The Pharma Innovation Journal 2022; SP-11(5): 1700-1703

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(5): 1700-1703

www.thepharmajournal.com
Received: 15-03-2022
Accepted: 18-04-2022

Ankit Dangi
Department of Veterinary Surgery and Radiology, College of Veterinary Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Sandeep Kumar
Scientist, Department of Veterinary Surgery and Radiology, College of Veterinary Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Maneesh Sharma
Department of Veterinary Clinical Complex, College of Veterinary Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

RN Chaudhary
Department of Veterinary Surgery and Radiology, College of Veterinary Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Ram Niwas
Department of Veterinary Surgery and Radiology, College of Veterinary Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Corresponding Author
Sandeep Kumar
Scientist, Department of Veterinary Surgery and Radiology, College of Veterinary Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India

Study of urine analysis in ultrasound guided and conventional tube cystostomy for surgical management of urine retention in male buffalo calves

Ankit Dangi, Sandeep Kumar, Maneesh Sharma, RN Chaudhary and Ram Niwas

Abstract
The present study was carried out in twelve clinical cases of male buffalo calves having history of retention of urine. The animals were randomly divided into two groups comprising of six animals in each group. Those animals were taken in present study which had intact urinary bladder diagnosed by ultrasonography. In group I ultrasound guided tube cystostomy and in group II conventional tube cystostomy was done. Urine samples were collected aseptically in sterile urine collection vial preoperatively, at 24 hours, 3rd day and 14th day. Abnormal colour, specific gravity, protein, glucose, RBC cells, pus cells and crystaluria was noticed at the presentation of animals in both the groups which became normal after treatment and reach to normal value on 14th day in both the groups. There was no significant difference found for urine analysis in between the groups.

Keywords: Male buffalo calves, urine analysis, ultrasound guided tube cystostomy

Introduction
Urinary obstruction in young male buffalo calves is a major complication in growing calves during or just after end of winter season [1]. Retention of urine is a multifactorial condition in young male buffalo calves subsequent to urethritis or lodgement of calculi anywhere in the urinary tract [2]. Age, sex, breed, season, hormonal imbalance, hydrophilic colloids, infection, vitamins and water intake by the animal play important role in its etiology [3]. Tube cystostomy along with medical dissolution of uroliths is considered as an effective technique for resolution of urine retention in small ruminants [4]. Ultrasound-guided suprapubic cystostomy using reusable trocar or selected surgical blade is simple, safe, effective and associated with minimal complications in poor-resource setting in human patient [5] and tube cystostomy in male buffalo calves [6]. Ultrasound machine is readily available and an inexperienced ultrasonographer can easily locate the urinary bladder for ultrasound-guided placement of a pigtail cystostomy tube [7]. Therefore, the present study was carried out for comparative study of urine analysis in ultrasound guided and conventional tube cystostomy for surgical management of urine 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 presented to Veterinary Clinical Complex, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana. 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 AcusonS2000 ultrasound machine (Siemens Healthcare Pvt. Ltd.) equipped with convex (3.5 - 6.5 MHz) transducer. In ultrasound guided tube cystostomy Foley's catheter was fixed in urinary bladder without any surgical manipulation in abdominal cavity but only a small size stab was given on skin (Fig.1) but in conventional tube cystostomy 3-4 cm incision was given in abdominal cavity and Foley's catheter was fixed by surgical manipulation (Fig.2). 2 ml of local anaesthesia i.e. 2% lignocaine was deposited at the left abdomen near rudimentary teat with slight sedation with xylazine @ 0.05 mg/kg b. wt in both procedures. After thorough clinical and ultrasonographic

examinations in all the animals, tube cystostomy was performed through different techniques in group I and group II through a left pre-pubic paramedian approach and one end of Foley's catheter (#18) was fixed into the urinary bladder by inflating the balloon while other end was fixed at ventral abdominal wall near preputial orifice with trans-cutaneous sutures. Post operatively all the animals were prescribed with Meloxicam @ 0.3 mg/kg body weight and ceftriaxone tazobactum @ 10 mg/kg body weight intramuscular for 5 days. Ammonium chloride @ 500 mg/kg body weight as urine acidifier was given orally for 4 weeks. The wound was dressed by liquid povidone-iodine solution and fly repellent spray twice daily till the healing of the wound.

