

Morphological Description of the Esophagus in the Mallard Duck (*Anas platyrhynchos*)

Hanan Raad Dheyaa Hussain¹, Wijdan Basheer Abed², Dalia H. Al-Hamawandy³

¹Assistant Lecturer, Directorate General of Education Al-Karkh first, Ministry of Education, ²Assistant Prof. Dr., Department of Biology, College of Education for pure Science (Ibn Al-Haitham), University of Baghdad,

³Lecturer, Directorate General of Education Al-Karkh first, Ministry of Education

Abstract

The esophageal morphology of Mallard Duck (*Anas platyrhynchos*) was investigated to fill the dearth of information on the morphology of esophagus from available literature and help in understanding its digestive tract biology. The esophagus is long and highly distensible, musculomembranous tubular shape, it began from oropharyngeal cavity and terminated on the proventriculus. The esophagus was divided into two regions are represented by cervical part and Thoracic part, the crop was absent. Internal lining of the esophagus consisted of un- branched straight longitudinal folds the mean length of esophagus was about 25 cm; it was wider in the anterior part than the posterior part.

Key words: Avian, Mallard duck, esophagus, *Anas platyrhynchos*.

Introduction

Domesticated forms of ducks descend from two different species, i.e. from *Cairina moschata* and *Anas platyrhynchos*¹. The mallard, *Anas platyrhynchos*, originated in the northern hemisphere and gave rise to many duck breeds and varieties. The Mallard is widely distributed across the Northern Hemisphere, North America from southern and central Alaska to Mexico, the Hawaiian Islands, and across Eurasia, from Iceland and southern Greenland and parts of Morocco (North Africa) in the west, Scandinavia to the north, and to Siberia, Japan, and China in the east². The distinctive anatomy and physiology of the avian gastrointestinal tract reflects the constraints of flight, in that most of the tract's weight is centralized within the body cavity to optimize aerial maneuverability. The avian gastrointestinal tract has a larger number of organs, which have greater interorgan cooperation than their mammalian counterparts. The precise anatomic plan of the digestive tract of companion birds varies somewhat, depending on their typical diet³.

Mallards is omnivorous and very flexible in its foods choice. Its diet may vary based on several factors, including the stage of the breeding cycle, short term variations in available food, nutrient availability, and inter- and intraspecific competition⁴.

Birds have relatively long necks because their beak must serve the function of hands or paws in food gathering. Their esophagus is, therefore, also relatively long. It has numerous mucous glands to help lubricate the passage of food. The crop is an enlargement of the esophagus and it serves to store food for subsequent passage to the stomach. (This is analogous to the cardia in the mammalian stomach) The size and shape of crops vary between species.

Materials and Methods

The animals under investigation were collected from Babylon Governorate. Five birds were used to study the different aspects of the present study. The studied pigeons have two large lateral pouches, gallinaceous birds have a single pouch, hawks have a spindle-shaped enlargement of the esophagus and

owls have no crop ⁵. Birds were anesthetized using chloroform. the length of esophagus and its different parts were measured.

Results

The esophagus of Mallard Duck (*Anas platyrhynchos*) (Fig. 1) was muscular membranous, tubular shape, which began from oropharyngeal cavity and terminated on the proventriculus, the esophagus divided into two regions represented by cervical part and thoracic part, the crop was absent (Fig. 2). The cervical part of esophagus was located in the right side of neck and began with the end of the oropharynx and intertwined on the trachea, the mean length of esophagus was about 25 cm, the mean width of esophagus was about 2.5 cm in cervical part and about 1.5 cm in the thoracic part. The lining of esophagus in Mallard Duck seems white color, the mucous membrane contain longitudinal folds varies in depth (height) and number, between them folds less tall, the cervical part of esophagus was composed of about 13 un-branched straight longitudinal folds, the thoracic part has contained about 7 un-branched straight longitudinal folds and the region in between contains about 10 folds (Fig.3). There was a cardiac sphincter separating the esophagus and proventriculus (Fig.4).



Figure 1: Mallard Duck (*Anas platyrhynchos*).



Figure 2: Forms, location of esophagus in Mallard duck. ES, Esophagus; L, liver; G, gizzard; SI, small intestine; PV, proventriculus.



Figure 3: Inner view of esophagus showing LF, Longitudinal folds .

