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Case Study: SAT, A New Treatment for Clinical Goat Endometritis

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Abstract

Endometritis is a common disease in peripartum livestock leading to economic losses. A two-year-old, primiparous Egyptian Baladi doe suffered from mucopurulent endometritis. In a standing position using a new treatment called SAT, 10 ml of boiling water (≈100°C) was slowly injected within the uterine lumen. Peripheral blood and cervical discharge samples were collected before injection (bi) and at 8, 24, 48, 96, 144 and 216 hrs. post injection (pi) and were sent to the lab. Two weeks pi, the doe was injected with prostaglandin F2α hormone IM, was naturally bred and subsequently became pregnant. By visual observation at 8 hrs. pi, there was a severe inflammatory response as evidenced by edema and redness within the vulva, vagina and external cervical os, mucopurulent discharge was evident and decreased gradually until dissolution. Hematological examinations revealed that there was a leukocytosis bi (15.8 x 10^9/ L) which increased at 8 hrs. pi (18.3 x 10^9/ L) then began to decrease up to normal values. The cytological cervical smears revealed an abundant number of pus cells bi which increased at 8 hrs. pi indicated a rapid activation of innate immune response. Also, normal intact epithelial cells were observed bi and increased at 8 hrs. pi then decreased suggesting a sloughing of the burned endometrium; young epithelial cells were reported at 24 hrs. pi suggesting an endometrial recovery. In conclusion, SAT induced a burning of the endometrium, leading to acute inflammation and sloughing of the endometrial layer prior to regeneration of new layer.

Keywords: Goat; Infertility; Endometritis

Introduction

Endometritis is a common postpartum disease in livestock causing economic losses as disturbances in uterine involution, milk yield, fertilization, fertility and finally leading to culling [1,2]. The incidence of endometritis is 10% to 17% in dairy cows [3] 5% to 10% in dairy sheep [4] and 1.5% to 3.2% in goats [5]. Although the incidence is not as high in goats as in cattle, many problems of parturition are common in dairy goats and predisposing them to endometritis [6].

Endometritis arises from either ascending infection by organism that normally inhibits the lower genital tract or infectious agents introduced in to the genital tract during mating, artificial insemination, or post-partum [7]. Endometritis has been categorized into 3 phases: acute, sub-acute, or chronic endometritis according to the degree and type of inflammatory response [8].

A few techniques are applied in the diagnosis of cattle endometritis, including hematology, bacteriology, vaginoscopy, ultrasonography, trans-rectal palpation, cytology and histological examination [9], while in commercial sheep and goat flocks, diagnosis of endometritis is usually done by inspection of the pelvic region and vaginal examination using vaginal scope [10].

There are several methods described for endometritis treatment in farm animals like logul's iodine [11], prostaglandin, oestradiol benzoate and systemic or local antibiotic [12-14]. Samia- treat (SAT) is a new treatment using moist heat (boiling water) for treatment of repeat breeder cases caused by subclinical endometritis in dairy cows [15]. Moist heat was used before for treatment of some acute and chronic human diseases [16].

The aim of this work was to use SAT for mucopurulent (clinical) endometritis treatment and get a more understanding of the mechanism of SAT.

Material and Methods

Two years old 30 kg Egyptian Baladi doe (once kidded) was suffered from repeat breeding. Three times natural mating was applied before and was failed and returned to estrus again.

Evaluation of the Reproductive System

Pelvic Region Inspection: The vulva, tail and perineum region were inspected before treatment.

Vaginal Examination: By using vaginal speculum and source of light the vagina and cervix were inspected.

Cervical Discharge Collection and Cervical Cytological Examination: Samples of cervical discharge were collected with a sterile cytobrush (Minitube Group Co., Ltd, Verona, USA) for cytological examination. In the standing position the goat was restrained and the perineal area was cleaned with sterile gauze. With the aid of vaginal speculum, the cytobrush was inserted through the vagina until it reached the external cervical os and collecting the samples by rotating the cytobrush. Cytological slides were prepared by rolling the brush onto a clean glass slides and were sent to the laboratory within an hour, cytologic assessment was done by counting 100 cells at X400 magnification (Optech GmbH, Munchen, Germany) to determine the percentage (%) of PMNs.

Blood Sample Collection:

Peripheral blood samples were collected twice before treatment from the jugular vein, 2 ml blood samples were collected in (EDTA/K3) tubes for counting the total leukocytes with automated cell counter.

Treatment: In standing position, the vaginal wall was lined with a layer of cotton and with the guide of ultrasound, vaginal speculum and detachable light; 10 ml of boiling water (≈100°C) was slowly injected (to avoid strong irrigation and escape of fluid to the oviducts) intrauterine by using 10 ml industrial syringe with blunt tip needle to not injury the cervix.

Evaluation of the Treatment: Pelvic region inspection: at 8, 24, 48, 96, 144 and 216 hrs. pi.

Vaginal Examination: As previously described the vaginal wall was inspected at 8, 24, 48, 96, 144 and 216 hrs. pi.

Cervical Discharge Collection and Cervical Cytological Examination: As previously described cervical discharge were collected at 8, 24, 48, 96, 144 and 216 hrs. pi and were sent to the lab within one hour.

Blood Sample Collection: As previously described, leukogram was made at 8, 24, 48, 96, 144 and 216 hrs. pi and was sent to the lab.

