



## CASE REPORT

### Two Cases of Bacterial Pneumonia in Bottle-nosed Dolphins (*Tursiops gillii*) at the Seoul Zoo, Korea

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#### ABSTRACT

Two bacterial pneumonia cases of bottle-nosed dolphins (*Tursiops gillii*) were found in Seoul Zoo. Firstly, severe fibrous pleuropneumonia was revealed in a 14-year-old male bottle-nosed dolphin on its necropsy. The clinical signs included anorexia, listing posture, and vertical submerging after the initial signs of low activity and avoiding trainers. White blood cell count increased up to  $31.80 \times 10^3/\mu\text{l}$ . Despite aggressive antibiotics therapy of intramuscular injection and nebulization it died two months later. At early time of illness *Staphylococcus aureus* and *Proteus mirabilis* were isolated. Lately *Pseudomonas aeruginosa* was isolated from the exhaled air culture and direct sample of lung parenchyma on necropsy. Secondly, a 6-year-old male bottle-nosed dolphin with anorexia and tendency to avoid trainers was completely recovered after prompt treatment with antibiotics and NSAIDs for six days prior to diagnosis. The diagnosis was based on history, clinical signs, blood cell count, and mucous culture from blowhole. The count of white blood cell dramatically decreased from  $25.36 \times 10^3/\mu\text{l}$  to  $7.28 \times 10^3/\mu\text{l}$  after four days of antibiotics therapy. *Staphylococcus aureus* was isolated from the culture.

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#### INTRODUCTION

Bacterial pneumonia is not an uncommon cause of death in captive dolphins (Medway and Schryver, 1973; Sweeney and Ridgway, 1975). *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Burkholderia pseudomallei* have been known to produce septicemia and death, but it is usually associated with other predisposing diseases (Dierauf and Gulland, 2001; Fowler and Miller, 2003; Diamond *et al.*, 1979). Not only an animal's general health condition, but also the degree of stress to the animal can be a cause of bacterial respiratory infection (Medway and Schryver, 1973). Clinical signs are decreasing appetite, change in buoyancy, unusual posture in the pool (vertical or listing), elevated respiratory rate, and sometimes coughing or unpleasant odor from exhaled air (Dierauf and Gulland, 2001). A blood examination and a bacterial culture from the blowhole air are essential for diagnosis (Fig. 1). Both an up-close and a distant visual examination constitute the next step in the clinical examination (Dierauf and Gulland, 2001). In addition, a lung aspiration using bronchoscope, ultrasonography, thoracentesis, and radiography can be helpful (Dierauf

and Gulland, 2001). The aim of this report is to review the procedure for a successfully cured case and re-evaluate the entire procedure from clinical signs to necropsy findings for a fatal case of pneumonia in bottle-nosed dolphins at the Seoul Zoo, Korea.

#### Cases

**Case 1:** "DOLBI" was a 14-year-old male bottle-nosed dolphin captured at sea near Jeju-do in 2002. He was moved to the Seoul Zoo on 8 Oct. 2002 weighing 172 kg and measuring 250 cm in body length. This dolphin was in good condition except for some respiratory illness in 2002 and 2004. In early Feb. 2008, he developed initial signs of low activity and loss of appetite, and he stopped eating on 23 Feb. 2008. He appeared to be isolated from the group of three other dolphins and avoided the animal trainer. A slight listing posture and submerging was observed in the pool (Fig. 2). On 28 Feb., the dolphin was restrained within a stretcher and placed on a soft mattress on the floor for treatment and examination. The results of the gastroendoscopy were normal; thick and yellowish mucous was found through blowhole endoscopy (Fig. 3); chest and abdomen radiography was unclear; white blood

cell count (WBCC) was  $31.80 \times 10^3/\mu\text{l}$  {reference range  $5-9 \times 10^3/\mu\text{l}$  (Dierauf and Gulland, 2001; Fowler and Miller, 2003)}; *S. aureus* and *Proteus mirabilis* were isolated from the exhaled air culture; and a culture and sensitivity test revealed sensitivity to ciprofloxacin, amikacin, and gentamycin (Seoul Zoo Clinical Pathology Laboratory, Korea). Body weight had dropped from 186 kg on 1 Jul. 2006 to 172 kg on 29 Mar. 2008. The dolphin was force-fed 3 kg of whole mackerel on 4 Apr. while being restrained by 5-6 zookeepers in the pool. *P. aeruginosa* was isolated from a blowhole mucus sample. Although the dolphin was given antibiotics by intramuscular injection and nebulization with tobramycin (Tobra<sup>®</sup> Inj, Daewoong Co. Ltd. 163-3 Samsung-dong, Kangnam-ku, Seoul, Korea, 400 mg, b.i.d. for 10 days), he died on 14 Apr. Severe fibrous pleuropneumonia and pleural effusion were revealed in the left thorax and lobe on necropsy (Fig. 4).

