International Journal of Veterinary Sciences and Animal Husbandry

ISSN: 2456-2912
VET 2024; 9(3): 503-506

www.veterinarypaper.com
Received: 22-03-2024
Accepted: 26-04-2024

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Study on evaluation of anaesthetic efficacy of diazepam-ketamine-guaifenesin combination for relieving esophageal obstruction in 12 buffaloes

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Abstract
The study was undertaken on twelve buffaloes weighing 276 to 446 kg, aged between 3-8 years to relieve the esophageal obstruction with use of diazepam as sedative @0.4mg/kg BW and ruminant double drip of ketamine-guaifenesin. Foreign body obstruction was noticed at the thoracic inlet (N=six, 50.00%) followed mid cervical (N=five, 41.66%), and at caudal cervical region (N=one, 8.33%). Esophageal diameter, volume of obstructed material and site of obstruction are corelated with each other for administration of the anaesthetic protocol. All the animals had intraluminal blockage, with 50% showing complete obstruction and 50% showing partial obstruction. Buffaloes which had incomplete obstruction (N=six, 50%) were pre-sedated with diazepam while buffalo which had complete obstruction required ruminant double drip of ketamine-guaifenesin, pre-sedated with diazepam. All the animals underwent haematological examination. Laparo-rumenotomy was performed 24 hrs after anaesthetic protocol and in all 12 cases leather piece was procured from the rumen.

Keywords: Diazepam, ketamine, guaifenesin, computed radiography

Introduction
Esophageal obstruction can be intra-luminal or extra-luminal former being more common Esophageal obstruction was significantly more frequent in females than males (Marzok *et al*., 2015) [8]. Esophagotomy is a well-established technique the risk of the post-operative complications associated with the esophagostomy should be considered such as the incisional dehiscence and esophageal fistula. Several complications are associated with cervical esophageal surgery due to the lack of the serosa layer which is necessary for the rapid formation of the fibrin seal and due to the constant movement during swallowing (Haven, 1990) [2]. To avoid the post-operative complications the muscle relaxants administered to dislodge the intraluminal foreign body into rumen, hence the diazepam and guaifenesin as muscle relaxants in combination with and without ketamine and their effect on the esophageal muscle specifically for the muscle relaxation to dislodge the non-potential foreign body into the rumen were tried. The intravenous administration of diazepam (@ 0.4 mg/kg) in buffaloes produces the desired muscle relaxation of 6 to 12 min only (Mirakhur *et al*., 1984) [7]. Ketamine is a commonly used dissociative anaesthetic and it causes mild cardiovascular stimulation with the maintenance of swallowing and cough reflexes (Kherkar *et al*., 2019) [4] which provides poor muscle relaxation when used alone hence an adjunct to ketamine is essential to improve muscle relaxation (Stegmann, 1998) [11] by adding guaifenesin which is a centrally acting muscle-relaxant in bovines that can cause least changes on respiratory muscle activity and cardiac function at the therapeutic dose of @ 75 mL/kg (Lin and Walz, 2014) [6]. Double drip of Ketamine-Guaifenesin may allow prolonged anaesthesia without bulky equipment (Davies and Jeanna, 1997) [1].

Materials and Methods
The 12 buffaloes presented with the esophageal obstruction showed clinical signs of anorexia (100%), acute tympany (50%), and recurrent tympany (50%), respiratory distress (66.66%),

ptyalism (66.66%), arching of the neck (33.33%), protrusion of the tongue (58.33%) and restlessness (66.66%). All the 12 clinical cases of the buffaloes which were suspected for the esophageal obstruction underwent computerized plain radiography of the cervical and the thoracic region of the neck which was performed in the standing position. About 2 ml of blood was drawn from all the buffaloes aseptically from the jugular vein for the haematological evaluation, pre-surgically and post surgically after 24 hrs. The animals were sedated with diazepam @ 0.4 mg/kg BW I/V for the central muscle relaxation. Stomach tube was used for the dislodgement of the foreign body into rumen with the stomach tube. If the esophageal obstruction is not relieved by sedation, then the animal was given induction protocol for the profound muscle relaxation. Induction of anaesthesia was carried out by using double drip solution of guaifenesin @ 1.5mL/Kg BW and ketamine @ 50 mg/mL in 5% dextrose solution of 500 mL I/V was given to the buffalo and further dislodgment of foreign body with the stomach tube will be done. The esophageal diameter, size of obstructed material and site of obstruction are inter-co-related with each other.

