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Pyothorax in a cat due to *Acinetobacter spp*. infection : a case report

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Abstract

A 3-month-old kitten weighing 1.05 kg was presented to the University veterinary hospital at Kokkalai in Thrissur district of Kerala, India, with the complaint of open-mouth breathing, lethargy and complete anorexia for the past three days, and weight loss. Detailed clinical examination revealed inspiratory dyspnoea without stridor, tachypnoea, muffled lung and heart sounds on auscultation, pale mucous membrane, and weak pulse. Haematology revealed leukocytosis with granulocytosis and monocytosis. Thoracic radiography, ultrasonography and thoracocentesis confirmed pyothorax. Microbial culture of thoracic aspirate revealed heavy growth of Acinetobacter spp. The cat responded to parenteral therapy with ceftiofur followed by cefixime orally for 21 days. Doxycycline was prescribed for concurrent mycoplasmosis. Thoracic radiograph 10 days later revealed a significant reduction in pleural fluid. A review of the case two months later found that the kitten recovered uneventfully. A rare case of Acinetobacter spp. associated pyothorax and its medical management in a cat is reported. The clinical manifestations, radiographic changes and ultrasonographic findings were discussed.

Keywords: *Kitten, pyothorax, Acinetobacter spp.*

Pyothorax is a life-threatening condition characterised by the accumulation of septic purulent fluid within the pleural space. In cats, pyothorax occurred secondary to extension of infection from the lungs, penetrating wounds of thorax, parasitic migration (*Toxocara cati*), haematogenous spread of bacterial infection, pulmonary abscess, neoplasia and iatrogenic causes (Stillion *et al*., 2015). Parapneumonic spread of infection seems to be the most frequent cause of feline pyothorax (Barrs and Beatty, 2009).The most common bacterial isolates that cause pyothorax in cats are the oropharyngeal anaerobes including *Fusobacterium, Prevotella, Porphyromonas, Bacteroides, Peptostreptococcus, Clostridium, Actinomyces, and Filifactorvillosus* and aerobes including *Pasteurella spp. and Streptococcus spp.* in more than 80 % of cases. In less

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than 20 % cases, cats had infections caused by bacteria not associated with the oropharynx including *Escherichia coli, Salmonella spp*., *Klebsiella spp*., *Pseudomonas spp*., and *Nocardia spp*. (Epstein, 2014). *Acinetobacter spp*. are aerobic, rod-shaped, Gram-negative bacteria belonging to the family Moraxellaceae of the class Gamma proteobacteria and are considered as ubiquitous organisms. In dogs and cats, *Acinetobacter spp*. had been isolated from wound and urinary tract infections (Van der Kolk *et al*., 2018). It is reported to cause pyothorax in dogs as an uncommon pathogen (Wadell *et al.,* 2002). *Acinetobacter baumannii* represents an important veterinary nosocomial pathogen now-a-days. Companion animals have been found to carry isolates more closely related to human strains (Ewers *et al.,2017)*, which could be an indication for humans possibly infecting their pets. Given the potential multidrug resistance of *Acinetobacter spp*., treatment of diseased animals is often supportive and should preferably be based on *in vitro* antimicrobial susceptibility testing. Antimicrobial therapy alone is generally an ineffective treatment for pyothorax and successful medical management includes drainage of purulent material from the pleural cavity.

A 3-month-old kitten weighing 1.05 kg was presented to University Veterinary hospital at Kokkalai in Thrissur district of Kerala, India, with complaint of open-mouth breathing, lethargy, complete anorexia for the past three days and weight loss. The cat was admitted to the intensive care unit and supplemental oxygen was delivered by face mask for a short period of time. Detailed clinical examination revealed inspiratory dyspnoea without stridor, tachypnoea (70/ minute), muffled lung and heart sounds on auscultation especially along the ventral border, pale mucous membrane, weak pulse and a normal body temperature. No abnormalities could be detected on examination of other body systems.

Peripheral blood smear was positive for *Mycoplasma spp*. organisms. Haematology (Table 1) revealed severe leukocytosis with granulocytosis and monocytosis, a normal haemogram and thrombocytopenia.