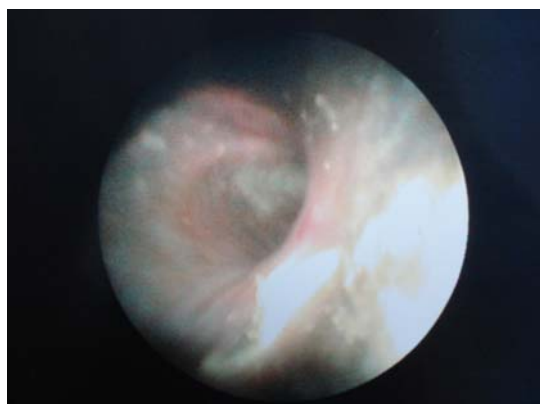


**Fig. 1:** Blood collection from superficial fluke vein using butterfly set

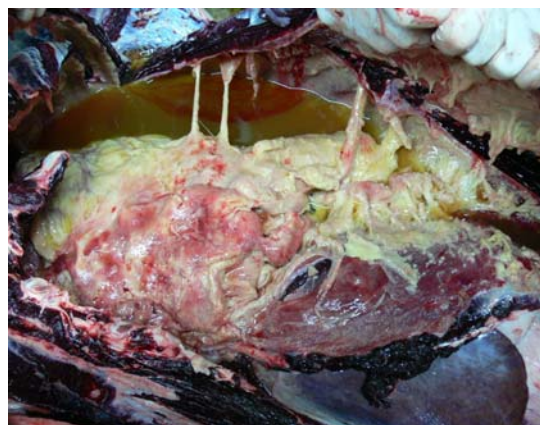
**Case 2:** "TAIJI" is the youngest male bottle-nosed dolphin (5-6 year old estimated, 204 kg body weight) and was moved from Japan on 25 Sep. 2008. A dolphin trainer informed us of his anorexia and tendency to avoid the trainer on 1 May 2009. Some mucus was found that had been spit from the blowhole. Prior to the diagnosis, antibiotic therapy consisted of ciprofloxacin (Cirok<sup>®</sup> Tabs, Korea United Pharm. INC. 154-8 Nonhyun-dong, Kangnam-ku, Seoul, Korea, 25 mg/kg p.o., b.i.d.) for 6 days and meloxicam (Mobic<sup>®</sup> Cap, Boehringer Ingelheim Korea, 15 mg p.o., s.i.d.) for 6 days. *S. aureus* was isolated from the mucus culture. A typical antimicrobial sensitivity test using the mucus sample from blowhole showed that the bacteria were sensitive to ciprofloxacin and amikacin (Seoul Zoo Clinical Pathology Laboratory, Korea). Blood sampling was not difficult because the animal was trained to present its flukes for regular blood collection. The initial complete blood count indicated that the white blood cell count (WBCC) was elevated to  $25.36 \times 10^3/\mu\text{l}$ . The WBCC declined from  $25.36 \times 10^3/\mu\text{l}$  to  $14.80 \times 10^3/\mu\text{l}$  on 6 May after four days of antibiotics, and it was normal ( $7.28 \times 10^3/\mu\text{l}$ ) on 13 May. The dolphin recovered from the acute bacterial pneumonia with proper antibiotics and nonsteroidal anti-inflammatory therapy.



**Fig. 2:** Vertical posture



**Fig. 3:** Thick and yellowish sputum clung to mucous membrane before larynx



**Fig. 4:** Fibrous pleuropneumonia and pleural effusion

## DISCUSSION

Pneumonia is probably the most common serious disease of dolphins (Dierauf and Gulland, 2001). Chronic low-grade pneumonia is not rare in cetaceans, and subtle anorexia or declining appetite is often the only apparent sign (Dierauf and Gulland, 2001). Zoo veterinarians should be aware that dolphins will mask signs of illness similar to terrestrial animals (Dierauf and Gulland, 2001; Fowler and Miller, 2003). If the disease is unknown, it should be considered as pneumonia until proven otherwise (Fowler and Miller, 2003). Anorexia is a very serious sign

in dolphins (Fowler and Miller, 2003). If a clinician thinks the animal may be sick, it should be treated properly without hesitation, for by the time the clinician knows the animal is sick, it may be too late (Dierauf and Gulland, 2001; Fowler and Miller, 2003). In case 1, *S. aureus* was the cause of pneumonia, but in the later stages, *P. aeruginosa* was prominent. To diagnose the disease in the early stage, it is very important that the animal should be trained to allow the collection of blood, urine, and a stool sample. Other clinical examination should include history taking, visual examination, and assessment of buoyancy and social behavior (Dierauf and Gulland, 2001). Case 2 suggests that early diagnosis and treatment are significant factors for recovery. Oral administration of drugs is much more convenient than other means for the patient as well as for veterinarians and zookeepers. Removing the animal from its social group to inject or force-feed may be a major stressor after the appetite is lost (Sweeney and Ridgway, 1975). Earlier medical management is the key to good results (Dierauf and Gulland, 2001).

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