COMPARATIVE HAEMATO-BIOCHEMICAL EVALUATION OF ULTRASOUND GUIDED AND CONVENTIONAL TUBE CYSTOSTOMY IN MALE BUFFALO CALVES

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ABSTRACT

The present study was carried out in twelve clinical cases of male buffalo calves with history of retention of urine. Buffalo calves of age in between one to four months were randomly divided into two groups comprising of six animals in each group. All the animals in present study had urinary retention with intact urinary bladder as diagnosed by ultrasonography. In group I ultrasound guided tube cystostomy and in group II conventional tube cystostomy was done. Blood samples were taken preoperatively, after surgery, 6 hours, 24 hours, 3rd and 14th day for heamatobichemical analysis. In hematological examination there was significant difference on 3rd day in TLC and neutrophil count in between the groups. In biochemical examination serum cortisol and total protein was found to be significantly varying in between the groups at different time intervals.

Urinary obstruction in young male buffalo calves is a major complication in growing calves during or just after end of winter season (Amarpal *et al.*, 2004). Age, sex, breed, season, hormonal imbalance, hydrophilic colloids, infection, vitamins and water intake by the animal play important role in its etiology (Mangotra *et al.*, 2016). Tube cystostomy along with medical dissolution of uroliths is considered as an effective technique for resolution of urine retention in small ruminants with overall higher survival rate (Ewoldt *et al.*, 2008, Pooniya *et al.*, 2020). Ultrasound-guided suprapubic cystostomy using reusable trocar or selected surgical blade is simple, safe, effective and associated with minimal complications in male buffalo calves (Niwas *et al.*, 2021). Hematological and biochemical parameters are an indication of health and physiological responses (Sayed, 2016). Therefore, the present study was carried out for comparative evaluation of haemato-biochemical study 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 inappetence, pulsating urethra and 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

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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 @ 0.05 mg/kg, IM. For ultrasound guided tube cystostomy, a stab incision was given 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. with the help of a AI gun plunger as stylet through this incision. The whole procedure was done under ultrasound guidance, once the urine starts dribbling from the Foley's catheter, the bulb was inflated with recommended amount of normal saline solution and stylet 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. The hanging Foley's was anchored to the skin near prepucial orifice. The abdominal wound was sutured in routine manner. 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.

For the estimation of haemato-biochemical studies, 6 ml blood was collected preoperatively, after surgery, after 6 hours, 24 hours, 3rd day and 14th day. Blood sample was stored in a sterile vial containing EDTA and another sterile vial without anticoagulant 3 ml in each vial. 3 ml fresh blood sample in EDTA vial was used for the study of haematological parameters and rest of the sample was centrifuged immediately at 5000 RPM for 5 minutes to separate out the plasma. Plasma was used for total plasma protein analysis. Similarly, 3 ml fresh blood sample in sterile vial without anticoagulant was centrifuged immediately to separate out the serum. Serum was used for analysis of biochemical parameters. Hematological parameters were estimated using automatic haematology analyzer (MS4S). For serum biochemical analysis serum samples were estimated using automatic biochemistry analyzer (EM 200), serum electrolytes were estimated using automatic electrolyte analyzer (Easy Lyte Expand). Two way ANOVA test was used to determine significant difference between groups and different time intervals.

RESULTS AND DISCUSSION

Total leucocytes count (TLC) and neutrophil count at 3rd day was significantly higher in group II as compared to group-I (Table 1 and 2). TLC was significantly lowered on 3rd and 14th day as compared to the preoperative values in group I whereas no significant difference was observed in group II when compared within the group. Neutrophil count in group I and group II after 24 hours, 3rd day and 14th day were significantly different within the group. The correction of leukogram was faster in group I than group II. This could be attributed to the fact that surgical intervention in conventional tube cystostomy method causes more surgical stress, pain, tissue damage and surgical manipulation as compared to the ultrasound guided tube cystostomy. Leucocytosis is associated with active defence against some pathological conditions, fear, stress, pain, excitement, anxiety, extensive tissue necrosis and peritonitis (Morris, 1990). TLC count could serve as an easy-to-obtain and early marker for serious injury (Santucci et al., 2008). Vishal (2019) reported significantly (p<0.05) lower neutrophil count at 15 minutes, 4h, 8h and 24h in animals undergoing laparoscopic ovariohysterectomy

