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Anatomical and histological study of esophagus in small geese (Anseer anseer)

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Abstract

The study carried out on 14 esophagus specimens of healthy geese. The length of the esophagus (both cervical and thoracic parts) was found and it has an (S) shape. The esophagus was situated between the oropharynx and glandular part of stomach. It was a thin-walled and elastic muscular tube. The histological examination showed that it was composed of four layers. The first layer lined by stratified squamous epithelium which is based on lamina propria that contained mucous glands followed by muscular layers which consist of two layers, circular inner layer and longitudinal external layer based on serosa layer.

Keywords: Esophagus, anatomy, histology, geese

Introduction

Birds have the coelomic cavity without diaphragm, the avian esophagus is a long distensible tube that connects the oropharynx and the proventriculus, it lies on the right side of the neck (mammals present on the left side) dorsally to the trachea. Immediately cranial to the thoracic entrance the esophagus returns to the median line and expands ventrally to form the crop [1] in geese and white stork [2,3,4,5] mentions the esophagus of rheas and captive bustards do not form the crop. The mean length of the total esophagus of white stork is 400 mm, and diameter 10 mm [3, 5] described the esophagus of male bustard is longer than of female also in tufted ducks *Aythya fuligula* [6], while in common pheasant and partridge the length of the esophagus of male is shorter than that of female [7, 8]. Avian esophagus consists of two parts: cervical and thoracic, in mammals consists of three parts: cervical, thoracic and abdominal part [1] while [9] mention the esophagus of common quail has three anatomical parts: cervical part, crop and thoracic part [10] said the chicken cervical esophagus extends from the oropharynx and expands to form the crop, it is shaped (S) like shape. Cranially, it is located in the median line, dorsally to the larynx and trachea, which is intimately fixed by connective tissue, caudally to the fifth cervical vertebra [12] said the cervical esophagus of chicken has [6-8] longitudinal folds [8] mention the length of cervical esophagus of partridge in male and female are (112 mm, 117 mm respectively), and in geese is 164.1 mm [2]. The thoracic esophagus is placed below the crop, dorsally to the trachea and extends until the proventriculus, mean length of it in male and female partridge is (40.30 mm, 40.50 mm respectively) [8]. The esophageal wall of chicken consists of four tunics (mucosa, submucosa, muscularis and adventitia) [10]. Mucosa of emu esophagus is formed by a non-keratinized stratified epithelium [13], while the epithelium of the esophagus of white stork and wild bird (Rock Dove and Linnet) is keratinized stratified squamous [3 and 4]. The lamina propria in the esophagus of emu contained numerous simple tubular mucous glands [13], these glands are developed in the thoracic esophagus more than that in the cervical esophagus of common quail [9], muscularis mucosa is thick and consists of a longitudinal smooth muscle layer, mean thickness of epithelium in the cervical esophagus of common quail is thicker than that in the thoracic esophagus [9]. Submucosa layer of avian is composed of loose connective tissues only and no glands as in mammals [10], tunica muscularis is composed of a thicker inner circular and thinner outer longitudinal smooth muscle layer [15] in homing pigeon and in wild bird (mallard) [16, 9] mention mean thickness of tunica muscularis of the common quail esophagus in the thoracic part is thicker than that in the cervical part and in male is thinner than that in female. Tunica muscularis is surrounded by the tunica adventitia at the thoracic esophagus of wild birds [14].

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1.2 Aims of the study

1. To investigate the anatomical structure of the esophagus.
2. To investigate histological structure of the esophagus.

2. Materials and Methods

Collecting samples

The study includes ^[14] adult healthy birds (small geese) were bring from local market in Baghdad.

2.1. Anatomical study

Anatomical study includes ^[7] small geese were used in the present study after scarified of the birds by euthanized by ketamine hydrochloride 25 mg/k.g. and Diazepan 5 mg/kg. Injected in the chest muscle IM (Shindala, 1999). The feathers were removed from the neck and chest, the skin over the neck was dissected carefully and the chest was opened. The esophagus was dissected carefully, and measurement (length of esophagus) were taken in situ, followed by extortions of the esophagus after the free from its relations and chest.

