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Research Article

COMPARATIVE STUDY OF ULTRASOUND GUIDED AND CONVENTIONAL TUBE CYSTOSTOMY PROCEDURE FOR MANAGING URINE RETENTION IN MALE BUFFALO CALVES

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ABSTRACT

The present study was carried out in twelve clinical cases of male buffalo calves having history of retention of urine and intact urinary bladder on ultrasonography. The calves were randomly divided into two groups comprising of six in each. In group-I, ultrasound guided tube cystostomy and in group-II conventional tube cystostomy was done under local anaesthesia and light xylazine sedation. Physiological parameters and pain assessment was done pre-operatively, immediately after surgery, at 6 hours, 24 hours, 3rd and 14th day post-operative. Post-operative observations and complications were recorded till complete recovery. Based on the pain assessment and postoperative complications, ultrasound guided tube cystostomy is recommended over conventional tube cystostomy in buffalo calves with intact urinary bladder.

Keywords: Male buffalo calves, Pain score, Ultrasound guided tube cystostomy

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Urinary obstruction in young male buffalo calves is a major problem during or just at the end of the winter season (Amarpal *et al.*, 2004). Retention of urine is a multifactorial condition in young male buffalo calves subsequent to urethritis or lodgement of calculi anywhere in the urinary tract (Rafee *et al.*, 2015).Tube cystostomy along with the medical dissolution of uroliths is considered as an effective technique for resolution of urine retention in small ruminants (Ewoldt *et al.*, 2008). Ultrasound-guided tube cystostomy using reusable trocar or selected surgical blade is a simple, safe, effective and associated with minimal complications in male buffalo calves (Niwas *et al.*, 2021). Therefore, the present study was carried out for the comparative evaluation of ultrasound guided and conventional tube cystostomy for the surgical management of urinary retention in male buffalo calves.

MATERIALS AND METHODS

The study was conducted on twelve clinical cases of male buffalo calves suffering from urinary retention but having intact urinary bladder and presented to the Veterinary Teaching Hospital, LUVAS, Hisar. There was history of anuria, partial anorexia, pulsating urethra, twitching of penis and restlessness. The calves of age upto four months and having illness from 1-4 days were randomly divided into two groups comprising of six in each group. In group-I ultrasound guided tube cystostomy and in group-II conventional tube cystostomy was done. Ultrasonography was carried out in a dark, quiet room using a real time; B-mode Siemens Acuson S2000 ultrasound machine (Siemens Healthcare Pvt. Ltd.) equipped with convex (3.5-6.5 MHz) transducer.

All the calves, were given mild sedation using inj. Xylazine hydrochloride @ 0.05mg/kg, IM. For ultrasound guided tube cystostomy, a stab incision was give on the skin and muscles in the parapenile region(near the rudimentary teat) after infiltering 1ml of 2% lignocaine hydrochloride. The Foley's catheter (F 18) was pushed inside the urinary bladder (Fig. 1) with the help of a AI gun plunger as stylet through incision. The whole procedure was done under ultrasound guidance Once, the urine starts coming from the Foley's catheter, the ballon was inflated with recommended amount of normal saline solution and the artery forceps or groove director was pulled out.

For conventional tube cystostomy 3-4 cm long incision was made on the skin after infiltering 4-5 ml of local anaesthesia. The muscles and peritoneum were dissected. The intact urinary bladder was palpated and the Foley's catheter (F 18) was pushed inside the urinary bladder with the help of AI gun plunger as stylet as described above (Fig. 2). The hanging Foley's was anchored to the skin near prepucial orifice. The abdominal wound was sutured in routine manner.

Post operatively all the calves were prescribed with inj. Meloxicam @ 0.3 mg/kg body weight and inj. ceftriaxone tazobactum @ 25 mg/kg body weight intramuscular for 5 days. Pulv. ammonium chloride @ 500 mg/kg body weight as urine acidifier was given orally for 4 weeks. The wound was dressed with liquid povidone-iodine solution and fly repellent spray twice daily till the healing of the wound. The skin sutures were removed on 12th day of surgery.