Urine was collected aseptically in sterile urine collection vial preoperatively, at 24 hours, 3rd day and 14th day (Fig.1). The qualitative analysis of glucose, bilirubin, nitrate, ketone bodies, leucocytes, protein, urobilinogen and blood was carried out along with urine pH and specific gravity using automatic strip analyser (Daka Phan Laura). The results were recorded as trace, +1, +2 and +3. Microscopic evaluation of urine was done for estimating cells, casts and crystals after centrifugation of the urine sample at 3000 rpm for 10 minutes. Scoring after microscopic examination of urine was done [8].

- RBC score - 0-normal (0-2 RBCs per hpf), +1-mild (2-5 RBCs per hpf), +2 moderate (5-10 RBCs per hpf), and +3- heavy (>10 RBCs per hpf).
- Pus cell score - 0-normal (0-2 pus cells per hpf), +1-mild (2-5 pus cells per hpf), +2-moderate (5-10 pus cells per hpf), and +3- heavy (>10 pus cells per hpf).
- Cast score- 0 – normal casts (0-2 casts per hpf), 1-mild casts (2-5 casts perhpf), 2-moderate casts (5-10 casts per hpf), and 3- heavy casts (>10 casts per hpf).
- Crystal score - 0-normal (no crystals), +1-mild, +2-moderate and +3-heavy crystal deposition depending on the quantity present in low power field.

Two way ANOVA test was used to determine significant difference between groups and different time intervals.

Fig 1: Urine sample collection

Results and Discussion

Physical properties of urine

The colour of urine in affected animals selected in the present study varied from red to light yellow on the day of admission in both the groups depending upon the duration of illness and the status of urinary bladder on day 0. In group-I the colour of the urine was red in three (50.00%), light yellow in two (33.33%) and yellow in one (16.67%) animal at the time of presentation i.e. on 0th day, which subsequently became pale by 14th day in all the animals. However, the colour of the urine was red in three (50.00%), pale in two (33.33%) and light yellow in one (16.67%) animals of group-II on the day of presentation and became normal or pale coloured in four animals and dirty yellow in one animal on 14thday (Table 1). Variation in the colour of urine samples could be due to the variation in concentration of urine, accumulation of sediment and haemorrhage. Diluted urine is pale yellow, while as concentrated urine is dark yellow [9]. The findings of this study match with those of Braun *et al.* (2006) and Sharma *et al.* (2006), [10, 11] who also recorded light yellow, dark yellow, pale yellow urine with clear and cloudy appearance in adult bovine and young calves suffering from obstructive urolithiasis.

Table 1: Urine colour at different intervals in buffalo calves of group I and II suffering from obstructive urolithiasis

Animal	Group I				Group II			
	Day0	Day 1	Day 3	Day 14	Day0	Day1	Day 3	Day 14
1	Pale	Yellow	Pale	Pale	Red	Light yellow	Yellow	Yellow
2	Red	Yellow	Yellow	Pale	Pale	Pale	Dirty yellow	Pale
3	Light yellow	Pale	Yellow	Pale	Red	Red	Pale	Pale
4	Red	Pale	Pale	Pale	Pale	Pale	Pale	Pale
5	Light yellow	Pale	Pale	Pale	Red	Yellow	Pale	Pale
6	Red	Red	Pale	Pale	Light yellow	Light yellow	Yellow	Dirty yellow

The mean ± SE values of urine specific gravity at different time intervals in male buffalo calves with obstructive urolithiasis in both the groups are shown in Table 2. In group-I and group-II the values were lower than the normal reference range (1.015-1.050) on the day of admission and a progressive and significant ($p<0.05$) increase was observed on 3rd and 14th day. Under normal conditions, urine specific gravity ranges between 1.015-1.050 with an average of 1.025 in healthy cattle [12]. Loss of concentrating ability of kidneys is the first sign of renal tubular disease. In the present study, specific gravity of urine in both the groups was lower than the normal reference range suggesting abnormal functioning of kidney. The values increased thereafter suggesting returning of normal functioning of kidney.

