432 Surgery Team

8 Inguinoscrotal Conditions In Infants and Children

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COLOR GUIDE: • Females' Notes • Males' Notes • Important • Additional

Objectives

Inguinoscrotal Pathology

1. **Inguinal Hernia**
2. **Hydrocele**
3. **Undescended Testis**
4. **Acute Scrotum**

Inguinal Hernias & Hydrocele

INTRODUCTION

Hernia:

Is the protrusion of an organ or the fascia of an organ through the wall of the cavity that normally contains it.

Inguinal Hernia:

Extension of the perineum (and usually its contents) through the inguinal canal.

- **It has two subtypes:** **indirect** (more common) and **direct**
  - ✓ An **indirect inguinal hernia** follows the tract through the inguinal canal (lateral to inferior epigastric vessels).(see pic in page5)
  - ✓ A **direct inguinal hernia** usually occurs due to a defect or weakness in the transversalis fascia area of the Hesselbach triangle (medial to inferior epigastric vessels).(see pic in page5)
  - ✓ **99%** of groin hernias are **indirect inguinal hernia**

Hydrocele:

Accumulation of fluid in the Tunica vginalis around the testis (so it is a fluid filled sac around the testis)

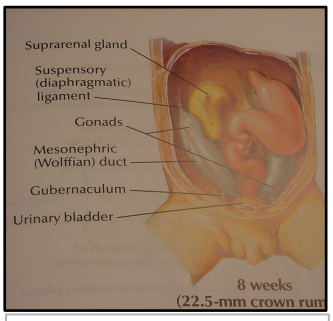
Anatomy & Embryology

- The processus vaginalis is present in the developing fetus at 12 weeks in utero.
- The processus is a peritoneal diverticulum that extends through the external inguinal ring.
- As the testis descends at the 7th to 8th months,
  a portion of the processus attaches to the testis, as it exits the abdomen and is dragged into the scrotum with the testis (Guided by the Gubernaculum).

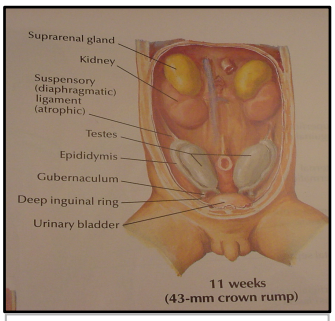
Notes:

Processus Vaginalis (PV):

An embryonic developmental outpouching of the peritoneum that connects the peritoneal cavity to the external genitalia to allow the passage for the testes.



weeks 8



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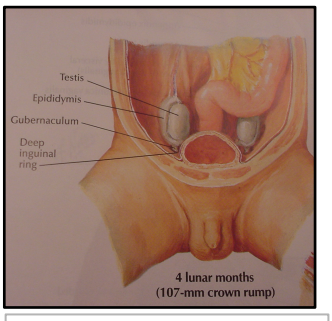
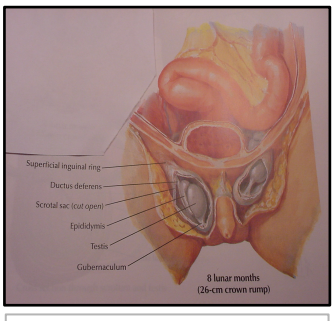


4 lunar months



8 lunar month

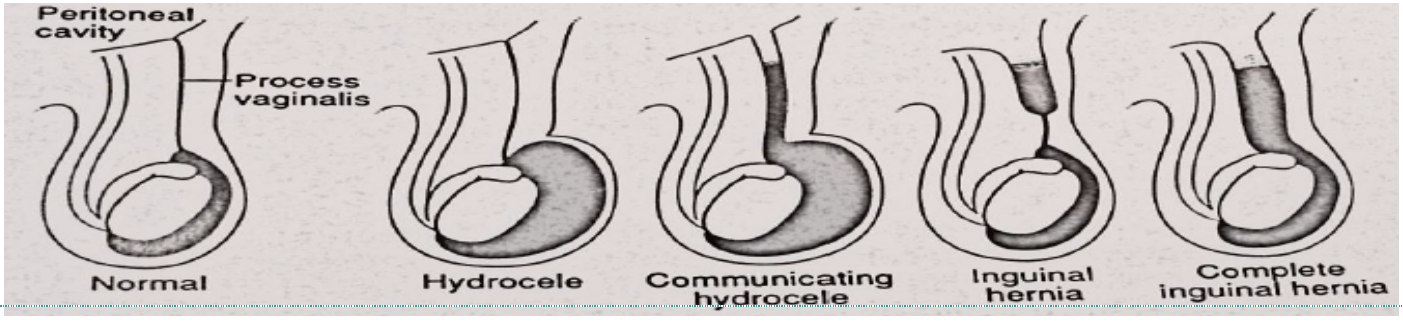
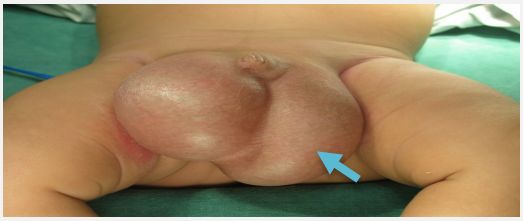