Table 1

Mean±SE values of hematological parameters in buffalo calves of group-I at different time intervals

Parameters	Preoperative	Immediately postoperative	After 6 hours	After 24 hours	On 3rd day	On 14th day
Hb (g/dl)	12.02 ± 0.58^{A}	11.73 ± 0.52^{AB}	11.97 ± 0.61^{AB}	11.80 ± 0.37^{AB}	11.57 ± 0.41^{AB}	10.97 ± 0.4^{B}
PCV (%)	33.52 ± 1.94^{A}	31.12 ± 2.22^{AB}	32.02 ± 2.24^{AB}	29.78 ± 1.82^{AB}	29.27 ± 1.91^{AB}	27.07 ± 1.02^{B}
TEC (×10^{6}/cu.mm)	6.55 ± 0.30	6.36 ± 0.40	6.46 ± 0.42	6.29 ± 0.37	6.20 ± 0.37	5.89 ± 0.53
TLC (×10^{3}/cu.mm)	11.01 ± 0.66^{A}	10.5 ± 0.24^{AB}	10.27 ± 0.66^{AB}	9.71 ± 0.65^{AB}	8.78 ± 0.53^{aB}	8.61 ± 0.61^{B}
N (%)	63.00 ± 5.05^{A}	64.43 ± 4.19^{A}	62.43 ± 5.14^{A}	51.22 ± 3.82^{C}	44.80 ± 4.59^{aBC}	44.02 ± 2.21^{B}
L (%)	34.80 ± 4.70^{A}	33.62 ± 3.98^{A}	35.97 ± 4.90^{A}	47.87 ± 4.05^{B}	51.75 ± 4.73^{B}	52.00 ± 3.94^{B}
M (%)	2.20 ± 0.44	1.95 ± 0.35	1.6 ± 0.35	1.63 ± 0.11	2.05 ± 0.17	1.98 ± 0.17

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

Table 2

Mean±SE values of hematological parameter sin buffalo calves of group-II at different time intervals

Parameters	Preoperative	Immediately postoperative	After 6 hours	After 24 hours	On 3rd day	On 14th day
Hb (g %)	12.25 ± 0.47	11.98 ± 0.43	12.18 ± 0.31	12.15 ± 0.41	11.80 ± 0.78	11.47 ± 0.75
PCV (%)	35.95 ± 1.61^{A}	34.35 ± 1.98^{ABC}	34.85 ± 2.19^{AB}	33.4 ± 2.15^{ABC}	32.93 ± 1.84^{ABC}	29.62 ± 2.52^{C}
TEC (×10^{6}/cu.mm)	6.72 ± 0.69	6.39 ± 0.65	6.55 ± 0.78	6.24 ± 0.95	6.12 ± 1.07	6.02 ± 1.04
TLC (×10^{3}/cu.mm)	11.95 ± 0.63	11.89 ± 0.62	11.48 ± 1.01	10.94 ± 0.47	11.12 ± 0.6^{b}	10.05 ± 0.32
N (%)	63.13 ± 6.50^{A}	64.92 ± 5.89^{A}	60.93 ± 5.02^{A}	55.28 ± 5.56^{CB}	51.32 ± 2.99^{bCB}	46.05 ± 1.63^{BC}
L (%)	34.63 ± 6.73^{AC}	32.78 ± 6.08^{AC}	37.20 ± 4.66^{AB}	43.93 ± 5.47^{CAB}	46.78 ± 3.37^{BC}	49.93 ± 3.39^{BC}
M (%)	2.23 ± 0.37	2.30 ± 0.38	1.67 ± 0.38	1.58 ± 0.39	1.87 ± 0.46	2.13 ± 0.46