2.2. Histological study

Histological study includes ^[7] small geese and collected samples(1cm)³ taken from the esophagus after that washing and cleaning froth any diet and fixed samples in formalin (10%) for (72) hours, the fixed samples were processed by the paraffin, tissue technique, thickness (5µm) and stained by hematoxyline and eosin(routine stain) the histological section were made and stained with hematoxylin and eosin for general histological study technique were down.(Bancroft and Gamble, 2008), to remove water from the tissue ascending grades of alcohol (50%, 70%, 80%, 90% and three changes in 100% on hour for each) were used. Xylene-1 and xylene-11, on hour each was used a clearing agent to make the tissue translucent. After clearing with xylene the tissue samples were immersed in two paraffin bath one hour for each at 58C to ensure the penetration of paraffin into tissues and to complete removing of clearing reagent as well, the tissue were oriented in melted paraffin in order to make paraffin blokes and then kept at -4 °C for hardening. By using rotary electrical microtome (Leica, 3500), section were cut 5µm thickness and stained.

3. Results

Anatomically the esophagus founded as an elastic muscular tube with thin wall, extended between the pharynx and stomach and divided into two parts, the neck part was long and elastic, the thoracic part was short and without sphincter, diameter of esophagus was differ according to the feeding, the lumen has layers make the internal distance help in food movement, also give the star shape of the opening of esophagus (Fig.1). The mean length of the esophagus of (7) geese was (10, 4).

The histological study founded that the esophagus consist of four layers, the mucosa, sub mucosa, muscular and serosa (Fig 1). Also, the mucosa consist of epithelium, lamina propria and muscular mucosa (Fig 1). The esophagus lining completely with thick layer of keratinizing stratified squamous epithelial tissue (Fig 2). Which opening with numerous number of mucous glands (Fig 3). The lamina propria consist of connective tissue under the epithelial layer with blood vessels, with mucous glands (Fig 3).

4. Discussion

The current study revealed that the esophagus of small geese consist of two parts, the neck and thoracic parts, this result

agreed with results of ^[17, 18] that the esophagus in pigeon located on the right side of the neck and has S shape.

Current study agree with ^[19, 20] those found the diameter of esophagus was differ according to the type of feeding of birds.

^[17, 11] recorded that the internal surface of esophagus has layers that increase the surface of absorption and help in movement of food that is similar with current study, and agree with ^[12, 13, 14] those noted that the avian esophagus histologically consist of four layers. Agree with ^[9] he was noted that the avian esophagus without sphincter. ^[18, 19, 20] they founded that the esophagus histologically has keratinized stratified squamous epithelial tissue agree with current study. The current results agree with ^[19] who found the muscular consist of smooth longitudinal layer with connective tissue in the serosa.

This study referred that the esophagus is an organ located in right side of neck and situated between the pharynx and stomach glandular part, this result agree with ^[18].The current study shows that the esophagus composed of two parts, cervical and thoracic part, it similar with results found by ^[18], cervical part longer than thoracic part this result agreement with ^[15] who study the esophagus in partied *Rhynchotus rufescens* also similar with ^[22] during his study on chicken esophagus but disagreement with ^[18] which study the chicken esophagus. The histological results showed the esophagus composed of four layers mucosa, sub mucosa, muscular and serosa layer. The mucosa constituted non keratinized stratified squamous epithelium with few mucous gland within the connective tissue of the lamina propria. The result agree with ^[21] who studies the esophagus of partridge *Rhynchotus*. These results were similar with esophagus in squirrel ^[22] and other birds like starling birds and pigeons during histological study ^[23, 24].

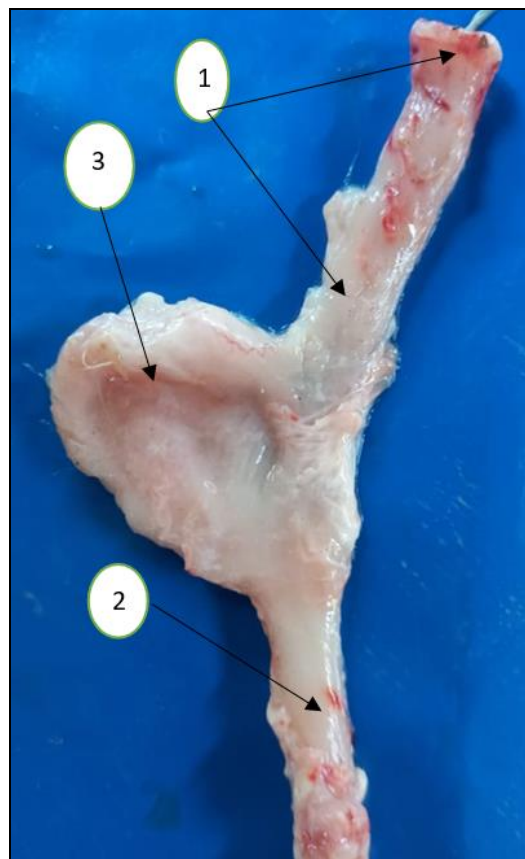


Fig 1: Shows esophagus of geese (1) cervical part of esophagus. (2) Thoracic part of esophagus. (3) Crope.

