



ISSN: 2456-2912

NAAS Rating (2026): 4.61

VET 2025; SP-11(4): 97-100

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www.veterinarypaper.com

Received: 02-02-2026

Accepted: 08-03-2026

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Therapeutic approaches for incomplete cervical dilatation in buffaloes following successful uterine detorsion

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DOI: <https://www.doi.org/10.22271/veterinary.2026.v11.i4Sb.3191>

Abstract

This study evaluated different therapeutic methods to manage incomplete cervical dilatation after successful detorsion using the modified Schaffer's technique. A total of 47 buffaloes presented with uterine torsion were examined, of which 45 buffaloes were selected for detorsion by the modified Schaffer's method. Out of 45 cases, 41 buffaloes were successfully detorted and those with incomplete dilatation were randomly allotted into three groups and treated with separate protocols like parenteral cloprostenol, intracervical cloprostenol and intracervical hyaluronic acid, along with supportive therapy and cervical massage with warm 2% carboxymethyl cellulose. Treatment response was assessed based on the time and extent of cervical dilatation and fetal outcome. Intracervical cloprostenol showed better results with faster and more complete dilatation and improved fetal survival compared to other treatments. The study indicates that intracervical cloprostenol is an effective option for managing incomplete cervical dilatation following uterine detorsion in buffaloes.

Keywords: Incomplete cervical dilatation, Buffalo, Uterine torsion, Intracervical approaches

1. Introduction

Uterine torsion is a serious obstetrical condition in bovines in which the gravid uterus twists along its longitudinal axis, resulting in obstruction of the birth passage and impairment of fetal blood circulation (Mota-Rojas *et al.*, 2020) [7]. This condition commonly occurs in late pregnancy and around the time of parturition, when the cervix may be partially or completely dilated before or shortly after detorsion (Pearson, 1971; Nanda and Sharma, 1986) [9, 8]. One of the major complications following successful correction of uterine torsion in buffaloes is incomplete cervical dilatation (ICD) (Yadav *et al.*, 2021) [13]. Studies have reported that nearly 76% of buffaloes experience cervical dilatation difficulties after detorsion (Chaudhari *et al.*, 2019) [4]. During normal parturition, cervical dilatation occurs through coordinated physiological, cellular and biochemical modifications within cervical tissue that facilitates its gradual dilatation (Breeveld-Dwarkasing *et al.*, 2003) [3]. However, ischemic damage to the cervix caused by torsion may alter its structural integrity and viscoelastic characteristics required for normal cervical dilatation (Singla *et al.*, 1989; Breeveld-Dwarkasing *et al.*, 2003) [12, 3]. Early detorsion can reduce cervical fibrosis and tissue damage (Barber, 1995) [2]. The present study was designed to assess the clinical efficacy of intracervical cloprostenol and intracervical hyaluronic acid compared with conventional parenteral cloprostenol administration, for promoting cervical dilatation in buffaloes after successful uterine detorsion using Modified Schaffer's method.

2. Materials and Methods

2.1 Source of Study

The present study was conducted on graded Murrah buffaloes diagnosed with uterine torsion at the Department of Veterinary Gynaecology and Obstetrics, NTR College of Veterinary Science, Gannavaram, Andhra Pradesh, during the period from July 2025 to December 2025.

2.2 Animal Selection

The present investigation was conducted on 47 pregnant buffaloes showing signs such as restlessness like frequent lying down and getting up, anorexia and abdominal kicking. All affected buffaloes were subjected to a detailed obstetrical examination using both transvaginal and transrectal approaches to evaluate the direction and degree of uterine torsion. Out of these, 45 buffaloes were selected for correction by the Modified Schaffer's rolling method, while 2 cases with a history of more than 72 h along with severe bloat were directly recommended for caesarean section. Before detorsion procedure, buffaloes received supportive therapy depending upon their general condition which comprised of fluid therapy, a pain killer, an antihistamine and styptic. Detorsion was successfully achieved in 41 animals, while 4 buffaloes that did not respond to the rolling procedure were subsequently subjected to caesarean section. After successful detorsion, cervical status was assessed through obstetrical examination and the buffaloes were selected and categorized into three groups

