Full Length Articles

Type of whelping and its infleunce on Apgar score

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ABSTRACT

The modified Apgar score for puppies was evolved based on the reference range of heart rate, respiration, irritability reflex, motility and membrane mucous colour according to the physiology of canine neonate. A total of 100 puppies born to the bitches that underwent Spontaneous Whelping (SW), Assisted Whelping (AW) and Caesarean section (CS) were selected and were divided into III groups viz. SW (n=30), AW (n=35) and CS (n=35).A modified Apgar score model was used to assess neonatal viability of the puppies. Among the total 100 pups evaluated 36, 13 and 51 pups were having Apgar scores of 0 to 4, 5 to 9 and 10 to 14, respectively. Out of 36 pups having Apgar scores of 0 to 4 at birth, 5.56, 19.44 and 75.00 per cent of pups were born through SW, AW and CS, respectively. Among 13 pups born with Apgar scores of 5 to 9 at birth, 0, 38.46 and 61.54 per cent of pups were born through SW, AW and CS, respectively. Out of 51 pups with Apgar scores of 10 to 14 at birth, 54.90, 45.10 and 0 per cent of pups were born through SW, AW and CS, respectively.Among the viable pups at birth, the pups born through CS were having low and medium Apgar scores of 0 to 4 and 5 to 9, respectively. All the pups delivered through SW had highest Apgar scores at birth while the pups delivered through AW had shown Apgar scores between 5 to 9 and 10 to 14.

Keywords: Apgarscoringsystem, Canine, Dystocia, Puppies, Mortality

INTRODUCTION

The incidence of neonatal mortality following normal delivery is reported to be as high at 9 to 26 per cent (Davidson, 2014) and 30 to 40 % (Mosier, 1986) following complicated whelping in dogs. Till date, there are very few reports on the use of Apgar scoring system to evaluate newborn puppies, mainly due to the polytocous condition of the dog. The modified Apgar score for puppies was

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evolved based on the reference range of heart rate, respiration, irritability reflex, motility ad membrane mucous colour according to the physiology of the canine neonate (Veronesiet al., 2009).

MATERIALS AND METHODS

The present study was conducted in the puppies born to bitches of different breeds brought to the Small Animal Gynaecology and Obstetrics outpatient ward (SAP-OP-OG) of Madras Veterinary College Teaching Hospital with the history of progressive whelping and / or dystocia.A total of 100 puppies born to the bitches that underwent Spontaneous Whelping (SW), Assisted Whelping (AW) and Caesarean section (CS) were selected and were divided into III groups as follows.

Group I (n=30) comprises of Spontaneous Whelping in which puppies which were born to five bitches through spontaneous whelping without any assistance. No medical/manual or surgical assistance were given to the bitches for delivering the puppies. Group II (n=35) comprises of assisted whelpingin which puppieswere born to 10 bitches that delivered through either manual or medical assistance. Manual assistance was attempted to the puppies which were partly expelled from the vagina and/or the puppies whose parts were within reach on vaginal examination but not progressed further. Medical assistance was supported with induction protocol with slow intravenous injection of oxytocin @ 1.1 to 2.2 IU/kg IM or SC with a dose range between 5 and 20 IU every 30 min and concurrent administration of 10% calcium gluconate @ 0.5 to 1.5 ml/kg to augment oxytocin's effect on myometrial contraction and intravenous fluids to correct hydration, electrolyte, and blood glucose abnormalities.Puppies born to 9 bitches that underwent caesarean section were included in group III. Under general anaesthesia using propofol @ 3 mg/kg and diazepam @ 0.5mg/kg for induction and 2 per cent isoflurane for maintenance, caesarean section was performed through mid-ventral approach by adopting standard surgical procedures The Apgar scores were evaluated at birth, 30 min, 2 and 24h after birth.

A modified Apgar score model developed by Groppetti et al. (2010) (Table 1) was used to objectively assess neonatal viability of the puppies. The following parameters were evaluated: mucous membrane colour, heart and respiratory rate, reflex irritability, mobility, suckling, and vocalization, as described in Table 1. Each parameter was assigned a value 0, 1, or 2. Apgar score for each pup is the summation of the value of each parameter.

The number of animals in each category is expressed as percentage of total number of animals in that category.

