



Ultrasonographic Studies on Heart Parameters in Relation with Survival Rate of Buffalo during Pre and Post Caesarean Section

Ajit Verma^{1*}, R. K. Chandolia², Rakesh Kumar³, Nitin Soni⁴, Sandeep Kumar⁵, Anand Kumar Pandey⁶ and Sonu Kumari⁵

¹Ph.D. Scholar, Deptt. of Veterinary Gynaecology & Obstetrics, COVS, LUVAS, Hisar

²Professor, Deptt. of Veterinary Gynaecology & Obstetrics, COVS, LUVAS, Hisar

³Veterinary Surgeon, Department of Animal Husbandry and Dairying, Haryana, India

⁴M.V.Sc. Scholar, Deptt. of Veterinary Gynaecology & Obstetrics, COVS, LUVAS, Hisar

⁵Assistant Professor, Deptt. of Veterinary Gynaecology & Obstetrics, COVS, LUVAS, Hisar

⁶Assistant Professor, Deptt. of Veterinary Clinical Complex, COVS, LUVAS, Hisar

*Corresponding Author E-mail: soniajit6@gmail.com

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ABSTRACT

The contribution of buffaloes to the Indian economy is overwhelming as half of the total milk produced in the country is obtained from buffaloes. Ultrasonography has become an important diagnostic tool for evaluating the female reproductive system in a non-invasive manner. Ultrasonography can provide information regarding changes in vital organ to predict survivability of buffaloes undergoing caesarean sections. The findings of present study indicate that the mean heart beat and pixel value of heart can be useful indicators for prognosis of caesarean section in buffaloes.

Key words: Buffalo, Caesarean section, Heart, Ultrasonography and Survival rate.

INTRODUCTION

The contribution of buffaloes to the Indian economy is overwhelming. Buffaloes contribute towards more than half of the total milk produced in the country, act as source of meat and are also extensively used for draught purpose in several parts of the country. Parturition, the last link in chain of events for successful reproduction, is a very crucial stage in the reproductive life of any animal as any deviation from the normal adversely affects the future productive and reproductive potential of the animal.

Ultrasonography has become an important diagnostic tool for evaluating the female reproductive system in bovine practice. Ultrasound technology has made possible to view the entire reproductive system in a non-invasive manner¹. B-mode ultrasonography provides real time, cross sectional images of the heart, vessels and valves. M-mode, on the other hand, provides opportunity to conduct quantitative analysis of the dimensions and motion of the chambers and valves².

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Ultrasonography could prove a useful tool to evaluate all the vital organs of dam undergoing caesarean section. Scanning of scientific literature revealed scanty information on effect of caesarean section on vital organs of buffalo in relation to survival rate of buffalo. Therefore, the present study was designed to assess ultrasonographic images of heart of dam before and after caesarean and to correlate ultrasonographic observation with survival rate of buffalo undergoing caesarean section.

MATERIAL AND METHODS

The ultrasonography was performed on 13 buffaloes after taking case history and diagnosis of dystocia before the start of caesarean section (0 h), after 12 hours of caesarean (12 h) and post 24 hours of caesarean (24 h). Ultrasonography was conducted using Toshiba Nemio-XG 3D ultrasound machine. The animals were kept in chute. No sedation was given to animals for ultrasonographic studies. The third and fourth intercostal space in both sides of the thorax was shaved for ultrasonography of heart. Ultrasound gel supplied by Medicone enterprises (Chennai) were utilized for the study. Sonography image capture and management system (Cutesono, Global softwares, Jaipur) installed in the computer attached to the ultrasound machine was used for the recording purposes and subsequent re-evaluation. The brightness and contrast were adjusted to get clear images. The near and far gains were adjusted according to the requirement to check the details of the images. Good, clear images were frozen and saved in the machine itself for the offline analysis. For the measurement of length and width, 'distance' option and for circumference measurement, 'trace' option of keyboard was used. Pixel values of heart muscles were measured with the help of adobe photoshop software after obtaining saved image of heart from ultrasound machine. Post caesarean section animals were divided into two groups. First group included animals which survived after caesarean section and second group

included the animals which couldn't survive after caesarean section.

Statistical analysis

The collected data is presented as Mean \pm SE in the table. Further data was analysed through one way ANOVA to see the difference a parameter between time periods. Independent sample t- test was employed to analyse the difference a parameters between groups within same time period. The value less than 5% ($p < 0.05$) was considered significant. All the statistical procedure was analysed by using SPSS 16.0 software for windows.

RESULTS AND DISCUSSION

Ultrasonography of heart: The mean values of ventricular wall thickness, heartbeat, atrial diameter, ventricular diameter and pixel value of heart obtained in this study are presented in table 1.

Ventricular wall thickness: Ventricular wall thickness (Figure 1) ranged between 6.5 to 13.13 mm and the mean values of ventricular wall thickness did not vary significantly between the animals of both groups. However, Hussain³ reported wall thickness of ventricles as 2.76 cm to 3.17 cm in buffaloes. This difference in thickness may be due to the reason that in our case the measurements were taken on ultrasonographic images while Hussain³ took measurements on gross specimen from a dead animal on slaughter house material or due to age of animals or individual differences in animals as reported by Acorda and Pilapil⁴.

