ESUR SCROTAL AND PENILE IMAGING WORKING GROUP
MULTIMODALITY IMAGING APPROACH TO SCROTAL AND PENILE PATHOLOGIES
2ND ESUR TEACHING COURSE

NORMAL ANATOMY OF THE SCROTUM

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NORMAL ANATOMY OF THE SCROTUM - DEFINITION

Double spaced cutaneous pouch connected in median raphe

- Situated in front of perineum
- 2-8mm in thickness

Contents

- Asymetry due to spermatic cord length
NORMAL ANATOMY OF THE SCROTUM-EMBRYOLOGY

Scrotum-Labioscrotal folds – testo - 5th week

Testis descent-retroperitoneum-gubernaculum guidance

9th month – inguinal canal – scrotum
Processus vaginalis enclose fetal testis-tunica vaginalis
# Normal Anatomy of the Scrotum - Testis

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oval shaped oblique position</td>
<td></td>
</tr>
<tr>
<td>Volume</td>
<td>30ml</td>
</tr>
<tr>
<td>Length</td>
<td>3.5-5 cm</td>
</tr>
<tr>
<td>Width</td>
<td>2.5-3.0 cm</td>
</tr>
<tr>
<td>Depth</td>
<td>3.0 cm</td>
</tr>
</tbody>
</table>

Superiorly suspended by spermatic cord  
Inferiorly attached to scrotum by gubernaculum  

![Coverings of the Testis Diagram](image)
SCROTAL WALL

**Dartos fascia**
- Smooth muscle layer continuous with Scarpa
  - Septum scrotum division
  - Skin contraction
  - Temperature regulation

**External spermatic-cremasteric fascia**
- From external oblique muscle aponeurosis
- Skeletal muscle in inguinal canal and scrotum
- From internal oblique muscle, around testis and spermatic cord

**Internal spermatic fascia**
- Continuation of the transversalis fascia
- Invests cord
SCROTUM PHYSIOLOGY

Supportive role for the testis

- Protection of testis

Temperature regulation for sperm production
**TESTICULAR COVERINGS**

<table>
<thead>
<tr>
<th>Tunica vasculosa</th>
<th>Blood vessels and connective tissue</th>
<th>Blood supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tunica albuginea</td>
<td>Dense layer enclose the testis</td>
<td>Creates septa to the testis</td>
</tr>
<tr>
<td>Tunica vaginalis</td>
<td>Visceral layer overlies tunica albuginea</td>
<td>Parietal layer adjacent to internal spermatic fascia</td>
</tr>
<tr>
<td></td>
<td>Hydrocele – fluid accumulation</td>
<td></td>
</tr>
</tbody>
</table>
TESTICULAR STRUCTURE

- Mediastinum testis
- Invagination of albuginea posterior surface
- Multiple septa divide the testis in 250-400 lobules
- Contain 1-4 seminiferous tubules
TESTICULAR STRUCTURE

- Mediastinum testis
- Support blood supply and lymphatics
- Connect to the rete testis
TESTICULAR STRUCTURE

- Seminiferous tubules 30-70cm length each
  - covered by smooth muscle
  - Contraction for transport of sperm

- Straight tubules form network of rete testis
  - Located in mediastinum
  - Efferent ducts (15-20) – head, body of epididymis

- Epididymis
  - 6m long tubular structure
  - Sperm restoration in body of epididymis
  - Sperm transportation tail of epididymis and vas deference

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TESTICLE ANATOMY-SPERMATIC CORD

Main structure of inguinal canal

- Surrounded by fascias
- Contain vas, testicular vessels, cremasteric artery, genitofemoral nerve, pampiniform venous plexus

Sperm transport, vascular supply
INTRATESTICULAR STRUCTURE

**Seminiferous tubules lined with germ cell epithelium**
- Lobules of glandular tubules held together with connective tissue containing Leydig cells
- Produce 90% of free testosterone-LH
- Promote spermatogenesis

**Spermatogenesis-primary function**
- Germ cells (spermatogonia) in basement membrane
- Mature as they advance to glandular lumen
- Sertoli cells interspersed in the layers to provide support to developing sperm cells
**Spermatogenesis**
- Tubular compartment - seminiferous tubules
- 60-80% testis volume
- 360m per testis

**Sperm cell production and maturation**
- Germinal epithelium-testo influence
- Peritubular cells-sperm cell contraction and transportation to tubular lumen

**Sertoli cells**
- Scaffold for the germ cells to develop
- Blood testis barrier - sperm cell protection
- Tubular fluid production - sperm maturation

**Blood testis barrier**
- Sperm cell protection

**Tubular fluid production**
- Sperm maturation
TESTIS FUNCTION - SPERMATOGENESIS

Spermatogenic process (4 phases)

- Spermatogoniogenesis (mitotic proliferation of spermatogonia)
- Meiotic division of spermatocytes-spermatids
- Transformation of spermatids to testicular sperm
- Release of sperm in tubular lumen - spermiation
- Complete cycle of spermatozoa production - 74 days
Testicle Anatomy - Arterial Supply

- Testicular artery
  - Abdominal aorta branch L3-L4 level
  - Inguinal canal to testis

- Differential artery
  - Cremasteric artery

- Collateral blood supply
  - Arterial communication with other testis through ductus deferens artery
TESTICLE ANATOMY- VENOUS DRAINAGE

Pampiniform plexus of veins from testis, epididymis through inguinal canal

Left testicular vein to left renal vein
Right testicular vein to IVC

Blood supply

Arterial supply:
- Testicular artery

Venous drainage:
- Pampiniform plexus of veins.
LYMPHATIC DRAINAGE

Scrotum, penis drain to inguinal lymph nodes

Testis drain to paraortic lymph nodes

Important to understand difference in lymphatic drainage of testis vs. scrotum
TESTICULAR INNERVATION

**Sensory fibers**
Ilioinguinal nerve, genital branch of genitofemoral nerve to scrotum

**Testicular plexus**
Autonomic and sensory fibers from renal and aortic plexi
REGULATION OF TESTICULAR FUNCTION

Pituitary gland

FSH, LH

GnRH

LC-TESTO

Inhibin

Hypothalamus

Regulation of testicular functions

Editor: Animal Physiology, W.H. Freeman and Co.; N.Y. 2000, Fig. 8-31.
TESTIS-MALE GONAD

Testosterone
- Main secretory product
- Local regulator of spermatogenesis
- Produced by Leydig cells

Steroidogenesis regulated by pituitary LH
- Testo-5a reductase-DHT – main androgen form of testosterone binding in ARs
- Acting on epididymis, vas deference, prostate

Steroidegenesis
- Male sexual function
- Fertility
- Male body phenotype
THANK YOU

ANATOMY OF THE SCROTUM