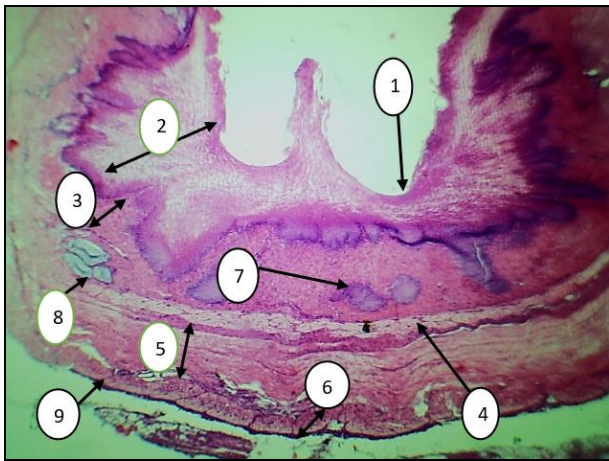


Fig 2: Histological section of the esophagus (1) mucosa, (2) epithelium, (3) lamina propria (3), sub mucosa (4), tunica muscular inner circular (5), tunica muscular outer longitudinal(6), lymphatic nodules (7), mucous gland (8), serosa (9), (H&E. stainx 40).

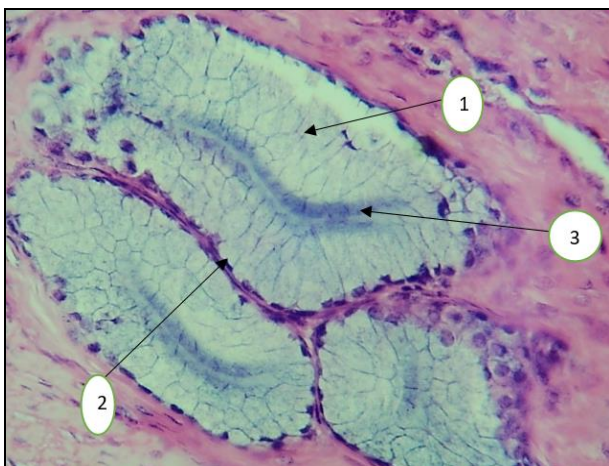


Fig 3: Transverse section of the esophagus, mucus gland, lobule (1), septa (2), duct (3) (H &E. Stain X 400).

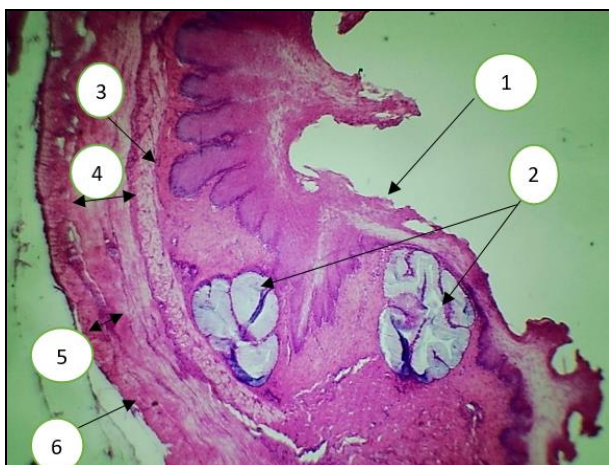


Fig 4: Cross section of the esophagus, mucosa (1), mucus gland (2), sub mucosa (3), tunica muscular inner longitudinal (4), tunica muscular outer circular (5), serosa (6). (H & E. staneX40).

Conclusions

1. The esophagus of geese tubular muscular organ S shape.
2. Esophagus of geese without sphincter.
3. Esophagus of geese found on the right side.
4. Esophagus of geese consist of four layers with mucous glands found on the sub mucosa layers.

Recommendations

1. Histochemical study of esophagus.
2. Study the esophagus by using the electron microscope.

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