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CASEOUS LYMPHADENITIS SEPSIS (*Pseudotuberculosis*) IN A DROMEDARY CAMEL: A CASE REPORT

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ABSTRACT

A female dromedary dead adult camel in poor body condition was sent to the Central Veterinary Research Laboratory (CVRL) for a proper necropsy. It was sick for a long time. No external lesions were observed but all external and internal lymph nodes were swollen containing multiple abscesses. All internal organs except kidneys and heart were infected with multiple abscesses of different size from which *C. pseudotuberculosis* serovar1 (ovine/caprine), was isolated.

Key words: Camel, caseous, lymphadenitis, pseudotuberculosis

Caseous lymphadenitis (CLA) or *pseudotuberculosis* is one of the most important bacterial infectious diseases in livestock. It is caused by a Gram-positive coccus-like bacteria named *Corynebacterium* (C.) *pseudotuberculosis*. The pathogen affects sheep and goats worldwide, produces an ulcerative lymphangitis in cattle and an endemic disease in horses in California, named pigeon fever (Promed, 2007). It is widespread in Old World camels (OWCs) and the pathogen has also been isolated from abscesses of New World camels (NWCs). Extensive investigations about this disease have been published over the last decades and a review was summarised by Wernery *et al* (2014) and (2016). We report here about a severe caseous lymphadenitis (CLA) case of a dromedary female adult camel sent to CVRL for necropsy.

Materials and Methods

An adult non-pregnant female dromedary camel weighing 360 kg in poor condition was necropsied at CVRL. It died after a long illness during which its body condition had deteriorated. During adspection, no external lesions were observed, but all external lymph nodes were enlarged, mainly the prescapular, popliteus and mammary lymph nodes. A severe soft swelling of the right carpal joint was also observed. When opening the lymph nodes, multiple abscesses containing creamy-coloured pus were observed. The right carpal joint was also filled with creamy pus. During necropsy all organs except kidneys and heart displayed multiple abscesses of different size. From each organ, abscess swabs were taken and streaked on 3% sheep blood agar. The agar plates were incubated for 48 h at 37°C. A lung swab taken from the cavern was stained after Gram and examined microscopically at a magnification of 100x with oil. Pieces of tissue from all organs were submerged in 40% formalin and processed and slides stained with haemotoxlin/eosin (HE) and examined microscopically.

Results

The lesions caused by *C.pseudotuberculosis* are presented in different pictures.

Discussion

C.pseudotuberculosis causes caseous lymphadenitis (CLA) in many different animal species. The disease is characterised by abscessation of one or more superficial lymph nodes and like in this case may also cause severe alterations in internal organs including mammary gland (Wernery and Kinne, 2016). The infection is spread via ingestion, inhalation or directly through wounds. In this case no external lesions were observed. Affected camels often concurrently suffer a severe tick infestation (*Hyalomma dromedarii*) from which *C.pseudotuberculosis* is often isolated. Mucous membranes of the oral cavity might be also damaged by acacia thorns

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and or by dry and hard stems of desert plants or ingested hay. Following the entry through the skin or mucous membranes, the pathogen is phagocytised predominantly by leucocytes and transported mainly by lymph to the predeliction sites which are nearby lymph nodes, where it causes abscesses of different size. The virulence of *C.pseudotuberculosis* is attributed to a major exotoxin, phospholipase D (PLD) which

Fig 1. Abscesses in the right carpal joint extending dorsal along the tendons of the deep digital flexors and *Mn. Interossei*.

Fig 2. Multiple abscesses in the udder lymph node (*L. nn. inguinales superficiales, L. nn. mammarii*).

Fig 3. Micro abscesses in the left hind udder quarter.

