




# MALE GENITAL SYSTEM

- 
- **SCROTUM**
  - **TUNICA VAGINALIS**
  - **TESTIS**
  - **EPIDIDYMIS**
  - **PENIS**
  - **PREPUCE**

- **ACCESSORY GENITAL GLANDS**

- ✓ **Vesicular glands (seminal vesicles) and ampullae**
- ✓ **Prostate and bulbourethral glands**

# SCROTUM

- Anomalies of scrotal development are **simple**.
- Apparent absence of the scrotum has been observed **in cryptorchidism**.
- Range bulls exposed to extreme cold may develop **scrotal frostbite**.
- A higher incidence of lesions in old bulls is attributed to their more pendulous scrotums.
- Because of its delicacy, scrotal skin is especially vulnerable to **inflammation**.

# SCROTUM

- Scrotal dermatitis frequently is caused by nonspecific environmental irritants.
- Any of the neoplastic diseases of the skin may occasionally arise on the scrotum.

# TUNICA VAGINALIS

- The cavity of the tunica vaginalis communicates with the peritoneal cavity and is susceptible to the accumulation of fluid, **hydrocele**, in conditions leading to **ascites**, **anasarca**, or **local lymphedema**.
- **Hematocele**, the accumulation of much blood in the vaginal cavity, is mostly the result of trauma.
- Inflammatory changes in the tunica vaginalis may be part of disseminated infection, with lesions typical of the infection, such as **feline infectious peritonitis**, **tuberculosis**, **caseous lymphadenitis**, and the various diseases causing **polyserositis** in pigs.

# TESTIS AND EPIDIDYMISS

## Anomalies of Development

- **Cryptorchidism**
- Testicular hypoplasia
- Testicular hypoplasia
- Monorchia
- Agenesis
- Fusion of the testes
- Ectopia
- Polyorchidism

# TESTIS AND EPIDIDYMISS

## Cryptorchidism

- *Incomplete descent of the testes and associated structures (cryptorchidism) is one of the most common abnormalities of the male reproductive system, and is the most common genital abnormality of the male cat and horse.*

Individual cases of cryptorchidism

may be due to **genotypic** or

**environmental causes**.

# TESTIS AND EPIDIDYMIS

## Cryptorchidism

- Most cases are **unilateral**.
- **Double-sided cryptorchids** are always sterile, unilateral cases have varying degrees of fertility.
- Increased rates of **testicular neoplasia** are associated with cryptorchidism in several species, most notably the dog.
- Retained testes in pubescent animals are smaller than their normal counterparts.



# TESTIS AND EPIDIDYMIS

## Cryptorchidism

- *The association between testicular neoplasia and testicular maldescent is well recognized in dog.*
- **Sertoli cell tumors** are the most common, especially in abdominally retained testes.
- **Seminomas** are the second most common neoplasm, and they are mostly in inguinally retained testes.
- Dogs are more likely to have **retention of the right testis** – perhaps because of a longer pathway for descent of the testis, or a less well-defined gubernaculum on the right.

# TESTIS AND EPIDIDYMIS

## Cryptorchidism

- Sertoli cell tumor and seminoma- are more prevalent in the right side also.
- Descent is usually complete by 3 months of age in the dog.
- Hormonal studies suggest that LH is lower in cryptorchid dogs.
- Cryptorchidism is common in boars.

# TESTIS AND EPIDIDYMIS

## Cryptorchidism

- There are many reports of cryptorchidism in stallions, and the condition is particularly noted because of the aggressive tendencies of stallions as compared to geldings.
- Testicular retention is usually unilateral, with about equal frequency as to side affected.
- Abdominal retention of left testes is more common than inguinal; the reverse is the case on the right side.
- Neoplasia of the retained testis is occasionally seen, with teratomas, seminomas, and Sertoli cell tumors being reported.

# TESTIS AND EPIDIDYMIS

## Inflammation of the testis and epididymis

### *Orchitis*

- Apart from bulls in areas endemic for *Brucella abortus* or tuberculosis, orchitis is a rare and sporadic disease in domesticated animals.
- *The vast majority of cases diagnosed clinically as orchitis are actually epididymitis.*
- Focal accumulations of lymphocytes are occasionally seen in the testes of most species as incidental findings.
- Lymphocytic (or nonsuppurative) inflammation is seen in some infertile animals.

