Ovozoa 12 No. 3, December 2023 p-ISSN 2302-6464 e-ISSN 2722-967X
Available at https://e-journal.unair.ac.id/OVZ/index

Case Report

Use of vitamin E and selenium injections as supportive treatment of retained placenta in dairy cattle

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Open access under CC BY – SA license, DOI: 10.20473/ovz.v12i3.2023.166-163
Received August 27 2023, Revised November 20 2023, Accepted November 27 2023
Published online December 2023

ABSTRACT

The placenta is considered retained when it cannot separate from the uterus beyond the normal time limit. Physiologically, a cow's placenta comes out 3-8 hours postpartum. This study aims to determine the diagnosis and treatment of retained placenta in dairy cows using vitamin E and selenium as supportive treatment. On physical examination the patient had a body temperature of 39.9°C, was weak, unable to stand, and had decreased appetite. General examination in this case showed the following clinical symptoms: the placenta was still hanging from the vulva and there was an unpleasant odor from the vulva area. The retained placenta was removed manually, followed by flushing the uterus with 0.2% povidone iodine (in water). Antibiotic (Colibact bolus) were introduced into the uterus and penicillin-streptomycin was injected intramuscularly along with vitamin E and selenium as supportive treatment. The results showed that the cow recovered and returned to estrus 14 days after therapy. It could be concluded that injections of vitamin E and selenium helped restore the estrous cycle in cows with retained placenta.

Keywords: antibiotics bolus, penicillin-streptomycin, povidone iodine flushing, retained placenta

INTRODUCTION

Dairy farmers in rural areas depend on milk production and calf birth as their source of financial income. Milk production by dairy cows is an inseparable part of their reproductive cycle. The sustainability of dairy farming is highly dependent on reproductive efficiency. Low reproductive efficiency resulted in economic losses due to decreased milk production, medical expenses, delays in obtaining calf once a year, and increased culling rates. Low reproductive efficiency could be caused by reproductive disorders including retained placenta, abortion, premature calving, and dystocia. Placental retention, metritis, and endometritis were interrelated and could reduce the reproductive efficiency of dairy cows (Huang *et al*. 2018).

Retained placenta is a failure to expel the placenta within 24 hours after parturition. Cows with retained placenta had an increased risk of metritis, endometritis, and reduced fertility (Huang *et al*., 2018). Several factors that influenced the occurrence of retained placenta in cows were age, hormone deficiencies, season, nutrition, and weakness. Placental retention

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occurred due to disruption of the separation and release of the cotyledon villi from the maternal caruncle crypts, and interdigitation was still present (Patel and Parmar, 2016). Several treatment options are currently available for placental retention. Generally, the retained placenta in cow's uterus was removed manually, followed by administration of intrauterine and/or intramuscular antibiotics (Cui *et al*., 2017).

Supportive treatment could be provided with intrauterine administration of prostaglandins or intramuscular estradiol. However, the results of this treatment were not relatively effective and often accompanied by a subsequent decrease in fertility in cattle (Huang *et al*., 2018). Supportive treatment with vitamin E and selenium had been used as a preventive measure for labor induction using $PGF_2\alpha$ (Jovanović *et al*., 2013) or during late gestation period to reduce the incidence of retained placental (Damarany, 2021). This study aims to determine the use of vitamin E and selenium as supportive treatment to manual removal, irrigation and administration of antibiotics in cows with retained placenta.

MATERIALS AND METHODS

The cow with retained placenta in this study belonged to a rural farmer who was a member of the Agro Niaga cooperative, Jabung district, Malang regency, East Java, Indonesia. The cow was a Holstein Friesian, approximately four years old, weighing almost 200 kg, with a body condition score of 2/5 (Figure 1).

Figure 1 Holstein Friesian cow with retained placenta

Anamnesis

The farmer reported to the veterinarian that one of his cows calved normally on August 9 2022 evening at around 22.00 Western Indonesia Time (WIB, UTC+07:00). However, on August 10 2022, the cow collapsed and until August 11 2022 at 08.00 WIB the placenta was still hanging out of the vulva. The owner reported that it was the first time his cow had experienced a case like that. Physically, the cow looked weak and did not want to eat. Pervaginam examination showed that the placenta was still present in the uterus. The veterinarian treated the cow on August 11 2022 at 11.30 WIB.