Table 1: Haematology of the kitten with pyothorax on the day of presentation

Parameter	Values	Reference interval
WBC (10^3/ µL)	42.9	5.5 – 19.5
GRA (10^3/ µL)	32.5	3.6 – 12.7
LYM (10^3/ µL)	7.6	1.1 – 10.7
MON (10^3/ µL)	2.9	0.1 – 0.8
RBC (10^6/µL)	9.74	5.0 – 10.0
HGB (g/dL)	11.2	8.0 – 15.0
HCT (%)	50.0	24 – 45
MCV (μm^3)	51.3	39 – 55
MCH (pg)	11.5	13 – 17
MCHC (g/dL)	22.4	30 – 36
RDW	17.2	14 – 18
PLT (10^3/ µL)	134	160 - 660

Right lateral thoracic radiograph revealed dorsal displacement of trachea, rounding of the lung margins at the costo-phrenic angles, scalloping of lung margins at the sternal border, increased radio-opacity along the cranio-ventral region of lung area effacing the cardiac silhouette which was suggestive of pleural effusion (Fig. 1). Thoracic ultrasonography revealed anechoic fluid between the thoracic wall and heart (Fig .2). Thoracocentesis was done using a 23G scalp vein needle at 7th left intercostal space on sternal recumbency (Fig.3) and about 40 ml yellowish-white pus-like fluid was removed. The aseptically collected aspirate was sent for microbial culture, antibiotic sensitivity, and triglyceride estimation. Pending the antibiotic sensitivity results, treatment was initiated with Inj. Ceftiofur at the rate of 2.2 mg/kg SC, Inj. Furosemide at the rate of 2.0 mg/kg IM,

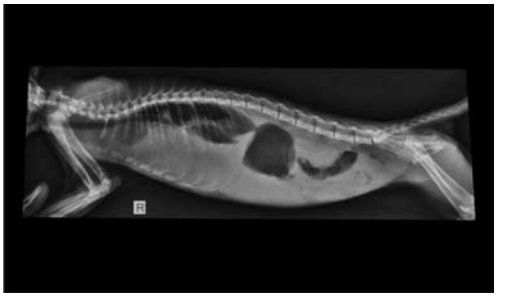

Fig. 1: Right lateral thoracic radiography on day 1

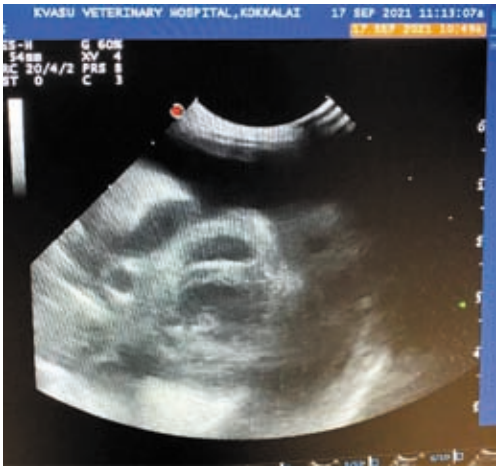

Fig.2: Anechoic fluid between heart and thoracic cavity revealed on thoracic ultrasonography

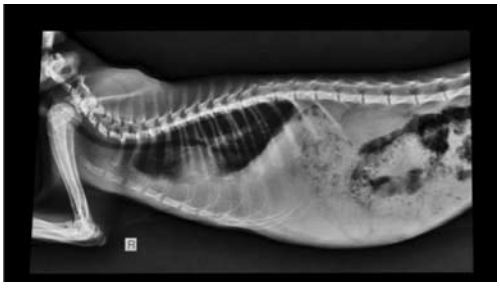

Fig. 4: Right lateral thoracic radiograph on day-10 showing a significant reduction in pleural fluid

B-complex injection and isotonic crystalloids parenterally. Next day, the kitten responded with a decrease in respiratory distress and an increase in general activity, and hence the same treatment was continued on the second and third day.

Microbial culture of thoracic aspirate in blood agar yielded heavy growth of non-haemolytic, white-cream coloured, smooth, circular colonies with entire edge. Culture in MacConkey agar gave non-lactose fermenting pale-coloured colonies. The organisms were catalase-positive, oxidase-negative, nitrate-negative, urease-negative, indole-negative, citrate-positive and H_2S production-negative. There was no gas or H_2S production in the alkaline slant or alkaline butt of triple-sugar-iron agar. On the basis of colony and biochemical characters, the organism was identified as *Acinetobacter spp*. The organism was sensitive to ceftriaxone, cefotaxime, cefixime, cefaperazone, cefazolin, ceftizoxime,

Fig. 3: Thoracocentesis at 7th left intercostal space revealed yellowish white pus like pleural fluid

ampicillin-sulbactum, tetracycline, co-trimazole, ciprofloxacin, gentamicin and amikacin (each with +++ sensitivity), and resistant to ampicillin and amoxycillin. Pleural fluid triglyceride level was 26 mg/dL.

