

CANADIAN UNDERGRADUATE UROLOGY CURRICULUM



Scrotal Conditions

A Message from CanUUC

This educational material is intended to supplement medical student knowledge on urological health and medical practices. We are committed to promoting inclusion across all our materials. We acknowledge that some language used within this content may include terminology from source materials and research studies, which has been maintained to reflect the scientific context in which information was gathered.

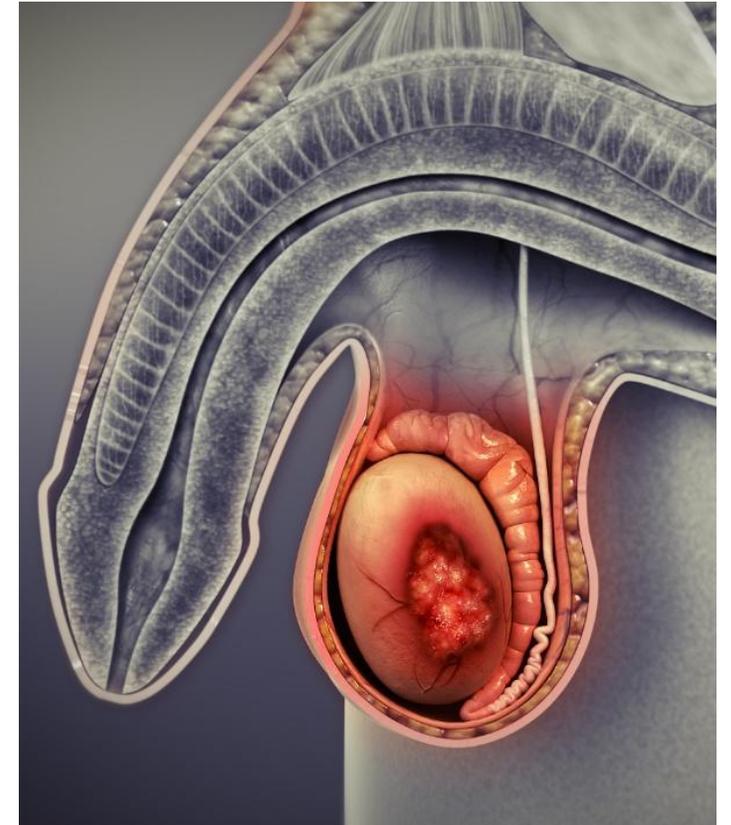
Wherever possible, we aim to use language that is respectful of all individuals, recognizing gender diversity, variations in sex characteristics, and the importance of inclusive terminology.

Objectives

1. List the differential diagnosis of a painful and painless scrotal mass.
2. Describe the important aspects of the history and physical examination that narrow down the differential diagnosis of a scrotal mass.
3. Outline the investigation of a scrotal mass (depending on patient presentation)
4. Recognize the clinical features that warrant urgent urological consultation for a patient presenting with a scrotal condition.
5. Discuss the management options for patients presenting with the following scrotal conditions: hydrocele, spermatocele, varicocele, epididymitis, testicular torsion, torsion of appendage, testicular cancer and Fournier's gangrene.

Scrotal Lesions: Why Bother?

- Common conditions: ~15% of males
- Patients tend to present later in the disease process
- Some lesions potentially life threatening
 - Testicular cancer
 - Fournier's gangrene



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Scrotal Lesions: Classification

1. Cutaneous (external) lesions

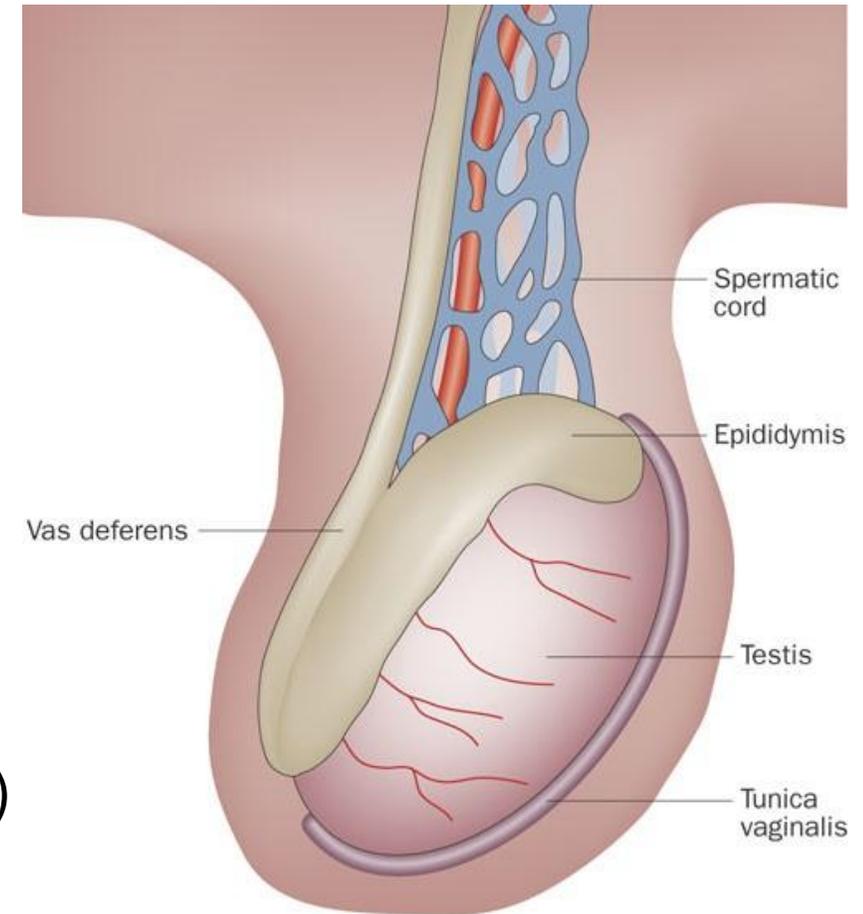
2. Intra-scrotal lesions

a) Extra-testicular (mostly benign – 75%)

- Epididymitis
- Epididymal cysts
- Spermatoceles
- Hydroceles
- Varicocele
- Adenomatoid tumors

b) Intra-testicular (high risk of malignancy – 90%)

- Primary germ cell tumors
- Malignant lymphoma



Cutaneous Lesions

Cutaneous Scrotal Lesions

Benign

- Angiokeratoma
- Psoriasis
- Epidermal cysts
- Vitiligo

Malignant

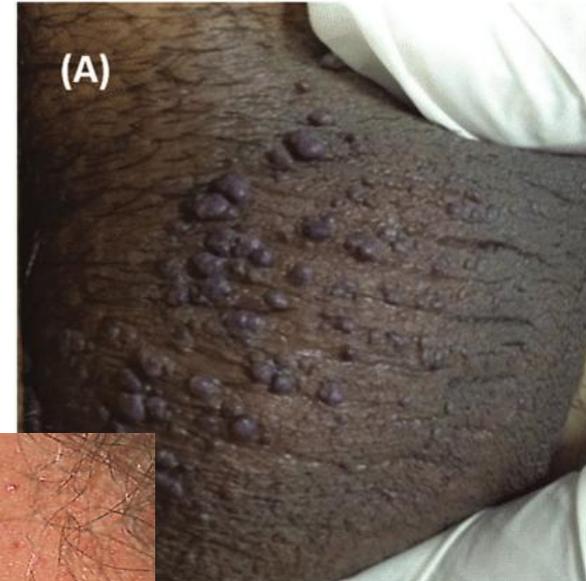
- Squamous cell carcinoma
- Kaposi's sarcoma

Infectious

- Condyloma
- STIs
- Tinea cruris
- Fournier's gangrene

Benign Cutaneous Lesions: Angiokeratoma

- Ectatic dermal blood vessels
- 1-2mm papules
- Benign
- May bleed recurrently & profusely requiring cauterization



Benign Cutaneous Lesions: Psoriasis

- May involve groin & scrotum
- Different characteristics with different skin tones
 - Red plaques with white scales
 - Salmon-colored or reddish-brown with silvery or grayish scale
 - Purple, violet, or dark brown plaques with thick, grayish scales
- Treatment:
 - Topical steroids
 - Emollients
 - Systemic
 - Psoralen + Ultraviolet A (PUVA)



Mallawaarachchi, K. (2021). Psoriasis. In: Ranawaka, R.R., Kannangara, A.P., Karawita, A. (eds) Atlas of Dermatoses in Pigmented Skin. Springer, Singapore. https://doi.org/10.1007/978-981-15-5483-4_5