RESULTS AND DISCUSSION

Percentage of pups with different Apgar scores at birth in relation to type of delivery is presented in Table 2. Among the total 100 pups evaluated, 36, 13 and 51 pups were having Apgar scores of 0 to 4, 5 to 9 and 10 to 14, respectively. Out of 36 pups having Apgar scores of 0 to 4 at birth, 5.56 (2/36), 19.44 (7/36) and 75.00 (27/36) per cent of pups were born through SW, AW and CS, respectively. Among 13 pups born with Apgar scores of 5 to 9 at birth, 0, 38.46 (5/13) and 61.54 (8/13) per cent of pups were born through SW, AW and CS, respectively. Out of 51 pups with Apgar scores of 10 to 14 at birth, 54.90 (28/51), 45.10 (23/51) and 0 per cent of pups were born through SW, AW and CS, respectively.

The survival rate of the puppies at birth, 30 min, 2 h and 24 h in relation to type of delivery and Apgar scores is presented in Table 3. Out of 75 viable pups at birth, 14.67 (11/75), 17.33 (13/75) and 68.00 (51/75) per cent pups were showing an Apgar scores of 0 to 4, 5 to 9 and 10 to 14, respectively.

Among 67 viable pups at 30 min, 5.97 (4/67), 11.94 (8/67) and 82.09 (55/67) per cent pups were showing Apgar scores of 0 to 4, 5 to 9 and 10 to 14, respectively. Out of 11 pups born through CS that had low Apgar scores of 0 to 4 at birth, 6 pups died within 30 min. Of the remaining 5 pups, one pup had an improved Apgar scores of 5 to 9 at 30 min while the remaining 4 pups continued to show low Apgar scores. Out of 13 live pups that had Apgar scores of 5 to 9 at birth, 2 died within 30 min and 4 had improved Apgar score of 10-14. The remaining 7 pups continued to show low Apgar scores of 5 to 9 at 30 min. (Totally, 8 pups showing 5 to 9 Apgar score at 30 minutes is because one pup had improved Apgar score from 0-4 at birth to 5-9 at 30 min)

Out of 61 viable pups at 2 h, 1.64 (1/61), 4.92 (3/61) and 93.44 (57/61) per cent of pups were having Apgar scores of 0 to 4, 5 to 9 and 10 to 14, respectively. In CS group, out of 4 pups which had low Apgar scores of 0 to 4 at 30 min, 3 pups died and one pup remained in the same group at the end of 2 h and subsequently died at 24 h. Out of 8 pups which had Apgar scores of 5 to 9 at 30 min, 3 died and 2 had improved Apgar scores of 10 to 14 at the end of 2 h. The remaining 3 pups failed to survive through 24 h.

All the 57 live pups at the end of 24 h showed Apgar scores of 10 to 14. Out of 28 pups live at birth born through spontaneous whelping all had good Apgar scores of 10 – 14 and all survived after 24 h. In the AW group, of the 13 pups, 5 had scores of 5-9 at birth, of which 2 died and the remaining 3 showed improved Apgar scores at 2 h and further survived after 24 h. All the remaining 23 pups of this group with Apgar scores of 10 – 14 survived after 24 h.

Among the viable pups at birth, those with low and medium Apgar scores of 0 to 4 and 5 to 9, respectively, were more in the CS group. All the pups delivered through SW had highest Apgar scores at birth while the pups delivered through AW had shown Apgar scores between 5 to 9 and 10 to 14. This is in accordance with the results of Groppettiet al. (2010) who have reported 92 per cent pups delivered through CS, had shown poor Apgar. This reduction in the Apgar scores in CS group might be due to the effect of anaesthesia used in the CS. Propofol is a short acting hypnotic agent and provides rapid induction of recovery from anaesthesia and it crosses placental barrier. Propofol is also reported to cause more cardio respiratory depression and increased PCO2 which might be the reason for reduced Apgar scores in the pups delivered through the CS.

Similar results of the pups delivered through CS having lowest Apgar scores and that of SW with highest Apgar scores and those delivered through AW with intermediate and high Apgar scores were found at 30 min, 2 and 24 h. These results were in accordance with that of Veronesi et al. (2009), Groppettiet al. (2010) and Jayakumar et al. (2015). Bharathidasan et al. (2016), who reported that low Apgar scores in the pups delivered through CS beyond 4 and a half hour after the onset of labour and have added that the duration of delivery had an indirect relationship with the Apgar scores. They have also added that CS should be performed within 4.5 h after the onset of second stage of labour and the number of inductions should be limited to one.

