The Haryana Veterinarian (December, 2023) **62(2),** 60-62 ISSN 0033-4359 (P) **Research Article**

COMPARATIVE EVALUATION OF PROPOFOL AND ETOMIDATE AS INDUCTION AGENT IN BUFFALOES

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ABSTRACT

The current study was undertaken for comparative evaluation of propofol and etomidate as induction agent in buffaloes during general anaesthesia. Twelve buffaloes affected with diaphragmatic hernia were randomly divided in two groups of six animals in each. Premedication was done with atropine sulphate (0.04 mg/kg I/M), xylazine (0.05 mg/kg I/M) and butorphanol (0.02 mg/kg I/V). Induction of anaesthesia was done with propofol (1.5 mg/kg I/V) in group I and with etomidate (0.25 mg/kg IV) in group II. Maintenance of anaesthesia was done with isoflurane (1.5%). For physiological parameters no significant difference was observed in between the groups at different time intervals. There was significant difference observed in muscle relaxation and recovery in between the groups and propofol was found better induction agent than etomidate in buffaloes.

Keywords: Buffalo, Diaphragmatic hernia, Etomidate, Induction, Propofol

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A serious digestive disorder in buffaloes called diaphragmatic hernia comprises the diaphragm rupturing at the musculotendinous junction, which causes the abdominal viscera to herniate into the thoracic cavity (Krishnamurthy *et al.*, 1985; Chaudhary *et al.*, 2016). Ruminants are poor subjects for general anaesthesia for performing diaphragmatic herniorrhaphy via a trans-abdominal route because the abdominal organ's weight puts pressure on the diaphragm, posterior vena cava, and aorta, that adversely affects ventilation and perfusion. Regurgitation and aspiration of ingested material are always a risk, but they can be reduced with appropriate anaesthetic management (Chaudhary *et al.*, 2016).

Ratnesh *et al.* (2014) have found transient apnea in buffalo calves with propofol, when used as an induction agent, but there was smooth recovery. Smooth and rapid recovery was observed in propofol induced goat than thiopentone and ketamine (Prassinos *et al.*, 2005). Etomidate exhibits minimal adverse on cardiovascular and respiratory system, which makes it suitable for hemodynamic instable patients (Ruth *et al.*, 2001). Poor quality score of recovery and ataxia along with longer and worse recovery were recorded after administration of etomidate than propofol in dogs (Sams *et al.*, 2008). The current study was conducted to evaluate the comparative study of propofol and etomidate as induction agents in buffaloes.

MATERIALS AND METHODS

The current study was conducted in twelve clinical cases of diaphragmatic hernia which were randomly divided in two groups containing six animals each. All the animals were premedicated with inj. atropine (@ 0.04 mg/kg I/M); followed by inj. Xylazine (@ 0.05 mg/kg I/M) and after 5 min inj. butorphanol (@0.02 mg/kg I/V), respectively. Induction of anaesthesia was done with propofol (@1.5 mg/kg I/V) in group I and etomidate (@0.25 mg/kg I/V) in group II. Anaesthesia was maintained with isoflurane (1.5%). Scoring for evaluation of quality of anaesthesia was done by assigning numerical values; starting from 0 to 3 (0-no effect, 1-mild effect, 2-moderate effect, 3-deep effect) for sedation, analgesia and muscle relaxation and 1 to 4 (1-poor, 2-fair, 3-good, 4-excellent) for premedication, induction, maintenance and recovery as per Kumar *et al.* (2023). Physiological parameters were studied using Edan veterinary monitor (iM8 vet) before doing rumenotomy, on next day before premedication, before induction, at 5 minutes, 10 minutes, 30 minutes after induction, at recovery and after 24 hours of recovery.The statistical analysis of data was done by two-way-ANOVA using Duncan's multiple range test and paired t-test.