Clinical symptoms

Generally, the cow was weak, unable to stand, with decreased appetite and had a body temperature of 39.9°C. The placenta was still hanging from the vulva, and there was an unpleasant odor from the vulva area, indicating that the placenta was still in the cow's birth canal.

Diagnosis and prognosis

Based on the anamnesis, physical examination, and clinical findings, the diagnosis of the dairy cow was retained placenta. Retained placenta is a condition where the fetal placenta does not come out of the cow's body for more than 12 hours postpartum (Rohmah *et al*., 2023). In the present case, the prognosis was poor.

Treatment

Treatment for retained placenta in this case was manual removal, followed by flushing the uterus with 0.2% povidone-iodine, administration of four intrauterine boluses of the antibiotics Colibact (Figure 2) and 15 mL of penicillin-streptomycin intramuscularly. Supportive therapy consisted of 15 mL of vitamin E intramuscularly.

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Figure 2 Manual removal of the placenta

RESULTS

The day after treatment, the cow's condition improved, she was able to stand, was willing to eat and drink, and her body temperature was normal. There was no pus discharge from the vulva, and there was no foul smell as it was noticeable before treatment. The cow recovered and returned to heat 14 days later.

DISCUSSION

Physiologically, a cow's placenta came out by itself 3-8 hours after parturition. Placental retention is a condition where fetal placenta did not come out of the cow's uterus for more than 12 hours postpartum. The placenta did not come out by itself because the fetal placenta (cotyledon) failed to detach from the cow placenta (caruncle) (Freselia *et al*., 2016).

In this case, placenta retention could occur because the cow was always kept in the cowshed and lacks exercise. Lack of exercise caused the muscles used for contraction during the purpureum to be suboptimal and reduced myometrial contractility (Górriz-Martín *et al*., 2017). Decreased myometrial contractility caused reduced uterine contractions which expel the placenta from the uterus (Amin *et al*., 2013). Retained placenta could be caused by failure of uterine contractions after parturition. Suboptimal uterine contractions caused suboptimal expulsion of the cotyledon; if the collagen connecting the cotyledons and the caruncles could not be broken, it would interfere with placental detachment (Abdisa, 2018). In addition, placental retention in dairy cows kept in cowshed all day was higher because the cows were not exposed to sunlight (Rohmah *et al*., 2023).

Enzymes in the placenta played a role in changes in estrogen (17β-estradiol) and progesterone levels (Moradi *et al*., 2022). Progesterone decreased drastically during parturition, and maternal plasma estradiol increased. High estradiol helped the release of the fetal membranes from the birth canal (Yi *et al*., 2022). Placental retention would occur if estradiol were low. High progesterone also caused the placenta to fail to produce specific steroid enzymes that induced placental detachment (Li *et al*., 2021). Apart from that, prostaglandin also influenced the incidence of placental retention. Low prostaglandin caused decreased myometrial contractility, so that expulsion of the placenta was restrained. This was because prostaglandins could trigger uterine contractions and initiate myometrial contractions (Yusuf, 2016).

In this case, the retained placenta might be caused by the condition of the cow that experienced vitamin, nutritional and mineral deficiencies. Deficiency of vitamin E and selenium in cows could disrupt general immunity and change cell defense mechanisms, thereby increasing the risk of placental retention (Amin *et al*., 2013). Selenium and vitamin E were the most important antioxidants that positively influenced neutrophil function and protected neutrophils from oxidative damage (Todorović and Davidović, 2013). In addition, retained placenta could be reduced by preventing hypocalcemia and maintaining adequate selenium level in dairy cows. Balanced nutrition of calcium and phosphorus in the diet, administration of intramuscular selenium, and injection of vitamin A with ß-carotene in the prepartum period should be considered to reduce the incidence of retained placenta (Swain *et al*., 2013).

