Diagnostic Exercise

From the CL Davis-SW Thompson Foundation

Case #:**228**; Month: **January**; Year:**2024**

Answer sheet

Title: Postpartum necrotizing endometritis in a goat

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Clinical history: Two-year-old female goat with a 2-day history of fever, bloody vaginal discharge, and anorexia after kidding. Due to poor prognosis, euthanasia was elected.

Necropsy findings: The main necropsy findings were observed in the uterus. The left uterine horn was enlarged and had three well-demarcated bulging, transmural, irregular, dark red to bluish foci visible from the serosal surface (Fig. 1A). In the lumen of the uterus there was large amount of dark red fluid, and the mucosal surface was dark red (Fig. 1B).

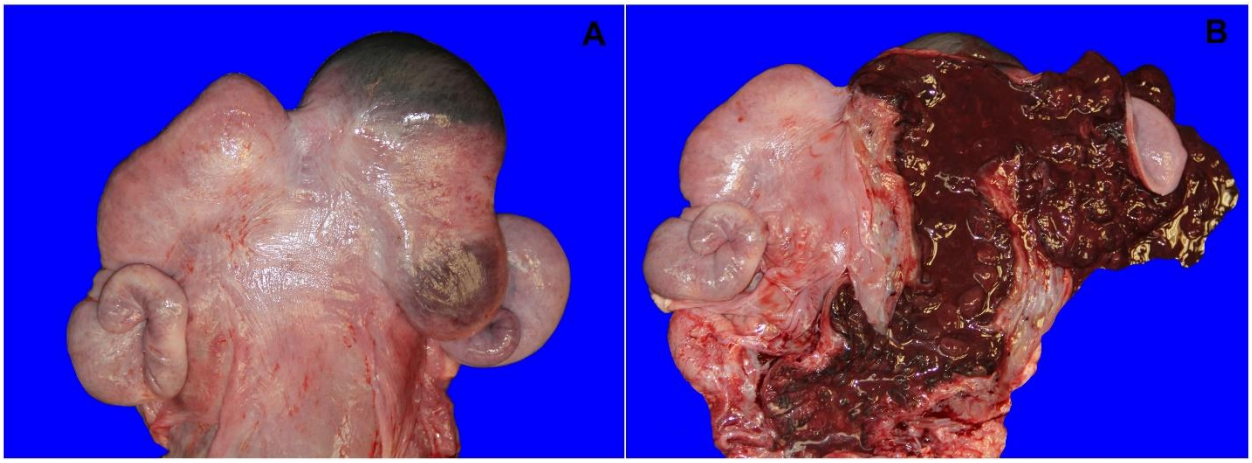

Figure 1. Uterus. (A) Serosal side. The left horn is enlarged and shows well-delimited multifocal dark red to blueish irregular areas. (B) Mucosal side. The lumen of the left horn is filled with dark red fluid and has a dark red mucosa.

Microscopic findings:

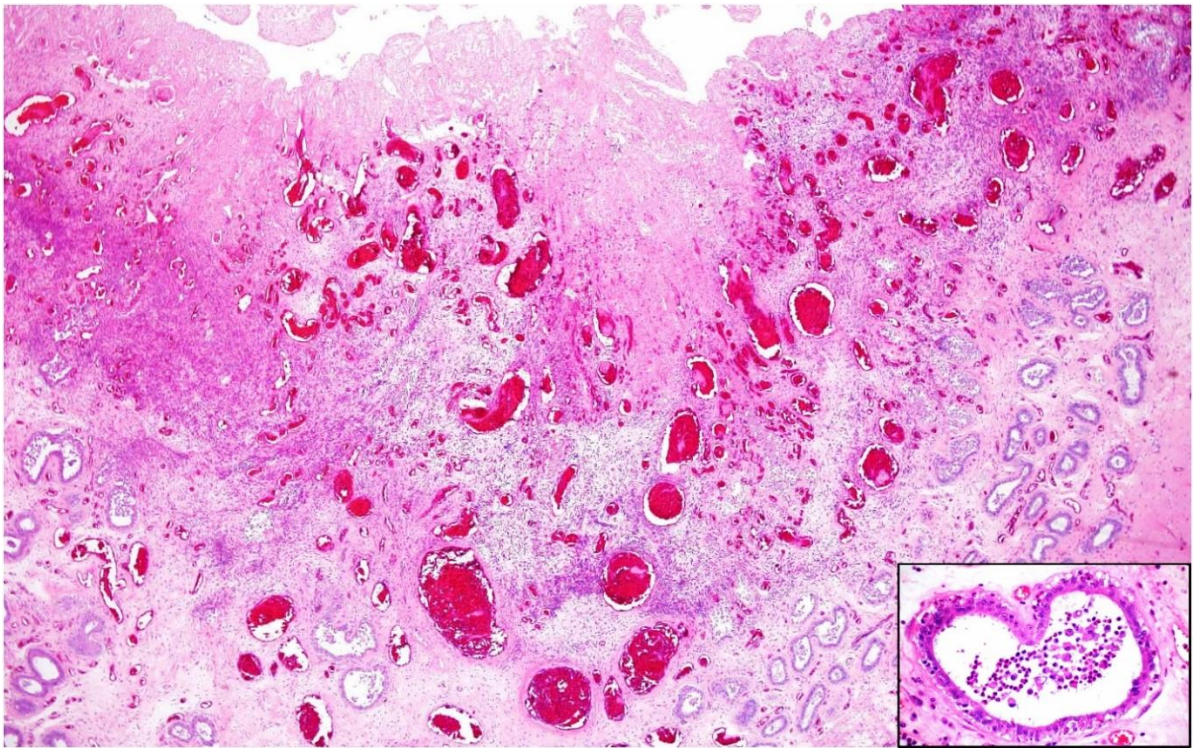

Figure 2: Endometrium. The endometrium is necrotic, hemorrhagic, congested and edematous. There are inflammatory cells reaching the endometrial glands (inset). H&E.

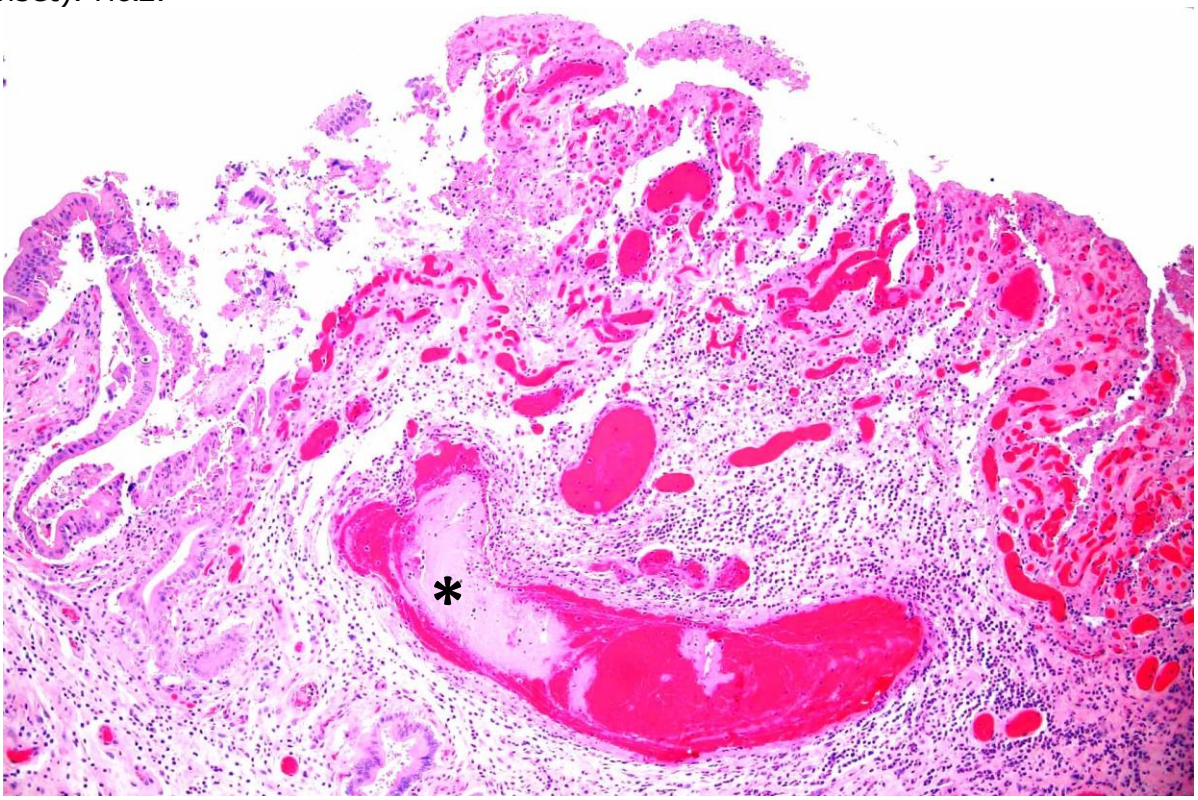

Figure 3: Endometrium. There is severe congestion, hemorrhage, and thrombosis (asterisk). H&E.