Physiological parameters and pain assessment was done preoperatively, after surgery, at 6 hours, at 24 hours, 3rd and 14th post-operative day. Clinical examination of all the calves was conducted and they were evaluated for

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rectal temperature (ºF), heart rate (beats/min), respiratory rate (breaths/min). The pain assessment was made by adopting a multifactorial UNESP-Botucatu unidimensional pain scale for acute postoperative pain assessment in bovine (Table 1). This composite assessment scale not only takes into account the pain intensity but also the sensory and affective qualities of pain (De Oliveira *et al.*, 2014). Several behaviours included in the scale were locomotion, interactive behaviour, activity and appetite. All the behavioural parameters were graded in a multifactorial score from 0 to 2 and a cumulative score from 0-10 were calculated by adding up each behavioural parameter score. Post operative observations and complication were recorded till complete recovery. Two way ANOVA test was used to determine significant difference between groups at different time intervals.

Table 1. UNESP-Botucatu pain scale

Item	Score/Criterion
Locomotion	❖ (0) Walking with no obviously abnormal gait.
	❖ (1) Walking with restriction, may be with hunched back and/or short steps.
	❖ (2) Reluctant to stand up, standing up with difficulty or not walking.
Interactive behaviour	❖ (0) Active; attention to tactile and/or visual and/or audible environmental stimuli; when near other animals, can interact with and/or accompany the group.
	❖ (1) Apathetic: may remain close to other animals, but interacts little when stimulated.
	❖ (2) Apathetic: may be isolated or may not accompany the other animals; does not react to tactile, visual and/or audible environmental stimuli.
Activity	❖ (0) Moves normally.
	❖ (1) Restless, moves more than normal or lies down and stands up with frequency.
	❖ (2) Moves less frequently in the pasture or only when stimulated.
Appetite	❖ (0) Normorexia and/or rumination.
	❖ (1) Hyporexia.
	❖ (2) Anorexia.
Miscellaneous behaviours	❖ Wagging the tail abruptly and repeatedly.
	❖ Licking the surgical wound.
	❖ Moves and arches the back when in standing posture.
	❖ Kicking/foot stamping.
	❖ Hind limbs extended caudally when in standing posture.
	❖ Head below the line of spinal column.
	❖ Lying down in ventral recumbency with full or partial extension of one or both hind limbs.
	❖ Lying down with the head on/close to the ground.
	❖ Extends the neck and body forward when lying in ventral recumbency.
	(0) All of the above described behaviours are absent.
	(1) Presence of 1 of the behaviours described above.
	(2) Presence of 2 or more of the behaviours described above

RESULTS AND DISCUSSION

The clinical signs exhibited by the calves are depicted in Table 2 for both the groups include anorexia (n=10; 83.33%) followed by straining for urination (n=9; 75.00%), restlessness (n=9; 75.00%), pulsating urethra and twitching of the penis (n=8; 66.66%), kicking at belly (n=7; 58.33%), tail lifting (n=7; 58.33), grinding of teeth (n=6; 50%), depression (n=4; 33.30%), recumbency (n=3; 25%), mild bloat (n=3; 25.00%), tendency for rectal prolapse (n=2; 16.60%) and concretion encrustation at preputial orifice (n=1; 8.30%). Kicking at belly, treading with hind feet and swishing of the tail point to the discomfort felt by the animal due to the distension of the bladder (Loretti *et al.*, 2003). Riedi *et al.* (2018) reported frequent straining, reduced general condition and eventual recumbency due to pain in urinary obstruction.

The physiological parameters at different time interval in calves of both the groups are depicted in Table 3. The base values of rectal temperature (ºFahrenheit) in preoperative period was on the lower side of the normal physiological limits (100.58 - 101.6 ºF) which increased progressively and returned to normal within 24 hours of treatment in both the groups. Statistically, a significant increase ($p<0.05$) in the values of rectal temperature was recorded on 14th day as compared to the base value in both the groups when compared within the groups. However, there was no significant difference in the values of rectal temperature in between the groups.