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

Table 3

Mean±SE values of biochemical parameters in buffalo calves of group-I at different time intervals

Parameters	Preoperative	Immediately postoperative	After 6 hours	After 24 hours	On 3rd day	On 14th day
Total Serum Proteins (g/dl)	6.51±0.4	6.35±0.27	6.42±0.24^a	6.37±0.33	6.52±0.35	6.65±0.37
Albumin (g/dl)	2.95±0.25^{AB}	2.68±0.27^{AB}	2.45±0.31^A	2.42±0.46^A	2.65±0.34^A	3.39±0.25^B
BUN (mg/dl)	39.98±8.20^A	38.56±12.60^A	34.00± 0.51^{AC}	31.94±10.93^{AC}	25.22±3.57^{CB}	19.11±0.31^B
Creatinine (mg/dl)	4.03±0.23^A	3.77±0.31^A	3.15±0.27^A	2.23±0.26^{AB}	1.29±0.39^{BC}	1.16±0.25^{CB}
Glucose (mg/dl)	77.08±9.4^{ACD}	97±11.95^A	70.4±10.15^{ACD}	55.85±9.47^{CB}	48.18±7.01^{BD}	57.78±7.91^{DC}
Calcium (mg/dl)	6.88±0.39	7.08±0.41	7.37±0.61	7.88±0.47	8.45±0.39	8.87±0.32
Sodium (mmol/L)	132.08±2.32	135.63±2.83	134.52±2.98	135.38±1.63	136.12±2.31	138.40±1.31
Chloride (mmol/L)	76.62±2.31^A	80.97±3.27^A	83.75±3.73^A	89.45±2.69^{AB}	90.53±2.02^{AB}	99.12±2.72^B
Potassium (mmol/L)	6.31±0.29	6.16±0.24	6.01±0.21	5.55±0.26	5.12±0.5	5.14±0.43
Phosphorus (mg/dl)	4.33±0.3	4.15±0.13	4.17±0.57	3.79±0.48	3.55±0.42	3.27±0.27
Magnesium (mg/dl)	3.02±0.37^A	3.21±0.34^A	2.95±0.39^{AB}	2.76±0.16^{AB}	2.7±0.26^{AB}	2.24±0.23^B
Cortisol (ng/ml)	61.18±4.13^{ACD}	63.81±2.80^A	55.75±2.57^{aC}	49.421.47^{aDB}	48.90±3.92^{BCD}	45.41±3.82^B

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

Table 4

Mean±SE values of biochemical parameters in buffalo calves of group-II suffering from obstructive urolithiasis at different time intervals

Parameters	Preoperative	Immediately postoperative	After 6 hours	After 24 hours	On 3rd day	On 14th day
Total Serum Proteins (g/dl)	6.41±0.1^A	6.32±0.32^A	6.96±0.20^{Bb}	6.56±0.25^{AB}	6.48±0.87^{AB}	6.63±0.33^{AB}
Albumin (g/dl)	2.90± 0.21^{AB}	2.88±0.23^{AB}	2.58±0.38^{AB}	2.56±0.46^{AB}	2.44±0.37^A	3.02±0.29^B
BUN (mg/dl)	40.56±3.75^A	38.81±4.03^A	35.64±6.45^{AC}	31.83±4.93^{ABC}	28.78±8.04^C	21.27±5.82^B
Creatinine (mg/dl)	4.06±0.70^A	3.67±0.12^A	3.17±0.25^A	2.25±0.31^{AB}	1.12±0.44^B	1.16±0.35^B
Glucose (mg/dl)	75.83±14.94^A	113.72 ±15.98^B	81.55±11.32^A	67.6±8.4^A	57.68±14.54^A	60.65± 6.6
Calcium (mg/dl)	6.65±1.05	6.73±0.91	7.03±0.37	7.52±0.47	8.12±0.34	8.68±0.48
Sodium (mmol/L)	133.38±1.82	136.47±1.81	134.37±0.78	135.93±2.93	138.43±1.7	137.25±2.7
Chloride (mmol/L)	71.63±13.4^A	76.65±5.71^A	77.27±5.77^A	83.37±4.55^A	92.9± 6.06^{AB}	97.32±3.34^B
Potassium (mmol/L)	6.26±0.4	6.21±0.32	6.35±0.74	5.96±0.86	5.77±0.65	5.73±0.23
Phosphorus (mg/dl)	4.95±0.68	4.54±0.68	4.05±0.63	3.44±0.36	3.58±0.59	3.49±0.53
Magnesium (mg/dl)	3.16±0.22^A	3.15±0.14^A	2.98±0.24^{AB}	2.93±0.26^{AB}	2.8±0.38^{AB}	2.45± 0.14^B
Cortisol (ng/ml)	59.62±4.16^{AB}	67.60±4.10^A	66.09±4.03^{bA}	60.16±1.05^{bA}	55.35±3.72^{AB}	51.28±3.02^B