Table 1

	Inguinal Hernia	Hydrocele
History	• Intermittent groin swelling (appears and disappears), may extend to scrotum. • Asymptomatic until get complicated. • In girls, lump in upper part of labia majora.	• Scrotal swelling. • Asymptomatic. • 1% over one year of age.
Examination	• Examine the testes • Reducibility the most reliable sign, all reducible masses are simple hernias, but some hernias are complicated and **IRREDUCIBLE.** • Thickened spermatic cord **(Silk glove sign)** → the thickening and silkiness of the spermatic cord which can be palpated as the cord crosses the pubic tubercle. This indicates presence of hernia sac around the cord.	• Get above the swelling.(you can determine the beginning of the swelling by squeeze above it) • Not reducible (most accurate) • Silk glove sign only in the communicating type of hydrocele. • Transilluminates (Reflects the light from the tourch; indicating the presence of fluid; not so reliable)
Management	• Herniotomy **(as soon as it is feasible > if** It's uncomplicated) • Ligation of the PPV at the level of the deep inguinal ring.	• Surgery not advised < 2 years of age (most hydroceles recover spontaneously after sometime and leaving them will not cause complications; so surgery is advised to be done after 2y of age) • Ligation of PPV at the level of the deep inguinal ring.
Pictures		
Etiology Failure of the processus vaginalis to close. **(Patent Processus Vaginalis, PPV)**	PPV is **wider** so bowel, omentum or the fallopian tubes can go through the PPV.	PPV is **not that wide,** only the **fluid** travels from the peritoneal cavity to tunica vaginalis around the testis

Notes: ***inguinal hernia***

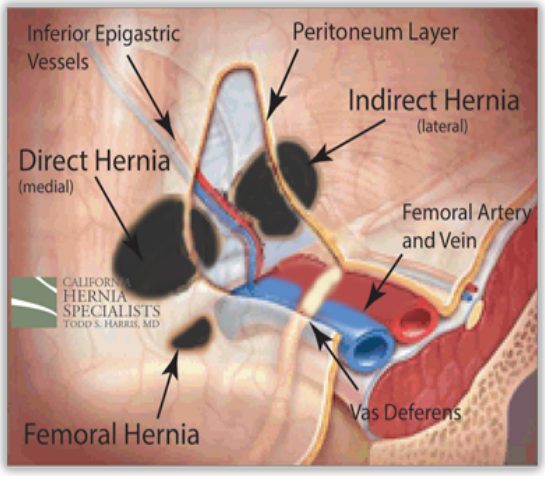
Congenital*, prevalent (1-5% boys), more in:* ***premature, males, in the right side.***
Indirect (99%): *(In children all the time it is indirect inguinal hernia meaning the structure passes through normal anatomy, deep ring > inguinal canal > superficial ring. Indirect hernias: lateral to the inferior epigastric a.)*
Associated Conditions slide #11 *The doctor focused on* ***Undescended testis****.*

