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Blood biochemical alterations following peritoneal lavage and drainage in caesarean operated cattle

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Abstract
Caesarean section is the last resort when per vaginal delivery of fetus is not feasible. Twenty four cows affected with dystocia reported at the teaching veterinary hospital, GADVASU, Ludhiana that required caesarean section for successful foetus delivery were included in this study. Cows were randomly divided into 4 groups based upon the use of peritoneal lavage and drain. In group I (treatment group, n=6), peritoneal lavage with NSS was done during CS. In group II (treatment group, n=6), peritoneal lavage with NSS and drainage was done with Foley's catheter (18 gauze). In group III (treatment group, n=6), peritoneal lavage with NSS and drainage was done with silicone tube catheter (28 gauze). In group IV (control group, n=6), no peritoneal lavage was done. Blood samples were taken when animal was presented at the clinics (pre-caesarean, day 0) and then at interval of 24 hrs (post-caesarean, Day 1 and 2). Blood plasma was used to estimate BUN, creatinine and total proteins. In between treatment and control groups; BUN, creatinine and total proteins did not differ significantly from each other. Post caesarean (Day 1 and 2) BUN and creatinine concentrations were significantly higher than pre caesarean (Day 0) concentrations within the treatment and control groups. Post caesarean (Day 1and 2) total protein concentration were significantly lower than the pre caesarean concentration (Day 0) within all treatment and control groups. In conclusion, there was no significant difference in the treatment and control groups in pre and post caesarean BUN, creatinine and total protein concentrations.

Keywords: Blood biochemical, lavage, caesarean operated cattle

Introduction
The production potential of an animal depends entirely on its healthy reproductive management. Parturition is the major management step in the reproductive cycle of the dairy animals. Dystocia leading to abnormal parturition constitutes a major portion of reproductive disorders in cattle. Various obstetrical techniques are used to relieve dystocia and manage successful per vaginal delivery. However, when all other techniques fail and per vaginal delivery is not feasible then caesarean section is the last resort to relieve dystocia. In the early part of the 20th century, veterinarians began to perform Caesarean section (CS) in cows (kolkman *et al* 2007) [4]. Caesarean section is one of the oldest surgical procedure which is done in field of veterinary science (Newman 2005) [5]. It is believed that there is decreased survivability and fertility of the caesarean operated cows in delayed cases, but dam survival rate may be high when early operation is done early (Prabhakar *et al*., 2002) [6]. Due to spillage of the uterine contents and break down of sutures, there may be chances of peritonitis (Singh *et al*., 2002). Leakage of uterine fluids through the uterine wound, rupture of suture material and knot failure of continuous uterine suture may develop severe peritonitis following CS.
In horses, peritoneal lavage technique has been used with success. To decrease adhesion formation in horses after surgery, 1% sodium carboxymethylcellulose (SCMC) was directly used over the intestinal surfaces in treatment group. In control group, normal saline solution (NSS) was used over the intestinal surfaces after surgery. There was significantly less adhesion development in treatment group when compared to the control group (Hay 2001) [3].
The number of adhesions was significantly less in horses in which peritoneal lavage with 10L ringer lactate was done. No inflammation was observed by use of peritoneal lavage by Ringer's solution or use of drain. The study indicated that peritoneal lavage reduced the frequency of intraabdominal adhesions in horses (Hague *et al* 1998) [2]. In humans, many a time peritoneal lavage and drainage are used to control the infection in surgical operations involving alimentary canal (Beek *et al* 2015) [1]. Therefore, the present study it is planned to use peritoneal lavage and drainage in cattle caesarean cases to improve post-operative survival and prevent uterine adhesion formation.

Material and Methods

Animals were randomly divided into 4 groups based upon the use of peritoneal lavage and drain. In group I (treatment group, n=6), peritoneal lavage with NSS was used during CS. In group II (treatment group, n=6), peritoneal lavage with NSS and drainage was done with Foley's catheter (18 gauze). In group III (treatment group, n=6), peritoneal lavage with NSS and drainage was done with silicone tube catheter (28 gauze). In group IV (Control group, n=6), no peritoneal lavage or drainage was done.

