Providing the best quality care and service for the patient, the client, and the referring veterinarian.

Reproductive Emergencies

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Canine Pregnancy – the Basics

- **Litter Size determination**
  - In general, the larger the breed, the larger the average litter size.
  - Other factors:
    - Sperm count of the male
    - Timing of breeding and frequency of breeding
    - Health of the bitch and condition of her uterus
    - Bitch’s nutritional status, underlying diseases, and exposure to pharmaceuticals
Canine Pregnancy – the Basics

- Normal gestation length 57-72 (avg. 65) days from the time of first breeding
Feline pregnancy – the Basics

- Induced ovulators
- Normal gestation length – 63-65 days from the time of first breeding
Pregnancy – the Basics

- Pre-parturition signs:
  - Mammary development
  - Vulvar enlargement
  - Mucoid vaginal discharge
  - Relaxation of the pelvic ligaments
  - Onset of lactation (24 hrs. prior to parturition)
  - Body temp. <99 F (24 hrs. prior to parturition)
Stages of Parturition

• Stage 1:
  - Typically lasts for 6 to 24 hrs.
  - Subclinical uterine contractions, progressive dilation of cervix
  - Bitches: restless, panting, nesting behaviors, hiding, and anorexia.
  - Queens: tachypneic, restless, vocal, purring, and may stay near a nesting box/area.
Stages of Parturition

- **Stage 2:**
  - Active expulsion of the fetuses
  - First fetus delivered within 1 hr. of onset of Stage 2, with subsequent fetuses every 15 min. to 4 hrs..
  - Entire process occurs within 2-12 hrs., but may take as long as 24 hrs. with larger litters.
Stages of Parturition

Stage 3:

- Expulsion of the placenta
- Should be one placenta for each fetus delivered
- Placentas are usually attached to umbilical cord and will be expelled with each birth.
- If placenta becomes detached, expulsion should occur several hours after birth.
“Green Vaginal Discharge”

- Lochia = greenish vaginal discharge
- Indicates placental separation
- May be seen during ALL stages of labor and does not necessarily indicate a need for concern!
- Reddish-brown vaginal discharge expected for 4-6 weeks post-parturition.
“Guadalupe” – 2 yr. F/I Chihuahua

- Presented with puppy (dead) protruding from vulva
- Owner stated pet had been this way for 6 hrs.
- No “known” medical history
- Vitals – HR 120; light pink, tacky MM
- PE – 5% dehydrated; live fetus palpated in abdomen; prominent mammary glands
Dystocia

- **Dystocia**: Difficult parturition to the point of needing human intervention.

- **Reasons to head to the ER:**
  - No signs of labor 24-36 hours after temp. <100°F
  - Active uterine contractions >1 hr. without expulsion of fetus
  - More than 3 (up to 4) hours between births
  - No fetus produced 4 hours after onset of labor
  - Failure to initiate labor at the end of gestation
  - Abnormal vaginal discharge
  - More than 1 week overdue
Dystocia – WHY?

- **Maternal factors**
  - Uterine inertia (most common)
  - Previous pelvic fractures
  - Reproductive tract issues: vaginal stricture, insufficient cervical dilation, vaginal mass, uterine torsion
  - Inguinal hernia
  - Extreme nervousness of the dam

- **Morphologic factors** – obstruction of birth canal
Dystocia – WHY?

- Fetal factors
  - Malpresentation (NOT posterior presentation)
    1. Head first with retention of forelegs
    2. One foreleg forward and retention of the other
    3. Dorsiflexion of the head
    4. Transverse presentation with fetal head in one uterine horn, rear quarters in the other.
  - Oversized fetus
  - Fetal malformations
  - Fetal death
Dystocia - Signalment

- Primiparous bitches < 2 years old.
- Toy and small brachycephalic breeds
- Very large or very small litters
- Not as common in cats
Clinical Signs

- Vocalization
- Biting/chewing at vulvar region
- Abnormal vulvar discharge
- Fetus protruding from vulva
- Systemic illness – fever, weakness, tremors
Dystocia – PE & Diagnostics

