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Histological Study of the Larynx In Indigenous Male Turkey (*Meleagris gallopava*)

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Abstract

Histological study description of the larynx in the indigenous male turkey (*Meleagris gallopav*a) (at the first year of their age and the mean live weight was (4715 ± 43.3 gm)), for making use in the study of the respiratory physiology, histopathology, the respiratory diseases diagnoses, surgery and anaesthesia. Five healthy birds employed in this study. After well bleeding the larynx dissected out and washing by normal saline solution, then were fixed immediately in 10% formalin, and then preparing for routine histological processing. The laryngeal mound was covered by non-keratinized stratified squamous epithelium. Toward the glottis the thickness of these epithelia decreased and converted gradually to ciliated, pseudostratified columnar epithelium, with simple branched tubular mucous glands. Lamina propria-submucosa contained loose connective tissue supported by partial ossified hyaline cartilages.

INTRODUCTION

The genus name *Meleagris* means "guinea fowl," from the ancient Greco–Romans. The species name *gallopavo* is Latin for "peafowl" of Asia (*gallus* for cock and *pavo* for chicken-like). (1).The purpose of the present study is to describe the histological features in details the larynx. To become a groundwork information utilizing in study of respiratory physiology, histopathology, also for availing in surgery and anaesthesia in turkey.The larynx is lined partly by a stratified squamous epithelium and partly by a ciliated, pseudostratified columnar epithelium. Numerous elastic fibers are present in the lamina propria. Glands (serous, mucous, and mixed) occur in the lamina propria and submucosa, but are lacking in the vocal and vestibular folds. Hyaline and elastic cartilages provide support of the laryngeal wall. The elastic cartilage of the epiglottis absent. Skeletal muscles are an integral part of the laryngeal structure (2).

Materials and methods

The present study was conducted on five (4715 ± 43.3 gm) live weight healthy male turkeys at the first year of their age collected from the center of Diwanyia city, Specimens were prepared by bleeding of birds with the cutting of the major neck blood vessels after making an skin incision in the neck and separation of trachea away from the site of cutting to avoid aspiration of blood and spoiling of the respiratory system.Each larynx were dissected out and washed with normal saline solution (0.9% NACL), then were fixed immediately in 10% formalin at room temperature. Then the routine histological processes were performed and used three stains were used in this study (3).

1- **Harris Hematoxylin & Eosin stain:-** Which was routine stain used to demonstrated the general histological structures

2- **Periodic acid-shiff (PAS) Stain:-** Used this stain to show the type of secretion.

3- **Van Gieson's Stain:-** Used this stain for collagen fibers detection.

Morphometric Measurements:

Five sections of each larynx were taken for studied by use of ocular micrometer and the following data were recorded: (4)

1- The thickness of the laryngeal epithelium, body of cricoid and arytenoid cartilages, and body of cricoid cartilage at mucosal ridge.
2- The diameter of laryngeal salivary and mucous alveoli and numbers of its cells.
3- Height of the cilia of epithelium of the laryngeal cavities.

And for purposes of photography used Sony W230 digital camera 12.1 Mega pixels.

Results

The histological investigations revealed that the laryngeal mound of turkey in this study were covered by non-keratinized stratified squamous epithelium (Fig. 1), the mean thickness was (204 ± 3µm), which decreased gradually toward the glottis. The submucosa composed of dense irregular connective tissue (Fig. 1).Close to the glottis, the laryngeal mound epithelium converted gradually to ciliated, pseudostratified columnar epithelium, firstly the deep layers of the stratified squamous cells modification to initial formation of the alveoli of the epithelial glands (Fig. 2A), next the upper layers of the squamous cells decreased gradually (7-9 layers) (Fig. 2B), when the upper squamous cell layers reached to 2-3 layers the acini good obvious (Fig. 2C), finally the converted to the laryngeal cavity epithelium and acini (Fig. 2D), the mean thickness of epithelia at the laryngeal cavity were (144 ± 20 µm) and, with various sizes of the mucous glands acini opened via epithelium toward laryngeal cavity which lined by pyramid cells basal circular nuclei and gave the positive reaction with PAS stain (Fig. 3), the mean diameter of large acini and its cells number were (116.8 ± 1 µm) and (28.78 ± 1.03) respectively, while the mean diameter of small acini and its cells number were (45 ± 2 µm) and (9.06 ± 0.18) respectively. Submucosa contained loose connective tissue (Fig. 3).The median mucosal ridge contained abundant small mucous glands alveoli, and large amount of submucosal connective tissue with sporadic lymphoid tissue. The mean thickness of epithelia and cricoid cartilage at the median mucosal ridge were (420 ± 33 µm) and (1070 ± 73 µm) respectively.

Laryngeal Cartilages:

Hyaline arytenoid cartilages were observed under the submucosa near the laryngeal inlet on the left and right side was partly ossified, the mean thickness was (640 ± 17 µm), and at the lateral and basal side of the laryngeal cavity there were body and wings of cricoid cartilages was hyaline type and partly ossified (Fig. 28), the mean thickness of body was (514 ± 9 µm).

Salivary Glands:

On the lateral aspect of each side of the laryngeal mound under the submucosa, there were salivary glands alveoli, the mean number and diameter were (7.4 ± 0.39) and (69.4 ± 6.6 µm) respectively (Table 1) (Fig. 1). It consisted of mucous cells which were pyramidal in shape, the mean number of these cells were (51.4 ± 3) (Table 1), and these glands gave the positive reaction with PAS stain (Fig. 1). On the lateral aspect of each side of the laryngeal mound under the submucosa, there were salivary glands alveoli, the mean number and diameter were (7.4 ± 0.39) and (694 ± 66 µm) respectively (Fig. 1). It consisted of mucous cells which were pyramidal in shape, the mean number of these cells were (51.4 ± 3), and these glands gave the positive reaction with PAS stain (Fig. 1).

