

Postpartum metritis and septicemia in an adult cross-breed pig: Aetiopathology and antibiotic sensitivity pattern

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ABSTRACT

The adult cross-breed pig had a history of retention of placenta after farrowing and discharge of purulent materials from vagina. At necropsy, epicardial hemorrhage, hemorrhagic lymph nodes, congestion of visceral organs, gastric and caecal mucosa were observed. The uterus was thickened, highly congested and hemorrhagic with presence of necrotic materials in the endometrium. Microscopically, vascular changes in different organs, fibrin thrombi in lymph node, multiple follicular cysts in ovary, severe vascular and inflammatory changes in endometrium and myometrium, meningitis, leucocyte margination and perivascular edemas in brain were observed. *Escherichia coli* was isolated from heart blood. The isolate was sensitive to ofloxacin, ciprofloxacin, chloramphenicol, levofloxacin, meropenem, ceftriaxone, amikacin, oripenem, ceftazidime/clavulanate. Based on pathology and bacteriology, the case was diagnosed as post-partum metritis and septicemia associated with *E. coli*.

Keywords: Antibiotic sensitivity, *Escherichia coli*, pathology, pig, post-partum metritis, septicemia

Infection and inflammation of reproductive organs are leading cause of infertility in domestic animal species¹. Post-partum and post mating uterine infections occur most commonly in domestic species. Post-partum uterine infection is a significant problem in pig breeding industry causing heavy economic losses by affecting health of sows and by reducing reproductive performance leading to early superannuation from the herd. After parturition, anatomic barriers to infection and reproductive tract compartmentalization is temporarily lost¹. Uterine contamination occurs due to poor hygiene, prolonged parturition, obstetrical intervention and retained placenta^{1,2}. Presence of epithelial tissue debris and fluids during postpartum period creates a suitable environment for bacterial growth. In pigs, uterine infection is caused by many pathogens like virus, bacteria, parasite, fungal toxin and other factors³. *E. coli*, *Truperella pyogens*, *Lactobacillus spp.*, *Biofido bacterium*, *Proteus vulgaris* were most common identified pathogens in sow endometritis⁴. *E. coli* is responsible for early puerperal endometritis⁵. Postpartum uterine infection can cause death of animals by causing severe sepsis. Limited literature is available on pathology of swine postpartum metritis. Therefore, the present study is intended to study bacteriology, antibiotic sensitivity and pathology of postpartum metritis and septicemia in an adult crossbreed pig.

One cross-breed adult female pig was submitted to post mortem facility, ICAR-IVRI, Izatnagar with history of farrowing, retention of placenta and discharge of purulent materials from vagina and the animal was under treatment. Detailed necropsy was conducted on the dead animal and gross lesions were recorded. Heart blood samples are collected aseptically in a sterile syringe and stored at -4°C for bacteriological work. Tissue samples were collected from different organs in 10% neutral buffer formalin for routine histopathological processing and Hematoxylin and Eosin staining⁶. For bacteriological examination, heart blood samples stored at -4°C were processed on brain heart infusion agar and MacConkey Agar and incubated at 37°C for 24-48 hours and bacterial smear was

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stained with Gram staining⁷. The antibiotic sensitivity test (ABST) was carried out in Mueller Hinton agar using disc diffusion method as per standard procedures described earlier⁸.

The nutritional status of the animal was good. The perianal region was soiled with dried bloody discharges (Fig. 1). Petechiae to ecchymosis hemorrhages were present on the epicardium of the ventricles and auricles (Fig. 2). The tonsil, lung, liver and kidneys were congested. Gastric mucosa was highly congested. In the small intestine, watery catarrhal content was present. The caecal mucosa was highly congested with presence of semisolid content in the lumen.



Fig. 1. Soiling of perianal region with dried bloody vaginal discharge; **Fig. 2.** Petechiae to ecchymosis hemorrhages on epicardium.