- Vaginal exam – sterile technique
- Abdominal radiographs
  - Assess size, number, position and location of the fetuses +/- fetal viability
  - Assess maternal pelvic structure and status of abdomen
Abdominal Radiographs

Normal fetal structure, size

Mummified fetus
Dystocia – PE & Diagnostics

- Abdominal ultrasound
  - Assess fetal viability, malformations
  - Fetal HR: dogs 180-245 bpm, cats 180-265 bpm

- Minimum database
  - PCV/TS, calcium level (total + ionized), BG
  - Ideally, full CBC + chemistry panel
Abdominal Ultrasound

Fetal head and thorax
Back to “Guadalupe”
Fetus In the Birth Canal

- Attempt manual removal of fetus
  - Sterile lube (diluted) +/- sterile red rubber catheter
  - Dam standing or laterally recumbent + caudal abdominal palpation
  - Posterior-ventral traction of the fetus
  - Obstetrical instruments should be avoided
  - An episiotomy can be performed at the dorsal vulvar midline if the vulvar opening is too narrow.

- If unable to remove fetus --- SURGERY!!
Digital manipulation and extraction of fetus

12-14 g. red rubber with sterile lube via syringe
Possible causes for Guadalupe’s dystocia:
1. Primary uterine inertia
2. Fetus presenting head first with retention of forelegs
Oxytocin

- Treat hypoglycemia, hypocalcemia prior to use
- Considerations – obstruction of birth canal, oversized fetus, abnormal presentation of fetus
- Uterine rupture = fetal death
Oxytocin

- **Dosage**
  - Dogs: 0.5-2 units IM (or IV) – some list up to 20 u.
  - Cats: 0.5 units IM (or IV) – do not exceed 3 u.
  - If no fetus, can repeat dosing 30 minutes later +/- 0.5 mg/kg 10% Dextrose slowly IV.
  - No additional doses of oxytocin recommended past this point (though some references list 3rd dosing)
Calcium Gluconate 10%

- Dose as a uterotonic agent: 11mg/kg diluted in saline administered IV over 10-15 minutes while monitoring EKG.
- If noted hypocalcemia, administer 50-150 mg/kg IV over 10-15 min. while monitoring EKG.
Prognosis

- Guarded
- 20-40% success with medical management
- Dystocia lasting >6hr = increased stillbirth rates
- Recent studies –
  - With C-sections, neonatal survival rate reported at 92%
  - 80% survival 7 days post C-section.
Off to C-Section…

- **Anesthesia**
  - Goal: survival of dam and neonates
  - Minimize exposure to fetuses
  - Prep dam prior to induction
  - Pre-oxygenate dam

- **Agents**
  - Glycopyrrolate
  - Propofol
  - Gas anesthesia (+/- mask down)
  - Regional anesthesia: line blocks, epidurals
Surgery

- Prophylactic antibiotics, anti-emetics??
- Cesarean without OHE
  - +/- oxytocin
- OHE
- En bloc resection

**Decision made based on dam and fetal status, staff available, and surgeon’s choice.**
Neonate resuscitation

- Suction nares, nasopharynx
- +/- swing technique
- Rubbing/drying, stimulation
- Acupuncture point – GV 26 (Jen Chung)
- Oxygen support
- +/- Naloxone, Doxapram, Epinephrine sublingual
Neonate resuscitation

- Umbilical cord care
- Heat support

**KEYS:**
- Be patient!!
- Listen for that sweet sound!!
Neonate care

- Once dam is recovered and relaxed, attach neonates to nipples and encourage suckling
- Oxytocin release
Success!!
“Violeta” – 10 yr. F/I Labrador

- Inappropriate urination, defecation, for a few days.
- Vomited multiple times at home.
- Seen by rDVM - possible splenic mass on palpation & X-rays. Abdominocentesis revealed frank blood.
- Owner opted to take Violeta home to make decision.
“Violeta”

