diagnosis
• DON’T rely on “cute physical exam findings” (prhen sign, cremasteric reflex) to “rule out” testicular torsion
• Torsion of the testicular appendage is common and once diagnosed can be managed conservatively
Take Home Messages

• When the diagnosis is unclear, color doppler ultrasound is the diagnostic test of choice
• You either have a “normal” testicular ultrasound or you don’t

• “Time is testicle”
Thank You!