The Mean ± SE respiratory rate (breaths/minute) in all the affected calves was higher than the normal reference value (25.06±1.56) (Saini, 2020). The respiratory rate (breaths/per minute) showed significant decrease ($p<0.05$) on 14th post-operative day as compared to preoperative values, after surgery and after 6 hours in group-I. While, in group-II, the value at 14th day was significantly lower ($p<0.05$) than the value after surgery and non-significant at 6 hours to 14th day. The respiratory rate increased non-significantly in both the groups after surgery as compared to base value. There was no significant difference in the values of respiratory rate in between the groups (Kumar 2020, Saini 2020). High respiratory rate could be due to pain caused by urethral calculi, abdominal crisis, electrolyte aberrations like hypocalcaemia, hypomagnesaemia

Fig. 1. Inflated balloon of Foley's catheter inside urinary bladder

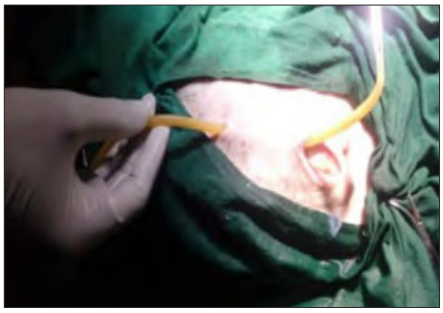

Fig. 2. Fixing of Foley's catheter in Group II

Table 5. Postoperative observations and complications ofgroups-I and group-II animals

Observations	Characteristics	Group-I	Group-II
Time required for surgery	Median	7.5min	23min
	Range	5-15	18-35
Dribbling of urine	Median	6	7
(Postoperative day)	Range	3 - 9	4 - 9
Free flow of urine	Median	9	10
(Postoperative day)	Range	4 - 13	5 - 14
Catheter blockade	No. of cases	1	2
Suture dehiscence	No. of cases	0	3
Exudation and swelling at incision site	No. of cases	0	5
Subcutaneous infiltration of urine	No. of cases	0	2
Licking at suture site	No. of cases	0	4
Outcome (No. of cases)	Recovery without any complication	5	1
	Recovery with complication	1	5
	Deaths	0	0

and hypovolumic shock (Wilson and Lofstedt, 1990) or dehydration, myocardial asthenia with hyponatraemia and hyperkalaemia (Radostits *et al.*, 2000).

The Mean ± SE heart rate (beats/per minute) in the affected calves was higher than the normal reference value (66.00±2.91) which initially increased after surgery (Kumar, 2020) and then decreased and progressed towards normal by 14th day. In group-I, the HR after surgery was significantly higher than that on the 3rd day and 14th day. In group-II, the HR on 14th day showed a significant decrease ($p<0.05$) from values after surgery. However, the Heart rate increased non-significantly in both the groups after surgery as compared to base value. There was no significant difference in the values of heart rate in between the groups.

The pain score at different time interval is presented in Table 4. The pain score recorded for group-II were significantly ($p<0.05$) higher in comparison to the values for group-I immediately after surgery, at 6 hours and at 24 hours. However, the pain score decreased significantly at 6

Table 2. Clinical examination findings in buffalo calves with obstructive urolithiasis

S. No.	Symptoms	Overall		Group-I		Group-II	
		No.	% age	No.	% age	No.	% age
1.	Anorexia	10	83.33	5	83.33	5	83.33
2.	Kicking at belly	7	58.33	3	50	4	66.66
3.	Restlessness	9	75	5	83.33	4	66.66
4.	Tendency of rectal prolapse	2	16.66	1	16.66	1	16.66
5.	Mild bloat	3	25	2	33.3	1	16.66
6.	Concretion encrustation at preputial orifice	1	8.33	0	0	1	16.66
7.	Straining for urination	9	75	5	83.33	4	66.66
8.	Depression	4	33.33	3	50	1	16.66
9.	Recumbency	3	25	1	16.66	2	33.33
10.	Pulsating urethra and twitching of the penis	8	66.66	4	66.66	4	66.66
11.	Tail lifting	7	58.33	4	66.66	3	50
12.	Grinding of teeth	6	50	3	50	3	50

hours of surgery in group-I. The pain scores decreased significantly after 24 hours, at 3rd day and at 14th day in both the groups when compared within the groups.