# TESTIS AND EPIDIDYMIS

## Orchitis

- Orchitis as the primary and severe disease has historically been attributed to brucellosis or tuberculosis.
- **Tuberculous orchitis** is a multifocal granulomatous disease that is much less common now because of eradication in many countries.
- **Brucellosis** is similarly reduced in testicular degeneration prevalence. *Brucella abortus* (bulls), *Brucella suis* (pigs), *Brucella canis* (dogs), and *Brucella melitensis* (goats) can cause orchitis as a dominant change. However, epididymitis is often the primary manifestation.
- Orchitis occurs sporadically in cats with **feline infectious peritonitis**, in rams and bucks with *Corynebacterium pseudotuberculosis*, in pigs with *Burkholderia pseudomallei*, and in stallions with **migrating larvae of *Strongylus* spp. nematodes**.

# TESTIS AND EPIDIDYIMIS

## *Orchitis*

- The relative isolation of the testis suggests that infection with the various agents is mostly **hematogenously** derived, or occurs **by direct penetration**.
- Orchitis has been divided into **three major categories**:
  - ✓ **interstitial orchitis,**
  - ✓ **intratubular or granulomatous orchids, and**
  - ✓ **necrotizing orchitis.**

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# TESTIS AND EPIDIDYMIS

## *Orchitis*

### ✓ **Interstitial orchitis:**

- Interstitial orchitis may not be recognized macroscopically, but histologically it is characterized by *lymphocytic infiltration of intertubular stroma, with concurrent or subsequent fibrosis.*
- It usually occur in bulls and stallions.



# TESTIS AND EPIDIDYMISS

## *Orchitis*

- ✓ **Intratubular or granulomatous orchids**
- Intratubular orchitis probably results from ascending infection.
- Macroscopically, solitary or multiple white-yellow foci of up to -1 cm in diameter are seen.
- Histologically, the tubule outline is retained in the affected area, but the seminiferous epithelium is obliterated and replaced by numerous macrophages and multinucleated giant cells that surround neutrophils and debris.

# TESTIS AND EPIDIDYMISS

## *Orchitis*

- ✓ **Necrotizing orchitis**
- Necrotizing orchitis is **characteristic of *brucellosis*** but may result from other infections, or conditions causing severe trauma or ischemia of the testis.
- Macroscopically, Necrotic areas are **dry, yellow, often laminated, and slightly mineralized**.
- The histological picture is ultimately one of **coagulative necrosis** bordered by **fibrosis and inflammatory cells**. **Abscessation and fistulation** through the scrotum may accompany necrotizing or other forms of orchitis.

# TESTIS AND EPIDIDYIMIS

## *Orchitis*

### ✓ **Orchitis in bulls**

- Orchids caused by *Brucella abortus* occurs in regions of endemic **bovine brucellosis**. The live vaccine strain (strain 19) is also capable of producing the lesion.
- In most instances, the orchitis is acute and the lesion is irreversible.
- It may be **unilateral** but affected animals **are sterile**.
- **Tuberculous orchitis** in bulls is an uncommon lesion, even in areas of endemic infection.

# TESTIS AND EPIDIDYMISS

## Orchitis

### ✓ Orchitis in bulls

- Other bacteria causing orchids in bulls, sometimes in association with overt abscessation, include **streptococci, staphylococci, *Arcanobacterium pyogenes, Escherichia coli, Histophilus spp.,*** and ***Salmonella spp.***
- ***Actinomyces bovis, Actinobacillus sp.,*** and ***Nocardia farcinica*** may also cause bovine orchids.
- Infection of bulls with ***Chlamydophila spp.*** causes orchids, and in field cases focal granulomatous lesions have been observed.
- Orchids may be observed in **lumpy skin disease** and ***Bovine viral diarrhea virus.***

# TESTIS AND EPIDIDYMIS

## *Orchitis*

### ✓ **Orchitis in boars**

- Pigs experimentally infected with *Porcine rubulavirus*, a **paramyxovirus** that causes "blue eye," may develop orchids and epididymitis.
- The virus targets the head of the epididymis where it causes interstitial inflammation and sperm granulomas.
- Seminiferous tubular degeneration and interstitial orchids occur in some animals.
- *Suid herpesvirus 1* infection (pseudorabies, Aujeszky's disease) may cause edema of the scrotal region.

# TESTIS AND EPIDIDYIMIS

## *Orchitis*

### ✓ **Orchitis in boars**

□ **Enteroviruses**

□ **Parvovirus**

□ *Brucella suis* results in multiple abscesses rather than confluent necrosis. Some cases have fibrinopurulent and hemorrhagic periorchitis. Abscessation develops in the epididymis as well as in the testis; there is central caseation surrounded by a zone of epithelioid macrophages, and these in turn by a broad connective-tissue capsule infiltrated by leukocytes.