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

as compared to conventional ovariohysterectomy in dogs. The mean hemoglobin and total erythrocytes count (TEC) was within normal reference range but towards the higher side in both the groups which fluctuated and decreased towards the lower side of normal reference range by the end of observation. Similar trend was also observed by many other workers (Saurabh, 2016; Kumar, 2020; Saini, 2020). No significant difference was noticed for hemoglobin, total erythrocytes count, packed cell volume, monocytes, eosinophils and basophils in between group I and group II.

PCV range was towards higher side of normal reference range in both the groups preoperatively and gradually progressed towards lower side of normal reference range postoperatively till the end of study. Ganguly *et al.* (2017) observed a non-significant variation for Hb, PCV, TEC, monocytes, eosinophils and basophils in diseased calves with obstructive urolithiasis compared to healthy calves. However, neutrophilic leucocytosis was observed in cases of urolithiasis compared to healthy calves. High Hb, TEC and PCV might be attributed to haemoconcentration due to

dehydration (Radostits *et al.*, 2000).

The pre-operative values of total plasma proteins and albumin were within normal range but towards the lower side in both the groups and fluctuated through the observation and reached at higher side of normal reference range (Table 3 and 4). In conventional tube cystostomy group total protein at 6 hours was significantly higher than the ultrasound guided tube cystostomy group. This can be due to increase in the globulin fraction due to more inflammation in group II. Pre-operatively, the levels of blood urea nitrogen (BUN) and serum creatinine were above the normal reference range in both groups, which decreased further to reach within normal reference range by14[th] day. Similar findings were also reported by Saurabh (2016), Saini (2020) and Kumar (2020). Serum cortisol was significantly higher in group-II as compared to group-I after 6 hours and 24 hours of surgery. Major injury is associated with a major stress induced neurohumoral response to stimulate the secretion of epinephrine and cortisol, these stress-induced hormones produce leukocytosis from both bone marrow and splenic sources (Paladino *et al.*, 2010). The preoperative values of serum glucose was increased after surgery significantly in group-II and non-significantly in group-I when compared within the group which decreased significantly by 3rd day. The significant increase in glucose concentration in open/ conventional method may be due to more release in cortisol in comparison to ultrasound guided method. Hypocalcaemia, hypochloraemia, hyponatraemia and hyperphosphatemia were observed preoperatively at the time of presentation in both the groups which come in normal range after surgery. Magnesium values were within the normal reference range during the entire period of study in both the groups. There was no significant difference in between the groups for electrolytes. Similar findings were also reported by Saurabh (2016), Saini (2020) and Kumar (2020).

CONCLUSION

On basis of present study, it can be concluded that ultrasound guided tube cystostomy produces less stress, less inflammation and less variation in others hematobiochemical parameters than conventional tube cystostomy.

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