Benign Cutaneous Lesions: Epidermal Cysts

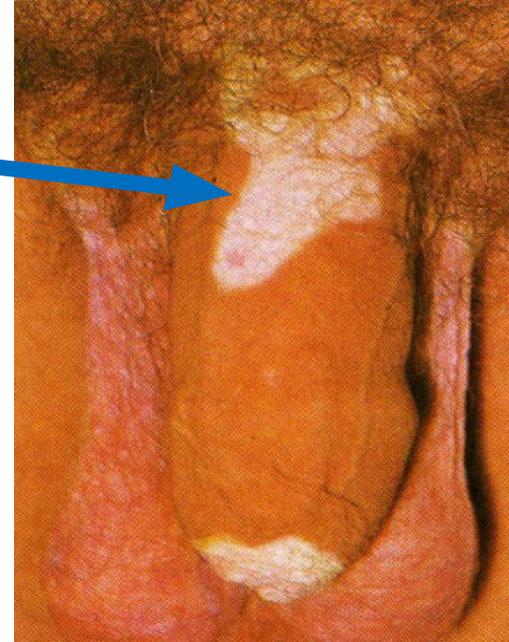
- Very common & benign
- Prone to recurrence
- Local resection if symptomatic/painful



https://assets.cureus.com/uploads/case_report/pdf/156442/20230627-12141-cylce7.pdf

Benign Cutaneous Lesions: Vitiligo

- ~1% of population
- Skin depigmentation
- Genitals commonly involved
- May regress spontaneously



Treatment:

- Reassurance
- UV light
- Corticosteroids PRN

Malignant Cutaneous Lesions: Squamous Cell Carcinoma

Risk Factors / Etiology

- Chronic UV exposure or industrial carcinogen exposure
- HPV infection (especially anogenital lesions)
- Smoking
- Uncircumcised foreskin
- Poor hygiene / chronic inflammation

Clinical Features

- Chronic, enlarging ulcerative or exophytic lesion
- May bleed, crust, or become painful
- Delayed presentation is common

Management

- Wide local excision with margin control

Outcomes / Complications

- Survival strongly linked to extent of nodal disease



Malignant Cutaneous Lesions: Kaposi's Sarcoma

- Increasing in incidence
- Lesions are violaceous or light brown in colour
- Associated with HIV-1
- **3% of males with AIDS will initially present with genital Kaposi's**
- Treatment if irritating or cosmetically bothersome
 - Intralesional chemotherapeutics
 - Local excision



Malignant Cutaneous Lesions: Kaposi's Sarcoma



1) Amerson, Erin & Maurer, Toby. (2009). Dermatologic manifestations of HIV in Africa. Topics in HIV medicine : a publication of the International AIDS Society, USA. 18. 16-22.

2) Tela, Usman & Ibrahim, Ahmed & adamu, sadiq & Goni, Baba & Musa, Alhaji Bukar & Waziri, Abdulmalik. (2014). Localised Primary Kaposi's sarcoma Of the Scrotum: A Rare Presentation.. IOSR Journal of Dental and Medical Sciences. 13. 83-85. 10.9790/0853-13328385.

3) Duprez, Renan & Lacoste, Vincent & Brière, Josette & Couppié, Pierre & Frances, Camille & Sainte-Marie, Dominique & Kassa-Kelembho, Eric & Lando, Marie-Jeanne & Jean louis, Essame & Nkegoum, Blaise & Hbid, Oumkaltoum & Mahé, A. & Lebbé, Celeste & Tortevoeye, Patricia & Huerre, Michel & Gessain, Antoine. (2007). Evidence for a Multiclonal Origin of Multicentric Advanced Lesions of Kaposi Sarcoma. Journal of the National Cancer Institute. 99. 1086-94. 10.1093/inci/dim045

Infective Cutaneous Lesions: Condyloma

- Caused by human papilloma virus (HPV6 & 11)
- Papillary, cauliflower-like proliferations
- Treating symptomatic lesions:
 - Podophyllin
 - Imiquimod (Aldara™)
 - Cautery/liquid N2
 - Laser ablation
- Cannot be cured of the underlying viral infection



Infective Cutaneous Lesions: Tinea Cruris

- Dermatophyte (fungal) infection – “jock itch”
- Causative agent (*Trichophyton* sp.)
- Hyperpigmented (chronic) area within the inguinal folds
- Treated with topical antifungals & local skin care (preventing maceration)



Infective Cutaneous Lesions: Fournier's Gangrene

- Rapidly progressive, life-threatening soft tissue infection involving the deep subcutaneous tissue and fascia
- Medical/surgical emergency
 - Requires immediate recognition and treatment**
- Early key feature:
 - Severe pain out of proportion to exam findings**
(may precede obvious skin changes)
- Management
 - Urgent surgical exploration + extensive debridement
 - Broad-spectrum IV antibiotics
 - Supportive care (resuscitation, ICU as needed)



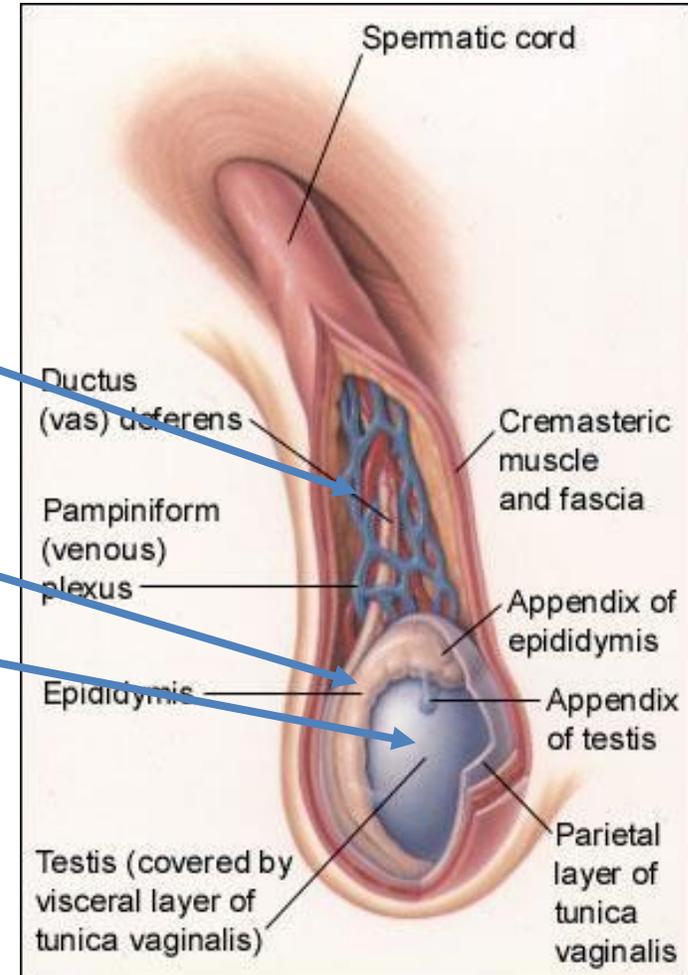
Extra-Testicular Lesions

Scrotal and Testicular Anatomy

Spermatic Cord

Epididymis

Testicles/Testes



Scrotal Lesions: Extra-testicular

Benign (non-neoplastic)

- Hydrocele
- Spermatocele
- Epididymitis
- Torsion of Testicular Appendage
- Testicular Torsion
- Varicocele
- Hernia

Neoplastic (rare):

- Sarcoma
- Adenomatoid tumour, etc.

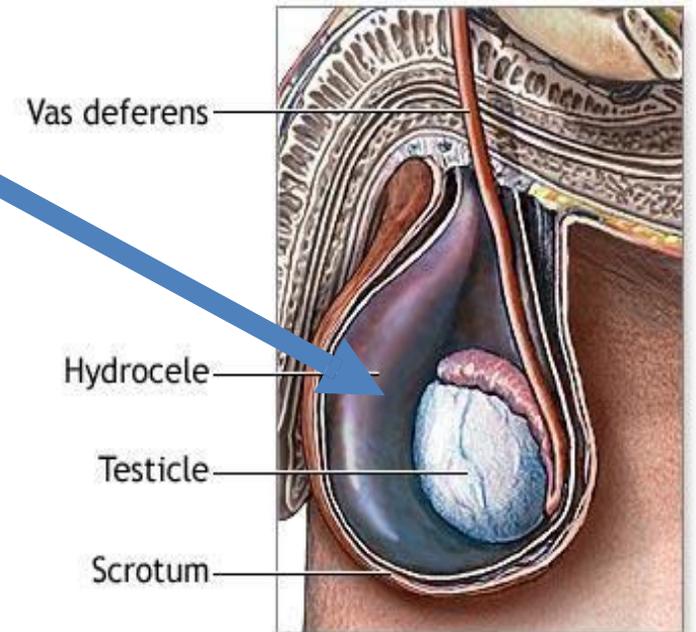
Scrotal Lesions: Clinical Questions

Clinical Questions:

- 1) What is the patient's age?
- 2) Is the onset acute or chronic?
- 3) Is it painful?
- 4) Is it intra- or extra-testicular?
- 5) Does it transilluminate?
- 6) Are there urinalysis findings?