Heartbeat: The mean heartbeat (figure 2) was below 80 and more than 84 beats per minute (bpm) in group 1 & 2 respectively. There was non-significant increase in heartbeat in animals of group 2 after caesarean section. The current results showed that heart beat monitoring may be a tool for assessing the outcome of the caesarean. There are no comparable studies on values of heartbeat in buffaloes to repute or confirm our findings.

Atrial diameter: The Atrial diameter (figure 3) ranged from 3.05 to 4.36 cm. There was no significant difference in animals of both the

groups. Similar atrium diameter has been reported by Torad⁵.

Ventricular diameter: The Ventricular diameter (figure 3) ranged from 4.42 to 6.66 cm. There was no significant difference in ventricular diameter among animals of both groups. The diameter reported in the present study is higher than those reported in normal buffalo's by Torad⁵ which may be due to size difference of animals.

Pixel value of heart: The pixel value of heart ranged from 41.39 to 91.50. The pixel values of animals of group 1 was higher as compared to animals of 2nd group indicating that heart muscles were in a better status in animals of group 1. There are no comparable studies on pixel values of heart in buffaloes to repute or confirm our findings.

Table 1: Mean value of heart parameters in buffaloes in relation to those either survived or not (Group 1: Survived buffaloes; Group 2: Not Survived)

Time interval	Ventricular wall thickness (mm)		Heartbeat (beat/minute)		Atrial diameter (cm)		Ventricular diameter (cm)		Pixel values of heart	
	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2
0hr	9.28 ± 0.70	9.72 ± 0.55	78.6 ± 6.1	84 ± 4.7	3.63 ± 0.23	3.63 ± 0.21	5.1 ± 0.17	5.51 ± 0.34	65.71 ± 7.1 ^a	58.65 ± 3.04 ^a
12hr	9.44 ± 0.62	9.69 ± 0.53	78.2 ± 3.9	85.1 ± 5.6	3.62 ± 0.20	3.64 ± 0.18	4.93 ± 0.26	5.44 ± 0.32	54.03 ± 4.3 ^{ab}	53.38 ± 2.48 ^{ab}
24hr	9.44 ± 0.62	9.56 ± 0.50	77.8 ± 5.4	85.6 ± 8.9	3.57 ± 0.25	3.59 ± 0.14	4.96 ± 0.25	5.45 ± 0.32	51.8 ± 2.04 ^b	50.55 ± 3.09 ^b

^{A, B}(P<0.05) different superscript differ significantly between groups. ^{a, b}(P<0.05) different superscript differ significantly between time periods.

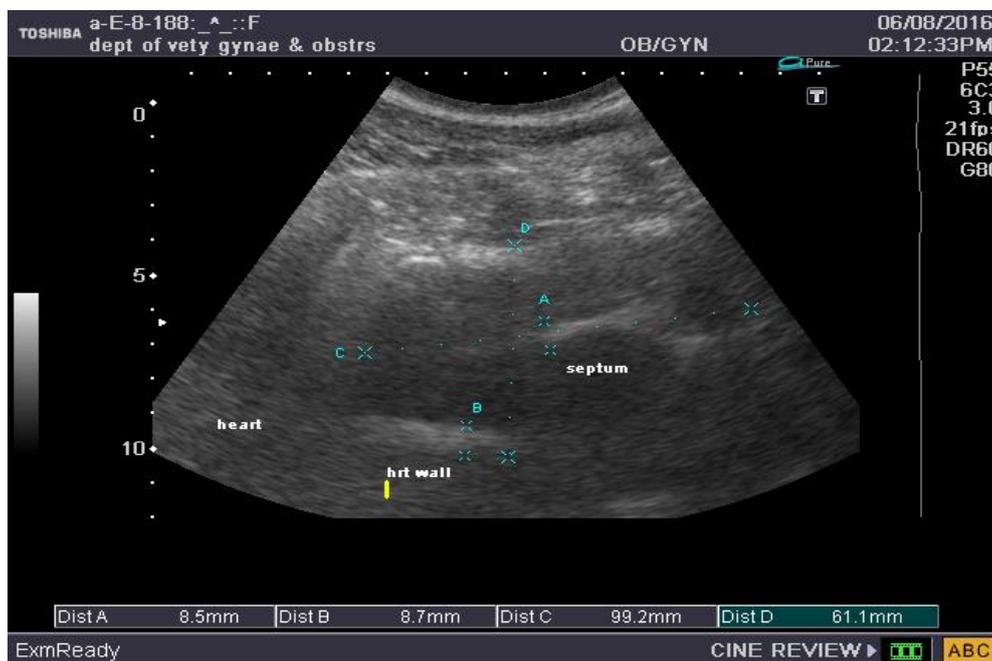


Fig. 1: Sonograph showing measurement of ventricular wall thickness (B)