Table 2: Mean ± SE values of urine specific gravity at different time intervals in male buffalo calves with obstructive urolithiasis in group-I and group-II

Group	Day 0	Day 1	Day 3	Day 14
I	1.007 ± 0.001^{A}	1.008 ± 0001^{AB}	1.018 ± 0.003^{B}	1.022 ± 0.002^{B}
II	1.007 ± 0.00^{A}	1.007 ± 0.002^{AB}	1.020 ± 0.006^{B}	1.025 ± 0.003^{B}

Chemical properties of urine

The mean ± SE values of urine pH of groups-I and group-II animals at different intervals are depicted in Table 3. The values of pH at day 0 were observed to be basic in both the groups which turned acidic by 3rd day. There were transient and non- significant decreases in urine pH at different intervals of observation. More reduction in urine pH was observed by 3rd day. Ewoldt *et al.*, (2006) and Rakestraw *et*

al., (1995) [13, 14] reported that oral supplementation of ammonium chloride and sodium chloride along with drinking water help dissolution of urethral concretions by acidification of urine. Kumar (2020) [15] observed that urine pH was alkaline in both the groups on day of presentation which became acidic by 3rd day due to oral administration of ammonium chloride supplement postoperatively for several days.

Table 3: Mean ± SE values of urine pH at different time intervals in male buffalo calves with obstructive urolithiasis in group-I and group-II

Group	Day 0	Day 1	Day 3	Day 14
I	8.00 ± 0.45	7.50 ± 0.34	6.50 ± 0.18	6.45 ± 0.19
II	7.83 ± 0.31	7.33 ± 0.49	6.92 ± 0.37	6.89 ± 0.20

The mean ± SE values of urinary protein score of groups-I and group-II animals at different intervals are depicted in Table 4. In group-I and group-II the values of urinary protein score suggested severe proteinuria which decreased progressively and non-significantly by the end of observation when compared within the group and in between the groups. Presence of protein in urine is called proteinuria. Normally urine does not contain proteins. These observations support the findings of Benjamin (1985), Osborne *et al*. (1995), Kumar (2020) and Saini (2020) [12, 15, 16, 17]. Who reported that increased protein level might be due to acute nephritis or inflammatory exudation resulting from pyelitis, urethritis, cystitis and urolithiasis.

Table 4: Mean ± SE values of urine protein score at different time intervals in male buffalo calves with obstructive urolithiasis in group-I and group-II

Group	Day 0	Day 1	Day 3	Day 14
I	1.33 ± 0.33^{A}	1 ± 0.37^{AB}	0.83 ± 0.31^{AB}	0.33 ± 0.21^{B}
II	1.5 ± 0.22^{A}	1.33 ± 0.33^{AB}	1 ± 0.26^{AB}	0.5 ± 0.34^{B}

The mean ± SE values of urinary glucose score of groups-I and group-II animals at different intervals are depicted in Table 5. Glucose was detected in urine samples of all animals in group-I and group-II on the day of presentation of case. Thereafter glucose was absent in all the urine samples of both the groups. Glucose is absent in urine samples of ruminants unless blood glucose level increases the renal threshold of 100-140mg/dl [18]. In the present study, glycosuria was recorded at the time of presentation which could be due to impaired tubular reabsorption or lowering of renal threshold for glucose [12]. Examination of ketone in urine samples in both the groups revealed no ketone at any stage of the experiment. Bilirubin and nitrate were also negative in all the urine samples.

