Pediatric Inguinal & Scrotal Conditions

Surgery Team
MED 433

MED 433

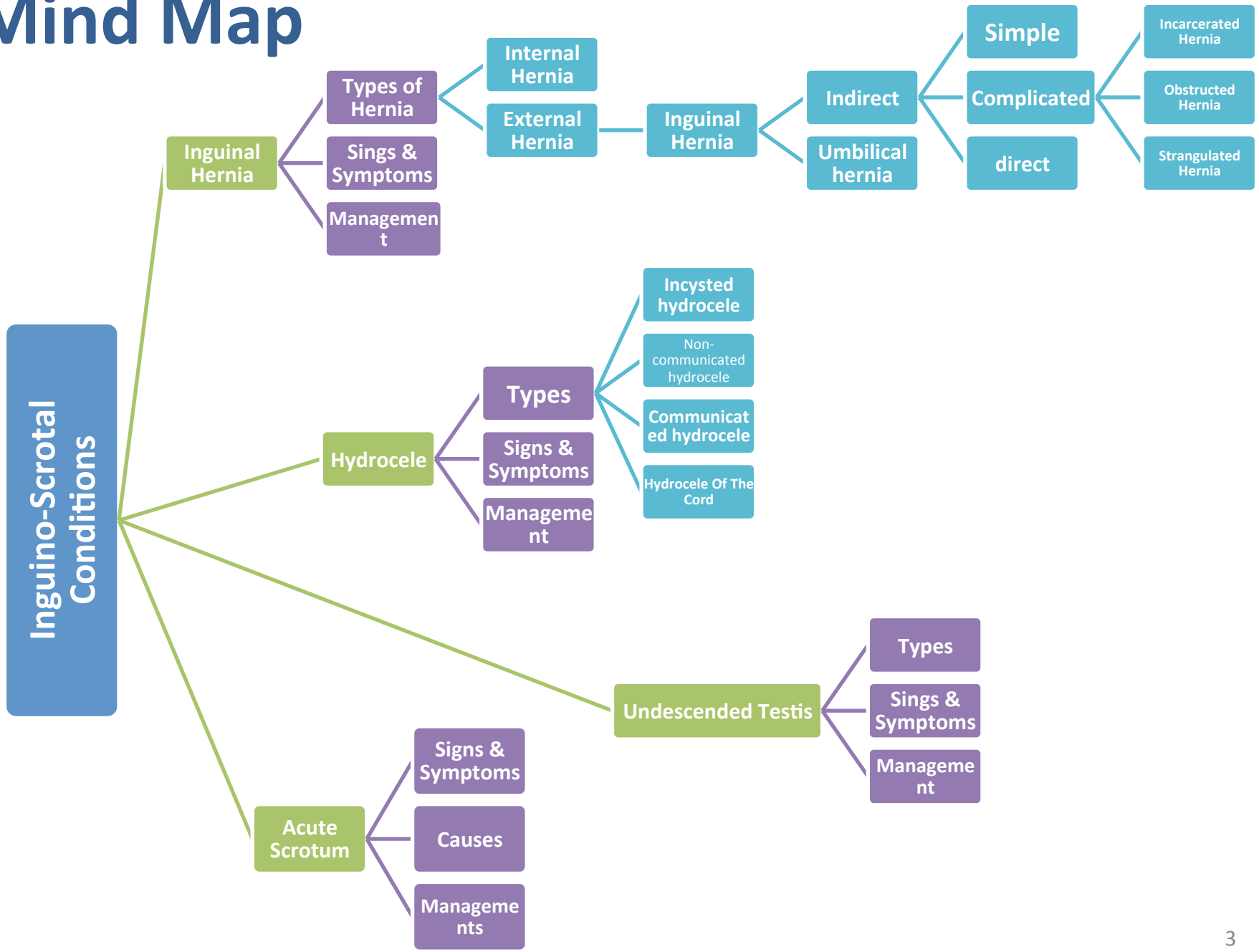
Objectives :

Were NOT Given

Sources : Slides, Raslan's Notebook

Color Index : Slides & Raslan's | Textbook | Doctor's Notes | Extra Explanation

Mind Map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Introduction & Anatomy of Inguinal Canal

