

## Aspiration pneumonia due to grain particle in a tammar wallaby (*Macropus eugenii*) with *Staphylococcus aureus* pneumonia

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**Abstract:** A 12-year-old female Tammar Wallaby (*Macropus eugenii*) died after a 6-day history of depression, anorexia, and coughing. The necropsy revealed pustules of varying sizes on the lung surface from which a pure culture of *Staphylococcus aureus* was isolated. Histopathologically, the pulmonary nodules formed typical granulomatous inflammation. The center of the granulomatous foci consisted of a necrotic center and grain particles with gram positive cocci that were surrounded by eosinophilic club-like bodies containing Splendore-Hoeppli material. To our knowledge, this is the first report of aspiration pneumonia with respiratory botryomycosis as a result of grain inhalation in a Tammar Wallaby.

**Key words:** aspiration pneumonia, tammar wallaby, botryomycosis, *Staphylococcus aureus*

### Introduction

Botryomycosis is defined as a chronic granulomatous condition in horses, cattle, swine, and humans. The disease usually involves the skin but can occasionally affect the viscera and lung [1, 7, 10-12]. The condition is characterized by granules in the pus containing bacteria generally staphylococci but sometimes other types. These granules are surrounded by a hyaline capsule that sometimes contains club-like bodies around its periphery. The histopathological lesion resembles that of actinomycosis and mycetoma [10]. Pulmonary botryomycosis is quite rare in animals but there have been cases reported in a horse [1], guinea pigs [2], and a dolphin [5].

Aspiration pneumonia is defined as pneumonia caused by the aspiration of foreign material, often in liquid form, which reaches the lungs through the airways [4]. Solid objects can also be included in the aspirated material such as dental calculus in a dog [3]. Fatal aspiration pneumonia can occur when the animal accidentally inhales objects, particularly grain particles that are contaminated with bacteria. Some of the microorganisms involved in aspiration pneumonia in animals other than *Staphylococcus aureus* include *Peptostreptococcus* sp., *Bacteroides melaninogenicus*, *Fusobacterium* sp., *Porphyromonas* sp. and *Prevotella* sp. [9]. This report describes the

clinical, bacteriological, and pathological findings from a captive 12-year-old female Tammar Wallaby (*Macropus eugenii*) with respiratory botryomycosis caused by the inhalation of grain, which resulted in aspiration pneumonia.

### Case

A Tammar Wallaby from a zoo located in Gyeonggi Province, Republic of Korea showed anorexia and coughing. There was some suspicion that a foreign body had been lodged in the trachea of the animal. The animal was treated with 250 mg enrofloxacin (Baytril, Bayer) IM. On the following day the animal recovered its appetite and there were no abnormal sounds noted upon auscultation of the chest. A detailed clinical examination was performed after first anesthetizing the animal with 25 mg tiletamine and 25 mg zolazepam (Zoletil 50, Virvac) IM. X-ray images and blood samples were taken. A laryngoscopic examination of the oral cavity and larynx revealed no foreign material. The x-ray examination showed some lung areas with a partial radiolucent appearance. A 3-month-old fetus measuring 5-6 cm in length was found inside the pouch of the animal. The results of the blood examination were unremarkable except for mild to moderate leukocytosis. The same antibiotics were given to the animal over the

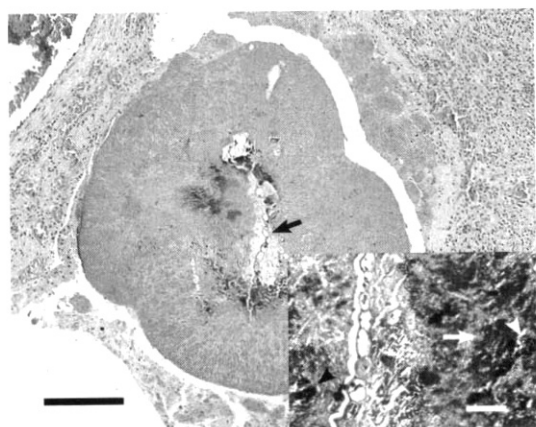
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next few days. Unfortunately, the animal died 6 days after the first examination. The presence of a mucous exudate in the trachea and congestion with hemorrhage in the lung were among the gross findings noted during the necropsy. Pustules of varying sizes were scattered diffusely on the surface of the lung. The other abnormalities observed were atrophy of the liver and cardiac muscles, the presence of gas in the stomach and an ulcer with hemorrhage in the mucosa of the upper pyloric region of the stomach.

Attempts to isolate the causative agent from the trachea and lung were carried out according to routine bacteriological procedures using blood agar and MacConkey agar incubated at 37°C. The cultures that grew after 24 h were stained with a routine Gram stain and were subjected to the VITEK system (BioMerieux, France). From these routine bacteriological procedures, *Staphylococcus aureus* was isolated as a pure culture.

Tissue samples from the major parenchymal organs were collected and subjected to a routine histopathological procedure using Hematoxylin and Eosin (H&E), and Gram staining (Brown and Brenn stain). The histopathological examination of the lung section showed the presence of multifocal dark-staining granular aggregates mainly occupying the lumen of the airways (Fig. 1). A closer examination of these granular aggregates under high power showed the center to contain lineally-connected



**Fig. 1.** Section of lung from a Tammar Wallaby. Note the granulomatous inflammation around the grain material (arrow) and bacterial colonies, H&E stain; bar = 200  $\mu$ m. *Inset:* Gram positive bacterial colonies (arrow) surrounded by Splendore-Hoeppli material (arrow heads). Brown and Brenn Stain; bar = 50  $\mu$ m.

vacuole-like structures with a clearly defined thick wall (Fig. 1). These aggregates were referred to a botanist who confirmed these materials to have a plant origin on account of the thick cell wall, which strongly indicated corn grains. The surrounding dark colored areas were also identified as colonies of gram-positive cocci, which were arranged in grape-like bunches compatible with *Staphylococcus aureus* (Fig. 1, inset). The lesion was surrounded by a hyaline membrane with radially arranged club-like bodies (Splendore-Hoeppli material), which was strongly indicative of botryomycosis (Fig. 1, inset). The findings of typical granulomatous lesions in the lung with a positive identification of *Staphylococcus aureus* confirmed the diagnosis of respiratory botryomycosis.

## Discussion

It is unclear how this animal developed aspiration pneumonia. From a clinical point of view, it is possible that during the time the animal had recovered its appetite after being moribund for some days, attempts to eat a regular meal in a weak body condition resulted in the inhalation of the particle that could have caused the aspiration pneumonia. The inhalation of plant material from a finely ground feed given in dry form by swine has also been reported to cause aspiration pneumonia [4]. It is likely that the inhaled corn granules were contaminated with *Staphylococcus aureus* that produced the botryomycotic lesion. There have been cases of animals suffering from a loss of control of the swallowing reflex leading to aspiration pneumonia. These include conditions such as chronic wasting disease in cervidae [13], milk fever [8] and animals under anesthesia [6]. Therefore, in order to prevent the occurrence of aspiration pneumonia, weak or moribund animals must not be given food or any oral fluids.

This case is the first report of respiratory botryomycosis resulting from the inhalation of grain causing aspiration pneumonia in a captive Tammar Wallaby (*Macropus eugenii*).

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