Pathology of the Domestic Ferret

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Bacterial UT Infections

Common in female ferrets
Can reach kidney in 2 weeks
Hydronephrosis is a common sequela
Leptospirosis

• Uncommon disease or underdiagnosed?
• Icteric animals, high activity of liver enzymes
• Prerenal uraemia, nervous symptoms, apathy, weakness
Leptospirosis
Leptospirosis
Leptospirosis
Urolithiasis

- Uncommon in ferrets – primarily struvite
- Male ferrets more likely than females
- More common in pregnant females
- Ddx prostatic squamous metaplasia
- Frequent licking genital area, anuria, occ. haematuria
Cystic Prostatic Disease

- Sequelae to adrenal disease in male ferrets
- Dysuria, but easily expressed
- Estrogen effect on glandular epithelium
- Adrenalectomy is curative
Prostatic Squamous Metaplasia

- Only recently recognised
- Causes dysuria and urethral blockage
- Squamous changes related to excess oestrogens from proliferative adrenal lesions
- Multiple prostatic cysts with keratin debris
- “Triple bladder syndrome”
Prostatic Squamous Metaplasia
Chronic Interstitial Nephritis

- Very common in older ferrets
- Triangular areas of cortical scarring containing obsolescent glomeruli
- Not infarcts
- Early lesions as early as 2 years
- Advanced cases with renal failure 4.5 years
- High protein diets (>34%)?
Chronic Interstitial Nephritis
Chronic Interstitial Nephritis
Common Incidental Findings

Renal Cysts - Over 25% of ferrets have benign renal cysts
Polycystic Kidney Disease
Mastitis

E. Coli is most common isolate; also see S. aureus

Must remove kits from jill
Induced ovulators, in oestrus until mated, spayed, or injected with HCG/Leupron, 50% of unbred jills will die.

- High levels oestrogen >> BM suppression
- Rare in pet ferrets they are castrated
Estrus-associated Anemia

- Signs referable to which line(s) affected in marrow
- Non-regenerative anaemia (PCV <20%), leukopenia, thrombocytopenia > death by severe anemia most common
Cardiomyopathy

- Common in American bloodlines
- Genetic with incomplete penetrance
Cardiomyopathy

3 types:
- Dilatative
- Hypertrophic
- Restrictive

Very similar to cat!
Cardiomyopathy
Cardiomyopathy

In fulminant cases, may see active myocardial necrosis

Usually just see scar tissue replacing myocardium
Polyfasciitis

- High fever
- Lethargy and ataxia
- Pain when moving
- Anorexia
- Marked leukocytosis with mature neutrophilia (34,000)
Polyfasciitis
Polyfasciitis
Etiopathogenesis

- Unknown
- Presentation and microscopic lesions suggest an infectious etiology, most likely bacterial:
  - Poor response to a broad variety of antibiotics
  - No bacteria observed microscopically
  - Fresh samples rarely available for culture or originate from ferrets treated with antibiotics
- Other differentials:
  - Vaccine-related polymyositis in humans
  - Vaccine reactions in ferrets (sarcoma)
  - Myositis not described as adverse affect
  - Vaccine history of ferrets not consistent
  - Heritable disease unlikely, ferrets from different breeding facilities
Dirofilariasis

- Animals in heartworm-endemic areas need preventative
- Small worm burden KILLS
- Requires occult test for diagnosis
- 50% mortality with treatment
- Heartgard or ivermecting solutions may be used as monthly prevention
Aspiration Pneumonia

- Most commonly seen in animals receiving nutrition via syringe
- Even antibiotics cause extensive damage when instilled into lung
- Usual cause of death in megaesophagus
Endogenous Lipid Pneumonia

Common incidental finding which is misinterpreted by practitioners
Endogenous Lipid Pneumonia

“foam cell foci” or “subpleural histiocytosis”
No clinical significance, cause and origin of lipid unknown
Influenza

- Can contract both Type A and Type B influenza from humans
- Symptoms similar to man, but slightly more severe and longer lasting
- Symptomatic treatment only if anorexic
- May use antihistamines to decrease watery nasal discharge
• Also seen as purulent pleuritis or purulent lymphadenitis or nephritis
Systemic Mycosis