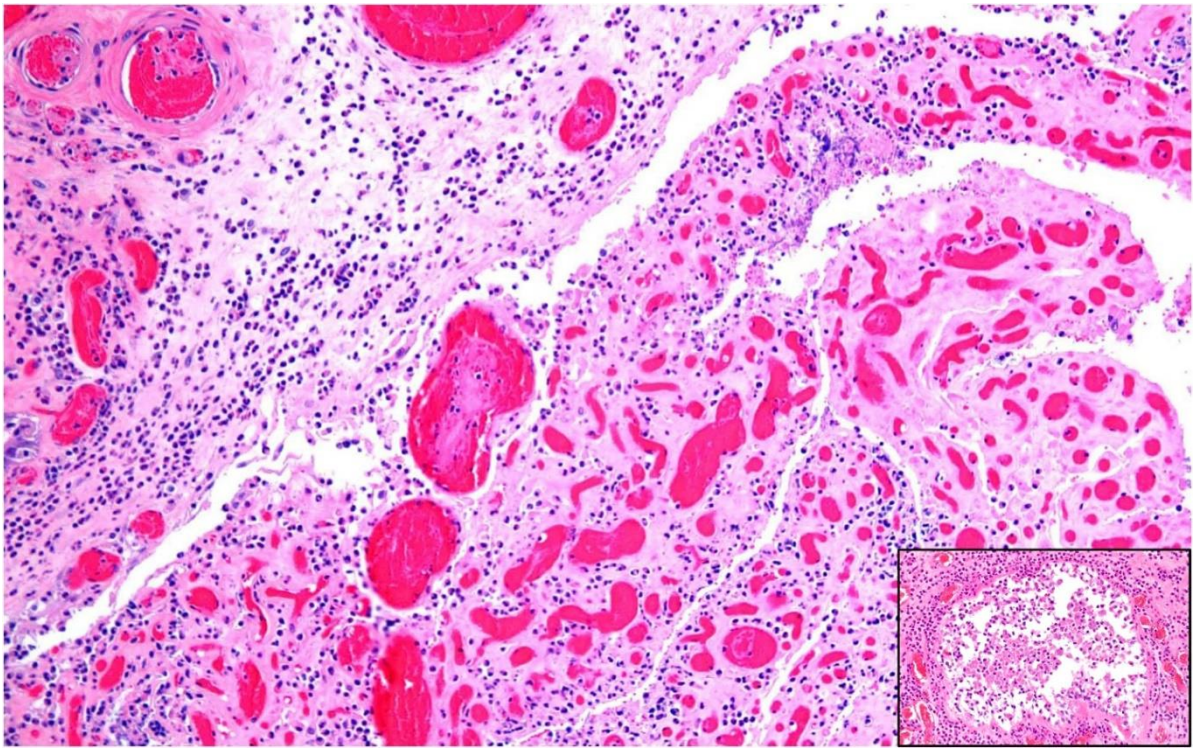

Figure 4: Endometrium. The inflammatory infiltrate is predominantly composed of neutrophils, which are also prominent within lymphatics (inset). H&E.