2.3 Experimental design

Buffaloes that were successfully detorted but failed to deliver the fetus vaginally due to incomplete cervical dilatation were selected for the study. These animals were divided into three treatment groups and each group received a different therapeutic protocol to facilitate cervical dilatation. All buffaloes included in the study received supportive therapy consisting of Inj. Dexamethasone (40 mg), Inj. Dextrose saline (3 L intravenously), Inj. Calcium borogluconate (450 mL intravenously) and antibiotics as required based on the clinical condition. Cervical massage was performed using warm 2% sodium carboxymethyl cellulose for 15 min and the procedure was repeated up to three times at 1-hour intervals whenever required. The cervical diameter and the time required to achieve complete cervical dilatation were recorded and compared among the treatment groups. Buffaloes that failed to achieve complete cervical dilatation within 15 h after detorsion were subjected to caesarean section.

2.3.1 Group I

This group consisted of eight buffaloes showing incomplete cervical dilatation after successful uterine detorsion. The animals were treated with cloprostenol sodium (500 µg) administered intramuscularly, along with the routine supportive therapy.

2.3.2 Group II

This group included six buffaloes with incomplete cervical dilatation following uterine detorsion. These animals were treated by intracervical administration of cloprostenol sodium (500 µg; 2 mL). The drug was injected 0.5 mL each at the 3, 6, 9 and 12 o'clock positions of the cervix using a 21-gauge scalp vein set. To ensure complete delivery of the drug, the tubing of the scalp vein set was flushed with 0.6 mL of air using a sterile 2 mL syringe.

2.3.3 Group III

This group consisted of six buffaloes exhibiting incomplete cervical dilatation after uterine detorsion. These animals were treated with intracervical hyaluronidase (10,000 IU in 6 mL of PBS solution). The drug was administered 1.5 mL each at the 3, 6, 9 and 12 o'clock positions of the cervix using a 21-gauge scalp vein set. The treatment was repeated at 6-hour intervals until complete cervical dilatation occurred or up to 15 h after

detorsion. Complete drug administration was ensured by flushing the scalp vein set tubing with 0.6 mL of air using a sterile 2 mL syringe

2.4 Statistical analysis

All the collected data was processed with IBM SPSS Statistics Version 22. An independent t-test was applied to analyze the duration required for cervical dilatation. A paired t-test was used to assess comparisons of cervical diameter before and after treatment within each group. Intergroup differences in cervical diameter during the pre and post-intervention periods was analyzed by ANOVA with Duncan's post hoc test.

3. Results and Discussion

Complete cervical dilatation (CCD) was achieved in 7 of 8 buffaloes (87.5%) treated under the conventional protocol (Group I). In comparison, Group II (n=6; intracervical cloprostenol) and Group III (n=6; intracervical hyaluronic acid) showed 100% success, with all treated animals attaining complete dilatation. These findings suggest that intracervical therapies is more effective than the conventional protocol in promoting cervical relaxation. The mean interval from detorsion to CCD was longest in the conventional group (1174.28 ± 213.88 min), suggesting a slower cervical response. Comparatively, buffaloes receiving intracervical cloprostenol achieved CCD much earlier (370 ± 76.55 min), while those treated with intracervical hyaluronic acid required 460 ± 109.17 min. The differences among treatment groups were statistically significant ($P < 0.05$), with intracervical cloprostenol showing the fastest response, followed by hyaluronic acid. These findings correspond with the observations of Ahuja *et al.* (2024) ^[1], who reported that intracervical cloprostenol produced faster cervical dilatation (5.7 ± 0.17 h) than the intramuscular route (11.9 ± 0.74 h). Similar results were also documented by Ghuman (2010) ^[5], Singh (2019) ^[11], and Yadav *et al.* (2022) ^[14], who highlighted the effectiveness of intracervical hyaluronic acid in improving cervical relaxation and dilatation.