□ *Burkholderia pseudomallei*

□ *Arcanobacterium pyogenes*,

□ *Streptococcus zooepidemicus*, and

□ *Streptococcus equisimilis*.

# TESTIS AND EPIDIDYMIS

## Orchitis

- ✓ **Orchitis in stallions** mild interstitial orchitis is common.
- **Equine viral arteritis.**
- **Equine infectious anemia.**
- **Glanders (*Burkholderia mallei*),**
- **an acute suppurative, sometimes abscess forming orchids in infection with *Salmonella abortus-equi*, *Streptococcus equi*, and *Streptococcus zooepidemicus*.**
- **The larvae of *Strongylus edentatus***
- ***Halicephalobus gingivalis***
- ***Streptococcus zooepidemicus***

# TESTIS AND EPIDIDYMIS

## *Orchitis*

- ✓ **Orchitis in small ruminants**
  - Nodular orchitis occurs in **sheep pox**.
  - *Visna/maedi virus*.
  - *Arcanobacterium pyogenes* and
  - *Corynebacterium pseudotuberculosis*.
  - *Brucella melitensis*.



# TESTIS AND EPIDIDYMIS

## *Orchitis*

### ✓ **Orchitis in dogs and cats**

- In dogs, orchitis is usually accompanied by epididymitis.
- **Distemper**
- *Escherichia coli*,
- *Proteus vulgaris*,
- *Brucella canis*
- *Burkholderia pseudomallei*
- Orchitis in cats is very rare and may be a manifestation of **feline infectious peritonitis**.

# Epididymitis

- Inflammation of the epididymis is one of the more common inflammatory diseases of the genitalia, but frequently it is diagnosed clinically as "orchitis."
- Epididymitis is often infectious, and infectious disease frequently causes a spectrum of lesions, including inflammation of the accessory genital glands.
- The effects of epididymitis are so **much more dramatic than prostatitis, vesicular adenitis, or ampullitis** that these latter manifestations are often overlooked.

# Epididymitis

- Direct infection of the epididymis by penetrating injury is a rare event.
- Secondary infection from periorchitis, or peritonitis is an occasional possibility.
- *Equine arteritis virus*
- *Brucella ovis*, *B. canis*, *B. melitensis*, and *B. suis*
- *Actinobacillus seminis* and *Histophilus somni*  
(*Haemophilus somnus*/*Histophilus ovis*) in the ram

# Epididymitis

- **Spermatocele (or spermatic cyst)** is, benign cystic accumulation of sperm, a fluid-filled sac that grows in the epididymis.

# Neoplasms of The Testis and Epididymis

- *Testicular neoplasms are most commonly found in the dog.*
- *The three main testicular neoplasms of dogs are*
- *The Sertoli cell tumor,*
- *The interstitial (Leydig) cell tumor, and*
- *The seminoma.*
- *Most primary testicular neoplasms in dogs are benign.*

# Neoplasms of The Testis and Epididymis

- Testicular tumors are seen mostly in **mature and old animals**; the occurrence of interstitial cell tumors in dogs is especially age associated.
- Canine testicular tumors are found more frequently in the **right than in the left testis**. This is also true for the cryptorchid testis.
- **Metastasis of neoplasms** to the testis is rare.
- **Epididymal neoplasms** are exceedingly rare.

# SPERMATIC CORD

*Varicocele* is a dilation and tortuosity of the veins of the pampiniform plexus and the cremasteric veins.

- Varices of the spermatic veins are most commonly seen in old rams and occur sporadically in the stallion.
- Varicoceles appear as dark red nodules, 1-3 cm or more in diameter, enclosed in fascia of the spermatic cord proximal to the testis.
- Dissection of varicoceles may reveal large organizing laminated thrombi.
- Varicocele in the ram is bilateral, or unilateral with no apparent predisposition as to side.

# Varicocele



- Varicocele associated with marked passive congestion of the testicle. The lesion was bilateral. The testicle exhibits severe degenerative lesions and the vaginal tunic is oedematous.



# SPERMATIC CORD

- **Funiculitis** *is inflammation of the spermatic cord*; it follows open castration.
- It may be acute and necrotizing, as is often seen **in the pig**, in those species in which there is ample opportunity for contamination, or it may be chronic, as in the typical "scirrhous cord" of **horses and cattle**.
- **In the pig**, it is often a necrotizing purulent response; there may be very little granulation.