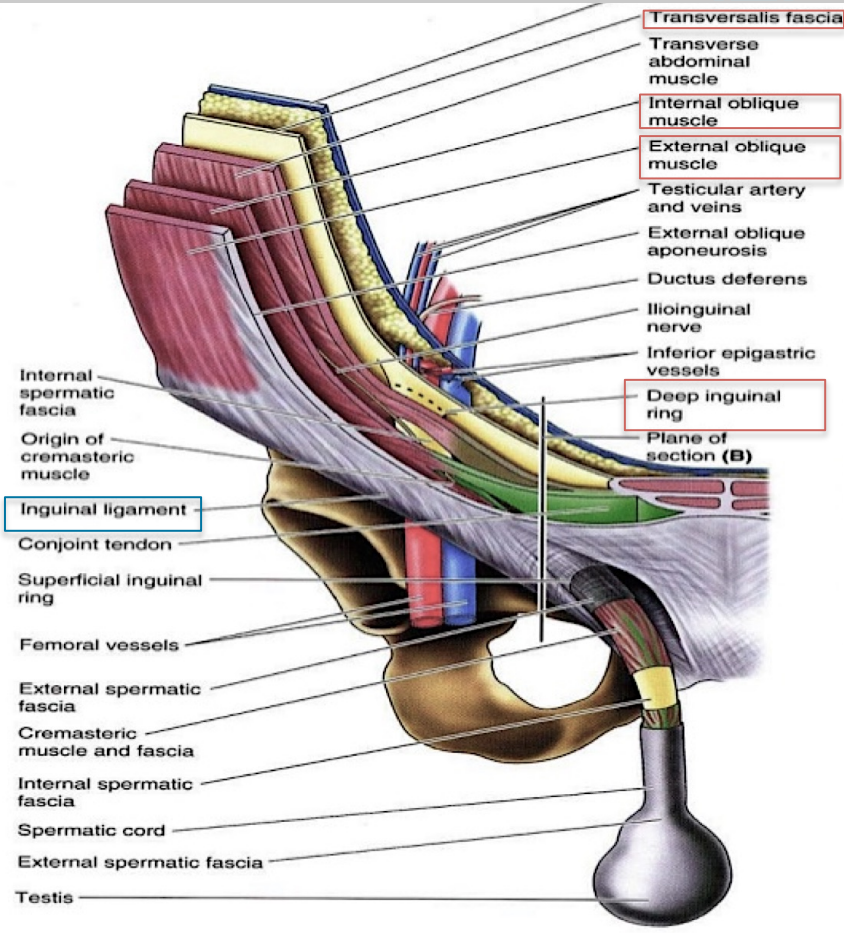
- During intrauterine life of fetus, the peritoneum will extend from abdominal cavity to external genitalia forming **Processus Vaginalis** and this extension guided by **Gubernaculum** (This extension caused by descending of testis in boys and round ligament of uterus in girls at the 7th to 8th months)
- **Processus vaginalis** must be fully obliterated at the end of gestation. In some cases it remains open leading to inguinal hernia and hydrocele.

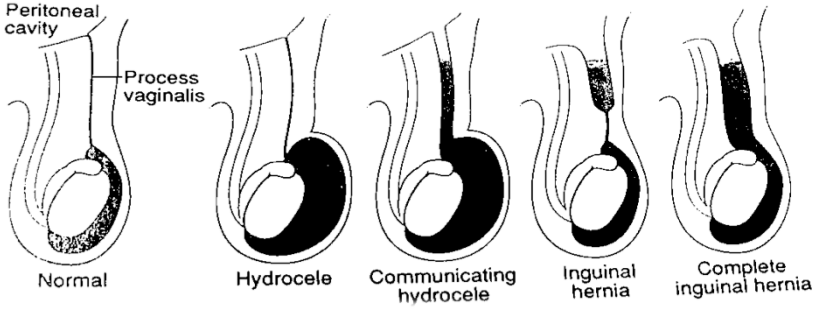
★ **If the opening is narrow** → Hydrocele (because it is fluid in nature, can pass)

★ **If the opening is wide** → Inguinal hernia

✸ Anatomy of Inguinal Canal :

- Inguinal canal extend from deep to external inguinal ring, And located **lateral to inferior epigastric vessels**.(the landmark to differentiate between direct & indirect inguinal hernia).
- Boundaries of inguinal canal:
  - **Anterior:** External oblique muscle
  - **Posterior:** Transversalis facia
  - **Inferior wall (floor):** Inguinal ligament
  - **Superior wall (roof):** Internal oblique & Transverse abdominis
- The deep ring is lateral to the inferior epigastric vessels.
  - It is the LANDMARK to differentiate between direct and indirect inguinal hernia
  - This indicates an Indirect Inguinal Hernia.
- If it's plugged medial to the inferior epigastric vessels then it's a direct inguinal hernia
- It is difficult to differentiate between direct and indirect inguinal hernia clinically





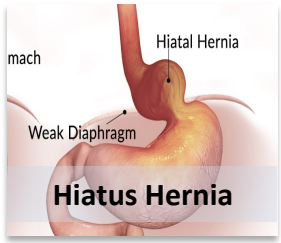
1st :Inguinal Hernias

Hernia: is the protrusion of an organ or the fascia of an organ through the wall of the cavity that normally contains it.

Types Of Hernia

Internal Hernia

- When an abdominal organ passes through a constricting band or peritoneal window (defect) within the abdominal cavity or the diaphragm (Not felt during clinical examination)
- Examples: **Hiatus Hernia** which is protrusion of part of stomach through diaphragmatic defect from its normal location in abdominal cavity to thoracic cavity. (Will be discussed in **Esophageal Diseases** lecture)



External Hernia

common and present as an abnormal lump which can be detected by clinical examination of the abdomen or groin

Umbilical Hernia (most common in children): during intrauterine life, cranial fold, abdominal wall and lateral fold meet in center of abdomen to close it. Most of the times they do not meet 100% resulting in a defect in the umbilicus