Complicated Inguinal Hernias

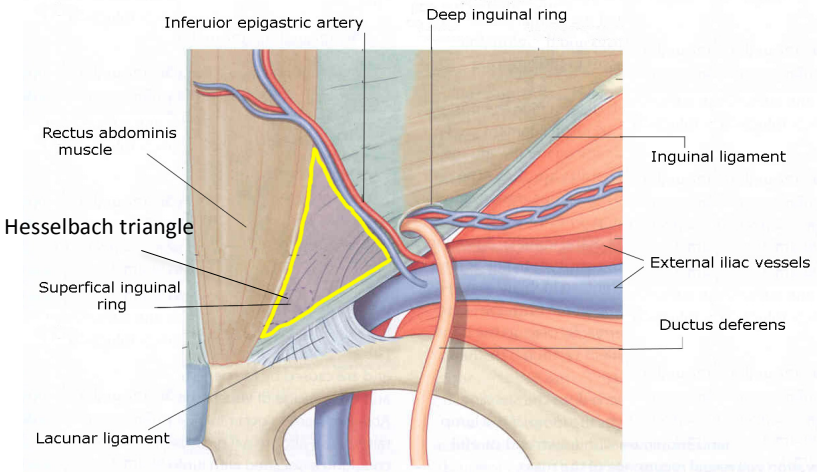
Incarcerated hernia	Irreducible swelling (there is no obstruction or interference with blood supply. The hernia simply will not reduce)	No evidence of bowel obstruction or strangulation.	Urgent herniotomy +/-Sedation and analgesia. Manual Reduction
Obstructed hernia	Irreducible swelling (hollow viscus is trapped and there is an obstruction with intact blood supply)	Symptoms and signs of bowel obstruction→ bilious (green vomiting), abdominal distention, constipation.	Emergent herniotomy
Strangulated hernia	Irreducible swelling (the arterial blood supply to the contents of the sac is compromised> ischemia)	Symptoms and signs of strangulation→ severe groin pain (1st sign), fever, tachycardia, skin discoloration of the groin (most reliable sign)	Emergent herniotomy +/- bowel resection

Notes:

Herniotomy: *An operation in which the hernia sac is removed without any repair of the inguinal canal is described as a herniotomy. Also called celotomy.*
Urgent: *half a day to 2 days.*
Emergent: *within few hours .*
****If you do not repair the complicated hernia it can cause testicular atrophy (because it can compress the testicular artery>> ischemia)***



Direct & indirect hernia



Hesselbach triangle

Undescended Testis

Cryptorchidism

Introduction

Testes originally develop high on the post.abdominal wall and then descend, normally before birth, through the inguinal canal in the ant.abdominal wall and into the scrotum of the perineum. During descent, the testes carry their vessels, lymphatics, and nerves, as well (vas deferens) with them.(grey's anatomy)Normally, both testes are in the scrotum by 6 months of age. However, they may be excessively mobile and readily retract towards the external inguinal ring, even into the inguinal canal, especially when the patient is examined in a cold room. Such retractile testes may easily be misdiagnosed as being incompletely descended. Care must be taken to examine the baby in a warm room or after a bath. (Principles & Practice of Surgery)

Descent of Testis – 2 Phases

Phase 1	Phase 2
• **10-15th week:** the gubernaculum enlarges to anchor the testis near the inguinal region as the embryo enlarges.	• **28-35th week:** the gubernaculum migrates out of the inguinal canal across the pubic region and into the scrotum. • The processus vaginalis develops as a peritoneal diverticulum within the elongating gubernaculum, creating an intraperitoneal space into which the testis can descend

Types of undescended testis

Non-palpable 20%

Palpable 80%

1. **True undescended testis:**
   Normally, testes descend from the genital ridge to the scrotum. If it stopped anywhere **in** the normal pathway above the scrotum, it is called **true undescended testes 'Retained testis'**.
2. **Ectopic:**
   it stops anywhere **rather** than the normal pathway, most commonly in the superficial inguinal pouch.
3. **Retractile:**
   The testis descends normally at birth, but **goes up again** due to hyperactivity of the Cremasteric muscle (cremasteric reflex). It may be milked again though. It can also ascend in the inguinal canal spontaneously.

- Normal phenomenon in children; the majority of them resolves.
- It's important to know the different types because each has a different management.

Notes:

Testes descend from the abdominal at the kidney level in the retro peritoneum; descend to the inguinal canal to the scrotum. Any rest in this processes we call it **true Undesigning testis.**

Incidence:

- At birth: 3-4%
- At one year: 1%
- Pre-term: 30%

Notes:

If you cannot feel the testis in the groin, what will be the next step?

We will do laparoscopy trying to search for testis. Laparoscopy can be diagnostic and therapeutic to bring the testis down to scrotum.