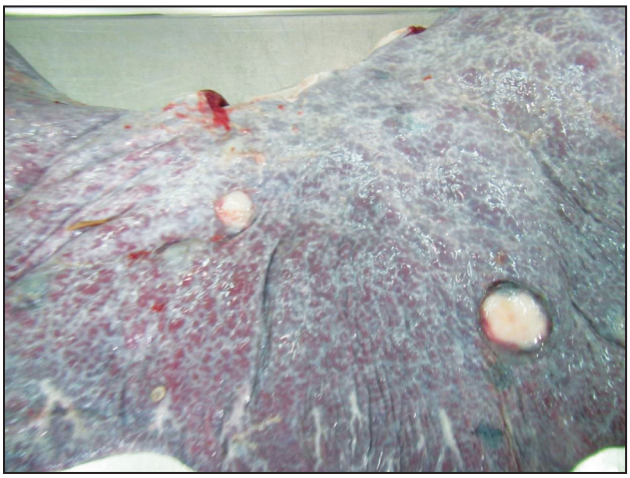

Fig 4. Two small abscesses in the spleen.

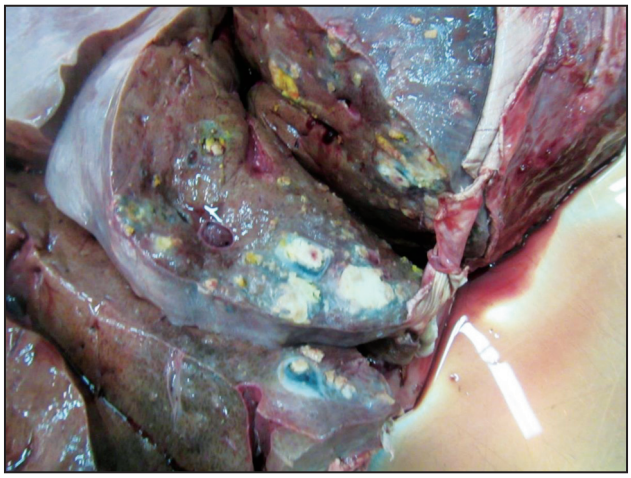

Fig 5. Multiple abscess formation of different size in the liver.

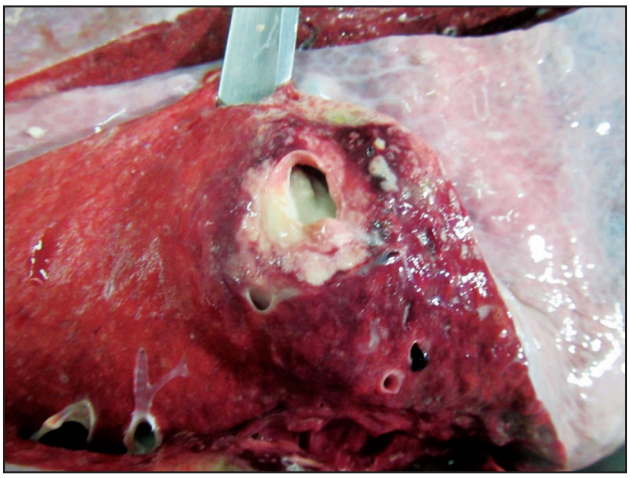

Fig 6. Golf ball size abscess opened showing cavernous appearance containing cream coloured pus.

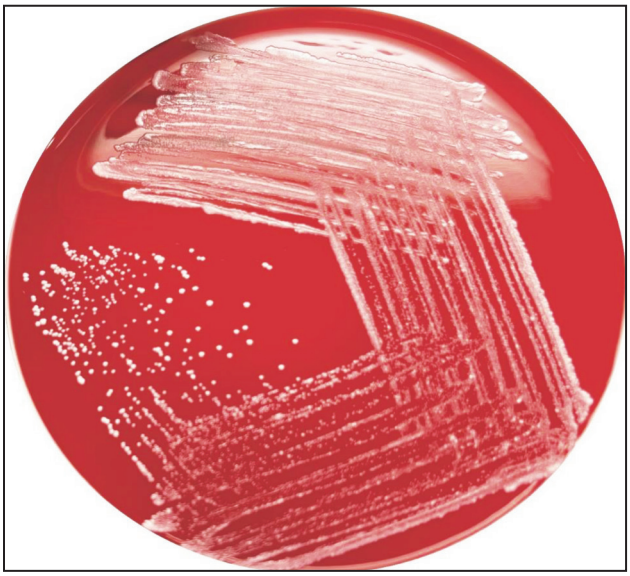

Fig 7. *Corynebacterium pseudotuberculosis* colonies on 3% sheep blood agar grown after 48hrs incubation at 37°C as small white, dry colonies surrounded by a narrow zone of haemolysis.