On the basis of clinico-pathological and imaging studies, the case was diagnosed as pyothorax due to *Acinetobacter spp*. infection. On the fourth day, respiratory distress was not evident and the kitten had a better appetite. Based on antibiotic sensitivity, tab cefixime at the rate of 20 mg/kg q12h PO was prescribed for ten days. However parenteral ceftiofur injection was continued on fourth and fifth day. Prescribed tab doxycycline @ 10 mg/kg PO q24h on fourth day for fourteen days to control *Mycoplasma* infection, and consequent thrombocytopenia. On review of the case ten days later it was found that the kitten was very active and playful with normal appetite. Thoracic right lateral radiography revealed significant reduction in fluid accumulation (Figure 4). Tab. Cefixime was continued *per os* at the same dose for 7 days more. Doxycycline therapy was discontinued because the peripheral blood smear was negative for *Mycoplasma spp*. organisms.

Open-mouth breathing with respiratory distress is considered an emergency in cats and should have a minimum work-up of thoracic radiography and ultrasonography for accurate diagnosis. In the present case, imaging techniques were critical in the detection of

large amounts of fluid in the pleural cavity and a normal lung parenchyma. Drainage of pleural fluid, cytological evaluation and bacteriological culture were important tools to detect or exclude the presence of complicating factors (MacPhail, 2007). Though there was no sex or breed predisposition, residence in a multi-cat household increased the risk for pyothorax (Wadell *et al.,* 2002) attributable to inter-cat aggression and unnoticed bite wounds in thorax and subsequent extension of infection to pleural cavity. In our study, age of the cat with pyothorax was three months. Cats with pyothorax usually tend to be young to middle-aged adults with outdoor exposure, although cats of any age may be affected. Pyothorax is often insidious in nature and associated with non-specific clinical signs (Stillion *et al*., 2015). Time of onset of clinical signs and presentation varies and has been reported from days to months.

The common clinical signs associated with pyothorax were tachypnea, dyspnea, cough, lethargy, weight loss and anorexia (Barrs and Beatty, 2009) and similar signs were noticed in this kitten except the cough response. A rapid, shallow and restrictive respiratory pattern with increased inspiratory effort was typical of pleural space disease (Beatty and Barrs, 2010). Auscultation helps to distinguish pleural space disease from pulmonary parenchymal disease when there is a restrictive pattern. Breath sounds were decreased or absent with pleural space disease. In contrast pulmonary parenchymal diseases were characterized by increased lung sounds, crackles or wheezes on auscultation (Gorris *et al.,* 2017). In this case auscultation of lung area revealed muffled lung and heart sounds.

In veterinary patients, thoracic radiographs are often the initial imaging modality of choice for diagnosis of pleural effusion. Although unilateral effusions were not uncommon, bilateral effusion occurred frequently and had been reported in 70–90 % of cats (Barrs and Beatty, 2009). In the thoracic radiograph cardiac silhouette was masked by soft tissue opacity of the free fluid and the trachea and lungs were displaced dorsally. Thoracic ultrasonography is a less invasive technique for the confirmation of a moderate to large volume of pleural effusion (Beatty and Barrs, 2010). Thoracocentesis was performed at the 7thintercostal space on the left side which yielded about 40 ml of malodorous, cloudy, and white coloured fluid. Around 30 ml/ kg of pleural effusion caused subtle dyspnoea whereas 60 ml/ kg resulted in obvious dyspnea (Padrid, 2000). Septic effusions were often turbid or opaque and may be malodorous. Use of single or repeat needle thoracocentesis in the successful management of feline pyothorax has been reported (Wadell *et al.,* 2002). The bacterial culture of pleural fluid in the present study showed heavy growth of *Acinetobacter spp*., which was an aerobic, rod-shaped, Gram-negative bacteria with an extraordinary ability to accumulate antibiotic resistance. Antibiotic sensitivity showed resistance to amoxicillin which was generally regarded as the first line treatment of pyothorax in cats (Stillion *et al*., 2015). The *Acinetobacter spp*. was sensitive to cephalosporins, aminoglycosides, tetracycline and sulpha-trimethoprim group of antibiotics on the basis of antibiotic sensitivity test. Owing to therapeutic response to parenteral ceftiofur, prescribed an oral cephalosporin, cefixime, at a higher dose rate of 20 mg/kg q12h. In most infectious cases, broad-spectrum antimicrobials effective against Gram-positive, Gram-negative, and anaerobic bacteria were prescribed until culture and susceptibility results were available. While there were no evidence-based guidelines-in veterinary medicine, antimicrobials are generally administered IV until the patient is clinically stable (Stillion *et al*.,2015).

Summary

A rare case of *Acinetobacter spp*. associated pyothorax is reported in a cat. The clinical manifestations, radiographic changes and ultrasonographic findings were discussed. The cat responded to parenteral treatment with ceftiofur followed by cefixime *per os*. The kitten was healthy and active on second month of review.

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Conflict of interest

The authors declare no conflict of interest.

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