Presentation:

- **Empty scrotum**
- **The testis could be:**
  - ✓ Palpable: you can feel it in the groin area
  - ✓ Not palpable Undesigning testis (it usually in the abdominal cavity)

Diagnosis:

- **Parents/Doctors** (The most common Dx method is the clinical picture and the mother's fear.)
- The **gold standard** tool for Diagnosis and treatment is **Laporoscopy**. (*Laparoscopy can be diagnostic and therapeutic to bring the testis down to scrotum*)
- **Imaging has no role unless the testis was not palpable**
  - ✓ In this case, we use MRA, MRI and US to determine the site of the testis.
  - ✓ The best imaging modality for Dx is MRA.
  - ✓ The diagnostic accuracy of the US, CT & MRI is very low! MRA is ok but it doesn't reach the diagnostic accuracy of laparoscopy.

Management:

- The **retractile type** does not need medical intervention. It usually returns to its normal position at puberty because of the increased weight of the testes and well development of the muscles.
- But the **other types** need surgical intervention:
  - ✓ The **treatment** should be done at the age of **6-12 months** to give a chance for spontaneous testicular descent after birth. (After this age, the surgery will not improve fertility, decrease risk of cancer. Before this age, the testis may descend)
  - ✓ The reason we don't wait 2,3 or 4 years is because fixation of the testis will be affected by then.

If it's palpable	**1. Open Orchiopexy:** Small incision, same as hernia, in which open groin and search for testis.
If it's non-palpable	**1. Laparoscopy-assisted Orchiopexy:** (The surgeon use an endoscope through the umbilicus to locate the testicle and fix it in the scrotum)**2. Two stages Fowler-Stephens Orchiopexy**

Orchiopexy:
Fixation of testis in scrotum, we place testis back to normal position to minimize cancer risk and to enhance the fertility!

- **Other indications of surgery:** (also considered possible complications):
  - ✓ Abnormal fertility
  - ✓ Testicular tumor
  - ✓ Cosmetic/Social
  - ✓ Trauma/Torsion
- The **higher** the testes the **worst** the prognosis.
- Also, if it was **bilateral** the **worst** the prognosis.
- The most feared outcomes are infertility and malignancy (high risk at ages 20,30,40).

Notes:

Why do we have to do surgery (orchiopexy)?

1. to maximize testicular function. (improve fertility)
2. to minimize the risk of developing testicular cancer.
3. to improve cosmetic\social (the person will hate the scrotum to be empty)
4.to minimize the risk of testicular torsion.

Acute Scrotum

Introduction

- Acute onset of pain in the scrotum
- Pediatric surgical emergency: 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)**
- When the History and Examination suggest testicular torsion, the next step is **emergent scrotal exploration**. Imp!!
- That's because if we wait to do a Doppler ultrasound or nuclear scan we will waste valuable time. Instead, we should take the boy to the OR and do emergent scrotal **exploration** and **untwist** the testis.
- If it's the left testis > untwist clockwise (fix contralateral testis)
- If it's the right testis > untwist counterclockwise

Causes

We will discuss the first three

- **Torsion of appendages (pre-pubertal)-commonest**
- **Testicular Torsion (the most serious one but it is rare)**
- **Idiopathic scrotal edema**
- **Epididymo-orchitis*** (commonest for **post-pubertal** boys)
- Other conditions e.g. Incarcerated hernia, acute hydrocele, HSP,
- trauma

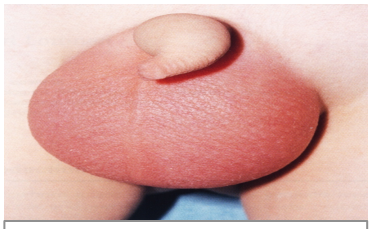
* Go to page #11 to know about " Epididimo-orchitis".