The lymph nodes were hemorrhagic. The uterus wall was thickened, highly congested and hemorrhagic with presence of necrotic materials in the endometrium (Fig. 3 & 4). The meningeal blood vessels of brain were highly congested.

Histopathology of lungs revealed highly congested blood vessels with presence of red blood cells in the lumen of alveoli and bronchiole and hemosiderin laden macrophages in the parenchyma (Fig. 5). Some alveoli were edematous and filled with fibrin. Bronchiolar lumen was

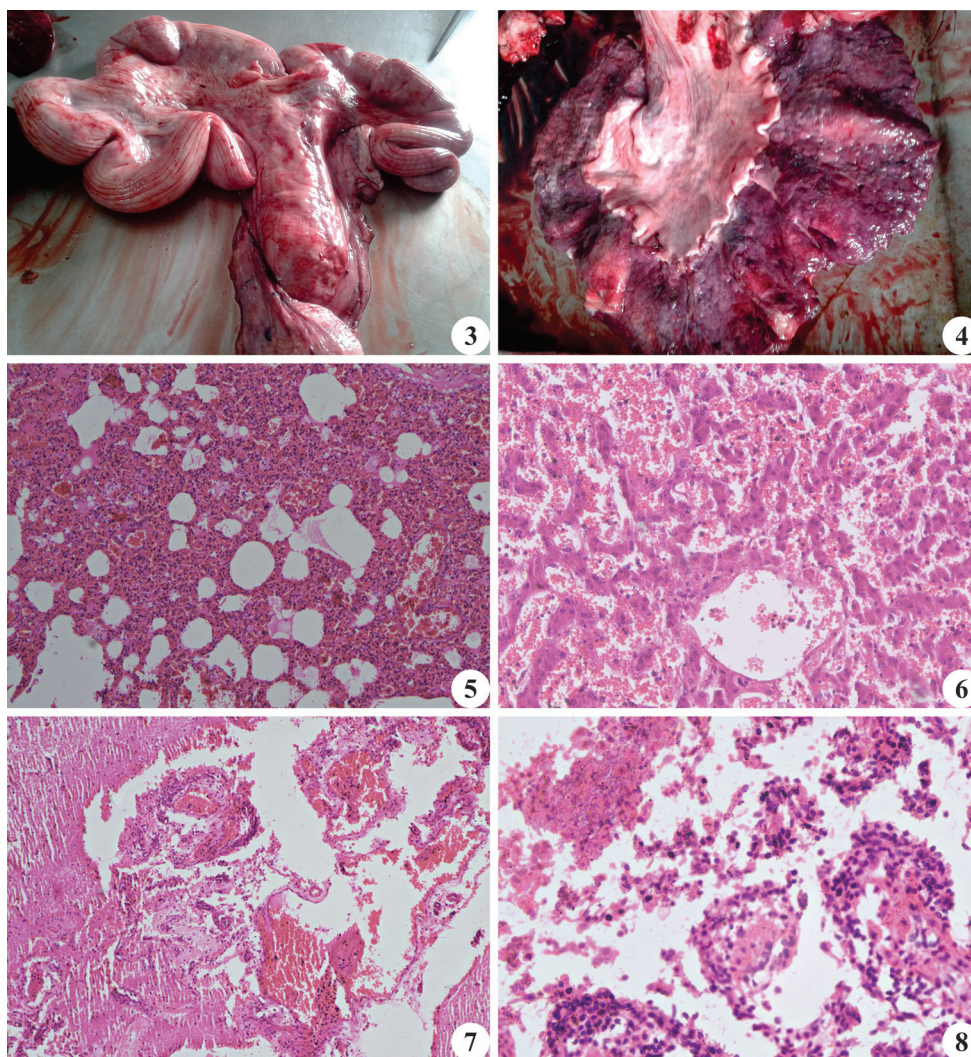


Fig. 3 & 4. Highly congested, thickened and hemorrhagic uterus; **Fig. 5.** Photomicrograph of lung showing hemorrhage, congestion and oedema in lungs (H&E staining x100); **Fig. 6.** Photomicrograph of liver showing highly congested hepatic sinusoids (H&E staining x200); **Fig. 7.** Photomicrograph of brain showing severe meningitis (H&E staining x100); **Fig. 8.** Photomicrograph of intestine showing necrosis and sloughing off epithelial cells into the lumen, infiltration of inflammatory cells in the lamina propria (H&E staining x400).