- Presented to ASEC 2 days later for surgical consult
- Vitals: WNL
- PE:
  - Small amount of sanguinopurulent vaginal discharge. No masses palpable but dorsal cranial wall of vagina feels slightly rough/irregular
  - Firm bony swelling palpable at the pubis
- Abdominal radiographs....
Abdominal Ultrasound

- 1. Uterine pyometra, mucometra, etc. with concurrent endometrial thickening and/or endometritis.
- 2. Suspect bilateral cystic ovaries.
- 3. Mild bilateral renal pyelectasia may represent pyelonephritis or another nephropathy.
- 4. Right renal cortical cysts likely represent a degenerative change.
- 5. Mild left adrenomegaly may be a variation normal of represent benign hypertrophy.
- 6. Irregular, proliferative pubic bone contour may represent neoplasia or osteomyelitis.
Suspected diagnosis.....

PYOMETRA!!!
Pyometra

- Secondary to cystic endometrial hyperplasia in response to endogenous progesterone
- Develops when bacteria invade the abnormal endometrium, leading to intraluminal accumulation of pus.
- Cats – Not CEH (cystic endometrial hyperplasia); ovulation by coitus, spontaneous ovulation
Pyometra

- Most common bacteria: *Escherichia coli*

- Other causes: foreign body, ovarian remnant
Signalment

- Older bitches
- Queens < 6 years old
- **4 weeks to 4 months post-estrus**
- Bitches with short interestrous intervals
- Young animals treated with exogenous estrogen or progestagen.
- +/- genetic predisposition in certain lines
Clinical signs

- Anorexia
- Lethargy
- Depression
- Polyuria
- Polydipsia
- Vomiting
- Diarrhea
- +/- Febrile
- +/- Vaginal discharge
- +/- Abdominal distention
- **Systemic illness, shock with closed presentation**
Diagnostics

- CBC: immature neutrophilia, leukopenia; mild normocytic, normochromic anemia
- Chemistry: Azotemia, elevated protein and globulins, +/- elevated ALT, ALP, electrolyte disturbances
“Violeta”

- In-house CBC:
  - LYMPH 8600 (H), GRAN 0, HCT 37.4%
  - MCV 63.3 (WNL), MCHC 38.0 (WNL)
  - PLT 187,000 (L)
- In-house Chemistry:
  - ALP 207(H)
  - Na+ 132 (L)
- No UA performed
Diagnostics

- **UA:** **NO CYSTO!!** Proteinuria +/- UTI
- **USG:**
  - >1.030 = pre-renal uremia
  - <1.006 = nephrogenic diabetes insipidus secondary to *E. coli*.
  - 1.008 - 1.030 = unsure of renal function at that time and will need to monitor, assess lytes
Azotemia – in depth

- *E. coli* interferes with Na\(^{+}\) & Cl\(^{-}\) absorption in the loop of Henle, thus reducing medullary hypertonicity and resulting in impaired water absorption.

- *E. coli* endotoxins block the action of ADH on the collecting ducts, resulting in PU/PD.
Diagnostics

- Vulvar discharge cytology: degenerative polymorphonuclear cells and bacteria; may be normal with closed cervix
- Abdominal Radiographs: *Don’t be fooled!!*
- Abdominal Ultrasound: best diagnostic tool
Obvious Much???
Medical management

- May be initiated if….
  - Open pyometra
  - Future breedings planned
  - Not systemically ill

- Antibiotics: fluoroquinolones – 3-4 weeks

- Prostaglandin therapy – lyse corpora lutea and cause myometrial contraction.
Prostaglandin therapy

- PGF2α dosing (off-label)
  - Dogs: 0.05-0.25 mg/kg SQ BID to TID for 3-7 days until no intrauterine fluid is noted via ultrasound
  - Cats: 0.1-0.5 mg/kg SQ BID to TID for 2-5 days until the size of the uterus is near normal
- Only natural prostaglandins should be used.
- Should be avoided in cases of closed pyometra.
Prostaglandin therapy