Results and Discussion

The mean average age of the affected animals 5.5±0.45 years, average duration of illness of 2.25±0.35 days with an average body weight of 356.08±12.34kg of all the females. Computed radiography proved to be confirmatory diagnostic tool in all the 12 animals (100%). Lamani (2021) [5] and Singh and Singh (1999) [9] also stated that esophageal obstruction is more common in females as compared to male. The esophageal obstruction was frequently noticed at the thoracic inlet of the esophagus (N=6, 50.00%), followed by mid-cervical (N=5, 41.66%), and at the caudal cervical region of the esophagus (N=1, 8.33%). Tiwari *et al*. (2011) [14], Jahangirbasha *et al*. (2017) [3] and Suryawanshi *et al*. (2023) [12] also stated computed radiography as a confirmative diagnosis. The overall mean volume of esophageal foreign body retrieved in the complete and the partial obstruction was 7012.5±733.42 sq.mm and 4731.5±336.42 sq.mm. Hence, all the 12 cases were given sedation i.e. diazepam as a pre anaesthetic @ 0.4 mg/kg BW, and in six cases (50%) the foreign body was dislodged successfully into the rumen under the sedation with diazepam where the size and location of the foreign body is taken into consideration while in the other 6 cases (50%) the induction protocol of ketamine-guaifenesin was used to achieve the profound muscle relaxation to dislodge the foreign body into the rumen. Singh *et al.* (1981) [10] and Trim (1982) [15] stated that the muscle relaxants significantly contribute to the anaesthetic quality by providing skeletal muscle relaxation. Wall and Muir (1990) [16] suggested combination of ketamine with the guaifenesin improved the quality of the induction and the muscle relaxation. It was observed that the foreign bodies which had presence of the smooth edges were dislodged easily into the rumen as compared to the foreign body with the rough and the serrated edges.

Table 1: Volume of the complete and incomplete esophageal obstruction in buffalo

Sr. No.	Incomplete Obstruction (sq.mm)	Complete Obstruction (sq.mm)
1	4764	5363
2	5395	9276
3	3389	5853
4	4438	6792
5	5760	5578
6	4643	9213
Mean ± S.E.	4731.50±336.42	7012.50±733.42

Quality of sedation was deep in eight animals and moderate in four animals while quality of induction was excellent in five animals and good in one animal. The mean induction time in the six buffaloes those were subjected to double drip of ketamine-guaifenesin was 3.58±0.17 min. Thangadurai *et al*. (2018) [13] also stated that the mean induction time was 1.64±0.09 min when guaifenesin (50 mg/kg BW IV) and ketamine hydrochloride (2 mg/kg BW IV) were administered with diazepam as the premedication. All the animals subjected to the induction showed smooth and fast recovery. There were no significant alterations in the blood profile of all the animals before and after a 24-hour period of the anaesthetic protocol.

The palpation of the ventral and lateral neck regions was done, while standing to left of the animal and moving the hands from proximal to distal cervical region up to the thoracic inlet. Especially in cases of the complete obstruction with the foreign bodies having large volume and serrations there was visible swelling, change in the normal consistency along the course of esophagus was felt. Out of 12 animals in 5 animals (41.66%), the method of palpating the cervical region was of diagnostic value. On the basis of the clinical signs in five animals (41.66%) it proved to be successful diagnostic tool. Computed radiography of the esophagus was performed in all the 12 cases in the buffalo of the lateral view of the neck in the standing position. In all the 12 animals (100%) esophageal obstruction was diagnosed in all cases successfully with the computed radiography the volume of esophageal (Table 1).