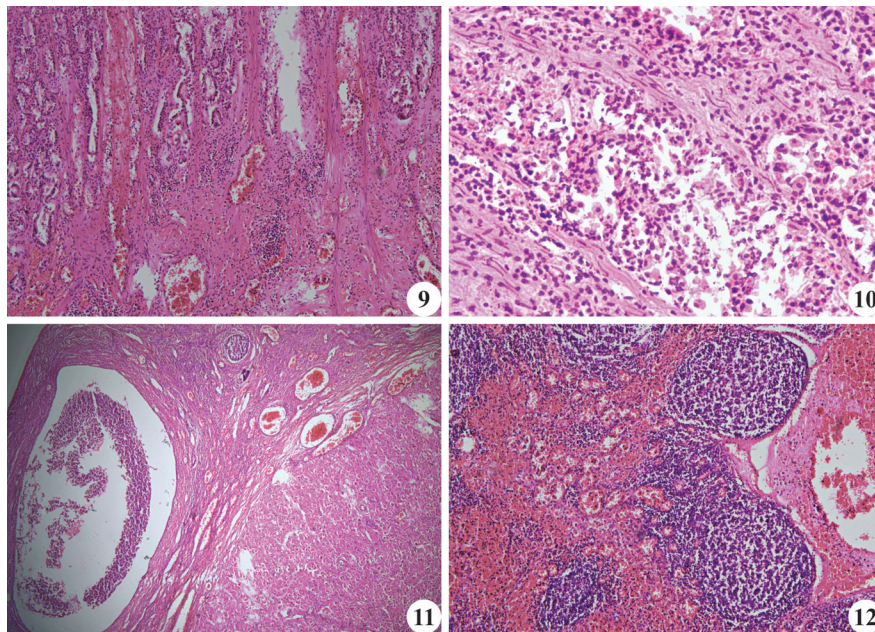


Fig. 9. Photomicrograph of uterus showing severe vascular congestion, necrosis and heavy infiltration of inflammatory cells (H&E staining x100); **Fig. 10.** Photomicrograph of uterus showing necrosis and heavy infiltration of inflammatory cells (H&E staining x200); **Fig. 11.** Photomicrograph of ovary showing cystic follicle (H&E staining x40); **Fig. 12.** Photomicrograph showing hemorrhagic lymph node and fibrin thrombi inside blood vessel (H&E staining x100).

partially blocked by shed epithelial cells. Hemorrhages were present in the myocardium with increased gap among cardiac muscle cells with prominent fibroblasts. The capillaries of the kidney were highly congested with cellular swelling and degeneration of tubular epithelial cells. In liver, severe congestion of hepatic sinusoids and interlobular blood vessels, hemorrhages, disorganization of hepatic cords were noticed with presence of hemosiderin laden Kupffer cells (Fig. 6). In cerebrum, meningitis, capillary congestion, margination of leucocytes, gliosis, perivascular edema with some eosinophilic neurons were observed (Fig. 7). In intestine, severe congestion, necrosis and sloughing off epithelial cells into the lumen and infiltration of inflammatory cells mainly neutrophils in the lamina propria were observed (Fig. 8). In the endometrium of uterus, severe vascular congestion and extensive hemorrhage, necrosis of endometrial gland, heavy infiltration of inflammatory cells mainly neutrophils in the surface epithelium and lamina propria were observed (Fig. 9 & 10). In myometrium, vascular congestion, hemorrhage and accumulation of perivascular mononuclear cells were observed. The ovarian blood vessels were highly congested with presence of multiple cystic follicle lacking ova and diminished granulosa cells thickness, corpus luteum and different developmental stages of follicles (Fig. 11). The retention of CL may be due to impaired transfer of PGF2 alpha from endometrium to ovary due to postpartum metritis. In sows, presence of multiple follicular cysts are common, usually interfering with normal reproductive cycle. In spleen and lymph nodes,

severe congestion, hemorrhages, fibrin thrombi in blood vessels and severe lymphoid necrosis with accumulation of neutrophils were observed (Fig. 12).