- Side-effects: anxiety, vomiting, tachypnea, and tachycardia within minutes of administration.
- Animals should be hospitalized and monitored during initial administration.
- If vaginal discharge is still present 2 weeks following a five-day course of prostaglandin therapy, a second round of therapy should be initiated.
- The pet should be bred on the very next estrus.
Surgery = “Glorified Spay”

- Routine OHE approach
- Uterus may be friable and prone to rupture
- Warm, sterile saline flush if fluid leakage
- Monitor BP, temp closely intra-op
“Violeta”

- Surgery - Both ovaries were palpably irregular textured and the left uterine horn was dilated. OHE performed. 50% debulking of pubic mass.
- Culture + MIC: E.coli and Bacteroides fragilis
- Histopath of mass: Chondrosarcoma
- Discharged from hospital 48 hr. post-op
Eclampsia

- a.k.a. - Puerperal tetany
- Result of hypocalcemia in postpartum or peripartum animals.
- Occurs most commonly within the first 21 days after whelping.
- Small and medium breed dogs
- Rare in cats
Clinical signs

Early signs:
- Restlessness, pacing
- Panting
- Whining
- Salivation
- Tremors
- Stiffness

Later signs:
- Tonic-clonic muscle spasms
- Fever
- Tachycardia
- Miosis
- Seizures
- Death
Calcium Gluconate 10%

- Administer 50-150 mg/kg IV over 10-15 min. while monitoring EKG.
- Can cause vomiting during administration.
- Pet will usually become more alert and muscle tremors subside.
Additional treatment

- IV catheter, IV fluids
- Dextrose supplementation PRN
- A second dose of calcium gluconate diluted 50:50 with saline can be given subcutaneously.
Long term management

- **Oral calcium treatment**
  - Dose: 50mg/kg PO TID
  - Should be continued throughout lactation
- **Puppies should be weaned early**
- **Puppies should be removed and hand-raised if eclampsia occurs again.**
Retained placenta

- Retained placenta within the uterus can predispose the dam to metritis.

- Clinical signs:
  - Foul smelling discharge
  - Fever
  - Vomiting
  - Anorexia
  - Lethargy
  - Toxemia
  - Death
Retained placenta

- **PE:** May be able to palpate placenta on abdominal palpation.
- **Confirm diagnosis based on abdominal ultrasound.**
- **Treatment:**
  - Antibiotics
  - PGF2α (preferred if >24 hr. post delivery) or Oxytocin
  - IV fluids, hospitalization if needed
Retained placenta

- Puppies or kittens should be allowed to nurse if the dam is not systemically affected.
- Be aware that if the bitch is not watched very closely she may eat the placenta before it is seen.
Metritis (Postpartum endometritis)

- Metritis occurs in the post partum period (1-7 days later)
- Metritis, as opposed to pyometra, occurs when progesterone levels are low.
- Due to ascending infection following uterine damage from whelping, abortion, dystocia, retained placenta, retained fetus, or fetal infection.
Metritis

Clinical signs:
- Anorexia
- Depression
- Fever
- Vomiting
- Weight loss in puppies due to decreased lactation
- Neglect of puppies
- Foul smelling vulvar discharge
Metritis

**Diagnostics:**
- Abdominal radiographs: may note fetal skeleton
- Abdominal ultrasound: may note retained fetus or placenta
- CBC: leukocytosis with left shift,
- Vaginal cytology: degenerative neutrophils, bacteria
- Rec: deep vaginal swab for culture and sensitivity prior to initiating antibiotic therapy
Metritis

- Treatment:
  - IV catheter, IV fluids
  - Antibiotics therapy: Enrofloxacin, TMS
  - +/- PGF2α therapy
  - OHE once stable

- Puppies may nurse if dam is stable and puppies are gaining weight but best to remove and hand raise.
Uterine prolapse

- Occurs during parturition or within the first 48 hours post-parturition, when the cervix is open.
- Rare occurrence, but more common in cats than dogs.
- Prolapse of both uterine horns usually after the entire litter is delivered.
- Occasionally a single uterine horn will prolapse and the remaining horn may still have viable fetuses present.
Uterine prolapse