# ACCESSORY GENITAL GLANDS

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- ❖ **Vesicular glands (seminal vesicles) and ampullae**
  - ❖ **Prostate and bulbourethral glands**

# ACCESSORY GENITAL GLANDS

## Vesicular glands and ampullae

- Vesicular adenitis** is a *inflammation of the vesicular glands*.
- It, which is frequently accompanied by similar reactions in ampullae, is a common lesion *in the bull*, and is seen rarely in the *stallion and boar*.
  - Two forms of vesicular adenitis are recognized in the bull;
  - *a chronic interstitial form* characterized by a considerable increase in size, excessive fibrosis, firm consistency, and loss of lobulation, and
  - *a predominantly degenerative form* characterized by at most a slight increase in size and consistency.

# ACCESSORY GENITAL GLANDS

## Prostate and bulbourethral glands

**Anomalies of the bulbourethral gland include**

- congenital retention cysts in bulls, rams, and cats,
- aplasia, hypoplasia, and fusion in bulls.
- Melanosis of the bulbourethral glands has been observed in the bull and in swine.

# ACCESSORY GENITAL GLANDS

## Anomalies of Prostate

- **Prostatic cysts** in the dog may be **congenital** or be **secondary** to the hyperplasia, neoplasia, or inflammation.

Classification of prostatic cysts in the dog into four types –

1. *multiple cysts associated with prostatic hyperplasia,*
  2. *retention cysts,*
  3. *paraprostatic cysts, and*
  4. *cysts associated with squamous metaplasia*
- Although their precise origin is still unclear, paraprostatic cysts probably result from anomalous development.

# ACCESSORY GENITAL GLANDS

## Prostatic cysts

- The smaller cysts are up to "7 cm in diameter and have a wall 2-5 mm thick, whereas larger cysts may be up to 24 cm long and 14 cm in diameter and contain much collagen and even bone in their walls.
- Cystic enlargement, which occurs mostly in old dogs, appears to be stimulated by estrogenism, as in response to a Sertoli cell tumor, and may cause constipation.

# ACCESSORY GENITAL GLANDS

## Prostate and bulbourethral glands

- Both types of cysts may be lined by epithelium that appears to be secretory.
- Accumulations of fibrin on the inner aspect of the larger cysts, as well as cauliflower-like bony lesions extending into the lumen, are common.
- Cysts may rarely become infected and rupture but their content is almost always sterile and is devoid of pus, urine, and spermatozoa.

# ACCESSORY GENITAL GLANDS

## Prostatitis

- **Prostatitis** is common in the dog. It is often a disease of older dogs in which hyperplastic prostatic changes are present.
- The infecting agents are
  - ❖ Urinary pathogens,
  - ❖ *Escherichia coli*,
  - ❖ *Proteus vulgaris*,
  - ❖ streptococci, and staphylococci,
- Prostatitis is often **acute, with systemic signs of illness**, and **about two-thirds** of affected dogs have a history of urinary tract signs that include **gross blood and or pus in the urine, urethral discharge, incontinence, or dysuria**.



# ACCESSORY GENITAL GLANDS

## Prostatitis

- Acute prostatitis is a diffuse or focal suppurative process with a tendency to abscess formation.
- The abscesses may be minute and multiple, or large with confluent areas of necrosis.
- The larger abscesses fluctuate on capsular palpation.
- Such abscesses may lead to metastatic sepsis, septicemia, peritonitis, and death, especially if there is sudden rupture.

# ACCESSORY GENITAL GLANDS

## Prostatitis

- In diffuse prostatitis, the gland is often asymmetrically enlarged, congested, and edematous with a soggy consistency, and pressure causes welling of pus over the cut surface.
- Localization in and destruction of acini proceeds to abscess formation.
- Acute inflammation may resolve and leave only extensive scarring, or it may become chronic, especially if ducts are obstructed, and the infection then tends to persist in small walled-off loci.

# ACCESSORY GENITAL GLANDS

## Prostatitis

- Chronic prostatitis *in the dog* is also a common lesion.
- The prostatic epithelium is atrophic and its cytoplasm loses its characteristic eosinophilic staining quality.
- The lumina of the gland contain a variable number of neutrophils and macrophages, and debris.
- The inflammation is apt to involve the gland segmentally.
- Aggregates of lymphocytes in the fibromuscular stroma, especially about the ducts, are very common.

# ACCESSORY GENITAL GLANDS

## Prostatitis

- Prostatitis is a constant feature of *Brucella canis* infection.
- Typically, involvement is extensive but lobular in distribution, and consists of a generalized **lymphocytic infiltration** with **destruction of adjacent epithelium** and associated **fibrosis**.
- Prostatitis may become **emphysematous** in the presence of gas-forming organisms.
- Systemic fungal infections, such as that caused by *Blastomyces dermatitidis*, may involve the prostate.