Plate 1: Volume of the obstructed oesophageal foreign bodies

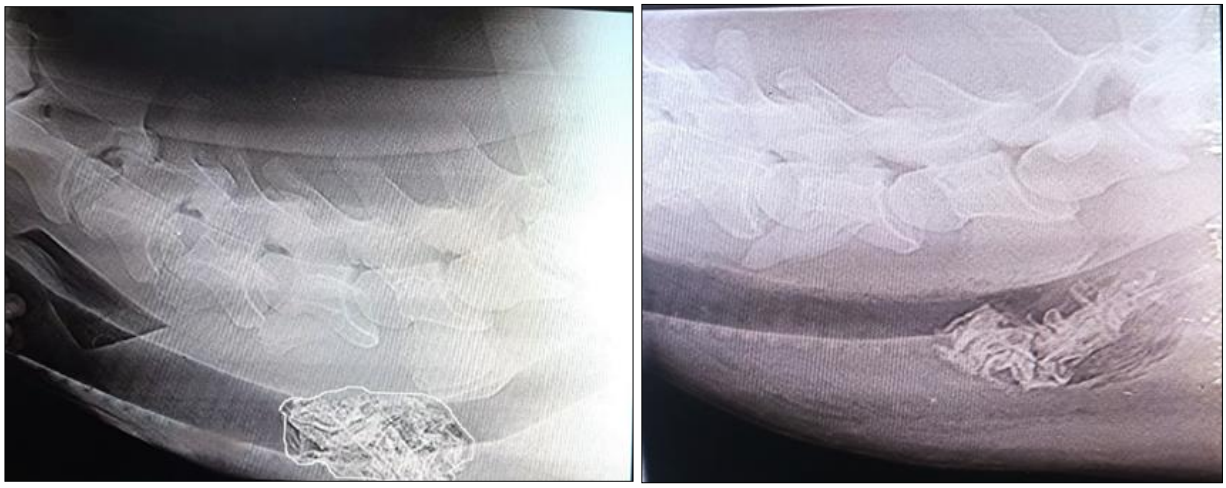

Plate 2: Complete and Incomplete oesophageal obstruction

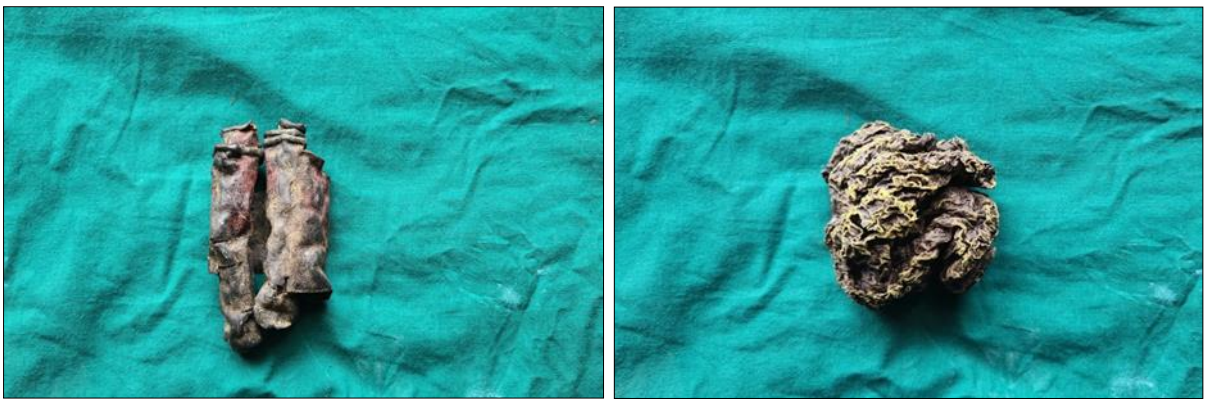

Fig 3: Foreign bodies with smooth and serrated edges retrived through laparorumenotomy

Conclusion

Oesophagostomy was not preferred due to the post-operative complications associated in the buffaloes as they lack the serosa layer which was necessary for the rapid formation of the fibrinous seal which hampers the healing due to movement during the deglutition and interrupted blood supply leading to the continuous tension on the suture line.

Mean size of the foreign body 4731.5±336.42 sq.mm can be dislodged under the influence of the diazepam @ 0.4mg/kg BW I/V. However, the foreign body having greater volumes as seen in the six cases, with the mean size of 7012.5±733.42 sq.mm required an additional muscle relaxant which was achieved with ketamine-guaifenesin @1.5 ml/kg BW for the dislodgement of foreign body in the rumen.