	Torsion of appendages	Testicular torsion	Idiopathic scrotal edema
	• Embryological remnants of the mesonephric and mullerian duct system occur as tiny (2-10 mm long) appendages of testis • Appendix testes (hydatid of Morgagni), appendix epididymitis, etc. • Peak age: 10-12 years	• Incidence: 1:4000 • Two peaks: Perinatal and peripibertal (about 14 years old)	• Peak age: 4-5 years
Presentation	• Pain at the upper part of the testis (more gradual onset), the rest of the testis is not tender. *milder pain than testicular torsion • **Blue dot sign** (the most specific sign) and usually at the top of the testis. • Swollen & red hemiscrotum appears on the 2nd day of onset of pain. So, in this case, they are an early presentation whereas in acute scrotum they present late.	**Symptoms:** ✓ Lower abdominal pain and vomiting ✓ **Hemiscrotal pain**: (Severe sudden onset pain referred to lower abdomen) Swollen & red hemiscrotum: (late sign indicates ischemia) **Signs:** ✓ **Tender when palpation** ✓ **Absent Cremasteric reflex** (most specific – 98%) ✓ Lies higher than contralateral testis ✓ Horizontal in position	• Swelling & redness in scrotum . • Minimal pain. • Usually bilateral Samoan color is very pathognomonic .
Investigation	--	• **(Don't do these, time is critical! Unless the diagnosis is not clinically obvious)** • **Color Doppler US.** • **Radionuclide scan** • High clinical suspicion of torsion needs no investigation but needs immediate intervention	--
Management	• Conservative (If Dx is sure) • Operative: If torsion cannot be excluded	• Emergent ! • Timing is critical **4-6 hours** (risk of ischemia) see Table 4 • **Exploration** if in doubt • **Untwist** (open book) and assess viability. **Fix the other side:** (likely to have the same condition if left without fixation) • If more than 12 hours it is likely to be non-viable (gangrenous) and may need orchiectomy.	• **Conservative**: Self-limiting within 1-2 days

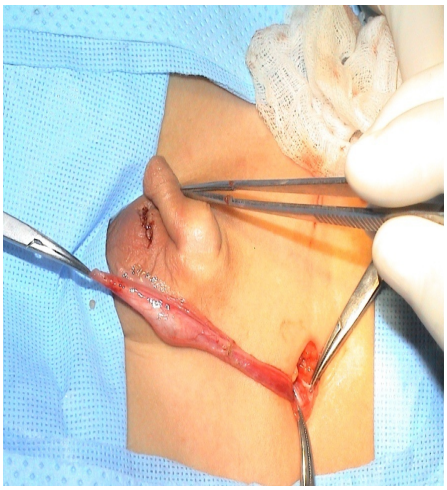
Duration of Torsion and Testicular Salvage Table 4

Duration of Torsion(Hours)	Testicular Salvage (%)
< 6	85-97
6-12	55-85
12-24	20-80
>24	<10

Testicular Torsion

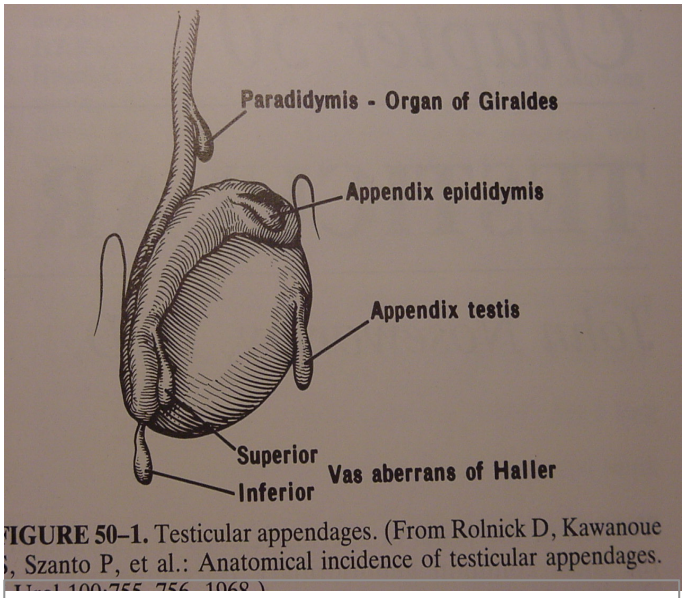


Idiopathic Scrotal Edema



open orchiopexy

Blue dot sign



IGURE 50–1. Testicular appendages. (From Rolnick D, Kawanoue , Szanto P, et al.: Anatomical incidence of testicular appendages.

Testicular Appendage

Notes:* *Torsion of the Testis - (Principles & Practice of Surgery)

Torsion of the cord can occur where the visceral layer of the tunica vaginalis completely covers the testis so that it lies suspended within the parietal layer. The patient, usually a teenager, presents with sudden onset of testicular pain and swelling. There may be a history of minor trauma, or previous episodes of pain due to partial torsion. On examination there is a red, swollen hemiscrotum that is usually too tender to palpate. Misdiagnosis of the swelling as epididymo-orchitis, which is rare in teenagers, is a serious error. Torsion of the testis is a surgical emergency; if the blood supply is not restored within 12 hours, the testis infarcts and must then be excised. If at operation the testis is found to be viable, it is sutured to the parietal tunica to prevent recurrence. As the underlying abnormality of the tunica is bilateral, the other testis must be fixed at the same time.

