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Short Communication

FOETAL HEART RATE AND DISTRESS DURING SPONTANEOUS WHELPING

A.A. CHAVAN*, S.U. GULAVANE, R.J. CHAUDHARI, S.M. GAIKWAD, R.R. SHELAR, T.R. KOYANDE and V.K. PANDEY
Department of Animal Reproduction, Gynaecology and Obstetrics,
Mumbai Veterinary College,Parel, Mumbai-400012, India

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SUMMARY

As parturition approaches, assessment of foetal health is important to avoid losses during whelping. Foetal heart rate (FHR) measurement is considered to be an easy but important parameter to judge distress. The purpose of this study was to study FHR during whelping. After predicting estimated date of parturition by ultrasound in 15 advance pregnant she dogs, signs of approaching parturition were noted and when signs became prominent, FHR of foetuses closest to the cervix was recorded with the help of a foetal Doppler. Various whelping parameters like time interval between and presentation of pups, total time for expulsion and Apgar score at birth were evaluated. Pups with FHR of >150 beats per minute (bpm) had no distress (Apgar 7-9) while <150 bpm had moderate to severe distress (Apgar 0-6). Pups born in anterior (70.37%) and posterior (29.63%) presentation showed time intervals between pups of 37.60 and 51.31 minutes, respectively. Pups born in posterior presentation had a lower FHR and Apgar at birth with some mortality as compared to anterior. As FHR dropped so did Apgar score at birth indicating foetal distress. Also, presentation of the pups and time taken between pups largely affects foetal distress.

Keywords: Apgar, Foetal distress, Foetal heart rate (FHR), Presentation

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Depending on the stress induced, the foetus shows variations in heart rates during parturition. As the stress increases, the heart rate drops thus showing an inverse correlation. Hence, fetuses showing extremely low heart rates show reduced survival rates and increased mortality (Davidson and Eilts, 2006; Johnson, 2008). Heart rate can be monitored using a handheld foetal Doppler (Kwon and Park, 2016). Foetal heart monitoring is required during progression of whelping to understand the intra uterine distress of the foetus and to judge its effect on the immediate extra uterine life. This will help one to know when and whether medical or obstetrical intervention is required. The objective of the present study was to identify and monitor foetal stress during whelping by measuring the foetal heart rate using a foetal Doppler.

For the present study, fifteen advance pregnant (pregnancy of more than 45 days) she dogs were selected and the following parameters were documented. For ultrasonographic evaluation in advance pregnancy, the biparietal diameter (BPD) is an accurate indicator for the estimation of gestational age (Luvoni and Grioni, 2000). To decide foetal age and approximate time of whelping, all 15 advanced pregnant she dogs were scanned using B-mode real time transabdominal ultrasound (Sonoscape, Arrow scan BA 5). The hair on the abdomen were clipped and a coupling/ultrasound gel was used for better conduction. A curvilinear transducer of the frequency 4-6MHz was used and calculations were done using the formula GA= (BPD × 15) + 20 as described by Lopate (2008). Signs of approaching whelping for these she dogs were monitored for temperature drop two days before expected parturition date along with other behavioural signs such as restlessness/nervous, seeking seclusion, attachment/detachment, inappetence, digging/nesting, aggression, vomittion, looking at flanks, shivering and panting were also observed. Foetal heart rate monitoring was done of the foetus closest to the cervix using a foetal Doppler. It is a hand-held device that needs direct contact with the skin and ultrasound gel to enhance conduction. Other parameters such as time interval between successive pups, total time for whelping along with a presentation of the pups were noted for each she dog. At birth, each puppy was scored using a modified Apgar score proposed by Veronesi *et al.* (2009) in canines. The parameters for Apgar score included mucous colour, heart rate, reflex irritability, respiratory effort and motility. Each parameter carried values of 0,1 and 2 and the total sum ranged from 0 - 10. A score of 7-10 indicated no distress, 4-6 indicated mild to moderately distress and 0-3 were severely distressed pups.

Observations of various parameters were recorded during the study and the data were subjected to statistical analysis as per Snedecor and Cochran (1994) using Microsoft Excel (2019).

Based on the foetal age, days for parturition were calculated and parturitions were documented. A total of 54 puppies were born spontaneously via vaginal delivery. The median FHR for each puppy was calculated. FHR was then studied retrospectively by scoring these spontaneously whelped puppies at birth by using Apgar. It was seen that as median FHR dropped, the Apgar scores dropped as well. (Table 1). It can be seen that during eutocia, a median FHR

*Corresponding author: chavan.a.aishwarya@gmail.com

Table 1

FHR and Apgar score

Sr.No.	FHR (median) (bpm)	No. of foetuses	APGAR Mean ± SE
1	190 (180-200)	04	8.50 ±0.25
2	170 (160-180)	10	8.10 ±0.26
3	160 (150-170)	19	7.89 ±0.46
4	150 (140-160)	12	5.25 ±1.02
5	140 (130-150)	04	3.50 ±1.79
6	130 (120-140)	04	1.50 ±1.30

Table 2

Presentation, time interval between and Apgar score of pups

Presentation (n=54)	Time interval between pups (mean ±SE) (minutes)	Apgar score (mean ±SE)
Anterior - 70.37%(39/54)	37.60± 2.65	8.18±0.15
Posterior - 29.63%(15/54)	51.31± 4.01	2.31±0.81

of ≥160 bpm indicated no distress, a median FHR of 150 bpm indicated mild to moderate distress while anything below 150 bpm indicated severe distress in new born puppies.

Whelping parameters: After comparing presentation, time interval and Apgar score, it was observed that puppies born in posterior presentation had a lower Apgar and increased time interval as compared to puppies born in anterior presentation. The presentation of the pup altered the time interval and affected the total time taken for expulsion of the whole litter. Therefore, it could be concluded that presentation of the puppy affects the time interval between pups, total time taken for whelping as well as Apgar score (Table 2).

At birth, the pups were segregated according to the Apgar score and a mean score for each group was calculated. A score of 7-10 indicated no distress, 4-6 indicated mild to moderate distress whereas 0-3 indicated severe distress. This mean Apgar was compared with median FHR, presentation and time interval between pups of respective pups from that group (Table 3). It can be observed from Table 3 that all dead puppies spontaneously born were in posterior presentation with a median FHR of 128 bpm while posterior born pups had an increased inter pup interval with a lower Apgar score.

CONCLUSION

It can be said that a foetal heart rate of ≥160 bpm indicates no distress, 150 bpm indicates mild to moderate distress and < 150 bpm indicates severe distress at birth in canines. Posterior born pups have an increased inter pup interval with a lower FHR and Apgar score and increased mortality.

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Table 3

Foetal distress and FHR

Foetal distress	Median FHR (bpm)	Apgar (mean ±SE)	Presentation (%)	Time interval between pups (minutes) (mean ±SE)
Number of pups (n=54)				
No distress (n=39)	164 (130-200)	8.26 ± 0.12 (7-9)	AP- 92.30 (36/39) PP- 7.70 (3/39)	39.04 ± 2.63
Mild to moderate distress (n=4)	143 (120-160)	6.00 ± 0 (4-6)	AP -50 (2/4) PP -50 (2/4)	61.00 ± 0.50
Severe distress (n=1)	150 (140-160)	2.00 (0-3)	AP-0 PP-100(1/1)	55.00
Dead at birth (n=10)	128 (120-160)	0	AP -0 PP -100 (10/10)	53.00 ± 4.67

*AP-anterior presentation, PP- posterior presentation