Treatment of retained placenta generally involved manual removal, followed by administration of antibiotics to reduce

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inflammation and avoid prolonged metritis or pyometra (Abdisa, 2018). In this case, the retained placenta persisted for 48 hours postpartum. The cow showed weakness, lethargy, inability to stand, and had an unpleasant odor in the vaginal area. This unpleasant odor indicated a decay process in the placental tissue which can trigger further bacterial growth in the uterus (Ghanem *et al*., 2015). Irrigation using povidone iodine into the uterus after removal of placental remains helped and promoted regeneration of endometrial epithelial cells, which in turn maintained endometrial fertility (Yoshida *et al*., 2020). Povidone iodine acted as an antimicrobial and antiseptic in the wound healing process. Povidone iodine had a high ability to kill gram-positive and gram-negative bacteria and fungi, as well as a moderate ability to kill spores and fungi (Bigliardi *et al*., 2017). Intrauterine administration of antibiotics was aimed at controlling bacteria in the uterus (Goshen and Shpigel, 2006). Four boluses of Colibact antibiotics were given to patients with retained placenta. Each bolus of Colibact contained 1000 mg sulfadiazine and 200 mg trimethoprim (Papich, 2011). Sulfadiazine was almost always combined with trimethoprim. Sulfadiazine was bacteriostatic and trimethoprim was bactericidal, but when combined, both forms of antibiotics were bactericidal (Koutsoumanis *et al*., 2021). The dose of trimethoprim and sulfadiazine in cattle is 16 mg/kg bw which can be given 2-4 boluses per cow (Papich, 2011).

In addition to the intrauterine bolus of Colibact, penicillin-streptomycin was also administered intramuscularly. The aim of administering intramuscular antibiotics was to prevent secondary systemic infections. Moreover, intramuscular administration of antibiotics could quickly reach the point of secondary infection (Timonen *et al*., 2021). The penicillin-streptomycin is a broad-spectrum bacteriostatic and bactericidal agent with short-acting activity against gram-negative and gram-positive organisms. The dose of penicillin-streptomycin for cattle, sheep and goats is 1 mL per 20 kg body weight (Plumb, 2011).

Vitamin E was an antioxidant that protected cell membranes from damage due to fat oxidation (Medina and Gupta, 2023). Selenium was an essential mineral for health and was a component of several key metabolic pathways, including normal thyroid metabolism, the antioxidant defense system, and immune function. Selenium was a component of several enzymes known as selenoproteins (Brown and Arthur, 2001; Mehdi and Dufrasne, 2016). Combining selenium and vitamin E could increase antioxidant activity to protect cell membranes against reactive oxygen species and lipid peroxidation. They also played a role in cell recovery and improved immunity, hormonal synthesis, and tissue integrity. Vitamin E prevented the formation of free peroxide, while selenium reduced peroxides that were already formed. Sodium selenite was a form of vitamin E or selenium that was commercialized to meet vitamin E needs (Hoque *et al*., 2016). The dose given to cattle was 2 mL per 10 kg body weight, with a maximum of 20 mL per head (Mehdi and Dufrasne, 2016).

In this case, the cow recovered and returned to estrus 14 days later. It was revealed that manual removal of retained placenta (Abdisa, 2018) and flushing of the uterine lumen with povidone iodine helped to clean intrauterine debris (Bigliardi *et al*., 2017). Intrauterine sulfadiazine and trimethoprim inhibited bacterial growth (Koutsoumanis *et al*., 2021), and intramuscular injections of penicillin and streptomycin prevented systemic spread of intrauterine infection (Timonen *et al*., 2021). Injections of vitamin E and selenium helped the recovery of endometrial cells (Hoque *et al*., 2016), thereby restoring their function in the estrous cycle.

CONCLUSION

It could be concluded that injections of vitamin E and selenium helped restore the estrus cycles of cows with retained placenta treated by manual removal, flushing the uterine lumen with antiseptics, and intrauterine and intramuscular administration of antibiotics.

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ACKNOWLEDGEMENT

Thank you to the veterinarians and veterinary paramedics at the Agro Niaga Cooperative, Kemiri village, Jabung district, Malang regency, Indonesia, for their technical support.

AUTHOR'S CONTRIBUTIONS

Nurul Insyirah Rahim (NIR), Viski Fitri Hendrawan (VFH), Habib Syaiful Arif Tuska (HSAT), Galuh Chandra Agustina (GCA)

NIR and VFH: conceived the idea, acquisition data, and manuscript drafting. HSAT, and GCA: critically read and revised the manuscript for intellectual content. All authors read and approved the final manuscript.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

FUNDING INFORMATION

This study was funded by the authors.

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