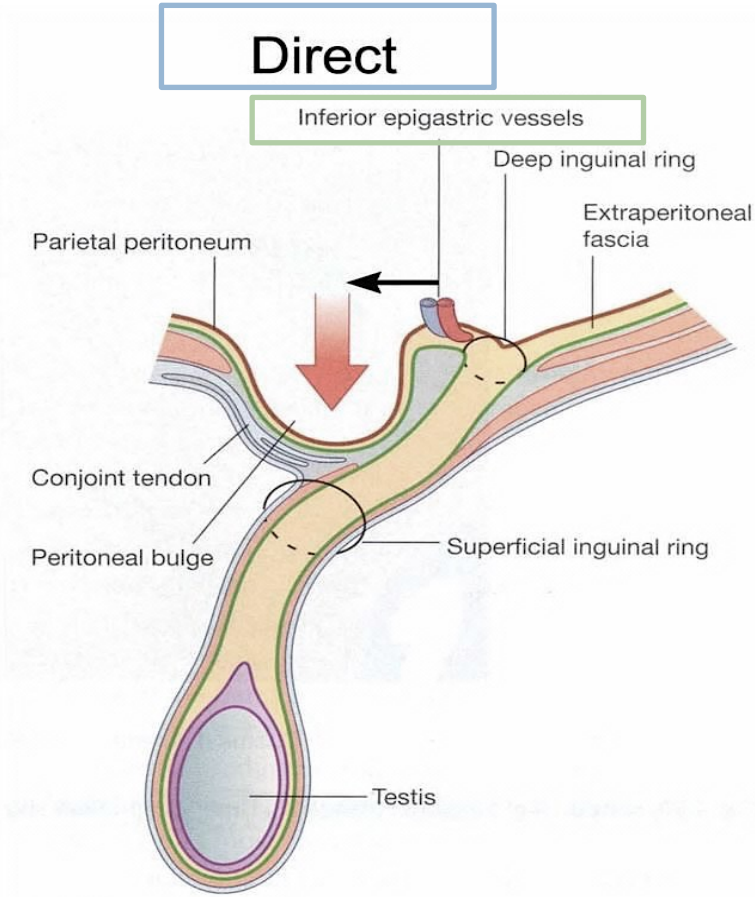
Inguinal Hernia: Extension of the peritoneum (and usually its contents eg. small intestines) through the inguinal canal because of:

- **Patent Processes Virginals:** The embryological canal that the testes descend through to the scrotum
- **Congenital Inguinal Hernia:** The processes virginals remains in open communication with the peritoneal cavity.
- A loop of intestine may herniated through it into the scrotum.
- **The opening may be:** Complete or Incomplete

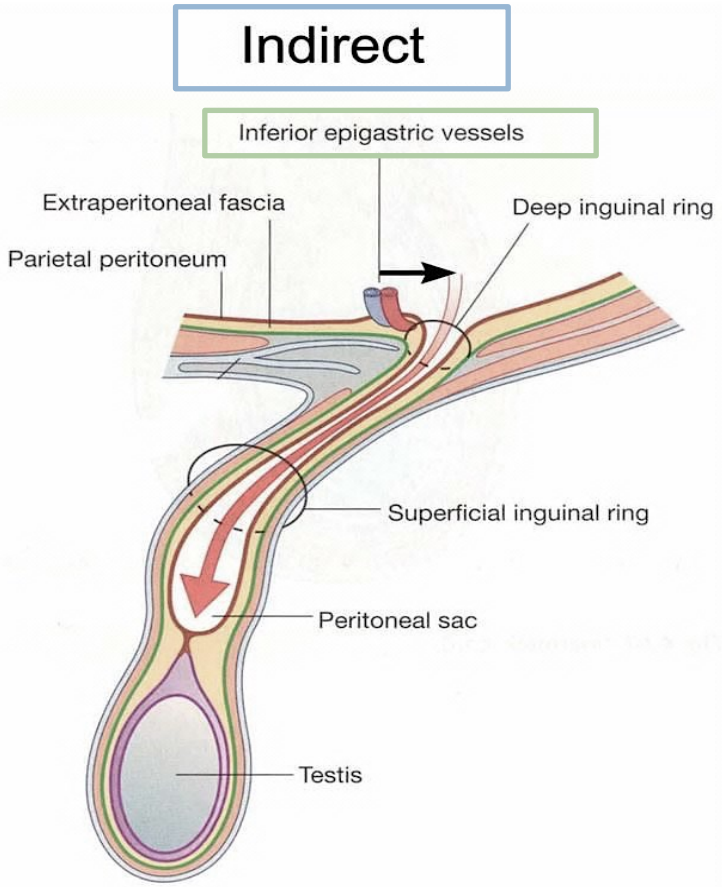
✸ **It has two subtypes:**

1. **Indirect Inguinal Hernia:** follows the tract through the inguinal canal **(hernia lateral to inferior epigastric vessels)**
   - **99% of groin hernias in children are indirect inguinal hernia**
2. **Direct Inguinal Hernia:** usually occurs due to a defect or weakness in the transversalis fascia area of the **Hesselbach Triangle (hernia medial to inferior epigastric vessels)**
   - Direct inguinal hernia is rare in children because muscles of children is strong in opposite to elderly (which mostly have the direct type)

Weakness Of Abdominal Muscles
(Age/pressure)



Patent Processus Vaginalis
(Children)

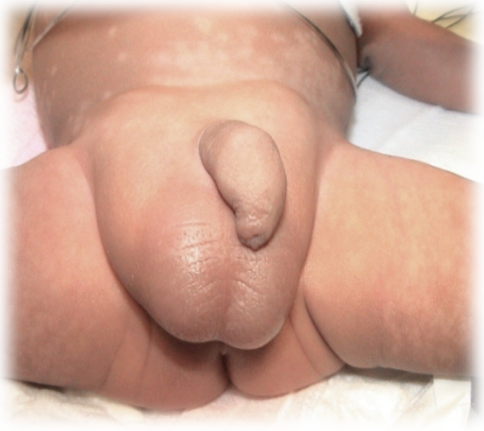


- It's different in children than in adults.
- In children, the inguinal hernia is indirect (so go from the deep ring through the canal to the external ring)
- It's fixed by separating the hernia sac from the other content of the inguinal hernia which differs between males and females.
- So you have to separate the sac from the adjacent structure.
- In children, you have to do simple high ligation at the level of the deep ring and that is **Herniotomy.**
- If any content is present in the hernia, you have to get it back to its normal location.

