

STUDIES ON SERUM PROGESTERONE LEVELS IN RELATION TO
OCCURRENCE OF UTERINE TORSION IN BUFFALOES
(BUBALUS BUBALIS)

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ABSTRACT

Serum samples from 32 buffaloes suffering from uterine torsion at approximately the completion of the gestation period were analyzed for progesterone concentrations by radioimmunoassay. Fifteen buffaloes had progesterone concentrations of more than 1.0 ng/ml (1.65 ± 0.13 ng/ml; 1.1 to 2.8 ng/ml), while the serum progesterone concentrations of the remaining 17 buffaloes were below 1.0 ng/ml (599 ± 59 pg/ml; 200 to 900 pg/ml). The occurrence of uterine torsion was associated with labour and/or abdominal pain around the expected time of parturition at the completion of the gestation period. High progesterone concentrations at labour in cases of torsion in almost half of the buffaloes may suggest that these were instances of premature labour resulting from an impaired hormonal milieu. Disturbances in the onset of labour owing to hormonal imbalance as evidenced by high progesterone levels may also contribute to the causation of uterine torsion. Cases of uterine torsion having low progesterone values are also discussed in this study.

Key words: buffalo, uterine torsion, progesterone, cervix

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INTRODUCTION

An alarmingly high incidence of one of the most serious calving disorders, that of uterine torsion, has been reported the world over in cattle (1) and in buffaloes (2). These reports also carry a few methods of correcting uterine torsion, but the etiopathology of the malady is still obscure. Various mechanical factors hypothesized to facilitate the occurrence of uterine torsion (3) remain unexplained for want of supportive evidence. Limited biochemical studies (4,5) in buffaloes with uterine torsion have not explained its occurrence either. Comprehensive efforts to uncover the etiopathology of uterine torsion in buffaloes are perceptibly low, considering the predominating incidence of this disorder which causes difficult parturition.

Parturition in buffaloes is primarily a hormonally controlled event, and a major endocrine reshuffle is involved in completing this process (6,7). Since torsion of the uterus occurs mainly near term, a breach in the normal endocrine sequence could perhaps be related to the occurrence of uterine torsion. A detailed endocrinology of the affected animals is therefore warranted to discover the etiology of this malady. The present work was undertaken to study the serum progesterone levels in relation to cervical states of buffaloes having torsion of the uterus to assess their possible role in the causation of this disease.

MATERIALS AND METHODS

Thirty-two graded Murrah buffaloes presented to the P.A.U. Veterinary Clinic for the treatment of dystocia due to uterine torsion constituted the subjects for this study. These buffaloes were 295 to 323 d pregnant and had a history of straining, abdominal pains, uneasiness and/or anorexia of varied duration which started at the completion of a normal gestation period for this breed (7). Animals included in this study were already handled to a varied extent by local veterinarians, but they were not given any hormonal treatment. Following the confirmation of the diagnosis, venous blood samples were collected from these animals before any treatment was given. Seven buffaloes showing symptoms of the disease for 5 to 15 d were operated on by Caesarean section to remove the fetus, while the remaining 25 (1-to 4-d old) cases were rolled on their backs with pressure applied to their abdomens to detort the uterus (1). The states of the cervix were recorded as open, partially open and

closed by vaginal examination following detorsion.

Blood samples were also collected for comparative study from 5 normally calving buffaloes from the P.A.U. Dairy Farm on the day of calving. Serum was separated by centrifugation of clotted blood and stored at -20°C for analysis. The serum progesterone was calculated by radioimmunoassay (8) using highly specific progesterone antiserum. All the samples were duplicates and were run in a single set to avoid inter-assay variation.

RESULTS

On detorsion, 10 buffaloes were found to have an open cervix through which a fetus could easily be delivered after necessary manipulation, 6 buffaloes had a partially opened cervix that allowed at a maximum only one hand to pass through it and 10 buffaloes had a closed cervix. In the remaining 6 cases, detorsion failed because of extensive utero-omental adhesions and the cervical state could not be ascertained.

Wide variations were recorded in the serum progesterone levels of buffaloes having uterine torsion. For the convenience of discussion, clinical cases have been divided into 2 groups depending upon the levels of progesterone. Seventeen buffaloes had an average progesterone level of less than 1.0 ng/ml (Group A), the details of which are given (Table 1). Average serum progesterone level in this group was $599 \pm 59\text{ pg/ml}$ (200 to 900 pg/ml). Eight (47 %) of them had an open cervix, while 3 (18 %) had a partially opened cervix. None of the animals in this group had a closed cervix after detorsion. In the remaining 6 cases, however, the utero-omental adhesions prevented detorsion of the uterus and hence the cervix could not be examined.