All the 28 live pups born through the SW at birth were having Apgar scores of 10 to 14 and all of them survived beyond 24 h. This result is similar to that of Jayakumaret al. (2015) whoreported that all the live pups born through SW have survived beyond 60 min, the numbers of which are slightly higher than Veronesi et al. (2009) who have reported that 92.6 per cent pups born through SW survived beyond 24 h.

Among the 28 live pups born through AW at birth, 23 were having Apgar scores of 10

to 14 and all survived beyond 24 h. Of the 5 pups having moderate Apgar scores of 5 to 9 at birth, 2 died and 3 pups had improved Apgar scores of 10 to 14 at the end of 24 h. Significant improvement in survival rates were observed when Apgar scores improved from medium to high grade at 2 h of evaluation after resuscitation,. The beneficial effects of resuscitation procedures were more apparent in improving the Apgar scores of puppies born with medium Apgar scores. Though dystocia promoted a long lasting bradycardia and slowed down Apgar scores progression in pups (Lucio et al., 2009), resuscitation measures helped to attain satisfactory improvement.

Among 19 live pups born through CS, 11 were having low Apgar scores of 0 to 4 and died at 30 min. 8 were having moderate Apgar scores of 5 to 9, among which 3 had improved to high Apgar scores of 10 to 14 at 2 h and remaining 5 pups died even after adopting resuscitation procedure. Systemic evaluation of puppies in this study allowed the timely detection of puppies with poor Apgar scores that might otherwise have been overlooked at birth. Three out of 8 pups with Apgar scores of 5 to 9 recovered completely which proved that prompt detection of less viable newborns, followed by attempts to resuscitate, could improve neonatal survival.

To conclude, the type of delivery had a significant impact on Apgar scores with survival rate being lowest for pups born of CS and adequate prompt adoption of resuscitation measures would help in reducing the neonatal mortality in pups.

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Table 1.
Apgar score model used in this study

Parameters	Score 0	Score 1	Score 2
Mucous colour (Appearance)	Cyanotic, pale	Pink	Reddish
Heart rate (BPM)	<120	120-180	>180
Respiratory rate (bpm)	<15	15-30	>30
Reflex irritability	None	Feeble reaction	Active reaction
Mobility	None	Hypo-mobility	Active mobility
Suckling	None	Weak	Energetic
Vocalization	None	Mild	Vigorous

BPM: beats/min; bpm: breaths/min

Table 2.
Percentage of pups with different Apgar scores at birth in relation to the type of delivery

Type of delivery	Total no. of pups (n)	% of pups with different Apgar scores at birth		
		0 to 4	**5 to 9**	**10 to 14**
Spontaneous whelping	30	5.56 (2)	0.00	54.90 (28)
Assisted whelping	35	19.44 (7)	38.46 (5)	45.10 (23)
Caesarean section	35	75.00 (27)	61.54 (8)	0.00
Total	100	36	13	51

Values within parenthesis indicate numbers.

Table 3.
Survival rate of the puppies at birth, 30 min, 2 h and 24 h in relation to type of delivery and Apgar scores

Type of Whelping	Percentage of viable pups with different scores											
	At birth			At 30 min			At 2 hrs			At 24 hrs		
	0 to 4	5 to 9	10 to 14	0 to 4	5 to 9	10 to 14	0 to 4	5 to 9	10 to 14	0 to 4	5 to 9	10 to 14
Spontaneous whelping	0	0	54.90 (28)	0	0	50.91 (28)	0	0	49.12 (28)	0	0	49.12 (28)
Assisted whelping	0	38.46 (5)	45.10 (23)	0	37.50 (3)	41.82 (23)	0	0	45.62 (26)	0	0	45.62 (26)
Caesarean section	100.00 (11)	61.54 (8)	0	100.00 (4)	62.50 (5)	7.27 (4)	100.00 (1)	100.00 (3)	5026 (3)	0	0	5.26 (3)
Total	**14.67 (11)**	**17.33 (13)**	**68.00 (51)**	**5.97 (4)**	**11.94 (8)**	**82.09 (55)**	**1.64 (1)**	**4.92 (3)**	**93.44 (57)**	**0**	**0**	**100.00 (57)**

Values within parenthesis indicate numbers.