Natural Breeding and Pregnancy Diagnosis: Two weeks post injection, the doe was injected 2 ml prostaglandin F2α hormone IM then it was naturally breed. 25 days post breeding the doe was examined by ultrasound (Sonoscape M12V Ultrasound B-mode (Heyi Medical Instrument Co., Ltd., Shanghai, China) for pregnancy diagnosis.

Results

Pelvic Region Inspection

Before Treatment: Viscous mucopurulent discharge on vulva and the tail

After Treatment: Sever inflammatory response appeared as edema and redness in vulva with watery, turbid and yellowish discharges (Figure1) at 8 hrs. pi, this inflammatory reaction decreased gradually until disappeared at 96 hrs. after treatment.

8 h r s, pi 24 h r s, pi 48 h r s, pi 96 h r s, pi

Figure 1: Sever inflammatory response appeared as edema and redness in vulva at 8 hrs. pi, this inflammatory reaction decreased gradually until disappeared at 96 hrs. after treatment

Vaginal Examination

Before Treatment: By using vaginal speculum there was viscous mucopurulent vaginal discharge.

After Treatment: There was large amount of yellowish mucopurulent purulent discharges in the vagina (Figure 2) at 8 hrs. and decrease in amount gradually until disappeared and vagina become clear at 96 hrs.

Figure 2: The image on the left 24 hrs. pi showing yellowish mucopurulent purulent discharges in the vagina, the image on the right 96 hrs. pi showing clear normal vagina without any abnormal discharge

Discussion

SAT is a new simple treatment which proved its effectiveness in treatment of repeat breeder dairy cattle affected by subclinical endometritis [15]. El-Rheem *et al.* [15] did not consider the disease as a local infection to give antibiotic, but they induced a correctable injury of the affected or diseased endometrium to regenerate a whole new endometrium mimicking the human menstruation idea. This study was designed to examine effect of SAT on repeat breeder doe diagnosed with mucopurulent endometritis (clinical endometritis).

By pelvic inspection there was edema and redness in vulva with turbid and yellowish discharges at 8 hrs. pi, indicate that SAT induced inflammatory reaction that decreased gradually until disappeared at 96 hrs. pi. It knows from common observation that the injured site becomes inflamed. For example, a burn rapidly becomes red, hot, swollen and painful, causing vessels to dilate and leak fluid [18].

There was large amount of yellowish mucopurulent discharges in vagina at 8 hrs. pi and decrease in amount gradually until disappeared as the vagina become clear at 96 hr. pi this large amount indicate that there was uterine contraction lead to evacuation of the uterine content as heat lead to uterine contraction and the stimulated contractions return to base line level following removal of heat [19], this visual observation was confirmed by cervical cytological smears (Table 1) as increasing the % of pus cells at 8 hrs. pi also this increasing in % of pus cells indicating that SAT stimulated the recruitment of leukocytes to the inflamed (burned) site.

	bi	8 hrs. pi	24 hrs. pi	48 hrs. pi	96 hrs. pi	144 hrs. pi	216 hrs. pi
Pus cells %.	62.9	92.6	91.8	55.8	12.7	8.1	<5

The smears showed normal and intact epithelial cells bi, a few young epithelial cells (with round nuclei and distinct cytoplasm) begin to appear at 24 hrs. pi and disappear at 96 hrs. pi smear (Table 1).
Table 1: Cervical cytological examination

Normal intact epithelial cells were observed in cervical discharge smears bi and increased at 8 hrs. pi then decreased suggesting sloughing of the burned endometrium, young epithelial cells with round nuclei and distinct cytoplasm were observed at 24 hrs. pi then decreased suggesting an endometrial recovery and approved by successful conception and pregnancy. The endometrium is a highly regenerative tissue that undergoes diverse cell proliferation, growth, and apoptosis cycles as a function of the estrous cycle, pregnancy and involution [20,21] and in women it repeatedly grows and lost during the menstrual cycle [22]. In cattle the endometrium shedding occurs only after parturition and then it regenerates itself [23]. After that no menstruation happens, only the endometrium just increases or decreases in thickness each estrous cycle in response to ovarian steroid hormones [24]. SAT induces endometrial burn and necrosis leads to sloughing and regeneration with a new healthy endometrium which will permit successful implantation and ongoing pregnancy [15].

Hematological examinations (Table 2) revealed that there was leukocytosis bi (15.8 x 10^9/ L) which increased (18.3 x 10^9/ L) at 8 hrs. pi then begin to decrease at 24 hr. (12.8 x 10^9/ L), 56 hr (7.9 x 10^9/ L) and reached to 10.2 x 10^9/ L at 216 hr. Sterile injury stimulates inflammation and innate immunity as when cells die and undergo necrosis in vivo, the tissue site is rapidly infiltrated with leukocytes [17].

	bi	8 hrs. pi	24 hrs. pi	56 hrs. pi	96 hrs. pi	144 hrs. pi	216 hr. pi	Normal
Total leukocytes No./µL	15800	18300	12840	7930	10063	10051	10089	4000-13000 [17]

Pregnancy diagnosis: After 25 days from natural mating and by using M12V Ultrasound B-mode, the doe was pregnant with 2 fetuses (Table 2).

Table 2: Leukogram

Conclusion

SAT is a new simple treatment for clinical goat endometritis; it improved the reproductive performance of the repeat breeder goat suffered from mucopurulent endometritis while it almost costs nothing. Further studies on a wider number of animals are needed to confirm this result, and get a more understanding of the mechanism which truly occurs in SAT.

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