RESULTS AND DISCUSSION

No significant difference was observed in any physiological parameters within and in between the groups except for respiratory rate in which significant variation was observed within the group after induction (Table 1). Similar results were recorded by Kishore (2017) after propofol as induction agent in buffaloes undergoing diaphragmatic herniorrhaphy. Karki and Singh (2017) noted that induction with propofol as compared to etomidate causes significant fall in mean arterial pressure

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Table 1. Effects of different anaesthetic combinations on physiological parameters in buffaloes undergoing diaphragmatic herniorrhaphy (Mean ± S.E.)

Parameters	Groups	Beforerumenotomy	Diaphragmatic Herniorrhaphy						
			Before pre medication	Before induction	At 5 min. after induction	At 10 min. after induction	At 30 min. after induction	At Recovery	At 24 hrs. after Recovery
Heart Rate (beats/min)	Group I	70.67 ± 0.65	71.33 ± 0.93	69.00± 0.71	67.17 ± 0.06	66.87 ± 0.50	68.17± 1.04	69.50 ± 0.61	72.33 ± 1.05
	Group II	70.50 ± 0.20	70.00 ± 0.33	68.17 ± 0.83	68.00 ± 0.75	70.17 ± 0.89	69.00 ± 1.05	71.67 ± 0.30	68.67 ± 0.30
Respiration Rate (breaths/min)	GroupI	15.17^{c} ± 0.28	16.17^{cde} ± 0.44	17.00^{e} ± 0.53	10.08^{a} ± 0.19	12.83^{b} ± 0.28	15.50^{cd} ± 0.31	16.00^{cde} ± 0.47	16.50^{de} ± 0.39
	Group II	14.50^{bc} ± 0.39	14.83^{bc} ± 0.37	14.67^{bc} ± 0.19	12.83^{a} ± 0.28	13.83^{b} ± 0.15	14.00^{bc} ± 0.24	14.67^{bc} ± 0.38	15.00^{c} ± 0.24
Rectal Temperature (ºC)	Group I	37.07 ± 0.03	36.92 ± 0.04	36.92 ± 0.04	36.92 ± 0.04	37.07 ± 0.09	37.10 ± 0.06	37.02 ± 0.05	37.13 ± 0.05
	Group II	36.95 ± 0.09	36.88 ± 0.05	36.94 ± 0.03	37.00 ± 0.05	36.93 ± 0.07	37.00 ± 0.06	37.03 ± 0.05	36.95 ± 0.03
Systolic BP	Group I	147.83 ± 2.44	144.00 ± 2.31	146.33 ± 2.17	149.67 ± 2.33	146.83 ± 2.52	148.83 ± 2.43	156.83 ± 2.57	157.83 ± 2.14
	Group II	147.33 ± 1.33	144.50 ± 2.83	149.83 ± 3.25	148.17 ± 2.15	145.50 ± 2.26	147.33 ± 2.51	152.17 ± 2.27	156 ± 1.71
Diastolic BP	Group I	107.67 ± 1.71	105.00 ± 1.71	104.67 ± 2.16	106.33 ± 2.09	108.17 ± 2.52	110.17 ± 2.37	107.83 ± 3.34	104.67 ± 3.66
	Group II	106.17 ± 1.30	106.17 ± 1.30	105.83 ± 1.40	107.83 ± 1.58	108.33 ± 1.65	108.83 ± 1.89	106.10 ± 2.03	105.83 ± 1.90
Mean BP	Group I	124.83 ± 1.30	121.67 ± 1.02	121.50 ± 0.76	123.17 ± 0.87	122.12 ± 1.08	123.11 ± 1.56	121.29 ± 1.71	122.56 ± 2.06
	Group II	123.81 ± 2.21	122.56 ± 2.21	121.48 ± 1.72	123.61 ± 1.48	124.30 ± 0.76	122.44 ± 0.67	121.41 ± 1.13	123.51 ± 1.33

Mean with different superscripts vary significantly (P<0.05). Superscripts a,b,c,d,e represents difference within the groups.

