Surgical Anatomy of the Esophagus in Cats and Removal of Esophageal Foreign Bodies (Sneeze Spine) Using Laryngoscope Technique

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Abstract

The aim of the work is to present the surgical anatomy of the esophagus in cats. It helps us how to remove foreign bodies (sneeze spine) through endoscopy technique. The current study is carried out on six cadavers cats of both sexes, and different breeds, with weight range from 1-3 kg and different breeds. They were collected from veterinary clinic in KSA and Syria. We could knowledge about the numerous layers which cover the esophagus and the topography relation with other structures. Clinical signs, radiography endoscopic examination the most important tools of diagnosis of presence a foreign body embedded in the esophagus walls. The foreign body was successfully removed by using alligator forceps under endoscopic guidance.

Keywords: Esophagus; Sneeze spine; Laryngoscope.

Introduction

The anatomy of the esophagus was previously studied in most mammals. The esophagus was composed of three parts in the cat as typical anatomical animals: cervical, thoracic, and abdominal [1-3]. While in canine the esophagus was consisted of the upper esophageal sphincter, the tubular esophagus, and the lower esophageal sphincter [4]. In canine the first part of esophagus lies dorsal to the trachea but deviates to the left in the middle of the neck and maintains this position through the thoracic inlet [3]. Bremner and Goldberg [5,6] described that, the presence of the transverse esophageal folds is originally a normal anatomic feature of the cat’s esophagus while [7] added that the transverse esophageal folds fine in the distal esophagus.

Kook [4] mentioned that the esophageal phase of swallowing begins with relaxation of the upper esophageal sphincter, thus moving the food bolus into the proximal esophagus. Exposure usually occurs because of the playing behaviour of the cat [8]. Ingestion of avian V-shaped bones such as clavicula has been described as a reason of obstruction of the pharynx and proximal esophagus [9]. There is a little literature about the surgical anatomy of the obstruction by foreign bodies in esophagus of cats.

Material and Methods

The esophagus was studied in seven (3-life and 4-cadavers) cats of both sexes, and of different weights range from 1-3 kg and different breeds. They were collected from the hospital veterinary in the Qassim university, the Veterinary Medical Clinics in Kingdom of Saudi Arabia and Syria. The esophageal length measurement was made in situ from the pharynx to the esophago-gastric junction. These were preserved in a solution of 10% neutral formalin to study the topography and relationship of esophagus with the other structures neighboring. Three types of sections were made 1. Longitudinal section was taken from the posterior wall of the cervical esophageal part 2-cross section was taken from the upper segment of cervical esophageal part 3-cross section was taken from inferior segment of cervical esophageal part. The cat was anesthetized by Ketamine 10% in a dose of 2mg/kg BW and Xylazine HCl in a dose of 0.2mg/kg BW intravenously. This dose was choosing because the time must be short for intervention used Laryngoscope.

Results

In cat, the esophagus (Figure 1-4) is considered as a complete functional organ. It has an important function in the
body. It transfers food, liquids from the mouth to the stomach. Many slides can be seen before reaching to the esophagus such as; the skin and subcutaneous layer then deep fascia which covers both the trachea. Facia is followed by the sternohyoideus and mylohyoideus muscles, which are also followed by trachea that lies ventrally to the esophagus. In cats the esophagus begins from the pharynx, extending through the cervical, thoracic and abdominal regions. It is a small, and strong elastic muscular tube, connects the mouth and stomach. The cervical esophagus lies on the dorsal side of the trachea. It courses completely straightly opposite the other animals, at the level of the first to the seven cervical vertebrae. The length of the esophagus in adult cats, varies between 15 and 18cm. (mean 16cm). According to the breeds types. The length of cervical esophagus is about 4 cm. It's about 30% of the length. In generally, its diameter is about 1 cm but it extends through the food course to a certain point. Its elasticity stops due to the extra stretching causing obstruction. The cervical esophageal walls are containing the longitudinal folds in its cranial and middle parts and transverse folds in the caudal part of the cervical pat of the esophagus (Figure 3).

The relationships between the cervical esophagus and other near structure (Figure 1 & 2). The esophagus related to the trachea, (sub vertebral muscles) prevertebral muscles and fascia, thyroid gland, the trachea, vagus nerve and recurrent laryngeal nerve. The cervical esophagus runs within the visceral space of the neck, related to longus colli and longus capitis (sub vertebral) muscles dorsally, and the trachea ventrally Almost completely without any inclination. The thyroid gland is in the upper part and bilateral sides of the cervical esophagus. On the right and left, the esophagus accompanying the right and left, common carotid artery and vagosympathetic trunk. It is easy to recognize the presence of the foreign bodies through symptoms and confirm their diagnosis through the radiograph x-ray (Figure 4) and Laryngoscope. Radiographic images are repeated in lateral view, the foreign bodies are embedded in bilateral esophagus walls tissue.

Laryngoscope in the cat is performed in recumbent position using a flexible Laryngoscope. Laryngoscope of human. In cats, we find many cases of obstruction by foreign bodies such as mass of hair and chicken food bones in esophagus in different side, especially in the first and middle parts of cervical part of esophagus embedded in bilateral esophageal walls tissue as well as stabilized inside it. It results licking hair, speed eating and a large bit food, which can’t passes in esophagus causing depression, lack of food. vomiting, and sneezing to try to remove the foreign body (Figure 4 & 5). Many of the foreign bodies had V shape of subclavian or humerus and ulna parts bone. Each splice about 4 cm length and 1 cm diameter with angle 45 degree between them causing obstruction. It was lied nearly 2 cm from the pharynx and embedded inside the walls of the esophagus. The foreign bodies are removed by using a long-grasped forceps under endoscopic guidance.

The foreign bodies are removed by using some long-grasped forceps. It can be successful if the foreign body is situated in the proximal part of the digestive tract (pharynx and proximal esophagus) and the shape and size of the foreign body permit this under endoscopic guidance. Endoscopy permits visualization and location of the foreign body and majority can be extracted without recourse to surgery.

![Figure 1: The photograph shows the esophagus in situ, esophagus (E), trachea (T), epiglottis cartilage (Ep), Longus colli muscle (L.c.m) and Longus capitis muscle (L.ca .m)](image1)

![Figure 2: The photograph shows the structure accompany of the esophagus in situ, trachea (T), esophagus (E), Thyroid gland (TG), Common carotid artery (CCA) , Vagosympathatic nerve (VSN) and Longus colli muscle (L.c.m).](image2)

![Figure 3: The photograph shows the internal wall of the esophagus (E) contained longitudinal (L.F) and transverse folds (T.F).](image3)
Competing interest

Author’s contributions GA (Syri) planned and conceived the search the data. GA (Syri), interpreted the results and designed the figures wrote the manuscript. The author read and approved the final manuscript.

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Discussion

The present study has shown that the esophagus was covered by many slides including the skin and the subcutaneous layer, deep fascia which was followed by the sternohyoideus and mylohyoideus muscles and trachea, these slides were arranged. These slides haven’t recorded in previous studies. The current study revealed that the esophagus was divided into three parts. They were the cervical, thoracic and abdominal. This result agrees with [10-12] in cats and dogs. While [1-3] in domestic animals.

Conclusion

The obtained data provided a sufficient basis to the endoscopic technique in the cat with esophageal obstruction cases. The gross and topographical anatomy of the cat esophagus had different approach than in other domestic animals. The Laryngoscope was the best technique used to remove the foreign bodies from the esophagus in the cat to avoid surgical complications.

Competing interest

The authors declare that it has no financial or personal relationships which may have inappropriately influenced them in writing this article.