Table 5: Mean ± SE values of urine glucose score at different time intervals in male buffalo calves with obstructive urolithiasis in group-I and group-II

Group	Day 0	Day 1	Day 3	Day 14
I	0.17 ± 0.17	0 ± 0	0 ± 0	0 ± 0
II	0.33 ± 0.33	0 ± 0	0 ± 0	0 ± 0

Microscopic examination of the urine

The mean ± SE values for score of RBCs, pus cells, casts and crystals in urine of animals in group-I and group-II at different time intervals are depicted in Table 6. The mean score for RBCs was high in both the groups on the day of admission, but thereafter the score decreased gradually throughout the observation. The score was significantly lower on 14th day as compared to base value. In both the groups, base values of RBCs were high, which could be due to cystitis, urinary tract infection, trauma due to lodgement of calculi or inadvertent mixing of blood with urine during surgical intervention [16, 18, 19]. The mean score for pus cells increased from mild on day 0 to moderate on day 3 non-significantly in group-I whereas significantly ($p<0.05$) in group-II. Thereafter the values decreased by 14th day to become mild. The mean score for casts increased non-significantly from 0 day to 3rd day in both the groups and decreased thereafter by 14th day. Gradual postoperative decrease in RBCs and pus cells score in the animals of both groups could be attributed to decrease in urinary tract infection and inflammation following administration of antibiotics and anti-inflammatory drugs and postoperative decrease in RBCs level and pus cells was faster in group I than group II. The score was significantly lower on 14th day as compared to base value. The mean score for crystals was high in both the groups on the day of admission, but thereafter the score decreased gradually throughout the observation. The score was significantly lower on 14th day as compared to base value. Heavy crystalluria on the day of admission in both the groups suggests that the urine was saturated and could have precipitated the development of urolithiasis [19]. Struvite was the most common type of crystal detected in the urine sample. Calcium phosphate was relatively less frequently found crystal. In all the cases, where Struvite was most commonly observed, which is similar to the study formulated by (Powe, 1986) [20] which stated that due to alkaline pH of urine favours the precipitation of calcium and magnesium phosphates and carbonates, triple phosphates crystals. There was no significant difference observed in between the groups at any time interval for all the parameters considered for urinalysis.

Table 6: Mean ± SE values of RBC, pus cells, casts and crystals score of groups-I and group-II animals at different time intervals suffering from obstructive urolithiasis

Parameters	Group - I				Group – II			
	Day 0	Day 1	Day 3	Day 14	Day 0	Day 1	Day 3	Day 14
RBCs	2.80 ± 0.31^{A}	2.20 ± 0.40^{A}	1.20 ± 0.31^{AB}	0.40 ± 0.21^{B}	2.70 ± 0.49^{A}	2.10 ± 0.54^{A}	1.30 ± 0.42^{AB}	0.50 ± 0.34^{B}
Pus Cells	0.60 ± 0.21^{AB}	0.80 ± 0.31^{AB}	1.10 ± 0.31^{B}	0.20 ± 0.17^{A}	0.50 ± 0.22^{A}	0.90 ± 0.40^{AB}	1.40 ± 0.33^{B}	0.50 ± 0.22^{A}
Cast	1.00 ± 0.37^{A}	1.10 ± 0.31^{A}	1.20 ± 0.40^{A}	0.20 ± 0.17^{B}	0.90 ± 0.17^{A}	1.10 ± 0.31^{A}	1.30 ± 0.33^{A}	0.30 ± 0.21^{B}
Crystals	2.50 ± 0.49^{A}	2.30 ± 0.43^{A}	1.90 ± 0.41^{A}	0.40 ± 0.38^{B}	2.60 ± 0.43^{A}	2.40 ± 0.42^{A}	2.00 ± 0.39^{A}	0.30 ± 0.33^{B}

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

References

1. Amarpal, Kinjavdekar P, Aithal HP, Pawde AM, Singh T, Pratap K. Incidence of urolithiasis: A retrospective study of five years. Indian Journal of Animal Sciences. 2004;72(2):175-177.
2. Rafee MA, Baghel M, Suvarna A, Palakkara A.