Lavage was done with the help of suction pump with 8-10LNSS (Normal saline solution). Intra peritoneal Foley's catheter/silicone tube was fixed for 48 hours on ventral dependent side of abdomen. Approximately 20 ml of blood samples were collected in heparinised vials (2- 5 IU/ml of blood) by jugular venipuncture at the time of caesarean section (Pre CS, day 0) and subsequently at 24 h intervals till the case was discharged (Post CS, day 1 and 2). Plasma was separated from the blood by centrifugation at 3000 rpm for 15 minutes. Plasma was stored at -20 C for estimation of fibrinogen, blood urea nitrogen, creatinine and total plasma proteins. BUN in plasma samples was estimated by using vitros 350 biochemistry orthodiagnostic analyser using commercial diagnostic kits supplied by Johnson and Johnson, USA. Intravenous (IV) fluid therapy consisting of 5 litres normal saline solution was given during CS and on subsequent days until day 7 post CS. Intra-muscular (IM) therapy comprising of Gentamycin (5 mg/kg body weight, twice a day), Penicillin (2.5g, twice a day), Metronidazole (15 mg/kg b.wt, I/V) were administered to all animals on the day of CS and on subsequent days.

Statistical analysis was done by using two-way ANOVA with repeated measures at 5 per cent level of significance by using SPSS.

Results and Discussion

BUN and creatine concentrations recorded in caesarean operated animals in relation to use of peritoneal lavage and drainage have been presented in Table 1 and Fig.1& 2 respectively. The pre-caesarean BUN and creatinine concentrations did not differ significantly in cows subjected to treatment and control group indicating equal distribution of animals with similar dystocia history into treatment and control group. Post CS BUN and creatinine concentrations recorded on day 1 and 2 were significantly higher than the Pre CS concentrations ($P<0.05$) within all treatment and control groups. Although BUN and creatinine concentrations at day 2 were higher in comparison to day 1 post CS but the difference was non significant at 5% level. No significant difference in post CS BUN and creatinine concentrations was observed between control and the treatment groups.

Total plasma protein concentrations observed in the present study in caesarean operated animals in relation use of peritoneal lavage and drainage have been presented in Table 1 and Fig. 3.Pre and post CS total plasma protein concentrations were not significantly different but showed decreased trend on post CS days in all the group. Post CS total plasma protein concentrations (Day 1 and 2) with respect to Pre CS concentrations (Day 0) were decreased significantly ($P<0.05$) within all treatment and control groups. Insignificant decrease in total plasma protein concentrations at day 2 was observed in comparison to day 1 post CS. No significant difference was observed in post CS total plasma protein concentrations of control group when compared with treatment groups.

Table 1: Plasma BUN (mg/dl), creatinine (mg/dl) and total protein (g/dl) concentrations (Mean ± SE) in caesarean operated cows in relation to use of peritoneal lavage and drainage

	BUN			Creatinine			Total protein		
	Day 0	Day1	Day 2	Day 0	Day1	Day 2	Day 0	Day1	Day 2
Group I (Lavage, n=6)	19.00 ± 2.19^{X}	31.16 ± 2.61^{Y}	32.83 ± 2.42^{Y}	2.05 ± 0.17^{Y}	2.90 ± 0.16^{Y}	3.10 ± 0.19^{Y}	7.75 ± 0.69^{X}	7.40 ± 0.67^{Y}	7.33 ± 0.67^{Y}
Group II (Lavage +Drainage with Foley's catheter, n=6)	19.33 ± 2.19^{X}	30.33 ± 2.61^{Y}	31.00 ± 2.42^{Y}	2.36 ± 0.17^{X}	3.13 ± 0.16^{Y}	3.35 ± 0.19^{Y}	7.65 ± 0.69^{X}	7.21 ± 0.67^{Y}	7.08 ± 0.67^{Y}
Group III (Lavage +Drainage with Silicone tube, n=6)	20.16 ± 2.19^{X}	30.00 ± 2.61^{Y}	32.16 ± 2.42^{Y}	1.86 ± 0.17^{X}	2.85 ± 0.16^{Y}	3.01 ± 0.19^{Y}	7.80 ± 0.69^{X}	7.35 ± 0.67^{Y}	7.25 ± 0.67^{Y}
Group IV (Control, n=6)	19.16 ± 2.19^{X}	28.66 ± 2.61^{Y}	29.16 ± 2.42^{Y}	2.06 ± 0.17^{X}	2.95 ± 0.16^{Y}	3.16 ± 0.19^{Y}	7.56 ± 0.69^{X}	7.31 ± 0.67^{Y}	7.21 ± 0.67^{Y}