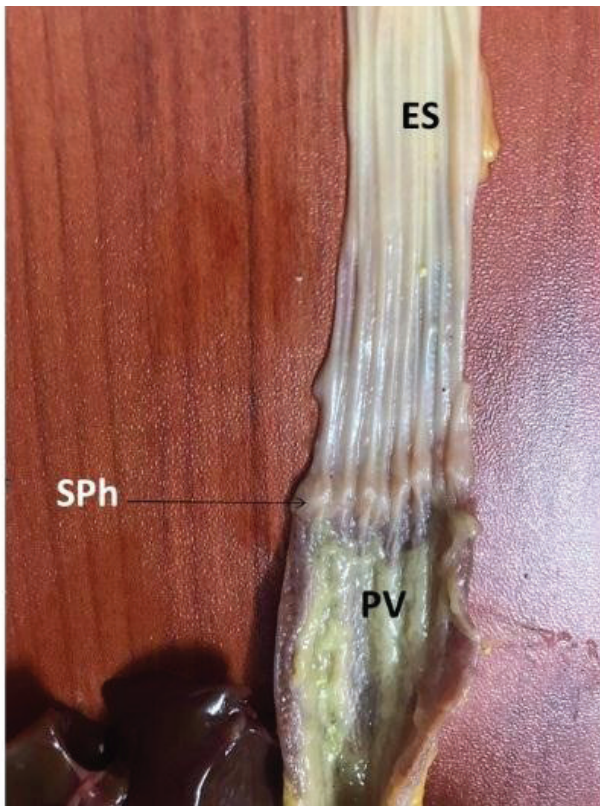


Figure 4: Inner view of esophagus showing ES, Esophagus; PV, proventriculus; SPh, cardiac Sphincter.

Discussion

Mallard (*Anas platyrhynchos*) anatomy was extensively studied in Iraq, ⁶ studied anatomical and histological features of the kidney, ⁷ studied Histomorphological and Histochemical structure of the stomach ⁸ studied Morpho-histological comparative study of the liver and ⁹ studied Histomorphological and histochemical study of the small intestine of the mallard (*Anas platyrhynchos*) in south Iraq. The digestive tract of birds shows a great diversity according to their respective feeding and dietary habits, results of the present study showed that the esophagus in the mallard duck under investigation was an organ located in right side of neck and situated between the pharynx and stomach glandular this result agrees with Sisson *et al.* (1986) ¹⁰⁻¹². Esophagus was divided into two anatomical regions these are cervical oesophagus and thoracic oesophagus, the crop was absent this description agree with AL-Jumaily and Al-Borzng

(2016) in their study of oesophagus in white breasted kingfisher (*Halcyon smyrnensis*) (Piscivorus); Rajabi and Nabipour (2009) in Passeriformes birds and Bailey *et al.* (1997) in captive bustards (opportunistic omnivores) and disagree with Rasha *et al.* (2015); Ivey *et al.* (2005) and Shehan (2012) they found that esophagus was divided into three anatomical regions, cervical part, crop and thoracic part.

The results of the current study showed the presence of longitudinal folds in the mucous membrane varies in depth (height) and number, it turns out that the cervical part form longitudinal folds between them folds less tall and alternately, the diameter of the esophagus and number of folds gradually narrows towards the thoracic part this result agree with Al-Jumaily and Al-Borzng (2016).

The reason for the variation in numbers and lengths of folds maybe back to the feeding pattern as the esophagus in this study has many folds that increase widening when swallowing prey as well as narrowing of the lumen of the posterior part of the esophagus allows it to store food between its folds for a time because the crop was absent in this bird (Nickle, 1977), Although food may be stored throughout the length of the esophagus of avian species which have no crop (Ziswiler and Farner, 1972; McLelland, 1979a), In ratites, the crop is also absent and the large proventriculus and ventriculus of these birds is considered to help with food storage (Angel *et al.*, 1996). Birds eating high-protein diets generally have less complicated digestive systems than those eating complex carbohydrates ⁵. In mallard, there was a strong sphincter between esophagus and proventriculus while it was absent in pigeon (Hassan and Moussa, 2012).

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Conflict of Interest: None to declare.

Ethical Clearance: "All experimental protocols were approved under the Ministry of Education and

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