Images for Reproductive lab 1 2009

- These 27 slides were selected from those used during the first 2 (and part of the 3rd) lectures.
- Attempt to make a morphologic diagnosis, and/or name possible etiologic agent(s) particularly for the gross lesions.
- Several questions related with the selected slides will be made during this revision in order to provide an idea what aspects should be considered most relevant for this part of the course.
- Best wishes in your revision & FINAL exam.
Schematic diagram of the normal components of the female reproductive system and the embryonic structures, especially the paramesonephric (Müllerian) duct and urogenital sinus and tubercle from which they were derived.
Sexual differentiation - female

- Early embryo is bipotential
- If XX, genes initiate ovarian differentiation & inhibit testicular differentiation
  - Germ cells undergo meiosis
  - Supporting cells form follicles
  - Steroid-producing cells form thecal cells
- Mullerian ducts form uterine tubes, uterus, cervix and cranial vagina
- Wolffian (mesonephric) ducts regress
- No longer seen as a passive process
Male differentiation

- In XY, differentiation is due to SRY coding for TDF
- TDF causes indifferent gonad to become testis
  - Germ cells go into mitotic arrest
  - Supporting cells become Sertoli cells
  - Steroid-producing cells become interstitial cells
- Sertoli cells secrete MIS → Mullerian duct regression
- Testosterone from Leydig cells → Wolffian duct development
- DHT → masculinization of external genitalia
Sexual differentiation

Sex can be determined at many levels:

- Genetic
- Chromosomal
- Gonadal
- Ductal
- Phenotypic

Discordance between levels leads to sexual ambiguity or intersex
Lesions of Freemartinism

- Small ovaries
- Small blind uterus
- Small vagina
- Complete hymen
- Enlarged clitoris resembling penis
- Seminal vesicles & other male structures
- Male twin is minimally affected
True hermaphrodites

Ovary and testis present in same individual

- **Lateral**: testis one side, ovary other side
- **Bilateral**: ovotestes both sides
- **Unilateral**: ovotestis one side, ovary or testis on other
- Ambiguous external genitalia
- Rare but seen more in dogs, goats & swine
True hermaphrodite, lateral, reproductive tract, gilt.

Ovotestes, true hermaphrodite, histo
Abnormal phenotypic sex
Chromosomal & gonadal sex agree, but genitalia is ambiguous, hence a pseudohermaphrodite

- Female pseudohermaphrodite (XX + ovary)
- Male pseudohermaphrodite (XY + testis)
  - Persistent Mullerian duct syndrome (PMDS)
  - Androgen insensitivity
- Often hormone-induced, hence can be iatrogenic
Male pseudohermaphrodites, reproductive tract, pig (left) and dog (right)
Anomalies with normal sexual differentiation
(Abnormal development of the paramesonephric duct system)

- **Segmental aplasia**
  May lead to
  - Pyometra
  - Lysis of CL in pigs
  - Persistent CL in cattle

- **Persistent hymen**

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Persistent hymen (arrow), vagina and vulva, bitch.

Segmental aplasia of a uterine horn, pig.
Anomalies with normal sexual differentiation

(Abnormal development of the paramesonephric duct system)

- **Imperfect fusion**
  - Double vagina
  - Double cervix
  - Double uterus (uterus didelphys)

Uterus didelphys (left) and double cervix (right), cows
Minor anomalies

• Incidental findings not be mistaken for lesions that can cause reproductive disease

Hydatid of Morgagni, ovary, mare.

Uterine serosal inclusion cysts and paraovarian cysts, reproductive tract, bitch.
Vulval tumefaction (hypertrophy and edema).

Vaginal polyps, bitches

Vaginal leiomyoma (fibroid), bitch
Transmissible venereal tumor (TVT), vulva and vagina (bitches), nasal passage (dog) & microscopic features
Pyometra
Accumulation of pus in uterine lumen

Acute or chronic, usually secondary

- Cervix is fully or partially closed
- Pathogenesis:
  - Carnivores: prolonged hormonal dysfunction + bacteria (CEH-PC)
  - Others: post-partum or post-coital infection
- Extragenital lesions in dogs:
  - Bone marrow depression & anemia,
  - Marked EMH in spleen & liver
  - Marked leucocytosis,
  - Immune complex glomerulonephritis

Bovine pyometra, acute (top), postpartum (left bottom), and chronic (right bottom)
Endometritis and hyperplastic vacuolated epithelium, histological examination.

Metritis-pyometra-endometrial hyperplasia, uterus, bitches.
Non-inflammatory diseases of uterus

- Physical influences
  - Rupture
  - Torsion
  - Prolapse
Subinvolution of placental sites

- **Young bitches**
- **Clinical signs:**
  - Prolonged bloody vaginal discharge
  - Discharge postpartum (> 6 wks)
- **Gross lesions**
  - Multiple segmentally thickened horns
- **Histo**
  - Persistence of trophoblast-like cells in hemorrhagic endometrium
  - Cells may invade and perforate myometrium

Trophoblastic-like cells, endometrium bitch
Pathogenesis of endometrial hyperplasia

- **Prolonged hyperestrogenism** (farm animals)
  - Sources of xs estrogens include:
    - Cystic ovarian disease
    - Granulosa cell tumor of ovary
    - Estrogenic pastures
    - Mycotoxins like zearalenone

- **Xs progesterone plus bacterial infection**
  - Xs PG from persistent CL (carnivores)
  - Estrogen priming??

- Cystic, not precancerous, but prone to infection in the bitch and queen.
Cystic endometrial hyperplasia, sow (left) and bitch (right)
Leiomyomas (myomas), uterus, bitches.
Mummification

- Dead fetus is retained indefinitely & becomes dehydrated
- No lytic or putrefactive bacteria
- Normal breeding may follow expulsion
Maceration

- Dead fetus is retained but infected by lytic/putrefactive bacteria
- Often secondary to dystocia or incomplete abortion
- May lead to pyometra
- Also maternal death from:
  - Uterus perforation leading to peritonitis & toxemia

Failure of pregnancy, macerated fetuses, lamb (top) and calf (bottom)
Lesions in brucellosis

- **Gross:**
  - Thick leathery placenta
  - Intercotyledonary edema
  - Fetal anasarca

- **Histo:**
  - Necrosuppurative placentitis
  - Numerous bacteria in trophoblasts
  - Granulomatous endometritis
  - Fetal bronchopneumonia
  - Other nonspecific fetal lesions
Bovine fetus with Brucellosis. Note the fibrin on the surface of the lung.

Bovine fetal liver with brucellosis. Large granuloma in center

Bovine fetal lung with severe arteritis due to brucellosis

Bronchopneumonia, Brucellosis, bovine fetus
Multifocal pale round umbilicated 1-10 mm areas of necrosis, *Campylobacter fetus*, lamb
Other bacterial diseases

- **Arcanobacteriosis**
  - Common cause of sporadic abortion in cattle

- **Leptospirosis**

- **Listeriosis**
  - Mostly in ruminants. A zoonosis

- **Salmonellosis**
  - Affects many species. Also a zoonosis

*Listeriosis, newborn lamb, multifocal necrotizing hepatitis*