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The effect of intra-umbilical arterial infusion of oxytocin on uterine involution in cross bred cows affected with retained foetal membrane

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Abstract

Twelve cows brought to Large Animal Obstetrics Ward of Madras Veterinary College Teaching Hospital with the history of retained foetal membrane were included in the experiment and they were divided into two groups viz. treatment (n=6) and control (n=6). The oxytocin at the rate of 20 IU was mixed with 60 ml of normal saline and infused through umbilical artery in the hanging portion of retained foetal membrane in the treatment group. After infusion, the umbilical artery was tied and the animals were left for 10-15 minutes and retained foetal membrane was removed manually by using standard procedure. Subsequently Oxytetracycline bolus @ 3-5g was kept inside the uterus and the animals were treated with anti-inflammatory and anti-histaminic for 5 days. The control animals were not infused with oxytocin but RFM removed manually and treated similarly as in the treatment group. Further, the experimental animals were observed for any development of post-partum septic metritis and delayed uterine involution until 60 days of post-partum and the results are discussed.

Keywords: RFM, uterine involution, intraumbilical infusion, oxytocin

Introduction

Reproductive performance is one of the most important factors determining profitability of dairy herds. Maximum reproductive performance is achieved by an inter-calving interval of approximately 1 year; this can only be achieved if cows cycle and become pregnant before 90 day of postpartum (Mollo *et al.*, 1987) ^[1]. Several factors that negatively impact reproductive efficiency in dual purpose herds have been identified, including under nutrition, presence of a calf during milking, inefficient estrus detection, stress, systemic diseases, retained fetal membranes (RFM), and uterine infections (Palomares *et al.*, 2010) ^[2]. Cows with RFM or delayed uterine involution have significantly reduced pregnancy rates and longer intervals to first insemination and to conception than unaffected cows (McDougall, 2001) ^[3]. Prompt uterine involution and elimination of the inevitable calving-related bacterial contamination is an important key to optimal first service conception rates and fertility.

Oxytocin plays a crucial role in calving and uterine involution by inducing uterine contraction, thereby expelling exudates associated with infection through the cervix, and stimulating synthesis of PGF₂α, which increases uterine contraction and phagocytosis, reducing total bacteria contents in the uterus (Titiz *et al.*, 2001) ^[8]. Several studies have demonstrated that oxytocin treatment induces PGF₂α secretion in postpartum cows, which can stimulate uterine motility and uterine involution. The prompt uterine involution favours early resumption of ovarian cycle, and optimizes the uterine environment necessary for normal embryo development and placental attachment has encouraged administration of oxytocin to prevent RFM, delayed uterine involution, and endometritis in dairy cows. In the present study has been designed with objective to study the effect of intra-umbilical infusion of oxytocin for reducing the incidence of retained foetal membrane, subsequent post-partum metritis and uterine involution.

Materials and methods

Cows of different breeds were used over a period of 6 months. Only cows showing no evidence of other diseases and having a body condition score of 2.5 to 3.5 were included in the study. Cows having or suspected of having any uterine or fetal disease were excluded. The experimental cows were divided in to two groups viz. treatment (n=6) and control (n=6). The oxytocin at the rate of 20 IU was mixed with 60 ml of normal saline and infused through umbilical artery in the hanging portion of retained foetal membrane in the treatment groups

(Figure 1). After infusion, the umbilical artery was tied (Figure 2) and the animals were left for 10-15 minutes and retained foetal membrane was removed manually by using standard procedure (Figure 3). Subsequently after removal RFM, oxytetracycline bolus @ 3-5g was kept inside the uterus and treated with anti-inflammatory and anti-histaminic for 5 days. The control animals were not infused with oxytocin but RFM removed manually and treated with similar manner as like in the treatment group. Further, the experimental animals were observed for any development of post-partum septic metritis and delayed uterine involution until 60 days of post-partum.

Results and discussion

The effect of oxytocin on uterine involution in cross bred cows affected with retained foetal membrane has been depicted in table 1. In the present study, 83 % of cross breed cows in the treatment group has shown complete uterine involution without any further complication like septic metritis and endometritis indicating the oxytocin helps the release of $PGF_2\alpha$ which further contracts the uterus thus favours the separation of placenta from maternal caruncles (Eiler *et al.*, 1997) [6]. Intra-umbilical arterial infusion of oxytocin might have reached the attachment of placenta and causes the contraction of uterus which in-turn hasten the separation process (Weeks *et al.*, 2010) [7].

Table 1: The effect of oxytocin on retained foetal membrane and uterine involution in cross bred cows

S. No	Attributes	Treatment group	Control
1.	No. of animals were selected for the experiment (n=6)	6	6
2.	No. of animal shown complete uterine involution without any complication after oxytocin infusion	5/6 (83.3%)	2/6 (33.3%)
3.	No. of animal has developed septic metritis after treatment	1/6 (16.7%)	3/6 (50%)
5.	Time duration for complete uterine involution	45-55 days	50-90 days
4.	Time taken from calving to appearance of first post-partum estrus	60-65 days	95-120 days

A study using pluriparous Friesian cows found a positive effect of treatment with oxytocin (30 IU immediately after delivery and 4 h later) on reduction of RFM (10.9 vs. 24.6% for treated and control cows), and shortening of interval from calving to conception (93.7 vs. 124.4 d for treated and control cows). The authors suggested that under circumstances of inadequate herd reproductive management, oxytocin treatment improved reproductive performance (Stevens, 1997) [4]. However, in control group only 33.3% of animals has shown the complete uterine involution.

In the treatment group, 16.7 % cows have developed the septic metritis resulted that increased duration of uterine involution which might be due to inadequate herd reproductive management (Makkonen *et al.*, 1995) [10]. In control group, 50 % animals have developed septic metritis

which might be due the remnants of placental membrane which might have acted as niche for the development of infection (Pipingas *et al.*, 1993) [9].

In the treatment group, the time taken for complete uterine involution was around 45-55 days whereas in the control group it was much extended to 50-90 days which was a huge difference. Additionally, Time taken from calving to appearance of first post-partum estrus in treatment group was 60-65 days whereas in control group it was around 95-120 days.

In the present study concluded that the intra-umbilical infusion of oxytocin in cows affected with retained foetal membrane may decrease the post-partum uterine involution periods and reduces the incidence of septic metritis.



Fig 1: Infusion of Oxytocin through umbilical artery



Fig 2: Knotted umbilical artery



Fig 3: Manually removed fetal membranes

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