The influence of fetal viability on the duration required for complete cervical dilatation (CCD) was evaluated across treatment groups. In the conventional treatment group, the buffalo delivering a live fetus (n = 1) attained CCD within 720 min, while buffaloes delivering dead fetuses (n = 6) required 1250 ± 236 min. Due to the presence of only one live fetus case, statistical comparison was not feasible. However, the live fetus case showed a shorter interval to CCD. In Group II (intracervical cloprostenol), the mean time to achieve CCD was 380 ± 144 min in buffaloes delivering live fetuses (n = 3) and 360 ± 91 min in those delivering dead fetuses (n = 3), showed no significant difference ($P > 0.05$), indicating that fetal viability did not influence cervical relaxation in this treatment. In Group III (intracervical hyaluronic acid), the single live fetus case achieved CCD within 180 min, whereas buffaloes delivering dead fetuses (n = 5) required 516 ± 114 min. Although statistical evaluation was not possible, the live fetus case showed comparatively faster cervical dilatation. The results suggest that intracervical cloprostenol produced the most rapid cervical dilatation followed by intracervical hyaluronic acid while the conventional treatment required the longest duration. Similarly, Singh (2018) ^[10], Singh (2019) ^[11], and Yadav *et al.* (2022) ^[14] reported that intracervical hyaluronidase enhances cervical softening by breaking down hyaluronic acid in the cervical extracellular matrix.

Tab 1: Analysis of time required for complete cervical opening in different groups.

Group		Time taken from detorsion to CCD (min)
Group I		1174.28±213.88 ^a
Group II		370±76.55 ^b
Group III		460±109.17 ^c
Group I	Live Fetus (n=1)	720
	Dead Fetus (n=6)	1250±236
Group II	Live Fetus (n=3)	380±144 ^{NS}
	Dead Fetus (n=3)	360±91 ^{NS}
Group III	Live Fetus (n=1)	180
	Dead Fetus (n=5)	516±114

Means bearing different superscripts (a, b, c) within a column differ significantly ($P < 0.05$). Nonsignificant (NS) difference ($P > 0.05$) between live and dead fetus within Group II. Statistical comparison between live and dead fetus was not performed for Group I and Group III due to the presence of only one live fetus.

The average cervical lumen diameter prior to treatment was 8.14 ± 0.17 cm (Group I), 8.30 ± 0.17 cm (Group II), and 8.26 ± 0.20 cm (Group III). Since the variation among groups was not significant ($P > 0.05$), it indicates that the buffaloes in all groups were uniform at the initiation of therapy. After therapeutic intervention, the cervical diameter increased markedly in all groups. The conventional group recorded 19.22 ± 0.20 cm, whereas buffaloes treated with intracervical cloprostenol showed the highest dilatation (21.55 ± 0.27 cm). The intracervical hyaluronic acid group showed a cervical diameter of 20.50 ± 0.68 cm. The significant difference among groups ($P < 0.05$) suggests that greater cervical dilatation with intracervical cloprostenol, followed by intracervical hyaluronic acid, compared with the conventional protocol. These results correspond with the findings of Ghuman (2010) [5], Singh (2018) [10], Singh (2019) [11], Yadav *et al.* (2022) [14] and Ahuja *et al.* (2024) [1], who reported that direct intracervical administration of therapeutic agents improves cervical relaxation and dilatation more effectively than conventional treatments.

Tab 2: Evaluation of cervical changes before and after therapeutic protocols.

S.no	Treatment groups	Before intervention mean diameter of cervical lumen (cm)	After intervention mean diameter of cervical lumen (cm)
1	Group-1	8.14 ± 0.17^A	19.22 ± 0.2^{cB}
2	Group-2	8.30 ± 0.17^A	21.55 ± 0.27^{aB}
3	Group-3	8.26 ± 0.2^A	20.5 ± 0.68^{bB}

Means bearing different superscripts (A vs B) was statistically significant ($p < 0.05$) between pre intervention and post intervention within the group. Means bearing different superscripts (a,b,c) in post intervention groups have significant difference ($p < 0.05$).

4. Conclusion

It was concluded that intracervical therapeutic approaches were more effective than conventional therapy in achieving complete cervical dilatation and enhancing fetal viability. Among the evaluated methods, intracervical cloprostenol resulted in the fastest cervical relaxation and better fetal survival rates, followed by intracervical hyaluronic acid and the conventional protocol.

Conflict of Interest

Not available

Financial Support

Not available

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How to Cite This Article

Basha AK, Anusha K, Teja A, Vani G. Therapeutic approaches for incomplete cervical dilatation in buffaloes following successful uterine detorsion. International Journal of Veterinary Sciences and Animal Husbandry. 2026;SP-11(4):97-100.

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