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Clinical case 1

Use of Recombinant Feline Interferon to treat Feline Infectious Peritonitis

Breed: Persian

Sex: neutered male

Age: 9 months

Consultation purpose: acute respiratory distress

Main symptoms: increase respiratory rate, cough, inspiratory dyspnoea, reduced appetite

Case history

A **nine month** old, male neutered, **Persian** cat *(photo 1)* was presented as an emergency in acute respiratory distress. The cat had been in the owner's possession since twelve weeks of age, was an indoor only cat, fully vaccinated including against Feline Leukemia Virus (FeLV) and had been regularly dewormed. Other than a one week history of diarrhoea shortly after moving into his new home the kitten had no other previous medical problems. Castration had been performed ten weeks prior to presentation. Another indoor / outdoor cat in the house-hold had no signs of illness.

(Photo 1)
At presentation.

In the forty eight hours prior to presentation, the cat had been quiet with a reduced appetite, but his thirst was normal. There had been a progressive increase in his respiratory rate and mild, possibly productive, cough had first been noted seven days previously.

Physical examination

The physical examination and diagnostic procedures were carried out in stages with the kitten being placed in an oxygen cage between examinations.

- The cat was quiet but alert
- Tachypnoea (RR 72 bpm)
- Inspiratory dyspnoea with paradoxical abdominal effort
- Mucous membranes pink, capillary refill time 1.5s
- Thoracic compression reduced, percussion dull ventrally
- Thoracic auscultation - reduced lung sounds cranioventrally
- HR 200 bpm, no murmurs or arrhythmias
- Pulse quality good, no pulse deficits
- Abdominal palpation - cranial abdominal pain, unable to decide if this was related to the left kidney or thoracolumbar spine. No other abdominal abnormalities detected.
- Temperature 37.4°C (ear thermometer)
- No abnormalities detected on ocular examination

Problem list

1. Inspiratory dyspnoea with paradoxical abdominal movement
2. Reduced thoracic compression
3. Dull thoracic percussion
4. Reduced lung sounds cranioventrally
5. Tachypnoea
6. Cranial abdominal pain

Differential diagnosis

An extensive list of differential diagnoses that needed to be considered is given in *table 1*. The most likely differentials at this stage were **pleural fluid** (pus, blood, chyle, exudates / transudate), diaphragmatic hernia (congenital or traumatic) or thymic lymphoma. The abdominal pain was difficult to localise and was considered to be either renal or spinal in origin.

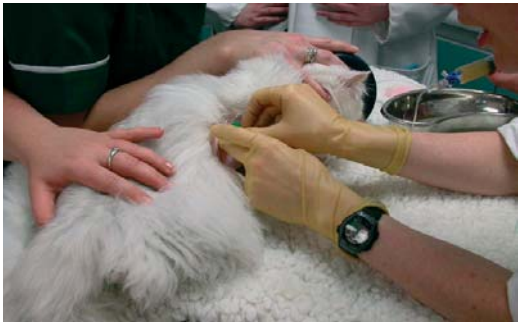
Table 1: Differential diagnosis

Inspiratory dyspnoea	
Haemoglobin disorders	Anaemia Methaemoglobinaemia Cyanosis
Non respiratory causes	Congestive heart failure Low output failure (dilated cardiomyopathy, subaortic stenosis) Right to left shunts Severe CNS disease Metabolic (acidaemia, severe hypokalaemia in cats) Pain
Upper airway disorders	Nasal cavity e.g. obstruction Pharynx/larynx e.g. pharyngeal polyp (cat) Cervical trachea e.g. trauma/foreign body
Lower airway disorders	Extraluminal compression (heart disease/lymphadenopathy) Bronchial disease (allergic/infectious/parasitic)
Pulmonary parenchymal disorders	Oedema (cardiogenic/noncardiogenic) Pneumonia (infectious/parasitic/inhalational) Allergy (parasitic) Embolism (disseminated intravascular coagulation) Trauma/bleeding disorders
Pleural / body wall disorders	Pneumothorax Pleural fluid (blood, transudate, exudate, chyle, pus) Congenital (pectus excavatum) Thoracic wall trauma Thoracic wall neoplasia ...

Pleural / body wall disorders *(following)*	Thoracic wall paralysis Diaphragmatic hernia (congenital or acquired)
Mediastinal disorders	Infection Trauma (including pneumomediastinum) Neoplasia
Peritoneal cavity disorders	Organomegaly/obesity Peritoneal fluid
Paradoxical abdominal effort	
	Diaphragmatic hernia Diaphragmatic paralysis Pleural space disease - pneumothorax - pleural fluid - blood, transudate, exudates, chyle, pus Decreased pulmonary compliance (pulmonary fibrosis) Severe upper airway obstruction

Complementary examinations

Thoracic radiographs taken by the referring veterinary surgeon earlier in the day indicated that **pleural fluid** was present.



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(Photo 2)
Thoracocentesis.

Buprenorphine (20 µg/kg IM) was administered and the presence of pleural fluid was briefly confirmed by **ultrasound** prior to performing **thoracocentesis** *(photo 2)*. Sixty five millilitres

of **viscous straw coloured fluid** was aspirated. This resulted in a rapid improvement in respiratory rate and effort. Respiratory rate reduced to 48 bpm.