1- Simple Uncomplicated Inguinal Hernia

Presentation

In hernia, the swelling starts in the groin and descents to scrotum (opposite to hydrocele)

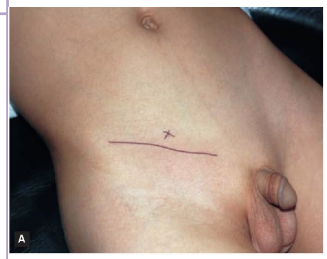


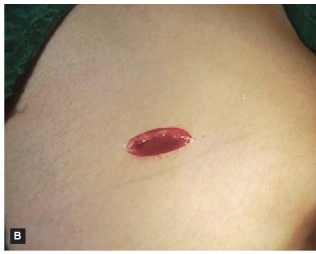
History

- **Intermittent groin** swelling (comes and go)
- Asymptomatic until it gets complicated.
- In girls, lump in upper part of **Labia Majora**
- The right side is affected more than the left side (more in males)

Examination

- Examine the testes:
- **Reducibility** (Uncomplicated is reduced spontaneously and complicated only by expert hand or never reduced)
- Thickened spermatic cord (felt in the groin area)
- The swelling disappear when lying down & appear when standing (due to gravity).

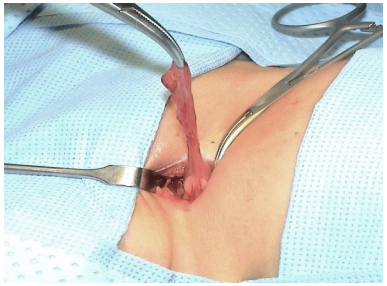


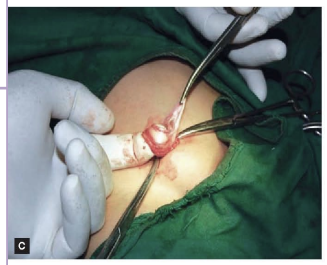


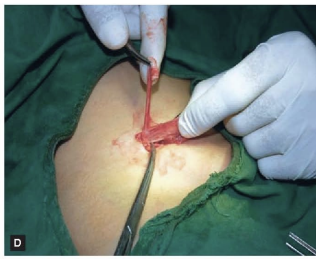
Management

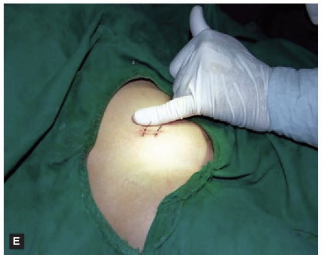
- **Herniotomy*** as soon as it is feasible to prevent complication

***Herniotomy:** The surgical correction of a hernia by cutting through a band of tissue that constricts it.





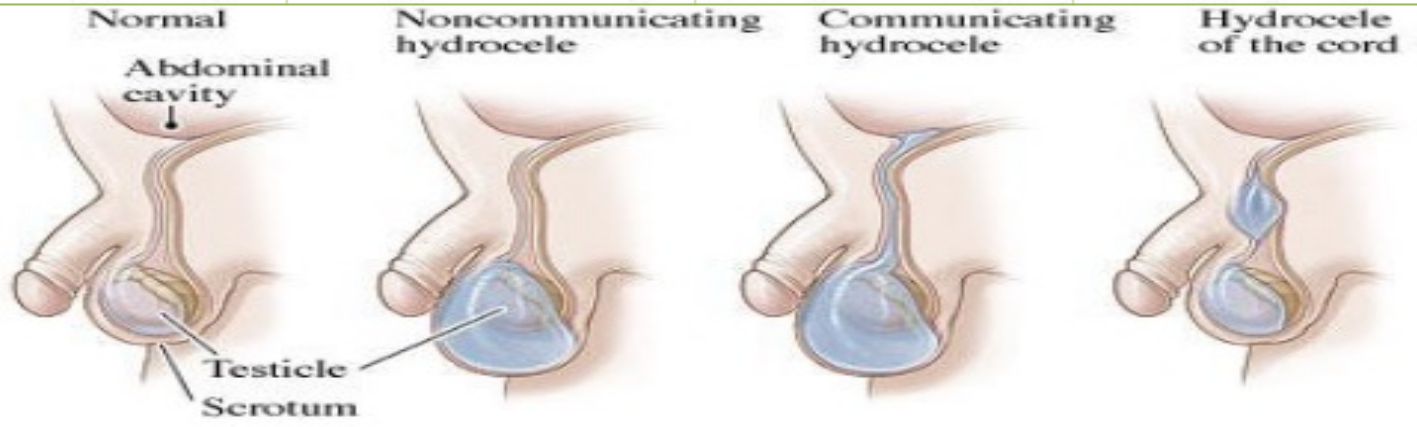




2- Complicated Types of Indirect Inguinal Hernia

Type	History	Management
Incarcerated Hernia (No obstruction or interference with blood supply)	• bulge in the groins is not reducible spontaneously but doctor is able to reduce the bulge. • The overlying skin is intact. • No or slight tenderness • No sign of mechanical bowl obstruction (no abdominal distention, vomiting or constipation)	+/-Sedation and Analgesia → Manual Reduction → **Urgent Herniotomy** (**Urgent** = within 24-48 hours)
Obstructed Hernia (hollow viscus is trapped with an obstruction with intact blood supply)	• bulge in the groins is not reducible spontaneously and doctor is not able to reduce the bulge. • The overlying skin is intact. • Slightly tenderness • **Signs Of Mechanical Bowl Obstruction** (mainly affect small bowel) : abdominal distention, greenish vomiting, constipation and obstipation(complete obstruction of the bowel, no pass of stool and gas).	**Emergent Herniotomy:** (**Emergent** = within few hours) **Why Emergent ?** ➔ To avoid bowel ischemia
Strangulated Hernia (the arterial blood supply to the contents of the sac is compromised = ischemia).	• bulge in the groins is not reducible spontaneously and doctor is not able to reduce the bulge (Cannot be pushed in because the hernia contains dead tissue, thus stimulating inflammatory reaction around it) • The overlying skin is discolored due ischemia. • **Severe groin pain** (tenderness): **1st sign** • **Signs Of Mechanical Bowl Obstruction** (abdominal distention, vomiting or constipation are present) • Child looks very sick and may have fever.	• **Emergent Herniotomy +/- Bowel Resection** • **If hernias left untreated in females?** ➔ The Ovaries will get necrotic • **If hernias left untreated in males?** ➔ Testicular Atrophy, Due to compression of the blood vessels.