The bacteria produced lactose fermenting bright pink, moist and circular colonies on MacConkey agar. Microscopic examination of Gram stained slide smear of culture revealed presence of pink colored gram negative bacilli. Based on colony morphology, biochemical tests and Gram's staining, the isolated bacteria was identified as *E. coli*. On ABST, the bacteria were found to be sensitive to ofloxacin, ciprofloxacin, chloramphenicol, levofloxacin, meropenem, ceftriaxone, amikacin, oripenem, ceftazidime/clavulanate; intermediate sensitive to tetracycline, pefloxacin, cefepime, erythromycin, cefoperazone, gentamycin, estapenem, piperacillin/tazobactam and resistant to ampicillin, methicillin, amoxiclav, sulphadiazine, cotrimoxazole and trimethoprim.

Metritis in sow mostly occurs 24-48 hours of post parturition. In the present case, the death of sow occurred after 24-36 hours of farrowing and retention of placenta was the one of the major risk factor associated with postpartum metritis. Prolonged farrowing and impaired placenta expulsion are reported to increase the chances of postpartum metritis². Prolonged farrowing causes energy and electrolyte imbalance and impairs sow immunity. In addition, shortage of oxytocin level hinders expulsion of fetal membrane and other inflammatory material resulting in profound bacterial growth⁹. Poor hygiene, prolonged parturition, obstetrical intervention, large

litter size, number of dead born fetuses per litter and retained placenta are recorded as major cause of uterine contamination in the previous study^{1,9}. In the current study, the observed gross lesions were hemorrhages on the epicardium and lymphnodes; moderate to severe congestion of tonsil, lung, liver, kidneys, meningeal blood vessels, gastric and caecal mucosa; thickening, congestion and hemorrhages in the uterus. In a previous report, a case of bacterial metritis and valvular endocarditis caused by *Actinobacillus equuli* was described in a gilt with secondary septicemia in United States¹⁰. In another case study, post-partum metritis in 4 years old Duroc with vulvar discharge associated with retention of macerated foetus was described¹¹. Distention of uterus with purulent fluid mixed with necrotic materials on necropsy and microscopically, edema, bacterial infiltration and purulent exudates in uterine wall were reported in sow metritis^{12,13}. In a production sow with nonpuerperal chronic endometritis and pyometra, histological lesions like dilation of endometrial glands, submucosal infiltration of inflammatory cells and vascular congestion in submucosa and myometrium, presence of multiple corpus luteum and albicans in ovaries, gastritis and nephritis were described¹³. In our study bacteriological examination of heart blood collected aseptically revealed presence of *E. coli*, *Truherellapyogens*, *Lactobacillus spp.*, *Biofidobacterium*, *Proteus vulgaris* were reported to be the most common identified pathogens in sow endometritis⁴. *E. coli* and *Staphylococcus* were also listed as commonly isolated pathogen associated with septicemia and death in animals and birds in Northern India¹⁴. In other study, bacteria like *E. coli*, *Staphylococcus* and *Proteus* etc. were detected in the vaginal discharges of sow suffering from postpartum metritis and the isolated *E. coli* was sensitive to ofloxacin, streptomycin and gentamicin and were resistant to nitrofurantoin, augmentin, chloramphenicol, ciprofloxacin, rocephin and ampiclox¹¹. In the present case, *E. coli* isolate was resistant to ampicillin, amoxiclav, methicillin, vancomycin, sulphadiazine, cotrimoxazole and trimethoprim. ABST assay was used as a guide by the associated pig farm to select suitable antibiotics for similar cases in future and there was no report of further death in postpartum sows in that pig farm. Antimicrobial resistance (AMR) is a major global health threat. Overuse and misuse or unregulated use of antibiotics in veterinary and public health care system and agricultural industry give rise to emergence of antimicrobial resistance. Accurate selection of antibiotics after antibiotic sensitivity test and proper use of antibiotics are crucial to combat AMR. Isolation of pathogens from post mortem cases and determination of their antibiotic sensitivity pattern are helpful in formulating effective treatment regimen for similar cases in future and helpful in proper understanding of antibiotic sensitive and resistance pattern of isolated pathogens.