# ACCESSORY GENITAL GLANDS

## Hyperplasia-hypertrophy of the prostate

- Hyperplasia-hypertrophy of the prostate is observed **in the bull**, but it commonly occurs only in the dog.
- Some degree of hyperplasia is often evident **in dogs 4-5 years of age**, and the prevalence and degree increase with advancing years, such that **80% or more of mature or old dogs** may have enlarged prostates.
- Enlargement of the prostate is frequently associated with *constipation*, presumably caused by pressure on the rectum. Less common, but more important, is *inteference with urination*.

# ACCESSORY GENITAL GLANDS

## Hyperplasia-hypertrophy of the prostate

- The hyperplastic gland is almost invariably **enlarged**, sometimes **up to four times its normal size**, and the surface is **irregularly nodular**, in some cases obscuring the normal **bilobed appearance**.
- Palpably fluctuating cysts and venous and lymphatic ectasias may be present beneath the capsule.
- The appearance of the cut surface varies depending on the degree of **acinar and stromal hyperplasia** and **on the presence and size of cysts**.
- The lobules vary much in size.

# Prostatic hyperplasia



Benign prostatic hyperplasia in a dog. The organ is obviously enlarged, maintaining the median sulcus and a regular external surface. On the right, after sagittal cut, it is possible to see focal haemorrhage on the right lobe.

# PENIS AND PREPUCE

- There are a number of developmental penile and preputial abnormalities that are of surgical importance.
- ❖ *Penile and preputial hypoplasias*
- ❖ *Diphallia* or duplication of the glans penis
- ❖ *Partial or complete lack of the sigmoid flexure of the penis*
- ❖ Congenital dilation of the penile urethra
- ❖ *Congenital short penis*
- ❖ *Hypoplasia of the glans penis*
- ❖ *Paraphimosis* (inability to retract the penis in the stallion.)
- ❖ *Phimosis etc.*



# PENIS AND PREPUCE

## Balanoposthitis

- Inflammation of the glans penis (balanitis) is frequently accompanied by inflammation of the prepuce (posthitis).
- Viruses → *Bovine parainfluenza virus 3* in bulls and herpesviruses in many species,
- Bacteria → *Corynebacterium renale* and *Histophilus somni*,
- Fungi, mycoplasmas and ureaplasmas, chlamydia, and protozoa.

# Balanoposthitis in a stallion

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- Balanoposthitis caused by *Habronema sp. larvae*. Note the extraordinary volume of the prepuce due to the intense inflammatory reaction developed due to the presence of the larvae of this parasite. The glans penis was also extremely hypertrophied.

# PENIS AND PREPUCE

## Balanoposthitis

- Balanoposthitis in the bull can be caused by *Bovine herpesvirus 1*.
- This virus causes both respiratory disease (infectious bovine rhinotracheitis, IBR) and genital disease (infectious pustular vulvovaginitis, IPV).
- The genital disease in the bull is characterized clinically by thin purulent preputial discharge.
- Simultaneous occurrence of th respiratory and genital forms of the disease is rare.

# PENIS AND PREPUCE

## Balanoposthitis

- In the acute stage of balanoposthitis, 2-3 days postinfection, numerous small gray-white opaque loci of necrosis are present. These areas of necrosis may form confluent and flat efflorescences.
- In severe cases, edematous swelling of the penis and prepuce may occur at this time.
- The loci of necrotic mucosa, which exist for 1-2 days only, subsequently become indistinct, the surface sloughs and sharp ulcers or erosions remain, especially in the area of the glans. A distinct zone of hyperemia surrounds many ulcers.
- Healing commences after 6-8 days and in uncomplicated cases is complete in 2 weeks.

# PENIS AND PREPUCE

## Balanoposthitis

- The microscopic lesion is one of epithelial necrosis with neutrophilic accumulation, lymphocytic infiltration of surrounding stroma, and the transient appearance of intranuclear inclusion bodies in degenerating epithelial cells.
- Herpesviral infection of male goats may also cause similar lesions that may, however, progress to extensive suppurative and necrotizing balanoposthitis involving the glans, fornix, and entire urethral process.
- Equine coital exanthema, caused by Equid herpesvirus 3, and
- In dogs, the genital lesions of Canid herpesvirus 1 infection

# PENIS AND PREPUCE

## Neoplasms of the penis and prepuce

- *The important primary tumors are*
- ❖ *transmissible fibropapilloma* in the bull,
- ❖ *squamous papilloma and squamous cell carcinoma* in the horse,  
and
- ❖ *transmissible venereal tumor* of dogs.
- ✓ Additional details on *bovine fibropapillomatosis and canine venereal tumor* will be given in the Female Genital System.