Scrotal Lesions: Hydrocele

- Very common benign scrotal mass
- 1% of all males
- A collection of serous fluid between the two layers of the tunica vaginalis
- Etiology
 - Increased production or decreased absorption of fluid by scrotal lymphatics



Hydrocele: Clinical Questions

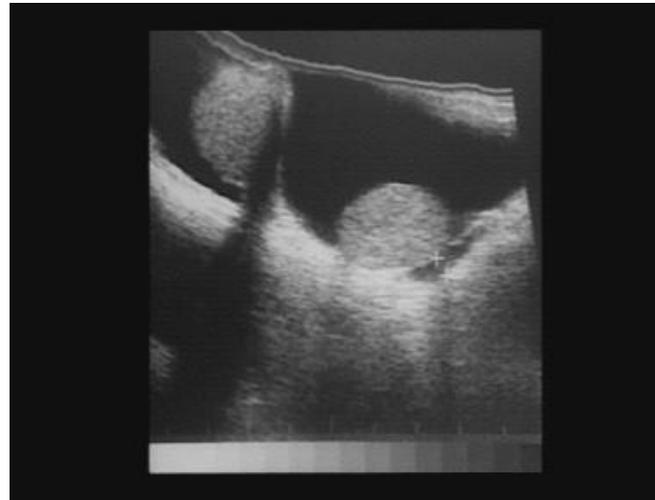
- | | |
|--|---------------------|
| <input type="checkbox"/> Age? | <1 years, >40 years |
| <input type="checkbox"/> Acute or Chronic? | Chronic (usually) |
| <input type="checkbox"/> Painful? | No |
| <input type="checkbox"/> Transilluminates? | Yes |
| <input type="checkbox"/> Intra-Testicular? | No, surrounding |
| <input type="checkbox"/> Urinalysis | Normal |

Hydrocele: Transillumination



Hydrocele: Ultrasound

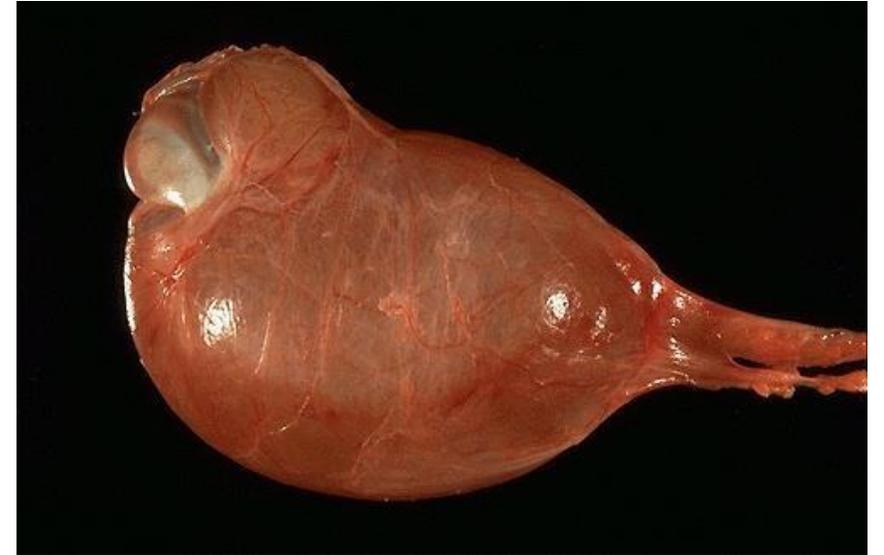
- Ultrasound required if unable to palpate testicle on exam
- Rule out underlying testicular neoplasm
- Aspiration rarely curative



Hydrocele: Treatment

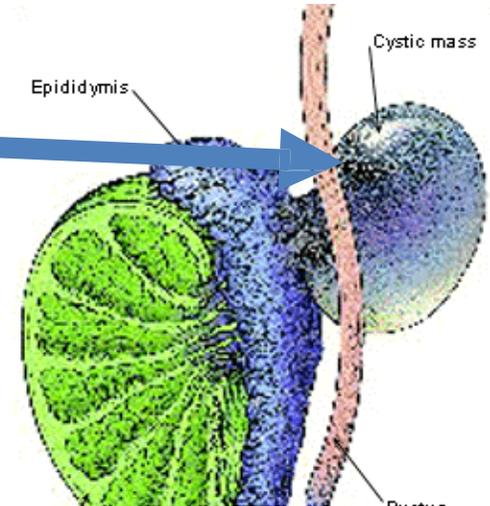
Surgical excision required if:

- Large & bothersome
- Socially embarrassing
- Uncomfortable



Scrotal Lesions: Spermatocele

- A sperm-containing cyst arising from the head of the epididymis
- Caused by ductal obstruction
 - Traumatic
 - Inflammatory
 - Idiopathic
- Lesion is usually discrete from the testicle (superior)
- Excise if large & bothersome

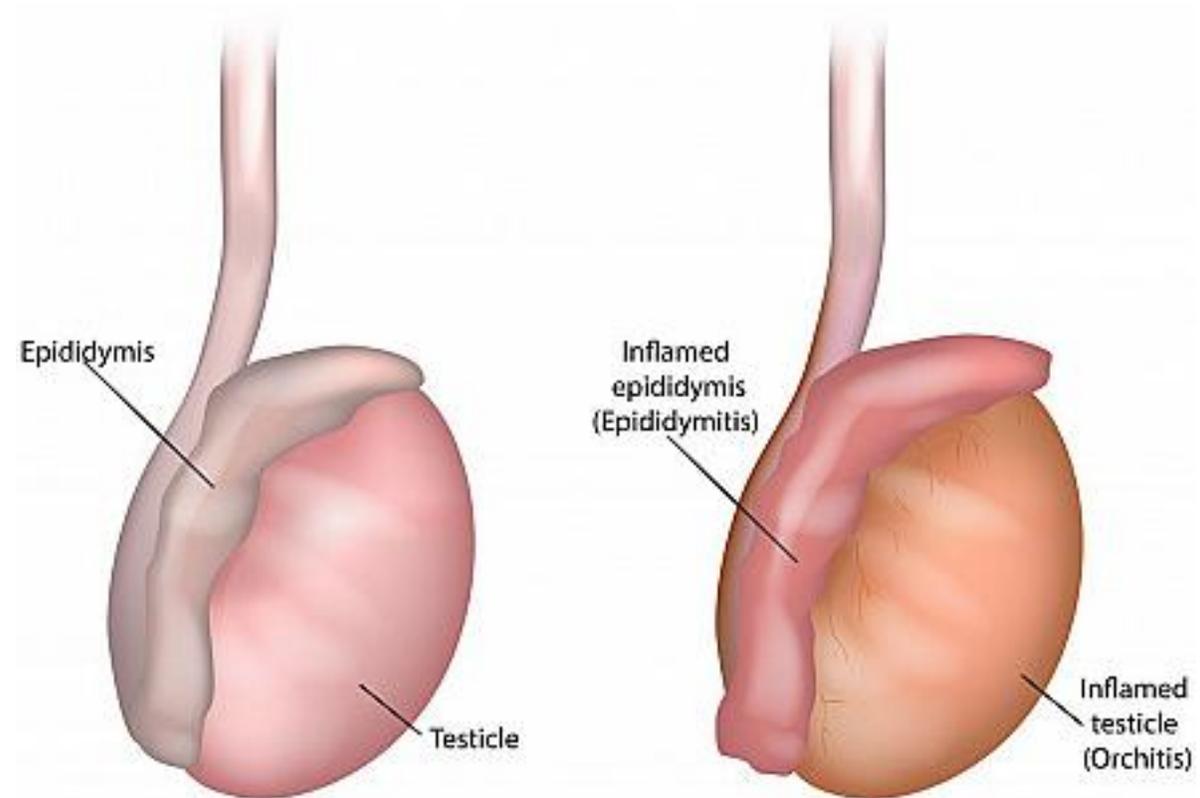


Spermatocele: Clinical Questions

- Age? >40 years
- Acute or Chronic? Chronic
- Painful? No
- Transilluminates? Yes
- Intra-Testicular? No (superior)
- Urinalysis? Normal