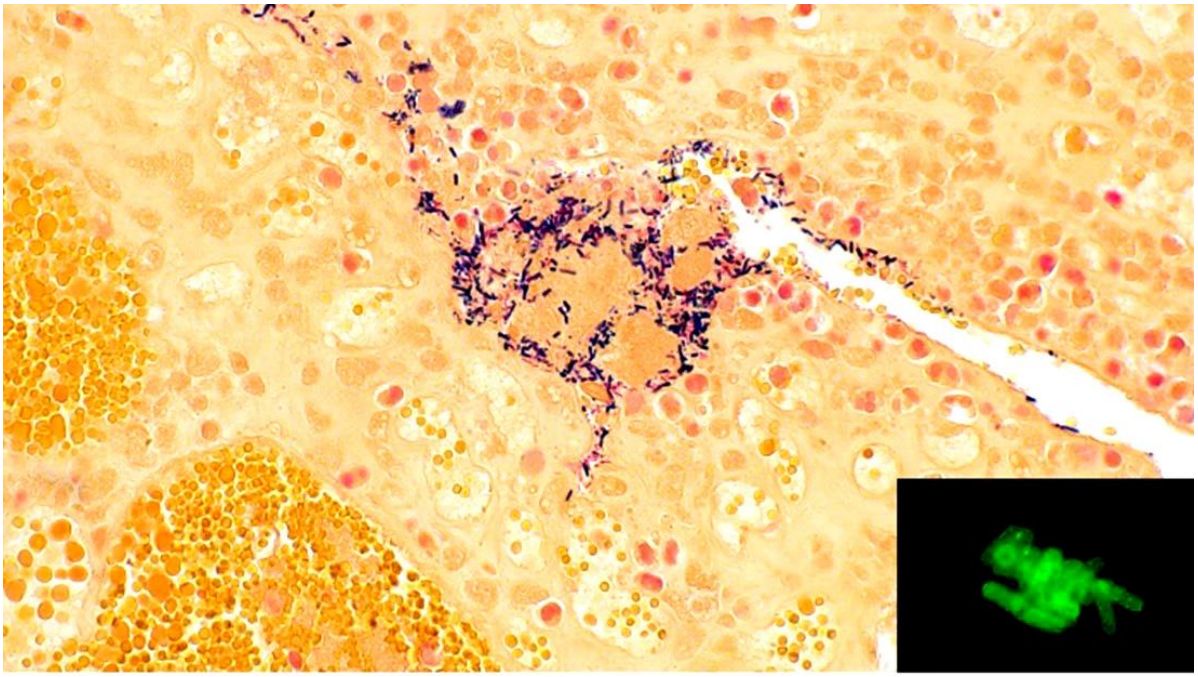

Figure 5. Endometrium. The bacterial colonies are composed of gram-positive bacilli. Gram stain. Inset: The uterine impression smear is positive for *Clostridium septicum*. Fluorescent antibody test (FAT).

Follow-up questions:

(1) Histologic description: The endometrium is superficially and diffusely necrotic, hemorrhagic, edematous, and infiltrated by large numbers of neutrophils (Figs. 2 and 3). The lumen of the endometrial glands is similarly occupied by large numbers of neutrophils. The vessels are markedly congested and thrombotic (Fig. 3). The inflammatory infiltrate is composed predominantly of neutrophils and these cells were also observed within lymphatic vessels (Fig. 4). In addition, gram-positive bacilli, single or in clusters, are present in the necrotic mucosa (Fig. 5).
(2) Ancillary test: Positive fluorescent antibody for *Clostridium septicum* (Fig. 5 inset).
(3) Morphologic diagnosis: Endometritis, necrohemorrhagic and suppurative, diffuse, severe, with edema, thrombosis, and intralesional gram-positive bacilli.
(4) Etiologic diagnosis: Clostridial endometritis.

Comments:

The diagnosis of clostridial endometritis in this goat was made based on macroscopic and microscopic findings coupled with the demonstration of intralesional *Clostridium septicum* by immunofluorescence (Fig. 5 inset). Clostridial postpartum metritis and endometritis have been recently described in goats, caused by *Clostridium perfringens* type A, *C. septicum*, *Clostridium novyi, Clostridium chauvoei* (1) and/or *Paeniclostridium sordellii* (2). In both studies, uterine lesions were characterized by superficial to transmural coagulative necrosis, hemorrhage, thrombosis, and edema (1,2). Those changes are like those described in this case.

In our case, *C. septicum* was the only clostridial organism detected. This microorganism is responsible for gas gangrene in several animal species, and it was also associated with cases of vulvovaginitis and postpartum metritis in heifers (3). *C. septicum* produces alpha-toxin (α-hemolysin), which uses glycosylphosphatidylinositol-anchored proteins in the membrane of target cells as its cellular receptor, undergoes proteolytic activation, and interacts with other activated monomers within the membrane to form a transmembrane pore. This pore-forming activity of alpha toxin is essential for *C. septicum*-mediated toxicity in vivo. This toxin causes acute necrosis, congestion, hemorrhage, and edema. Furthermore, *C. septicum* produces several other toxins, including, amongst others, delta toxin (another hemolysin), beta toxin (a DNase), gamma toxin (a hyaluronidase), a neuraminidase, and a hemagglutinin (4).

Clostridial infections should be considered as the causative agent in the differential diagnoses for cases of postpartum endometritis in goats.

References:

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2. Gonzalez-Astudillo V, Asin-Ros J, Moore J, Uzal FA, Navarro MA. *Paeniclostridium sordellii*-associated peripartum metritis in goats. Vet Pathol. 2023;60(1):69-74.

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4. Popoff MR. Toxins of histotoxic Clostridia: *Clostridium chauvoei*, *Clostridium septicum*, *Clostridium novyi*, and *Clostridium sordellii*. In: Uzal FA, Songer JG, Prescott JF, Popoff MR, eds. Clostridial Diseases of Animals. Hoboken, NJ: John Wiley; 2016. p23–44.

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