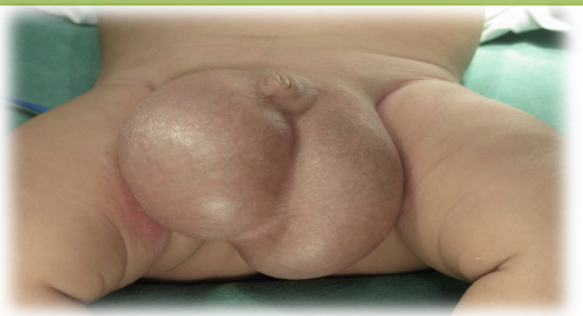
2nd :Hydrocele

Definition	**Accumulation of fluid in the testes** (so it is a fluid filled sac around the testis)			
Types of Hydrocele	**1- Incysted Hydrocele**	**2- Non-communicated Hydrocele**	**3- Communicated Hydrocele**	**4- Hydrocele Of The Cord**
	The fluid around the testicles is absorbed	The fluid stays around the testicles and is not absorbed. (there was a tunnel then it was obliterated	The fluid flows back and forth between the scrotum and the abdomen(communication between abdominal and scrotum, so you can squeeze the fluid back to the peritoneum cavity)	The fluid is located in the spermatic cord, between the scrotum and the abdomen.
Pictures				
Etiology	• Same as inguinal hernia: **Patent Processus Vaginalis** • The opening is smaller than in inguinal hernia, so only fluid comes Through. • Fluid may accumulate forming middle part of the processus vaginalis • If the abdominal end of the processus vaginalis remains open but is too small to permit herniation of intestine peritoneal fluid passes into the patent processus vaginalis forming a hydrocele of the testis.			

Hydrocele

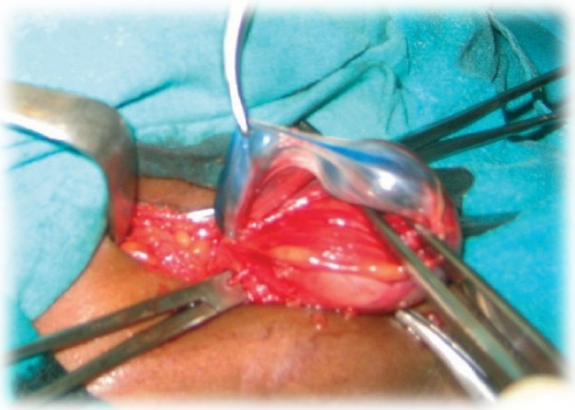
Clinical Features

- Non reducible **Scrotal** swelling.
- Painless (Asymptomatic), swollen testicle (which feels like a water balloon)
- 1% over one year of age
- A hydrocele may occur on one or both sides.



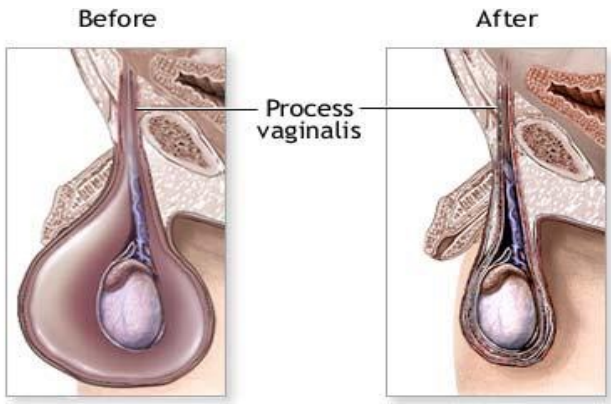
✸ Examination:

- Get above the swelling, The groin will not be swelled as Inguinal Hernia (you can determine the beginning of the swelling by squeeze above it)
- **Not reducible (most accurate sign)**
- Transilluminates (Reflects the light from the tourch indicating the presence of fluid)
- Often, the testicle cannot be felt because of the surrounding fluid.
- The size of the fluid-filled sack can sometimes be increased and decreased by pressure to the abdomen or the scrotum.
- If the size of the fluid collection varies, it is more likely to be associated with an inguinal hernia.



Management

- Hydroceles are usually **not dangerous**
- **Under 2 Years Of Age:** Surgery not advised, because Process Vaginalis may close spontaneously.
- **If Above 2 Years Of Age And Hydrocele Does Not Disappear**: **Ligation of processus vaginalis** is required.