Scrotal Lesions: Epididymitis

- Inflammation of the epididymis (<6 weeks duration)
- Generally due to ascending bacterial infection
- Etiology
 - <35 years: *C. trachomatis* or *N. gonorrhoea*
 - >35 years: Gram negative (*E. Coli*)



Epididymitis: Clinical Questions

- Age? >20 years
- Acute or Chronic? Sub-Acute
- Painful? Yes
- Transilluminates? No (unless reactive hydrocele present)
- Intra-Testicular? No
- Urinalysis? Positive (50%)

Epididymitis: Examination

- No transillumination
- Erythematous or indurated scrotal skin
- Need to rule out testicular torsion



Epididymitis: Treatment

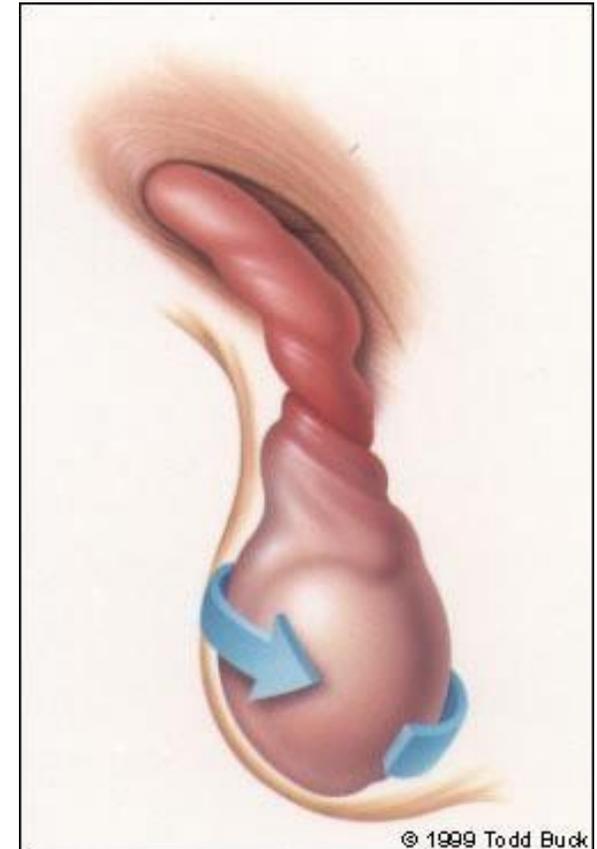
- NEED TO RULE OUT TESTICULAR TORSION!
 - Doppler ultrasound or scrotal exploration
- Bedrest, scrotal support
- NSAIDs
- Age <35 years:
 - Ceftriaxone 1g IV then Doxycycline 100mg po bid x 14 days
- Age >35 years:
 - TMP-SMX or fluoroquinolone x14 days

Epididymitis: Complications

- Abscess
- Infertility
- Testicular infarction
- Chronic pain

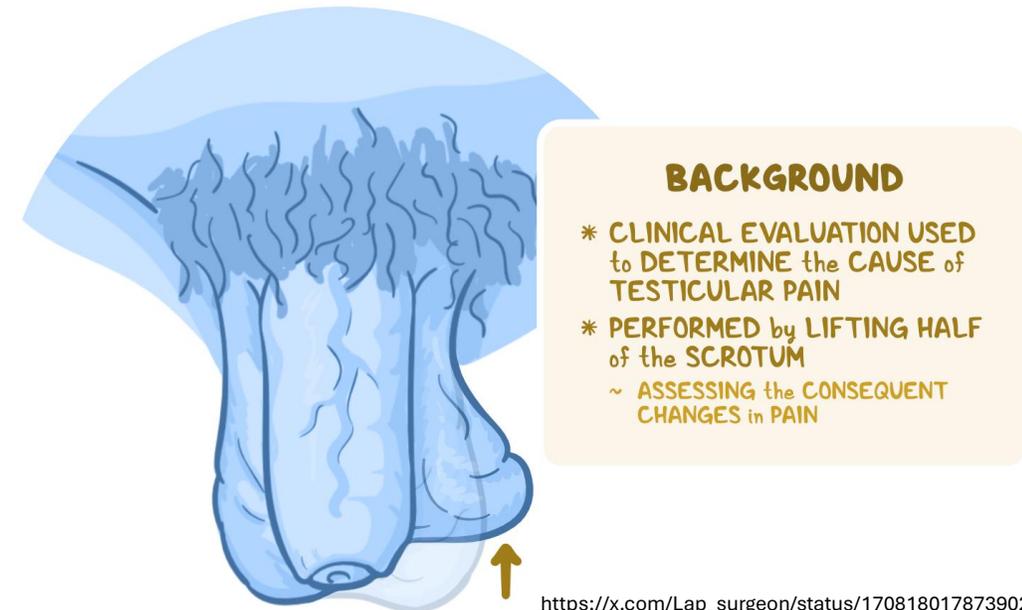
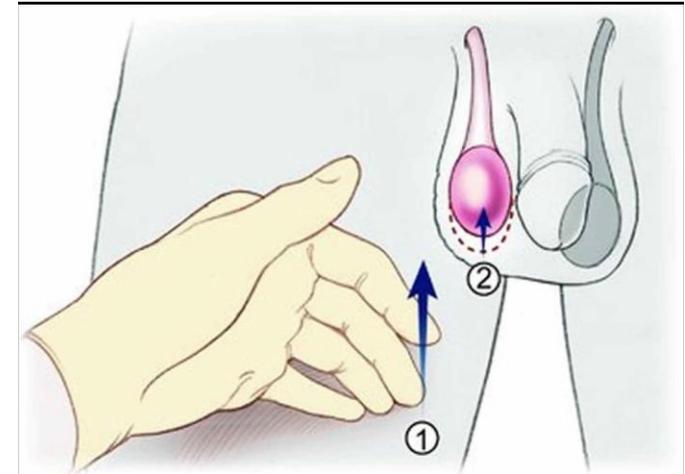
Scrotal Lesions: Testicular Torsion

- Urologic emergency
- Sudden onset scrotal pain
- Can present as isolated abdominal pain only in 20% – needs scrotal exam
- Incidental trauma
- Prior episodes
- Visceral stimulation (nausea)
- “Bell clapper deformity”
 - Testicle laying on its side, high riding, no gubernacular attachment



Special Tests

- Cremasteric Reflex
 - Stroking the patient's superior and medial thigh results in an immediate, visible upward movement of the ipsilateral testicle.
 - **Present in epididymitis, absent in torsion**
- Prehn sign
 - Elevating the patient's scrotum toward the pubis symphysis, positive if this results in pain relief
 - **Positive in epididymitis, negative in torsion**



BACKGROUND

- * CLINICAL EVALUATION USED to DETERMINE the CAUSE of TESTICULAR PAIN
- * PERFORMED by LIFTING HALF of the SCROTUM
 - ~ ASSESSING the CONSEQUENT CHANGES in PAIN

Testicular Torsion: Clinical Questions

<input type="checkbox"/> Age?	12-25 (75%)
<input type="checkbox"/> Acute or Chronic?	Acute
<input type="checkbox"/> Painful?	Yes, markedly
<input type="checkbox"/> Transilluminates?	No
<input type="checkbox"/> Intra-Testicular?	No (Yes -pain)
<input type="checkbox"/> Urinalysis?	Negative
<input type="checkbox"/> Cremasteric reflex	Absent
<input type="checkbox"/> Prehn Sign	Negative

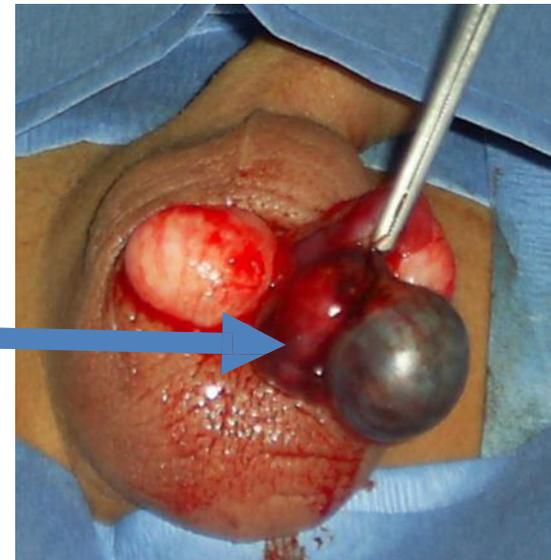
**** This requires urgent attention****

Testicular torsion: Treatment

Requires prompt surgical exploration:

- Reduction of torsion & bilateral testicular fixation
- 97% testicular salvage if <6 hours
- 55-85% if 6-12 hours
- <10% if >24 hours

Torsion

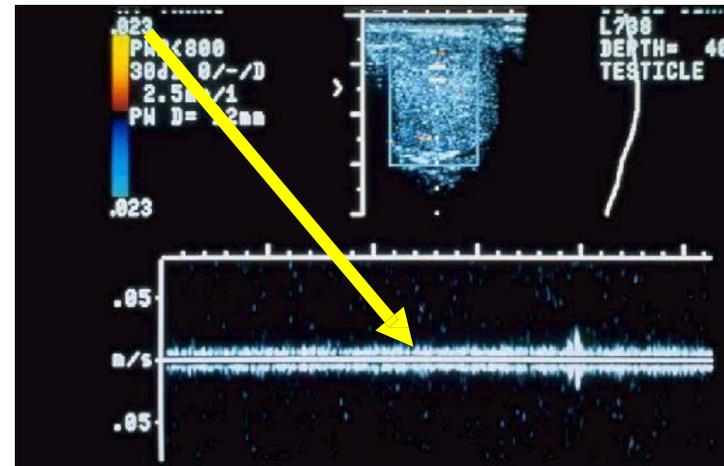
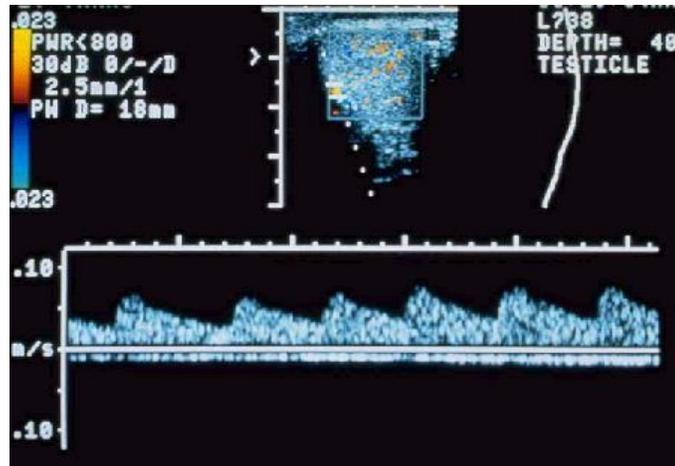


Testicular Torsion: Doppler Ultrasound

Imaging if diagnosis is uncertain

Duplex ultrasound:

- ~82-100% sensitivity
- Operator dependent
- Heterogenous testicle with absent flow on Doppler



TWIST score

Table. The Testicular Workup for Ischemia and Suspected Torsion (TWIST) scoring and risk stratification system.

TWIST Score (original Barbosa et al. scoring system)	
Testicular swelling (two points)	Score 0-2 Low risk
Hard testis (two points)	Score 3-4 Intermediate risk
Absent cremasteric reflex (one point)	Score 5-7 High risk
Nausea or vomiting (one point)	
High riding testis (one point)	

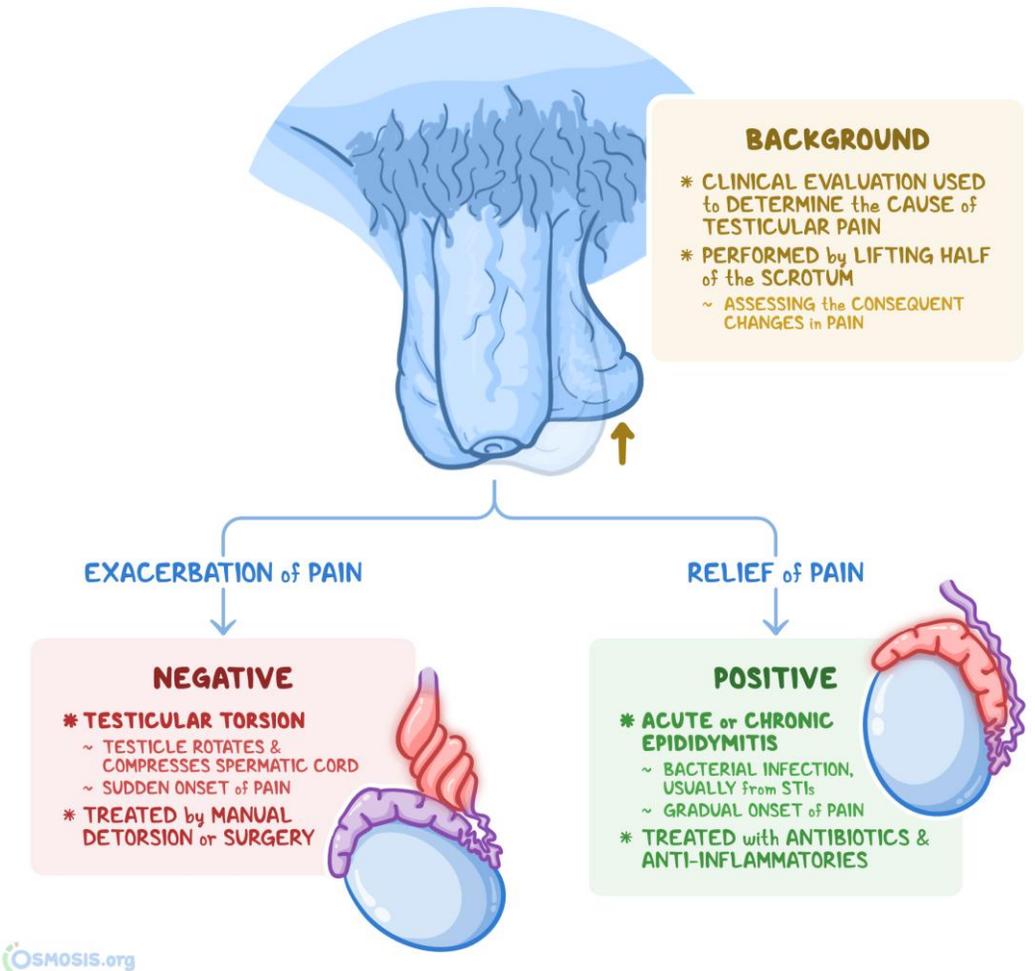
→ Observation

→ Scrotal Ultrasound

→ Surgical Exploration

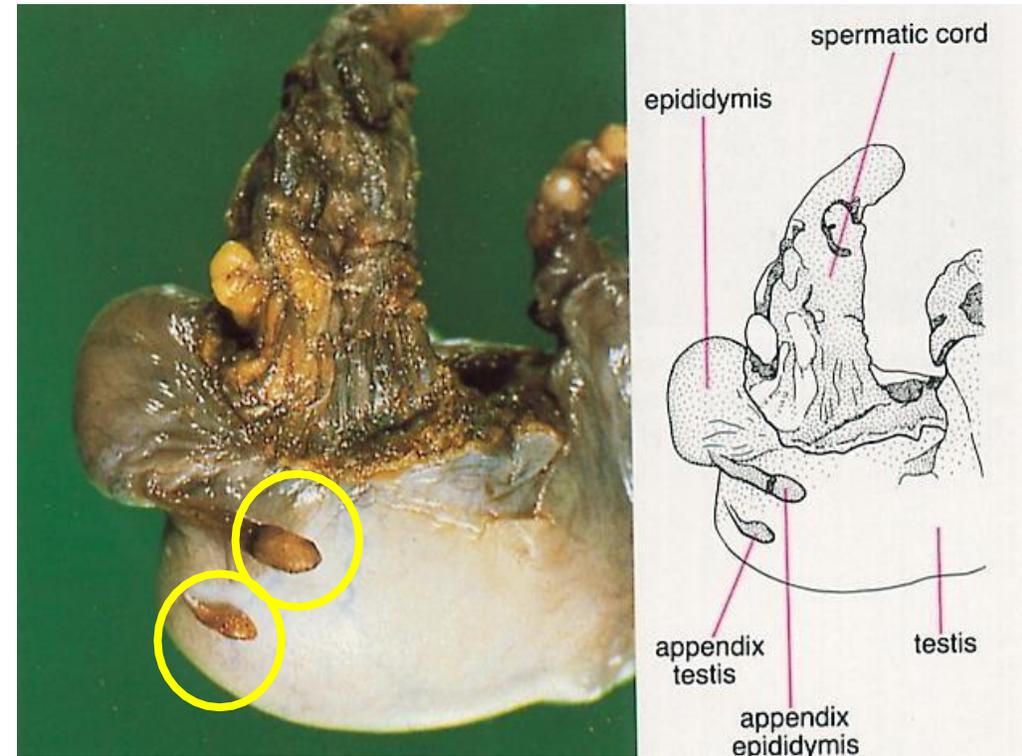
Testicular Torsion vs Epididymitis

	Testicular torsion	Epididymitis
Onset	Sudden, severe	Gradual, worsening
Exam	High-riding, horizontal testis; very tender	Tender epididymis, may have scrotal swelling
Cremasteric reflex	Absent	Present
Prehn sign (pain relief with elevation)	Negative (no relief)	Positive (relief)
Systemic/urinary sx	Usually none	Often dysuria, frequency, fever
Doppler US	↓/absent blood flow	↑ blood flow
Management	Immediate urology consult + surgery	Antibiotics + scrotal support