Conflict of Interest

Not available

Financial Support

Not available

References

1. Davies T, Jeanna S. Romifdine, ketamine and guaiphenesin continual infusion anaesthesia: Some experiences of its use under field conditions. Equine Vet Educ. 1997;9(1):12-16. DOI: 10.1111/j.2042-3292.1997.tb01268.x.
2. Haven ML. Bovine esophageal surgery. Vet Clin North Am Food Anim Pract. 1990;6(2):359-369.
3. Jahangirbasha D, Shivaprakash BV, Mallikarjun M,

Kedar N, Karan H, Shaista K, *et al*. Oesophageal obstruction in a pregnant buffalo. Buffalo Bull. 2017;36(4):705-708.
4. Kherkar TT, Pitlawar SS, Badgujar CL, Chaudhari KS. Anesthetic effects of ketamine-guaifenesin and isoflurane anesthesia for diaphragmatic herniorrhaphy in buffaloes. Buffalo Bull. 2019;41(2):299-309.
5. Lamani TD. Studies on non-invasive retrograde retrieval of non-potential foreign bodies from the caudal cervical esophagus in bovines [PhD Thesis]. Karnataka Veterinary, Animal and Fisheries Sciences University, Bidar; 2021.
6. Lin HC, Walz P. Injectable anesthetics. In: Farm Animal Anesthesia: Cattle, Small Ruminants, Camelids, and Pigs. 1st Ed. John Wiley & Sons, Inc.; New Jersey, USA; c2014. p. 68.
7. Mirakhur KK, Khanna AK, Prasad B. Diazepam as a sedative in calves. Agri-Pract. 1984;5:29-32.
8. Marzok M, Moustafa A, Khodery SE, Muller K. Esophageal obstruction in water buffalo (Bubalus bubalis): a retrospective study of 44 cases (2006–2013). Turk J Vet Anim Sci. 2015;39:233-240.
9. Singh AP, Singh P. Oesophageal radiography in cattle and buffaloes. Indian J Vet Surg. 1999;20(2):65-69.
10. Singh J, Sobti VK, Kohli RN, Kumar VR, Khanna AK. Evaluation of glyceryl guaicolate as a muscle relaxant in buffalo calves. Zentralblatt Fur Veterinarmedizin, Reihe A. 1981;28:60-69.
11. Stegmann GF. Observations on the use of midazolam for sedation, and induction of anaesthesia with midazolam in combination with ketamine in the goat. J S Afr Vet Assoc. 1998;69(3):89-92. DOI: 10.4102/jsava.v69i3.823.
12. Suryawanshi RV, Tayyab A, Shubham P, Sheik T. Surgical management of complete esophageal obstruction in graded Murrah buffalo (Bubalus bubalis)-A case report. Buffalo Bull. 2023;42(2):125-128.
13. Thangadurai R, Senthilkumar S, Dharmaceelan S, Kathirvel S. Effect of four anaesthetic protocols on hematological indices in cattle during thoracotomy. Indian Vet J. 2018;95(2):63-64.
14. Tiwari DK, Dar MUD, Jhala SK, Pitroda A, Joy N, Patil DB, *et al*. Ultrasonography and computerized radiography aided diagnosis of oesophageal foreign body obstruction and its treatment in a buffalo. Buffalo Bull. 2011;30(2):107-110.
15. Trim CM. Muscle relaxants in large animal anaesthesia. Vet Anaesth Analg. 1982;10(1):127-134.
16. Wall R, Muir WW, 3rd. Hemolytic potential of guaifenesin in cattle. Cornell Vet. 1990;80(2):209-216.

How to Cite This Article
Ghodake AC, Pitlawar SS, Suryawanshi RV, Dhenge SA, Chavhan SG, Ghule PM, *et al*. Study on evaluation of anaesthetic efficacy of diazepam-ketamine-guaifenesin combination for relieving esophageal obstruction in 12 buffaloes. International Journal of Veterinary Sciences and Animal Husbandry. 2024; 9(3): xx-xx.