Normal Descent of Testis

✸ Normal Descent of Testis:

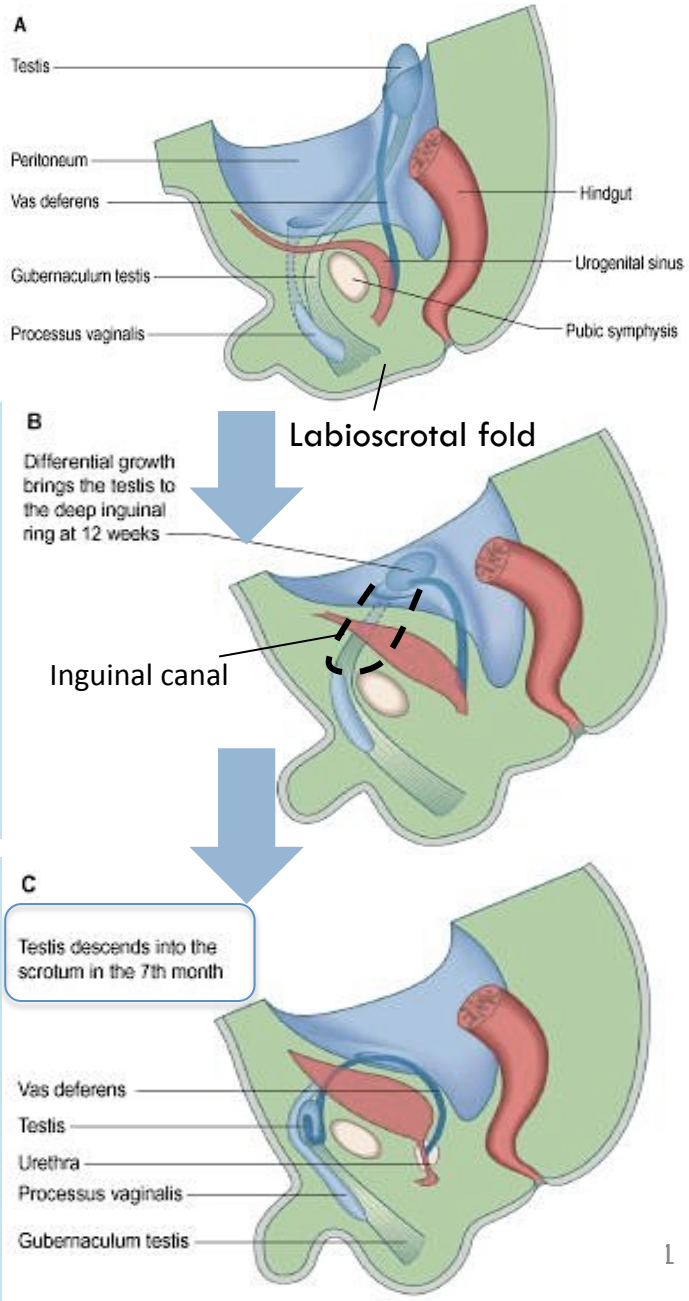
Occur in two phases [1]:

1. **Internal Descent Of Testis**: Descent of testis from posterior abdominal wall(at the kidney level) to ➔ deep inguinal ring. (During 12th week of gestation)

2. **External Descent Of Testis :** Descent of testis from **deep inguinal ring**, through inguinal canal to ➔ **the scrotum** (Begins in 7th month of gestation and takes 2 to 3 days). This descent Guided by: gubernaculum and Facilitated by Processus Vaginalis.

★ **Any rest in this processes will result in true Undesigning testis.**

- During first 3 months after birth, most undescended testes descend into scrotum.
- No spontaneous descent occurs after the age of 1 year.



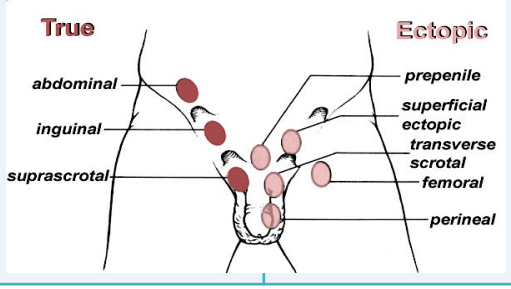
3rd :Undescended Testis

- Normal phenomenon in children; the majority of them resolves.
- **Incidence: At birth**= 3-4%, **At one year** = 1% , **Premature infents** = 30%.
- **Undescended Testis:** Can involve testis bilaterally (Impalpale2) in 20% of cases or unilaterally (palpable3) in the rest
- It's important to know the different types because each has a different management.

Types Of Undescended Testis

True Undescended Testis

The testis stopped migration anywhere in the **normal pathway above the scrotum,** it is also called "Retained testis".



Ectopic

If the testis stops migration anywhere **rather than the normal pathway,** commonly in the superficial inguinal pouch.

Retractile

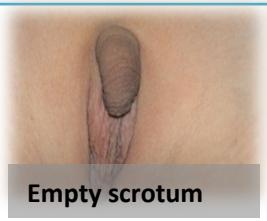
- **80%** of boys children
- Testis at the scrotum at birth, but goes up again due to **hyperactivity of the cremasteric muscle.**

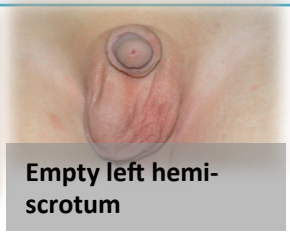
★ **3 Criteria to diagnose it:**

1. Testis was in the scrotum at birth.
2. Physician able to manipulate it down to the scrotum.
3. After pulling it down to the scrotum, it wont rebound.

Presentation

1. **Empty scrotum.**
2. The testis could be:
   - **Palpable**: you can feel it in the groin area.
   - **Not palpable:** it usually in the abdominal cavity.


Empty scrotum


Empty left hemi-scrotum

★ **Can't feel the testis in groin? what will be the next step?**

We expect the testis in abdomen ➔ so to visualize the abdominal activity we will do laparoscopy trying to search for testis. Laparoscopy can be diagnostic and therapeutic to bring the testis down to scrotum.