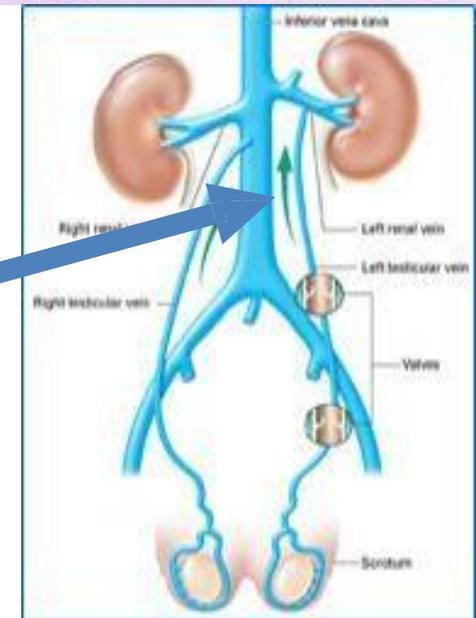
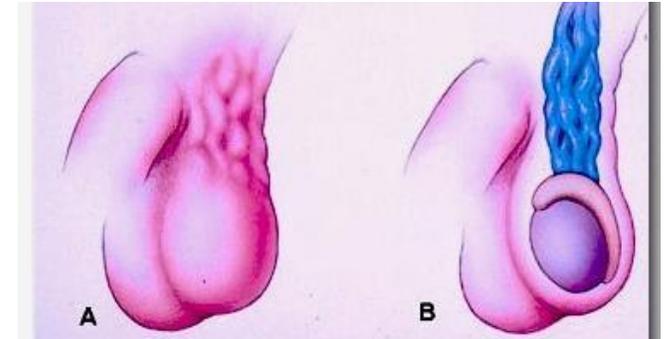
Scrotal Lesions: Torsion of Appendage Testes

- Torsion of the appendix testes or appendix epididymis
- “Blue dot” sign (seen on scrotum)
- More focal pain (upper hemiscrotum)
- Often difficult to distinguish from other causes
- Treatment:
 - Conservative
 - Pain relief (NSAID’s)



Scrotal Lesions: Varicocele

- Dilation of the veins of the pampiniform plexus in the spermatic cord
- “Bag of worms” feeling
- ~15% of post-pubertal males
- Predominantly left sided (>90%)
- Associated with infertility
- Isolated right sided varicocele is worrisome for retroperitoneal mass or obstruction



Varicocele: Clinical Questions

- Age? >12 years
- Acute or Chronic? Chronic
- Painful? Yes, chronic discomfort
- Transilluminates? No
- Intra-Testicular? No (left sided)
- Urinalysis? Negative

Varicocele: Treatment

Surgical varicocelectomy is required for:

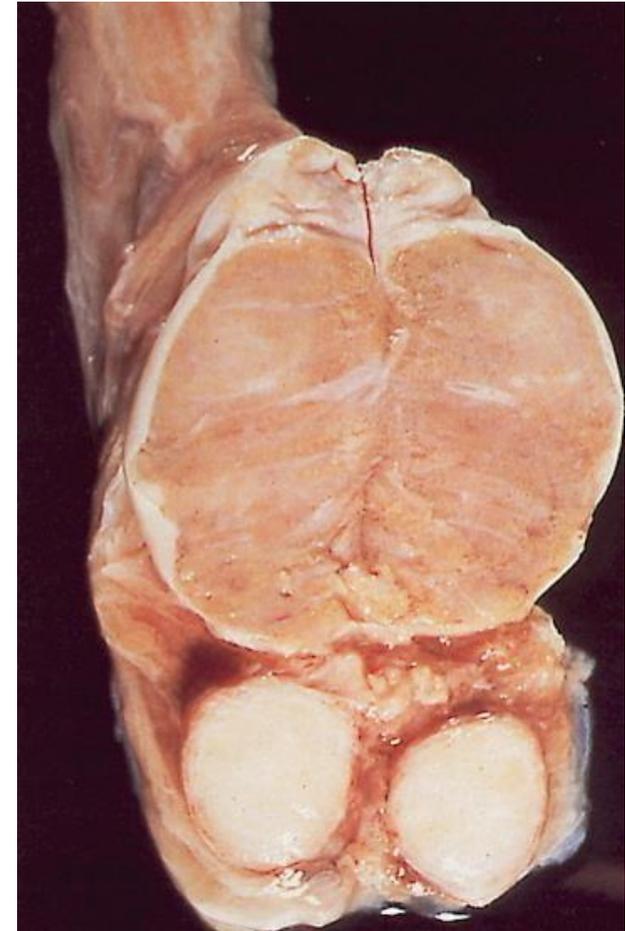
- Impaired sperm quality (associated with infertility)
- Loss of testicular volume (in an adolescent)
- Pain

Varicocelectomy involves ligating the offending incompetent vessels of the spermatic cord either:

- Inguinally
- Subinguinally
- Laparoscopically
- Embolization

Scrotal Lesions: Extra-testicular & Neoplastic

- A rare group of tumours
- Adenomatoid tumour of the epididymis is the most common of these



Intra-Testicular Lesions (**URGENT**)

Scrotal Lesions: Intra-Testicular

- All solid intratesticular lesions must be considered malignant until proven otherwise ! (90% are cancer)
- Proven otherwise = radical orchiectomy

Testicular Cancer: Presentation

- Incidence: 3/100,000
- Most common carcinoma between ages 15 & 35
 - Cryptorchidism (undescended testicle) is a risk factor
- Painless enlargement more common
 - 10% have acute pain
- Avg. delay in diagnosis 4-6 months
- Symptomatic metastases in 10-15%

Testicular Cancer: Clinical Questions

- | | |
|--|-------------|
| <input type="checkbox"/> Age? | 15-35 years |
| <input type="checkbox"/> Acute or Chronic? | Chronic |
| <input type="checkbox"/> Painful? | No |
| <input type="checkbox"/> Transilluminates? | No |
| <input type="checkbox"/> Intra-Testicular? | Yes! |
| <input type="checkbox"/> Urinalysis? | Negative |

History & Physical

1. Assess risk factors

- Increased risk in differences in sexual development (germ cell tumours), cryptorchidism, family and personal history of testicular cancer

2. Check for lymphadenopathy, abdominal masses

3. Examine both testes (2-5% bilateral)

- Try to transilluminate
- If hydrocele prevents exam, get ultrasound

4. DO NOT biopsy

- Do not breach the scrotum; this is to avoid local recurrence due to change in pattern of lymphatic drainage

Metastatic Evaluation

Initial Management

- Tumor markers
- CXR
- Radical (Inguinal) orchiectomy
- CT scan of chest, abdomen and pelvis
- Further staging after orchiectomy
 - » Repeat markers serially

Tumor Markers

1. a-fetoprotein

- Normal <20ng/ml
- Elevated in:
 - 80% of embryonal carcinoma
 - Yolk sac and teratocarcinoma
 - NOT in seminoma or choriocarcinoma

2. bHCG

- Elevated in almost all choriocarcinomas
- Elevated in 5% of pure seminomas

3. Others

- LDH, PLAP etc.