The postoperative observations and complication in calves of group-I and group-II are shown in Table 5. The median time required for execution of the procedure for ultrasound guided tube cystostomy was 7.5 minutes (5-15) whereas it was 23 minutes (18-35) for conventional tube cystostomy. The Catheter blockage was observed in one calf in group-I on 3th day and two calves in group-II at 4th

Table 3. Mean±SE values of physiological parameters at different time interval in male buffalo calves of group I and group II with obstructive urolithiasis

Parameters	Preoperatively	After surgery	After 6 hours	After 24 hours	On 3rd day	On 14th day
RT I	100.1 ± 0.30^{A}	100.4 ± 0.35^{AB}	100.7 ± 0.33^{AB}	101.1 ± 0.40^{AB}	101.4 ± 0.55^{B}	101.5 ± 0.42^{B}
RT II	100.4 ± 0.33^{A}	100.7 ± 0.38^{AB}	101.0 ± 0.47^{AB}	101.4 ± 0.29^{AB}	101.4 ± 0.23^{AB}	101.7 ± 0.40^{B}
RR I	32.67 ± 1.61^{A}	34.33 ± 1.12^{A}	31.67 ± 0.88^{A}	29.83 ± 2.41^{AB}	28.33 ± 1.9^{AB}	25.50 ± 1.78^{B}
RR II	30.50 ± 1.09^{AB}	35.00 ± 1.92^{A}	32.33 ± 1.73^{AB}	31.50 ± 1.77^{AB}	29.17 ± 1.60^{AB}	27.33 ± 1.52^{B}
HR I	74.50 ± 1.59^{AB}	77.00 ± 1.92^{A}	69.33 ± 2.2^{AB}	70.67 ± 1.09^{AB}	66.33 ± 1.94^{B}	66.67 ± 2.87^{B}
HR II	72.83 ± 0.65^{AB}	76.67 ± 1.61^{A}	72.33 ± 2.23^{AB}	69.67 ± 0.67^{AB}	68.33 ± 0.88^{AB}	67.33 ± 1.75^{B}

Mean with different superscripts vary significantly ($P<0.05$). Superscripts A, B represents difference with in groups

Table 4. Mean ± SE values of pain score in buffalo calves of group I and II suffering from obstructive urolithiasis at different intervals.

Pain Score	Preoperatively	After surgery	After 6 hours	After 24 hours	On 3rd day	On 14th day
Group I	7.17 ± 0.31^{A}	7.5 ± 0.34^{aA}	5.83 ± 0.40^{aB}	4.83 ± 0.31^{aB}	2.5 ± 0.43^{C}	0.17 ± 0.16^{D}
Group II	7 ± 0.45^{A}	8.5 ± 0.22^{bB}	7.67 ± 0.33^{bAB}	6.17 ± 0.42^{bC}	3.5 ± 0.56^{D}	0.83 ± 0.37^{E}

Mean with different superscripts vary significantly ($P<0.05$). Superscripts A, B, C, D, E represents difference with in groups. Superscripts a, b represents difference in between groups.

and 8th day of surgery, respectively. Exudation and swelling at incision site was evident in 5 calves of group-II for upto 3 days (Parrah *et al.*, 2011). Suture dehiscence occurred in two calves of group-II on 3rd and 7th day with pus at suture site. Licking at suture site was observed in 4 calves of group-II. Subcutaneous infiltration of urine was observed in two animals of group-II. Earlier researchers have reported the problem of catheter's blockade due to concretions, blood clot and urinary sludge, which required daily inspection and flushing of the catheter for dislodgement of the obstruction in Foley's catheter (Fortier *et al.*, 2004). The amount of surgical manipulation in conventional method might have lead to the more postoperative complications in group-II than group-I.

On basis of present study, it is concluded that ultrasound guided tube cystostomy produces less pain and minimal post-operative complications than conventional tube cystostomy. The Ultrasound guided tube cystostomy is recommended over conventional tube cystostomy for surgical management of retention of urine in male buffalo calves having intact urinary bladder.

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