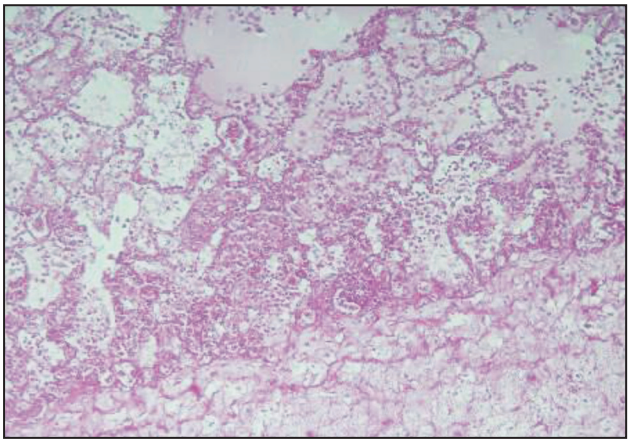

Fig 9. Massive alveolar and marked intralobular oedema of the lung with some fibrin and central necrotic masses.

increases vascular permeability and also facilitates dissemination of the pathogen into neighbouring lymph nodes where it inhibits chemotaxis and death of neutrophils as well as inactivation of complement (Markey *et al,* 2013). Often the immune system of the infected animals is overwhelmed by the infection and the pathogen enters different organs like in this case. In lungs it not only produces abscesses but often caverns. Two bio types are known to infect camels (Berlin, 2015), biotype 1 (biotype ovine/caprine) and biotype 2 (biotype bovine/equine). Biotype 1 was isolated from this case using the nitrate reduction test (Berlin, 2015).

Although Corynebacteria are very sensitive to penicillin, tetracyclines and cephalosporins treatment of chronic CLA is unrewarding. Multiple abscesses

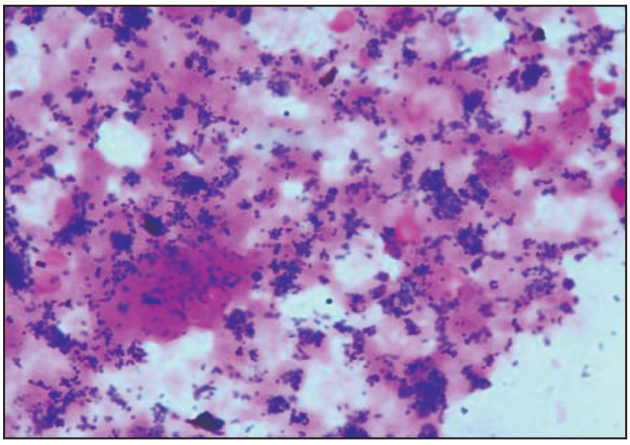

Fig 8. *Corynebacterium pseudotuberculosis* bacteria from a lung abscess smear, stained with Gram 100x oil.

with fibrous capsule and pus in the abscesses prevents the medication from reaching the bacteria. Vaccines against CLA for sheep and goats are available, but not for camelids. However, several vaccine candidates have been tried especially in NWCs with different success (Wernery, 2015). Berlin *et al* (2015) used only the exotoxin PLD from non-formalin inactivated culture supernatant containing no *C.pseudotuberculosis* bacteria or any bacterial cell wall protein. The mixture of both CLA biotypes 1 and 2 containing 750 mg PLD per dromedary gave a complete protection against a challenge dose containing 4.0 x 10^3 cfu/ml of an ovine/caprine biotype. Sero conversion was tested with an indirect CVRL in house ELISA using PLD as antigen and protein A as conjugate.

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