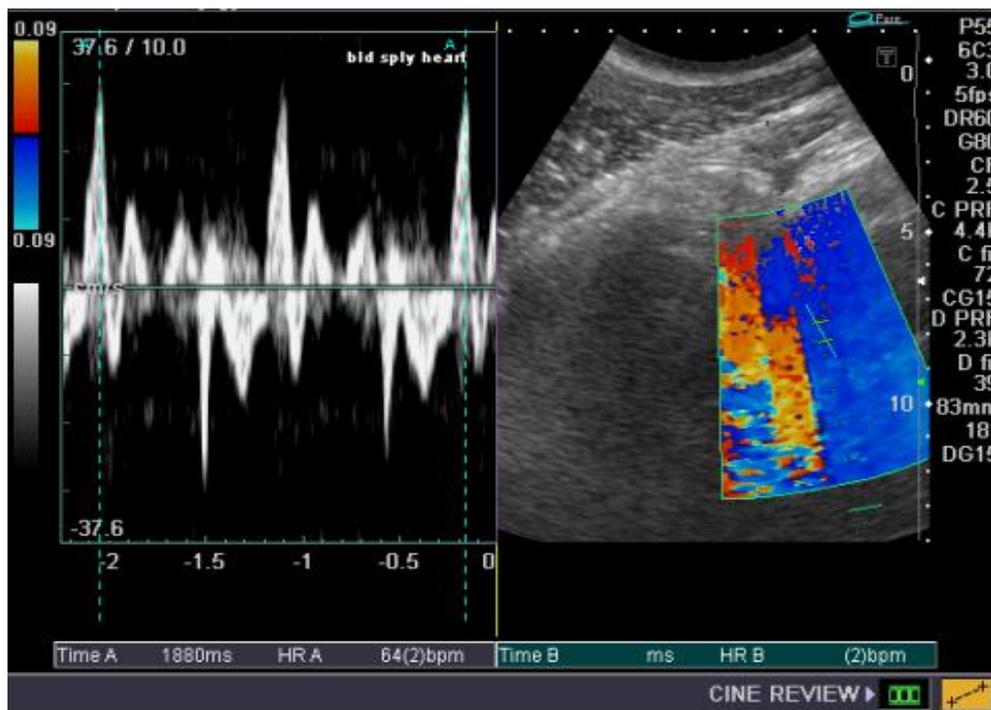


Fig. 2: Sonograph showing measurement of heart beat

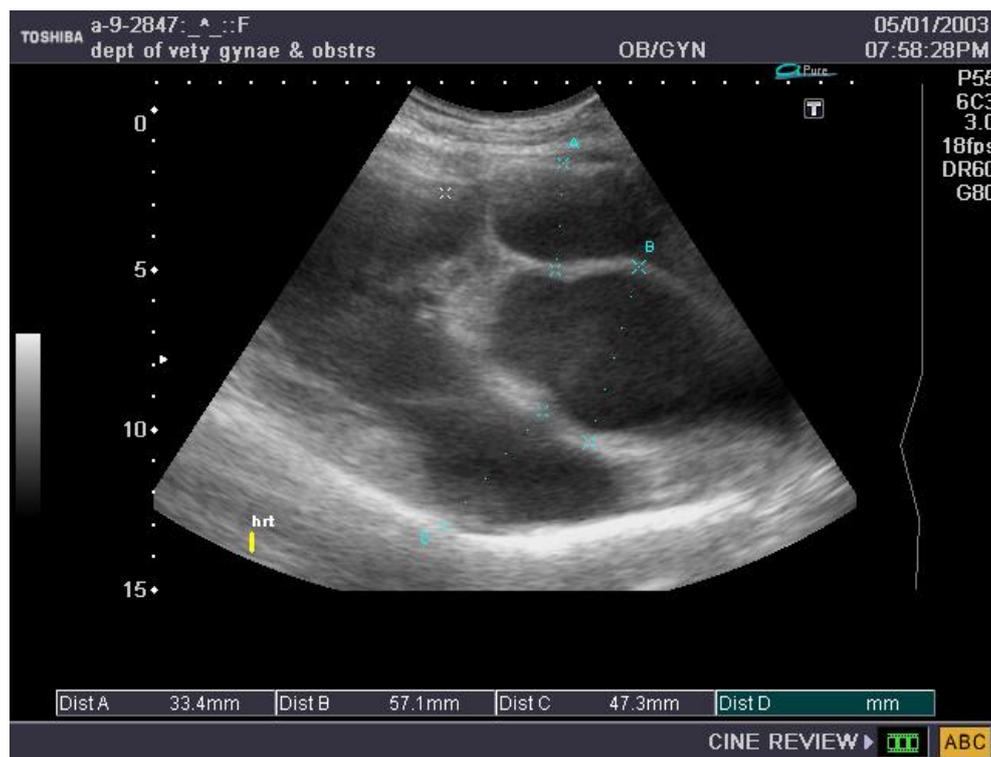


Fig. 3: Sonograph showing measurement of atrial (A & C) and ventricular diameter (B)

CONCLUSION

The mean heartbeat, and pixel value of heart can be useful indicators about prognosis of caesarean section in buffaloes and can be used for selection of animals which requires intensive care post caesarean section.

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