Postpartum is a very crucial period in animals. Postpartum uterine infection is very common in sows. Postpartum metritis causes delay in uterine involution and can cause sow mortality from severe sepsis. Proper care and treatment of sows during and after farrowing will reduce the incidence of postpartum infection and sow mortality. Identification of pathogens and their antimicrobial sensitivity to different antibiotics are very essential for choosing an effective treatment regimen.

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REFERENCES

1. Pascottini OB, Aurich C, England G and Grahofer A. 2023. General and comparative aspects of endometritis in domestic species: A review. *Reprod Domest Anim* **58**: 49-71.
2. Björkman S, Oliviero C, Kauffold J, Soede NM and Peltoniemi OAT. 2018. Prolonged parturition and impaired placenta expulsion increase the risk of postpartum metritis and delay uterine involution in sows. *Theriogenology* **106**: 87-92.
3. Wang Y, Guo H, Bai Y, Li T, Xu R, Sun T, Lu J and Song Q. 2020. Isolation and characteristics of multi-drug resistant *Streptococcus porcinus* from the vaginal secretions of sow with endometritis. *BMC Vet Res* **16**: 1-8.
4. Madiyev DZ. 2024. Clinical microbiota isolated from the uterine contents of sows in postpartum endometritis. In BIO Web of Conferences. *EDP Sci* **108**: 03015.
5. Drillich M and Wagener K. 2018. Pathogenesis of uterine diseases in dairy cattle and implications for fertility. *Anim Reprod* **15**: 879.
6. Bancroft J and Gamble M. 2008. Theory and Practice of Histological Techniques. 7th ed. Elsevier Health Sciences: Amsterdam, The Netherlands.
7. Coico R. 2006. Gram staining. *Curr Protoc Microbiol* **1**: A-3C.
8. Baur AW, Kirby WM and Sheories JC. 1996. Antibiotic susceptibility testing by standard Disc Diffusion method. *Ann J Clin Pathol* **48**: 493-497.
9. Nam NH, Dao BA and Sukon P. 2023. Risk factors for puerperal endometritis in the sow. *S Afr J Anim Sci* **53**: 843-9.
10. Ramos-Vara JA, Wu CC, Mitsui I, Lin TL and Miller MA. 2008. Metritis, valvular endocarditis and septicemia by *Actinobacillus equuli* in a gilt in the United States. *Vet Pathol* **45**: 495-9.
11. Oke-Egbodo EB, Samaila D, Oke OP, Anzaku JE and Hassan R. 2017. A Case of Bacterial Postpartum Metritis in a 4-Year Old Duroc Sow. *Niger Vet J* **38**: 300-4.
12. Fangman TJ and Shannon MC. 2007. Diseases of the puerperal period. In: Current Therapy in Large Animal Theriogenology: WB Saunders. 789-794.
13. Morris C, Watson K, Schwartz D and Pereira R. 2023. Nonpuerperal chronic endometritis with pyometra causing systemic illness in a production sow. *Clinical Theriogenology* **15**.
14. Singh B, Agri H, Karthikeyan R and Jayakumar V. 2023. Common bacterial causes of septicemia in animals and birds detected in heart blood samples of referred cases of mortality in Northern India. *J Clin Med Img* **7**: 1-4.