Table 2. Quality of anaesthesia for different anaesthetic combinations in buffaloes undergoing diaphragmatic herniorrhaphy (Mean ± S.E.)

Parameters	Group I Mean±SE	Group II Mean±SE
Premedication (1-4)	3.67±0.21	3.63±0.17
Induction (1-4)	3.63±0.17	3.33±0.21
Maintenance (1-4)	3.67±0.21	3.33±0.33
Recovery (1-4)	3.67^{B}±0.17	2.3^{A}±0.22
Sedation (1-3)	2.33±0.21	2.33±0.33
Muscle relaxation (1-3)	2.83^{A}±0.17	2.0^{B}±0.26
Analgesia (1-3)	2.67±0.21	2.33±0.33

Means with different superscripts (A/B) in a column show significant difference in between groups (P<0.05)

during human general anaesthesiatill 5 minutes of induction.

During recovery and muscle relaxation scores, significant differences were observed in between the group, while there was no significant difference for premedication, induction, maintenance, CNS sedation and analgesia (Table 2). Recovery and muscle relaxation scores were better in group I than group II. Sams *et al.* (2008) also reported that when etomidate was used as an induction drug instead of propofol, the recovery quality and ataxia score were poorer, and etomidate resulted in longer and worse recoveries than propofol in human patients. However, Sharma (2019) found that etomidate had lesser cardiopulmonary depression effects and better induction agent than propofol during general anaesthesia in buffaloes undergoing diaphragmatic herniorrhaphy. For relaxation of jaw muscle, loss of tongue reflex, loss of swallowing reflex, intubation, extubation, regaining of muscle tone, regaining of head righting reflex, return to sternal recumbency, standing with ataxia and complete recovery was found better in group I than group II (Table 3). Induction was rapid and smooth when propofol was used alone (Kumar *et al.*, 2011; Ratnesh *et al.*, 2014) or with glycopyrrolate-xylazine-propofol combination in buffaloes (Potliya, 2015). Chaudhary *et al.* (2016) found

Table 3. Different behavioural characteristics induced by administration of different anaesthetic combinations (Mean± S.E.) in buffaloes undergoing diaphragmatic herniorrhaphy

Parameters	Group I Mean ±SE (Minute)	Group II Mean ±SE (Minute)
Muzzle dryness°	14.52±0.61	14.68±0.67
Weak time°°	15.33±0.50	14.92±0.49
Down time°°	16.33±0.32	16.22±0.41
Loss of palpebral reflex*	3.23±0.19	2.84±0.17
Relaxation of jaw muscle*	1.31^{A}±0.08	1.77^{B}±0.07
Loss of tongue reflex*	2.09^{A}±0.15	2.88^{B}±0.09
Loss of swallowing reflex*	2.24^{A}±0.19	3.11^{B}±0.29
Intubation*	2.06^{A}±0.28	3.00^{B}±0.11
Extubation†	13.13^{A}±0.28	15.31^{B}±0.50
Regaining of muscle tone†	14.8^{A}±0.21	18.83^{B}±0.39
Regaining of head righting reflex†	16.23^{A}±0.56	20.34^{B}±0.67
Return to sternal recumbency†	17.61^{A}±0.45	21.1^{B}±0.58
Standing with ataxia†	23.34^{A}±0.74	37.57^{B}±0.68
Complete recovery†	30.08^{A}±0.42	47.62^{B}±0.1.33

Means with different superscripts (A/B) in a column show significant difference in between groups ($P<0.05$)
°after administration of atropine; °°after administration of xylazine
*after administration of induction agent; †after discontinuation of isoflurane

that glycopyrrolate-xylazine-butorphanol-propofol-isoflurane anaesthetic combination was found to be safe and effective in buffaloes undergoing diaphragmatic herniorrhaphy. In the present study both induction agent (propofol and etomidate) were found safe and effective for general anaesthesia in buffaloes undergoing diaphragmatic herniorrhaphy and propofol was found better than etomidate in terms of muscle relaxation and recovery.

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