A brief **abdominal ultrasound examination** was then performed. The kidneys were normal in size but contained multiple small hypoechoic areas suggestive of polycystic kidney disease (cats need to be a minimum of 10 months of age for this disease to be confirmed). No other abnormalities were detected. Repeat **thoracic radiographs** indicated that a small amount of pleural fluid was still present, there was no evidence of a thymic mass.

Diagnosis

The **thoracic fluid** was an exudate with a low nucleated cell count *(Table 2)*. **Cytological examination** revealed a background of proteinaceous fluid with mature and degenerate polymorphs mostly neutrophils and only occasional macrophages were present. No bacteria were seen. **Haematology** revealed a mild mature neutrophilia (15.0×10^9/l; ref 2.5-12.8) and a moderate lymphopenia (1.21×10^9/l) (ref 1.5-7.0). On **serum biochemistry** there was a moderate elevation in total protein (96.7 g/l) (ref 69-79). Hypoalbuminaemia (21.9 g/l) (ref 28-39) and hyperglobulinaemia (74.8 g/l) (ref 23-50) was present. **Albumin:globulin** (A:G) ratio was 0.29.

Table 2: Pleural fluid analysis

Appearance	Turbid straw coloured fluid
Specific gravity	1.045
Total protein	82.7 g/l
Cells (WBC)	1.2×10^9/l

A tentative diagnosis of wet FIP was made. Feline coronavirus antibody titre (> 1280) and alpha-1 glycoprotein levels (1900 µg/ml) later added further support to this diagnosis. Although no neurological deficits were present, there was concern that the cranial abdominal pain may in fact be spinal in origin possibly indicating a central FIP lesion.

Treatment

- Buprenorphine (10 µg/kg b.w. SC once prior to discharge)
- Prednisolone (2 mg/kg *per os* q 24 hours)
- **Recombinant Feline Interferon (1 MU/kg b.w. injected SC every second day).** Initially given every second day for 4 weeks, then given once weekly for over 6 months - case still ongoing - see discussion).

The prednisolone and Feline Recombinant Interferon doses were taken from an abstract by Ishida and others, 2002.

Thoracocentesis had alleviated the acute respiratory distress and the kitten was sent home so that stress, a known contributing factor in FIP cases, would be kept to a minimum. The owner was shown how to count the respiratory rate and asked to seek veterinary attention if the rate was greater than 50 bpm.

Prognosis

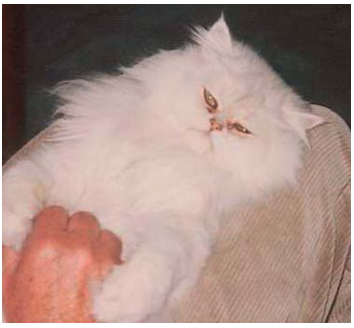
The prognosis for wet FIP is grave; most cats will die within two months of the onset of clinical signs (McReynolds and Macy, 1997). Recently, a study by Ishida and others (2002) using a combination of Recombinant Feline Interferon and glucocorticoids in naturally occurring cases of FIP achieved complete remission (survival greater than two years) in 4/12 cats and partial remission (two and five months) in another 2/12 cats.

Results and discussion

The most likely differential diagnoses for pleural fluid in a cat of this age and breed were **wet FIP**, neoplasia (particularly thymic lymphoma) or cardiac disease. Clinical examination of the cardiovascular system made cardiac disease unlikely. Repeat thoracic radiography after drainage of the fluid ruled out thymic lymphoma. A definitive diagnosis of FIP can only be made by histological examination of lesions but a **high index of suspicion of FIP was present in this case.**

Approximately half the cats with FIP are younger than two years of age, they have typically been in a multicat environment in the past year and may have a history of stress (e.g. neutering or re-homing) in the previous few months (Addie and Jarrett, 1998). Cats that have clinical signs suggestive of FIP in combination with lymphopenia (< 1.5×10^9/l), hyperglobulinaemia (> 51 g/l) and a FCoV antibody titre over 1:160 have an 88.9% probability of having FIP confirmed at *post-mortem* examination (Sparkes et al., 1994). Alpha-1 acid glycoprotein levels greater than 1500 µg/ml is consistent with a diagnosis of FIP (Duthie et al, 1997). Another useful test not performed in this case is the A:G ratio of the pleural fluid. In an effusion with a total protein greater than 35 g/l and low cellularity an A:G ratio of less than 0.45 is considered diagnostic of effusive FIP (Addie and Jarrett, 1998). The serum A:G ratio of 0.29 is low supporting a diagnosis of FIP.

In the days following discharge from the hospital, the kitten's appetite and energy levels improved and his respiratory rate remained stable at approximately 30 bpm.



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(Photo 3)
Five months post diagnosis.

After three weeks the prednisolone dose was reduced to 1mg/kg b.w. *per os* q24 hours and then slowly decreased to 0.5mg/kg b.w. every other day.

After four weeks the **Recombinant Feline Interferon** was reduced to 1MU/kg b.w. SC once a week. This treatment has been continued for five months and the cat is clinically normal at time of writing (January 2004) and it is now over 9 months since diagnosis.

Conclusion

The role of Recombinant Feline Interferon in the treatment of FIP has still to be determined. The difficulty in gaining a pre-mortem diagnosis of FIP severely limits the conduction of good clinical trials. Unfortunately, biopsy material is needed for the diagnosis to be anything other than presumptive. However, when this is not possible, and where all other differential diagnoses have been ruled out, it may be beneficial to consider using the treatment protocol described above. It is only through further experience that we will be able to determine the usefulness of this molecule.

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