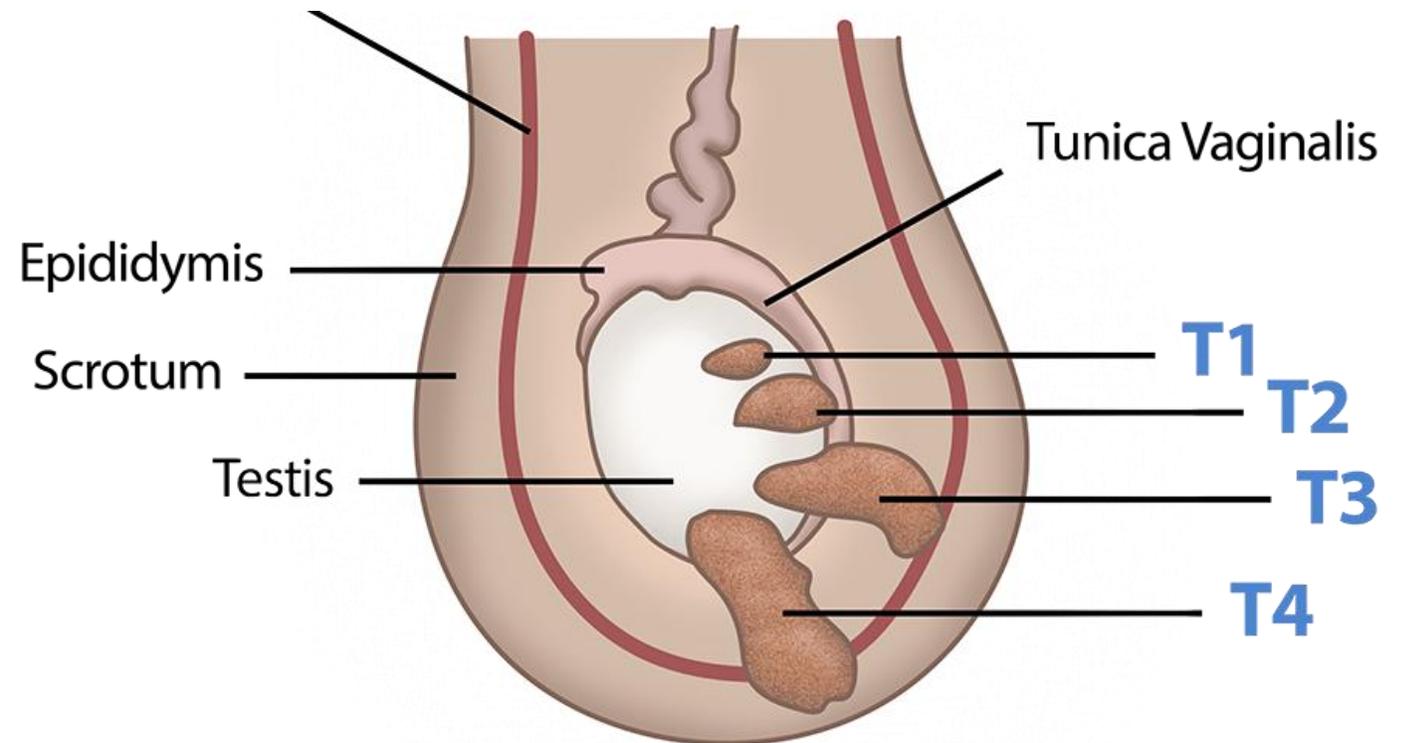
Clinical Staging: TNM

T1: Limited to testes & epididymis. No vascular invasion

T2: Invades beyond tunica or vascular invasion

T3: Invades spermatic cord

T4: Invades scrotum



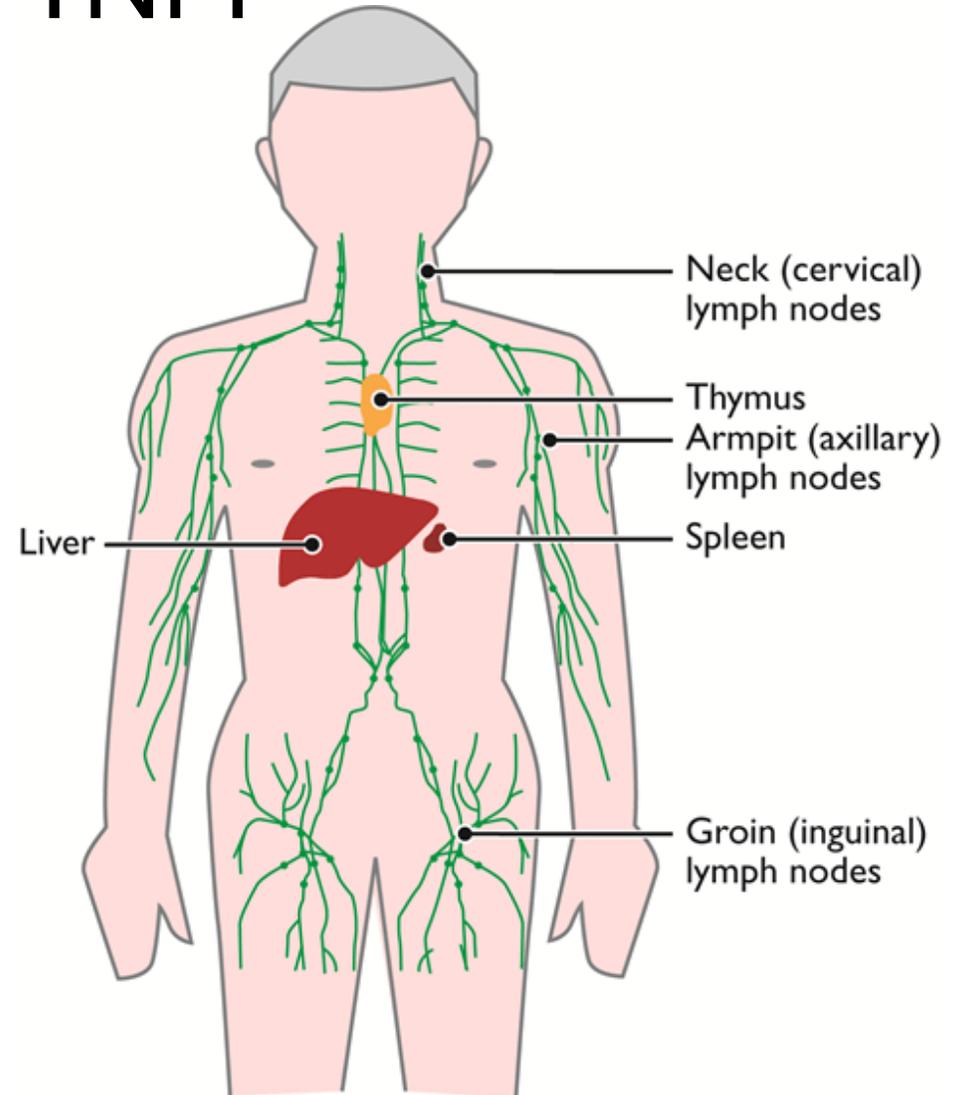
Clinical Staging: TNM

N0: No nodes

N1: Lymph node mets $<2\text{cm}$ and <5 nodes

N2: >5 nodes, or nodal mass $>2\text{cm}$ or $<5\text{cm}$

N3: Nodal mass $>5\text{cm}$

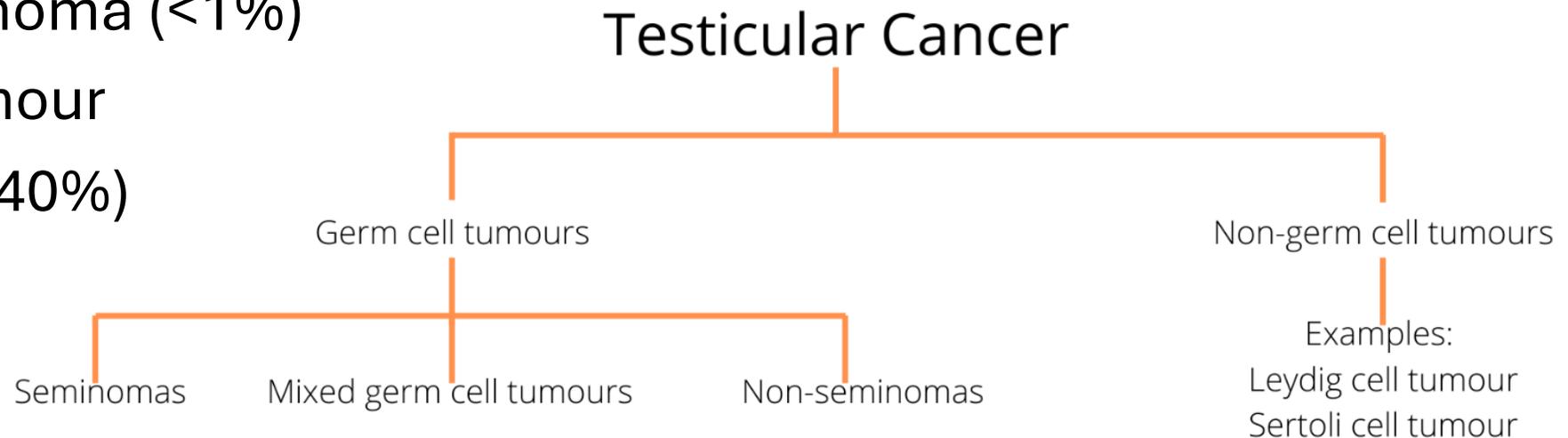


Lymph Node Metastases: Pattern of Spread

Metastasis (M)	Do other organs contain cancer?
M0	The cancer has not spread to other organs.
M1a	The cancer has spread to the lungs or distant lymph nodes furthest away from the testicle.
M1b	Organs such as the liver or brain have been affected.