Obstructive urolithiasis in buffalo calves: a study on pattern of occurrence, aetiology, age, clinical symptoms and condition of bladder and urethra. Buffalo Bulletin. 2015;34(3):261-265.
3. Mangotra V, Singh K, Chaudhary RN, Kumar A, Tayal R. Management of obstructive urolithiasis by tube cystostomy technique in male buffalo calves. Indian Journal of Animal Sciences. 2016;86(3):260-263.
4. Ewoldt JM, Jones ML, Miesner MD. Surgery of obstructive urolithiasis in ruminants. Veterinary Clinics of North America: Food Animal. 2008;24:455-465.
5. Muhammad AS, Agwu NP, Abdulwahab-Ahmed A, Abdullahi K, Mungadi IA. Safety and efficacy of ultrasound-guided percutaneous suprapubic cystostomy in resource-poor setting: A 7-year review. Urology Annals. 2018;10:24-8.
6. Niwas R, Saharan S, Priyanka, Kumar S. Ultrasound guided tube cystotomy in buffalo calves. The Pharma Innovation Journal. 2021;10(1):42-45.
7. Culler CA, Fick M, Vigani, A. Ultrasound-guided placement of pigtail cystostomy tubes in dogs with urethral obstruction. Journal of Veterinary Emergency and Critical Care. 2019;7:1-6.
8. Mahajan A, Gupta AK, Bhardwaj MS, Bhat MA, Bhardwaj HR. Occurrence and Management of Obstructive Urolithiasis in Ruminants. Journal of Animal Research. 2017;7(4):723-731.
9. Finco DR. Kidney function. In: Clinical Biochemistry of Domestic Animals Edt. by Kaneko JJ, Harvey JW, Bruss ML. Academic Press San Diego, 1997, 441-484p.
10. Braun U, Nuss K, Wapf P, Lischer C. Clinical and ultrasonographic findings in five cows with a ruptured urachal remnant. Veterinary Record. 2006;159:780-782.
11. Sharma PD, Singh K, Singh J, Kumar A. Bacteriological, biochemical and histopathological studies in uroperitoneum in buffalo calves (*Bubalus bubalis*). Indian J. Anim. Sci. 2006;76(2):124-126.
12. Benjamin MM. Outline of veterinary clinical pathology. Iowa State University Press, 1985.
13. Ewoldt JM, Anderson DE, Miesner MD, Saville WJ. Short-and long-term outcome and factors predicting survival after surgical tube cystostomy for treatment of obstructive urolithiasis in small ruminants. Veterinary Surgery. 2006;35(5):417-22.
14. Rakestraw PC, Fubini SL, Gilbert RO, Ward JO. Tube cystostomy for treatment of obstructive urolithiasis in small ruminants. Veterinary Surgery. 1995;24(6):498-505.
15. Kumar A. Efficacy of Ammonium chloride and Walpole's solution for the treatment of obstructive urolithiasis in male buffalo calves. M.V.Sc thesis submitted to Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar (Haryana), 2020.
16. Osborne CA, Lulich JP, Bartges JW, Unger LK, Thumchai R, Koehler LA, *et al*. Canine and feline urolithiasis*:* Relationship of aetiopathogenesis to treatment and prevention. In: canine and feline nephrology and urology. Williams and Wilkins publications, 1995, 798-888.
17. Saini D. Comparative evaluation of latex Foley's catheter and silver coated latex Foley's catheter for surgical management of obstructive urolithiasis in buffalo calves. M.V.Sc thesis submitted to Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar (Haryana), 2020.
18. Carlson GP. Clinical chemistry tests. In: Large Animal Internal Medicine by Smith, B.P. The C.V. Mosby Co, 1990, 386-414.
19. Radostits OM, Blood DC, Gray CC, Hincheliff KW. Vety. Medicine: A textbook of the disease of cattle, sheep, pigs, goats and horses. Billiere Tindall, London, 2000, 493-498.
20. Powe TA. Diseases of the Urinary System. Current Veterinary Therapy 2-Food Anim. Pract, (1.L. Howard, ed.).W. B. Saunders, Philadelphia, 1986, 816-818.