- Rare condition
- May be infected with all commonly seen dimorphic fungi (Histoplasma, Cryptococcus, Blastomyces, Coccidioidomyocides)
- Disseminated infection with pneumonia most commonly seen
- Most are advanced at time of dx and refractory to treatment
Dermatomycosis

- Uncommon in ferrets
- Young or immunosuppressed
- *Microsporium canis*
- *Trichophyton mentagrophytes*
- Necropsy
  - Crusting alopecia, brittle hair
  - Many broken hair shafts
  - (generalised rash)
Chordoma

- Most common orthopedic tumor of ferret
- Only on spine
- Develops from primitive notochord
- Most commonly seen at tail tip
Chordoma
Chordoma

- Lobulated mass with 3 concentric zones
  - Zone I: Discrete, vacuolated cells in a myxomatous matrix
  - Zone II: Small discrete cells in a hyaline matrix
  - Zone III: Central area of mineralization
Chordoma

- Intra- and extracellular acidic mucopolysaccharides
- Intracellular glycogen accumulation
Chordoma

Cytokeratin

S-100

Vimentin

NSE
Chordoma

- **Osteonectin**
  - Role in regulation of osteoblast and platelet adhesion to the extracellular matrix

- **Osteocalcin**
  - Prevalent noncollagenous, intraosseus protein
  - Considered specific for bone forming cells and tumors
Osteoma

- Benign tumors of flat bones
- Complete surgical excision curative
Osteoma

Before

After
Osteosarcoma

- Uncommon malignancies that are most commonly seen on extremities
- Low malignant potential
Hemangiosarcoma

- May arise in any organ
- Neoplasms of blood vessels
- Often result in hemorrhage
Hemangiosarcoma

- Low metastatic potential for skin tumors
- Moderate metastatic potential for visceral tumors
Hemangiosarcoma
Sebaceous Epithelioma

- Most common skin tumor in ferrets
- Invariably benign
- Often look much worse than they really are
- Don’t believe malignant diagnoses!

Cutaneous Neoplasms
Cutaneous Neoplasms
Cutaneous Neoplasms

Mast cell tumors

• Scaly, flat tumors
• May be multiple and pruritic
• Invariably benign
• Surgical excision is curative
Cutaneous Neoplasms
Apocrine tumors

- Arise from scent glands of ferrets
- Primarily seen in head, neck, prepuce, and vulva
- Most commonly benign – “Blue dot disease”
Preputial/vulvar tumors - High incidence of malignancy
• Metastasize to local lymph nodes, viscera
• Arly removal of all tumors in this area is recommended
Cutaneous Neoplasms

Leiomyoma/
Leiomyosarcoma

- Most commonly seen over skin of back or shoulders
- Arise from erector pili muscle – “piloleiomyoma”
- Low grade malignancies but behave in a benign fashion
Cutaneous Neoplasms

Vaccine-site sarcomas

- Recently described neoplasms at injection sites
- Pleomorphic fibrosarcomas
- Variable in appearance with
  - Lymphocytic aggregates
  - Immunopositive for smooth muscle actin, desmin
- Behavior?
Cutaneous Neoplasms

- Spindle cell tumors – usually arise from smooth muscle
- Locally aggressive, slow to metastasize
- Malignant peripheral nerve sheath tumors
- Difficult to excise, usually recur
Ectoparasites

- Ticks (*Ixodes* sp)
- Ear mites (*Otodectes cyanotis*)
- Fleas (*Ctenocephalides* sp.)
- Sarcoptic mange has been reported
  - Very pruritic, whole body form
  - Variable pruritic form localised to the feet
- Demodectic mange in old or immunosuppressed ferrets
  - Biopsy moderate hyperkeratosis and mites
Ectoparasites

Ixodes hexagonus (hedgehog)
Ectoparasites

Earmites (Otodectes cyanotes)
Ectoparasites

*Demodex sp*
Cataracts

Occasionally seen in ferrets

Cause not identified
Glaucoma

Rarely seen in ferrets
May be primary or secondary
Poorly responsive to topical therapy
Buphthalmia
Peripheral Retinal Atrophy

Very common in older ferrets

Owners rarely notice the ferret is blind!!!