Testicular Cancer: Types

- Seminoma (35%)
- Non-Seminomas
 - Embryonal Cell Carcinoma (20%)
 - Teratoma (5%)
 - Choriocarcinoma (<1%)
 - Yolk Sac Tumour
- Mixed cell type (40%)



Testicular Cancer: Seminoma

Typically later age of onset:

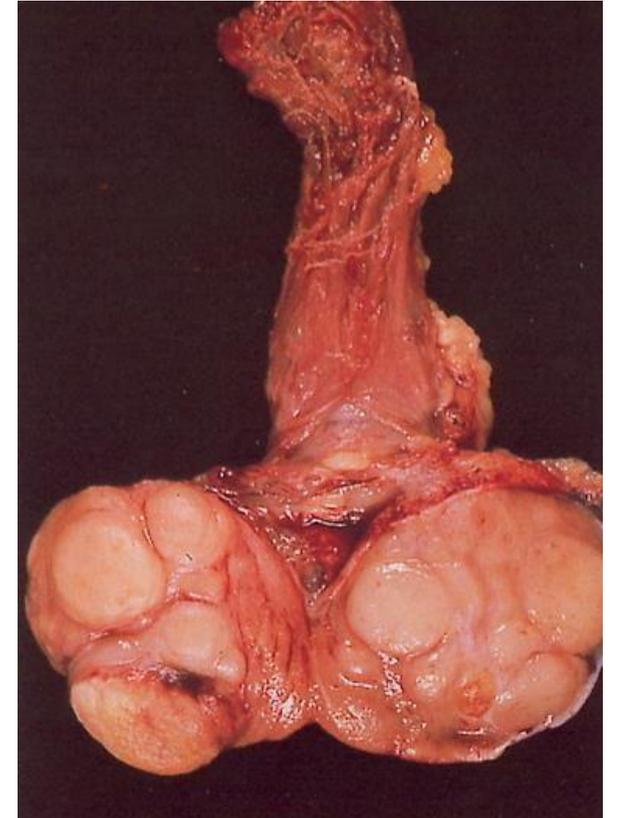
- 30's

Grossly:

- Gray, coalescing nodules

Micro:

- Sheets of clear cells
- May contain syncytiotrophoblasts
(8% - BHCG production)



Testicular Cancer: Embryonal Carcinoma

- Often associated with teratoma
- Younger onset
- Increased AFP levels (>50%)
- 1/3 have clinically evident mets at diagnosis

Grossly: Solid, grey-white with necrosis

Micro: Poorly differentiated



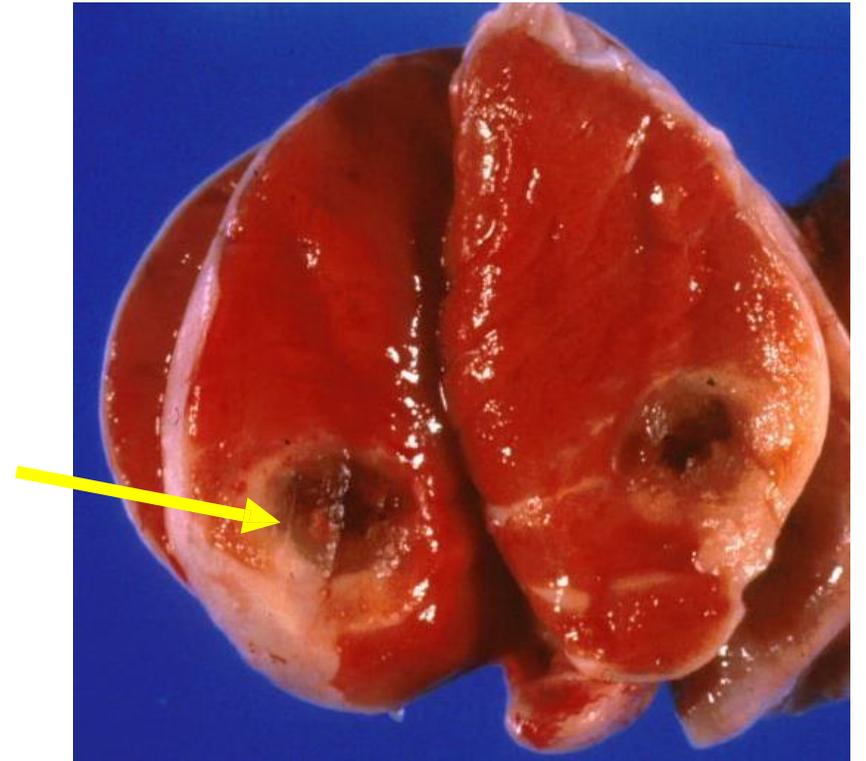
Testicular Cancer: Teratoma

- Well differentiated tumours
- Lesions can become quite large
- Bimodal age distribution
- May contain differentiated cell types (i.e. cartilage, neural)



Testicular Cancer: Choriocarcinoma

- Rare neoplasm (<1% germ cell tumours)
- Produces bHCG
- Hemorrhagic tumours
- Hematogenous metastases
- Primary tumour may be quite small
- Presentation commonly due to metastatic disease



Testicular Cancer: Yolk Sac Tumor

- Related to embryonal carcinoma
- Occurs only in infants & very young children
- Produces AFP



Treatment: Testicular Cancer

Stage I:

- Radical orchiectomy (75-90% cure alone) PLUS
- Surveillance (CXR, markers q1month, CT q3months)

OR

- Retroperitoneal lymph node dissection (RPLND) – for resection of small volume nodal disease (25%)

OR

- Chemotherapy

Treatment: Testicular Cancer

Stage II and III:

- Radical Orchiectomy

AND

- Chemotherapy (Cisplatin based)

AND

- RPLND for patients with residual retroperitoneal nodes after chemo (if tumour markers normalize)

Testicular Cancer: Treatment Summary

- Most curable of all solid neoplasms
- Almost 100% cure rate for low-stage disease
- Chemotherapy regimens are changing to reduce morbidity
- Stage I disease = orchiectomy and surveillance is an option
- Chemotherapy and more treatment complex at higher stages/non-seminomas

Importance of the Physical Exam

It's crucial and life-saving for doctors to overcome discomfort and thoroughly examine scrotal changes.

- Delay in diagnosis can lead to progression of testicular cancer to advanced stages, decreasing survival.
- Lesions can be a sign of STIs which require prompt treatment to prevent complications and stop further spread.
- Untreated lesions may lead to scarring, sexual dysfunction, or increased cancer risk (i.e.: squamous cell carcinoma in lichen sclerosis).
- Promptly detecting scrotal infections like cellulitis or Fournier's gangrene can prevent life-threatening complications, including systemic sepsis.
- Universal application of a trauma-informed approach is beneficial for everyone.

Overlooking scrotal changes may lead to misdiagnosing conditions as benign when they are malignant or systemic.

Scrotal Conditions: Summary

- Classify and organize lesions logically
 - Cutaneous
 - Extra-testicular
 - Intra-testicular
- Benign lesions are more common than malignant
- Malignant lesions are most likely intra-testicular than paratesticular
- Testicular cancer is the most curable solid tumor (especially if caught early)
- DO NOT biopsy testicular lesions or remove them trans-scrotally (they need radical inguinal orchiectomy)
- If in doubt, GET AN ULTRASOUND!