- The most common Diagnosis method is the clinical picture and the **mother's fear**

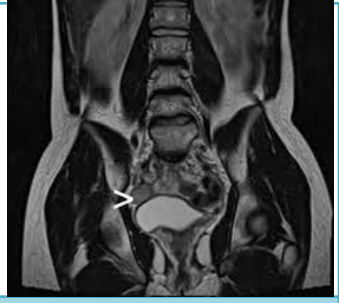
Diagnosis

★ **Imaging:** only if the testis is not palpable.

1. **MRA**: The best imaging modality for **Diagnosis**
2. **MRI.**
3. **Ultrasound.**

to determine the site of the testis

★ **Laporoscopy**: **The Gold Standard** tool for Diagnosis and Treatment.



Management

True Undescended Testis	Ectopic	Retractile

- The treatment should be done **at the age 6-12 monthes** to give a chance for spontaneous testicular descents after birth.
- Don't wait until 3 to 4 years**, why ?** because fixation of the testis will be affected by then.

★ **Surgical Intervention**

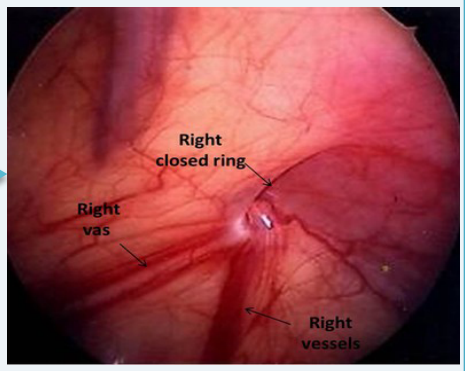
- If it is Palpable: **open Orchiopexy***
- If it is Non-palpable:
  1. **Laparoscopy Assisted Orchiopexy**
  2. **Two Stages Fowler-Stephens Orchiopexy** (If the testis is higher in the abdomen)

★ **Other indications of surgery: (also considered possible complications)**

- **Abnormal Fertility**.
- **Testicular Tumor**, especially seminomas (30-40% increase Risk of malignancy)
- Cosmetic and Social causes.
- Torsion of the testis.
- Ipsilateral Inguinal Hernia.

*is a surgery to move an undescend testicle into the scrotum and permanently fix it there

- **Does not need medical nor surgical intervention.**
- It usually returns to its normal position **at puberty** (because of the increased weight of the testes and well development of the muscles)



Prognosis

- The **higher the testes** the worst the prognosis.
- if it was **bilateral**, the prognosis is worst.

4th :Acute Scrotum*

Definition

* It is a pediatric surgical emergency.

- **Acute onset of pain in the scrotum with or without swelling and reddness.**
- **It might lead to testicular loss**

Presentation

- **Pain** is the **major feature**; do not wait for swelling and redness.
- It may be associated with lower abdominal pain.
- It may also have an **atypical presentation** such as right flank pain
- They present with **painful scrotum +/- swelling +/- redness.**
- They present with **sudden onset of scrotal pain** that can progress to **swelling** and **redness** which means the testis is **necrotic**.
- Patient can have abdominal pain and Nausea & vomiting.

Signs

- **Tenderness** of testis
- **High** lying testis
- Maybe lying in horizontal plane
- **Absent Cremasteric reflex (very specific)**

Causes Of Acute Scrotum

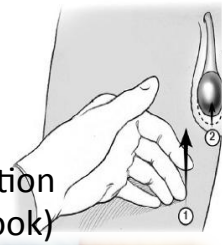
1- Testicular Torsion

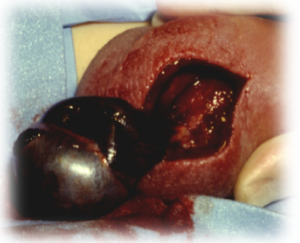
- **Two peaks**: peripubertal and perinatal.
- **Symptoms**: Lower abdominal pain, vomiting and **Painful swollen red hemiscrotum.**
- **Signs:** Tender, **Absent cremasteric reflex (most specific)**
  - Affected testis lies higher than contralateral testis and horizontal in position
- **Investigations: 1)** Color Doppler US **2)** Radionuclide Scan
- High clinical suspicion of torsion needs no investigation but needs immediate intervention
- **Management: Timing is critical (4 - 6 hours) take him to the OR and** Untwist (open book)

And assess viability and fix the other side. (If it's the **left testis** ➔ untwist clockwise
If it's the the **right testis** ➔ untwist counterclockwise)

- **Do scrotal Exploration if in doubt:**
  - ✓ Untwist and assess viability.
  - ✓ Fix the other side. (

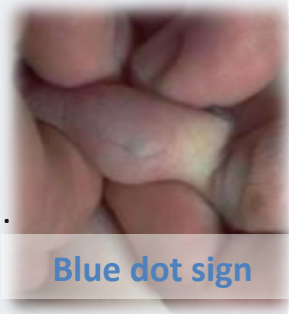
***If more than 12 hours, it is likely to be non-viable and may need orchiectomy**





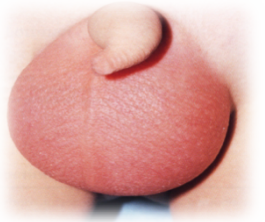
2- Torsion of Appendage

- **commonest for prepubertal boys:** It is an embryological remnants of the mesonephric and mullerian duct system occur as tiny appendages of testis.
- Can occur in appendix testis (hydatid of Morgagni), appendix epididymis ..etc
- **Peak age**: 10-12 years old.
- **Presentation**: pain (more gradual onset), **Blue dot sign** and swollen red hemiscrotum.
- **Investigation**: Color Doppler scan
- **Management**: **Conservative** or operative (if torsion cannot be excluded)