The details of the 15 cases of uterine torsion with high (i.e., more than 1.0 ng/ml) serum progesterone (Group B) are also given (Table 2). Ten animals (67 %) had a closed cervix, 3 (20 %) had a partially opened cervix and 2 (13 %) had an open cervix following detorsion. The serum progesterone levels of the 5 control buffaloes on the day of parturition ranged from 100 to 800 pg/ml ($300 \pm 143\text{ pg/ml}$).

DISCUSSION

Serum progesterone levels of less than 1.0 ng/ml that were recorded in the control group of buffaloes on the day of parturition are in agreement with earlier reports for buffaloes (6,7). While one (7) observed

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Table 1. Details of uterine torsion cases with low levels of progesterone (Group A)

Serial No.	Progesterone level (pg/ml)	State of cervix
1	770	Open
2	260	Open
3	378	Open
4	784	Open
5	500	Open
6	840	Open
7	200	Open
8	420	Open
9	900	Partially open
10	630	Partially open
11	350	Partially open
12	770	- ^a
13	434	-
14	840	-
15	900	-
16	378	-
17	840	-

^aThat state of cervix not studied.

Table 2. Details of the uterine torsion cases with high levels of progesterone (Group B)

Serial No.	Progesterone level (ng/ml)	State of cervix
1	1.54	Closed
2	1.19	Closed
3	1.19	Closed
4	1.47	Closed
5	1.1	Closed
6	2.52	Closed
7	2.8	Closed
8	1.1	Closed
9	1.96	Closed
10	1.47	Closed
11	1.26	Partially open
12	2.0	Partially open
13	1.89	Partially open
14	1.96	Open
15	1.33	Open

that the progesterone level started to decline sharply 1 to 2 d before delivery, also (6) observed was a drastic progesterone fall in conjunction with the parturition. In any case, this suggests that a buffalo in an actual state of parturition ought to have low progesterone levels (less than 1.0 ng/ml) and that animals with more than 1.0 ng/ml serum progesterone are not in actual labour.

In the present study, 53 % of the torsion cases had low progesterone levels as expected on the day of parturition (Group A). Eight buffaloes had a fully dilated cervix, which suggests that the torsion in them might have occurred late during the first stage of labour. Torsion of the uterus in 3 animals with a partially opened cervix in this group may have occurred in the beginning of the process of parturition (early first stage of labour), just at the start of cervical dilatation. Further dilatation of the cervix was prevented by the torsion-induced mechanical closure of the cervix. The lack of a closed cervix in this group substantiates the finding that the fall in progesterone culminates in the dilatation of the cervix and the occurrence of parturition. The occurrence of utero-omental adhesions in the remaining 6 cases supports that these animals were afflicted with uterine torsion for 5 to 15 d. Torsion in these buffaloes either occurred similarly to other cases in Group A, or if it occurred pre-partum (as in the case of Group B), the progesterone level might have gone down in the course of time following PGF2 alpha release.

Of the total uterine torsion cases, 47 % had higher progesterone levels (Group B) and in 87 % of cases among them, the cervix was not fully dilated. Although all the buffaloes had completed their expected gestation period, the higher progesterone levels associated with a closed cervix may suggest that torsion in these animals occurred before they entered into the first stage of labour. The labour and/or abdominal pain observed in concurrence with the occurrence of the uterine torsion at the expected time of parturition may, therefore, be premature labour resulting from the impaired hormonal milieu. These findings do not agree with a previous report on cows (9) which states that uterine torsion is a complication of late first stage or early second stage of labour.

None of the cases of uterine torsion studied had a history of exposure to conditions thought to facilitate the occurrence of torsion, viz. transportation, grazing on hills, wallowing or accidents. Rather, the condition of uterine torsion could be attributed to the hormonal events. Parturition involves an abrupt turn

of events in the blood hormonal profile. Prostaglandin F2 alpha is needed for luteolysis and fall in progesterone levels in sub-partum cattle (10); it is also important during the opening stage of parturition for widening the cervical canal (11). Increased production of estrogen prior to sufficient release of prostaglandin near term could culminate in a premature labour which in cases of a closed cervix might provoke uncoordinated fetal movements, thereby destabilising the uterus and leading to its rotation on its longitudinal axis. Elaborated studies on endocrinology of uterine torsion should be undertaken to validate this hypothesis.

The high progesterone level in 2 cases with an open cervix supports previous observations (12,13) that the complete withdrawal of progesterone from maternal circulation is not always essential for parturition. Parturition could as well be the product of change in the ratio of estrogen to progesterone in the blood, rather than an absolute fall in the progesterone level.

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