x:y:z ($P<0.05$) significantly different within column

X:Y:Z ($P<0.05$) significantly different within rows

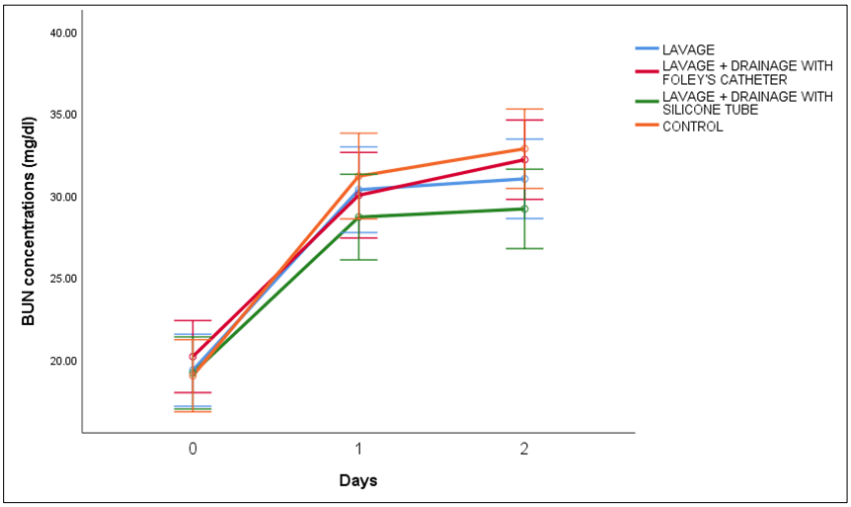

Fig 1: Plasma BUN concentrations (mg/dl, mean ± SE) in caesarean operated cows in relation to use of peritoneal lavage and drainage

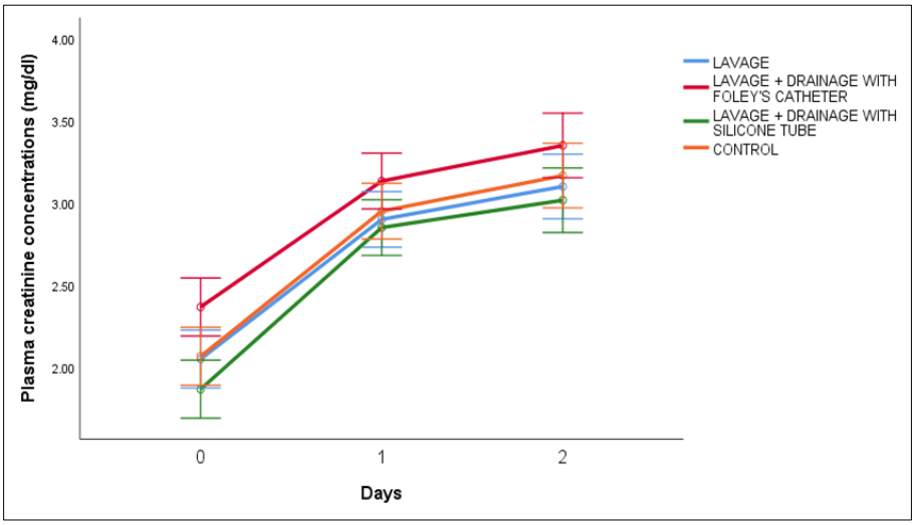

Fig 2: Plasma Creatinine concentrations (mg/dl, mean ± SE) in caesarean operated cows in relation to use of peritoneal lavage and drainage

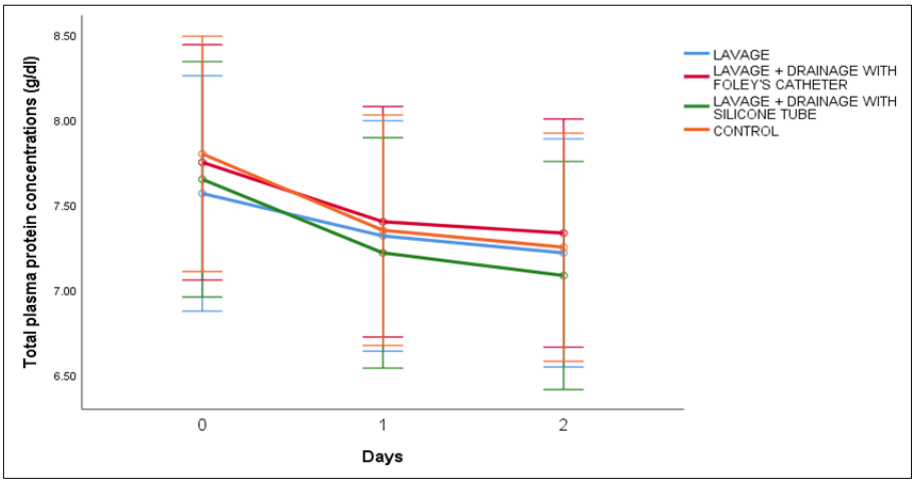

Fig 3: Total Plasma Protein concentrations (g/dl, mean ± SE) in caesarean operated cows in relation to use of peritoneal lavage and drainage

Conclusion

No change in the biochemical alterations were observed in between the cows in treatment groups in which lavage or drainage was done and control group in which no lavage or drainage was done.

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