3- Idiopathic Scrotal Edema

- Unknown cause.
- **Peak age**: 4-5 years old.
- **Presentation:** Swollen, **red scrotum, minimal pain** usually bilateral
  Samoan color is very pathognomonic
- **Management:** Conservative, **self limiting** within 1-2 days



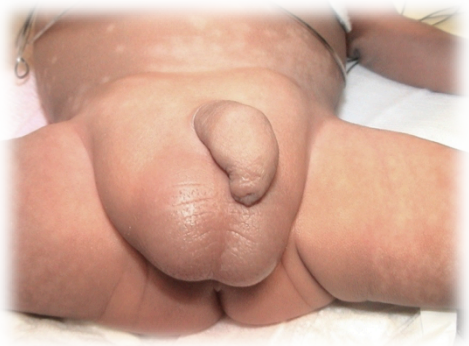
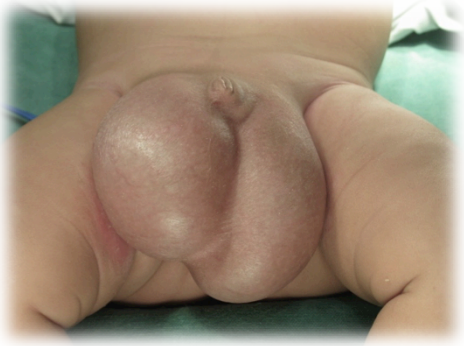
4- Epididymitis

Commonest for post-pubertal boys

Other conditions

Incarcerated Hernia, Acute Hydrocele, Henoch-Schonlein Purpura (HSP), Trauma

SUMMARY

	Simple Uncomplicated Inguinal hernia	Hydrocele
Presentation	**In hernia , the swelling starts in the groin and descents to scotum .** 	
History	• Intermittent groin swelling (comes and go) • Asymptomatic until get complicated • In girls, lump in upper part of labia majora • The patient is irritable	• Scrotal swelling • Asymptomatic (non tender) • 1% over one year of age • The patient is fine & not irritable
Examination	• Examine the testes • Reducibility (Uncomplicated is reduced spontaneously and complicated only by expert hand or never reduced) • Thickened spermatic cord (felt in the groin area) • The swelling disappear when lying down & appear when standing (due to gravity).	• Get above the swelling (you can determine the beginning of the swelling by squeeze above it) • Not reducible (most accurate sign) • Transilluminates (Reflects the light from the tourch indicating the presence of fluid)
Management	• **Herniotomy** as soon as it is feasible to prevent complication	• Surgery not advised < 2 years of age because process vaginalis may close spontaneously. • If > 2 years and hydrocele does not disappear **Ligation of processus vaginalis is required**.

SUMMARY

	Inguinal Hernia	Hydrocele	Undescended Testis	Acute Scrotum
Types	1. Simple 2. Complicated A. **Incarcerated** B. **Obstructed** C. **Strangulated**	1. **Incysted Hydrocele** 2. **Non-communicated Hydrocele** 3. **Communicated Hydrocele** 4. **Hydrocele Of The Cord**	1. **True Undescended Testis** 2. **Ectopic** 3. **Retractile**	1. **Testicular Torsion** 2. **Torsion of Appendage** 3. **Idiopathic scrotal edema** 4. **Epididymitis** **Other conditions** (Incarcerated hernia, Acute hydrocele, HSP, Trauma)
Sings & Symptoms	• **Intermittent groin** swelling (comes and go) • Asymptomatic until it gets complicated.	• Non reducible **Scrotal** swelling • Painless (Asymptomatic), swollen testicle (which feels like a water balloon) • 1% over one year of age • A hydrocele may occur on one or both sides.	1. **Empty scrotum** 2. The testis could be : • **Palpable:** you can feel it in the groin area • **Not palpable:** it usually in the abdominal cavity	• **painful scrotum** • **+/- swelling** • **+/- redness** ★ **Signs :** • **Absent Cremasteric reflex (very specific)**
Management	• **Herniotomy** • **+/- Bowel Resection**	• **Hydroceles are usually not dangerous** • Surgery not advised < 2 years of age • If > 2 years and hydrocele does not disappear **Ligation of processus vaginalis** is required.	1. **Retractile**: Does not need medical or surgical intervention 2. **Ectopic and True Undescended Testis :** • **Orchiopexy (open or labroscopic)** • **Two Stages Fowler-Stephens Orchiopexy** (If the testis is higher in the abdomen)	1. **Testicular Torsion**: emergent scrotal exploration and untwist the testis. 2. **Torsion of Appendage: Conservative** or operative 3. **Idiopathic scrotal edema :self limiting**

MCQs

Q1 Regarding the scrotal swellings:

a) Haemetocele is very common

b) Hydrocele could be inguinoscrotal

c) Solid epididymal swelling is usually tumor

d) Transluminant testicular mass is a tumor

Q2 Which one of the following clinical future helps to differentiate Between inguinal hernia and hydrocele in children?

a)Reducibility

b)Scrotal swelling

c)Tenderness

d)Transillumination

Q3 The 1st symptom of strangulated inguinal hernia is :

a) Vomiting

b) fever

c) Septic shock

d) pain

Q4 13 Y/O boy comes to ER with painful right scrotal swelling. It was gradual in onset over the last 5 days. He gave history of dysuria & suprapubic pain (for the last 2 weeks) . What is the common cause ?

a) Hydrocele

b) Testicular torsion

c) Epididymitis

1=B, 2=A, 3=D, 4=C.

Thank You..

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