- External reduction should be attempted as soon as possible to minimize edema & necrosis.
- Treatment:
  - General anesthesia (+/- epidural)
  - Flush exposed tissue with sterile saline
  - 50% dextrose, mannitol or hypertonic saline topically to help reduce edema before attempting reduction
  - Sterile lubricant applied liberally
  - Episiotomy PRN
  - Manual reduction of the tissue
  - Oxytocin 0.5-5 (up to 10) units IM
Uterine prolapse

- If the uterus stays in for 24 hours, further risk of prolapse is unlikely because the cervix should be closed.
- If the tissue is damaged or necrotic, OHE is recommended.
Surgical intervention

- Internal reduction of the prolapse can usually be achieved during OHE.
- In some cases, reduction is impossible due to extreme engorgement of the prolapsed tissue. In these cases, the prolapsed segment is amputated prior to OHE.
Mastitis

Inflammation of the mammary gland associated with infection
Occasionally occurs in lactating bitches, rarely in queens.
May be seen with false pregnancy.
DDx: Inflammatory mammary adenocarcinoma
Mastitis

- Can range from hard, painful, enlarged mammary glands due to galactostasis to abscessed or gangrenous mammary glands with accompanying septic shock.
- Cytology of milk: degen. Neutrophils, intracellular bacteria, & macrophages
- Common bacteria: *E. coli*, *Staph aureus*, and *B-hemolytic Strep*.
- Systemic antibiotics: TMS, chloramphenicol, ampicillin (IV), clindamycin, or cephalosporins
Mastitis

- In general, pups should be allowed to nurse unless the infected glands are necrotic, or the bitch is systemically ill.
- Continued nursing will avoid galactostasis and will aid drainage.
- Hot packing/warm compressing of the affected glands will also promote drainage.
- In severe cases, the pups should be removed and necrotic glands should be surgically lanced, drained, flushed, and debrided.
Prostatitis

- Acute bacterial infections of prostate may warrant ER visit
- Clinical signs:
  - Fever
  - Anorexia
  - Hemorrhagic or purulent urethral discharge
  - Stiff gait
  - Painful prostate
  - +/- dysuria and tenesmus
Prostatitis

- **Diagnostics:**
  - Abdominal radiographs: sublumbar lymphadenopathy, prostatomegaly
  - Abdominal ultrasound: enlarged prostate; DDx: neoplasia, cyst
  - Urinalysis: WBCs, RBCs, bacteria; submit Culture + MIC
Prostatitis

Treatment:
- IV catheter, IV fluids
- Antibiotic therapy: TMS, enrofloxacin, Clavamox, or chloramphenicol for 3-4 weeks
- +/- stool softeners if tenesmus
- Recommend castration
Paraphimosis

- Inability to retract penis into prepuce
- Clinical signs:
  - Engorged penis
  - Excessive licking of penis
  - Drying or necrosis of exposed penis
  - Stranguria
  - Hematuria
  - Anuria
Paraphimosis

● Causes:
  – Sexual excitement
  – Trauma
  – Infection
  – Neoplasia
  – Strangulation by preputial hair
Paraphimosis

Treatment:
- Sedation +/- general anesthesia
- Clean, debride exposed penis
- Apply sterile lube liberally and attempt manual reduction
- +/- hyperosmotic agents
- +/- surgical enlargement of dorsocranial aspect of prepuce
- +/- urethral catheter
Paraphimosis

- Surgical intervention:
  - Penile amputation may be warranted with necrosis or thrombosis of the penis
  - Castration recommended if intact
Testicular torsion

- Most often occurs in cryptorchid dogs
  - Intra-abdominal testicle more prone to torsion and neoplasia
- Clinical signs:
  - Acute abdominal pain
  - +/- palpable abdominal mass
  - Slow, stiff gait
  - Vomiting
  - Shock
Testicular torsion

- May be difficult to diagnose immediately
- Abdominal ultrasound will be of most benefit
- Surgical intervention is necessary
- Submit histopathology on testicle to rule out neoplasia
References