SUMMARY

Inguinal Hernia	Hydrocele
Inguino-scrotal swelling	Scrotal swelling
Check reducibility	Not reducible
May have +ve transillumination	+ve transillumination (not specific)
The pt is irritable	The pt is fine & not irritable

Undescended testis (Cryptorchidism)

- **Types:**
  - ✓ True undescended testis: stopped anywhere **in** the normal pathway.
  - ✓ Ectopic: stopped anywhere **rather than** normal pathway.
  - ✓ Retractile: descend normally at birth, but **goes up again**.
- **Presentation:**
  - ✓ Empty scrotum
  - ✓ Palpable in groin area or
  - ✓ Non-palpable in the groin area (it goes to abdominal area)
- **Dx:**
  - ✓ The **gold standard** tool for Dx & Rx is **laparoscopy**
  - ✓ **Imaging** has **No rule**, unless the testis was not palpable. The best imaging modality in this case is **MRA**.
- **TTT:**
  - ✓ At the age of 6-12 months
  - ✓ Retractile >> no need for medical intervention.
  - ✓ True undescended + ectopic >> need for surgical intervention.
    - ➢ **If palpable:** Open Orchiopexy
    - ➢ **if non-palpable:** Laparoscopy-assisted Orchiopexy \ Two stages Fowler-Stephens Orchiopexy

Acute Scrotum- Go to page #9 – Table 3

Notes: Epididymo-orchitis - (Principles & Practice of Surgery)

Acute epididymo-orchitis is usually the appropriate term, as both testis and epididymides are involved in the acute inflammatory reaction. The spermatic cord is also often thickened (funiculitis). After infection has subsided, the epididymis alone may remain thickened and irregular, so that chronic epididymitis may be diagnosed. Thus a late effect of tuberculosis is an irregularly hard (craggy) epididymis. Apparent involvement of the testis alone may be a feature of viral infections such as mumps orchitis. The usual cause of epididymo-orchitis is bacterial spread, either from infected urine or from gonococcal urethritis. The affected side of the scrotum is swollen, inflamed and very tender. In all cases, the urine or urethral discharge must be cultured. Sometimes there is no evidence of a bacterial cause and a viral aetiology is then likely. Treatment consists of antibiotics, analgesia, bed rest and a scrotal support. The choice of antibiotic depends on the results of culture and sensitivity determination of the organism responsible. If there is any doubt about the diagnosis, the testis should be explored. Abscess formation is now rare, but if signs of localization or fluctuation develops, the pus should be drained. Infertility is an important late complication of epididymo-orchitis.

Questions

1. 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

2. 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

3. The LANDMARK to differentiate between direct and indirect inguinal hernia is
   a. Superior epigastric vessels
   b. Inferior epigastric vessels
   c. Transversals fascia
   d. Inguinal ligament

4. Patent processus vaginalis results in:
   a- indirect inguinal hernia
   b- direct inguinal hernia
   c- femoral hernia
   d- umbilical hernia

5. A mother brought her child to the family clinic and he had a swelling in the genitalia. On examination the baby had no pain and was found to have an irreducible scrotal mass. The treatment should be on:
   a. An urgent base
   b. An emergent base
   c. After 6 months
   d. After 2 years

6. The first symptoms of strangulated Inguinal Hernia is:
   a. Vomiting
   b. Fever
   c. Constipation
   d. Pain

7. The following are important steps in the management of strangulated hernia except:
   a. Nasogastric tube
   b. Antibiotics
   c. Conservative treatment until obstruction is relieved
   d. Consent for possible bowel resection

8. Which one of the following is the most common cause of ACUTE SCROTUM in pre-puberty boys:

   a) Epididymo-orchitis
   b) Testicular Torsion
   c) diopathic scrotal Edema
   d) Torsion of appendages

9. An 11 month/old boy born prematurely was brought to the clinic by his parents because his testes were not in the scrotum. His mother said that it descended during sleep, but it goes up again when she pulls it down. Which of the followings is(are) true?
   a) There is scrotal hypoplasia
   b) It is due to cremasteric reflex
   c) Orchidopexy at 1-2 years is the treatment of choice
   d) All of the above

Answers:

1st Questions: B

2nd Questions: A

3rd Questions: B

4th Questions: A

5th Questions: D

6th Questions: D

7th Questions: C

8th Question: D

9th Question: B