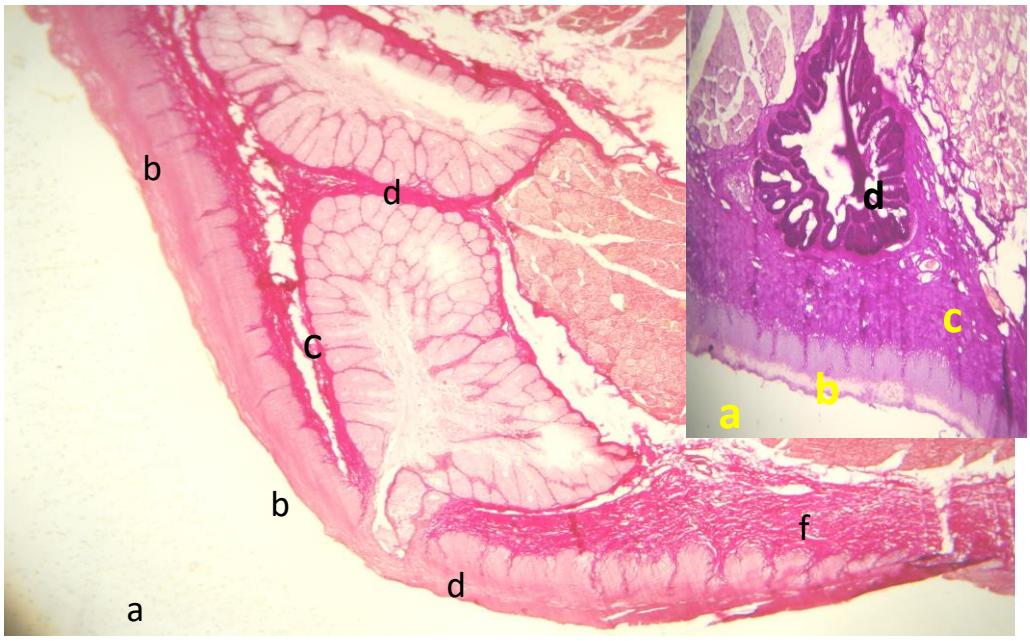

Fig. (1): Cross section in laryngeal mound in the Turkey demonstrating the subepithelial salivary glands surrounded by collagen fibers: oral cavity (a) non-keratinized stratified squamous epithelium (b) lamina propria-submucosa rich by large bundles of collagen fibers (c) simple tubular branched mucous salivary glands (d) opening of salivary gland (e) superficial extrinsic laryngeal muscle (f)
V. G. stain X 40 A (Magnification zoom 2)

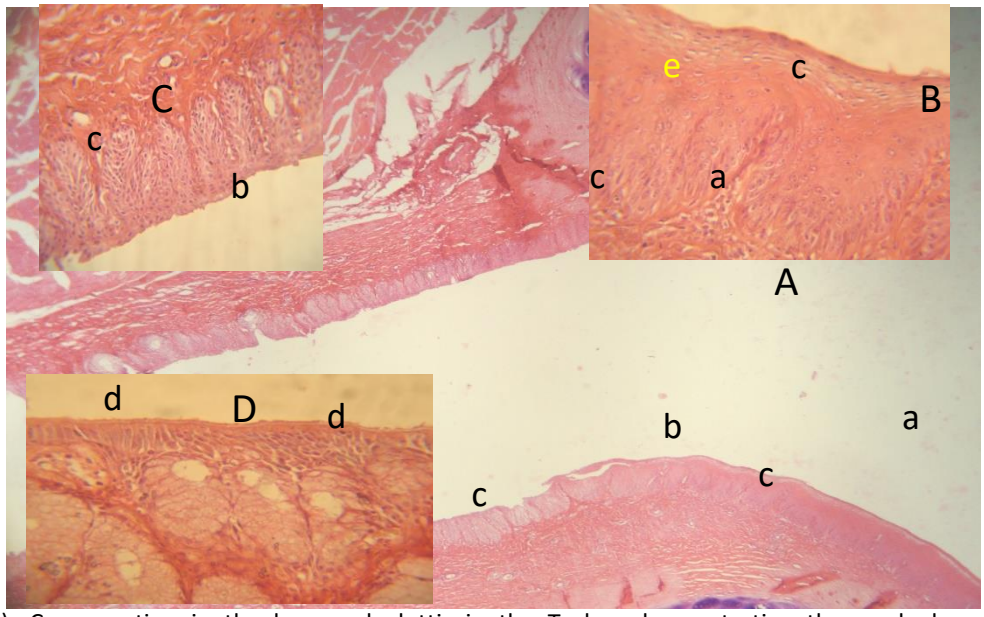

Fig. (2): Cross section in the laryngeal glottis in the Turkey demonstrating the gradual converted of epithelium toward the laryngeal cavity in the Turkey: oral cavity (B), laryngeal glottis (C), and laryngeal cavity (D)) showing: oral cavity (a), laryngeal glottis (b), stratified squamous epithelium gradual converted to mucous acini (c), complete converted to mucous glands and epithelium became ciliated, pseudostratified columnar epithelium at the laryngeal cavity (d), arytenoid cartilage (e).
H & E stain X40 A (Magnification zoom 2.4)
H & E stain X400 B, C & D (Magnification zoom 2)

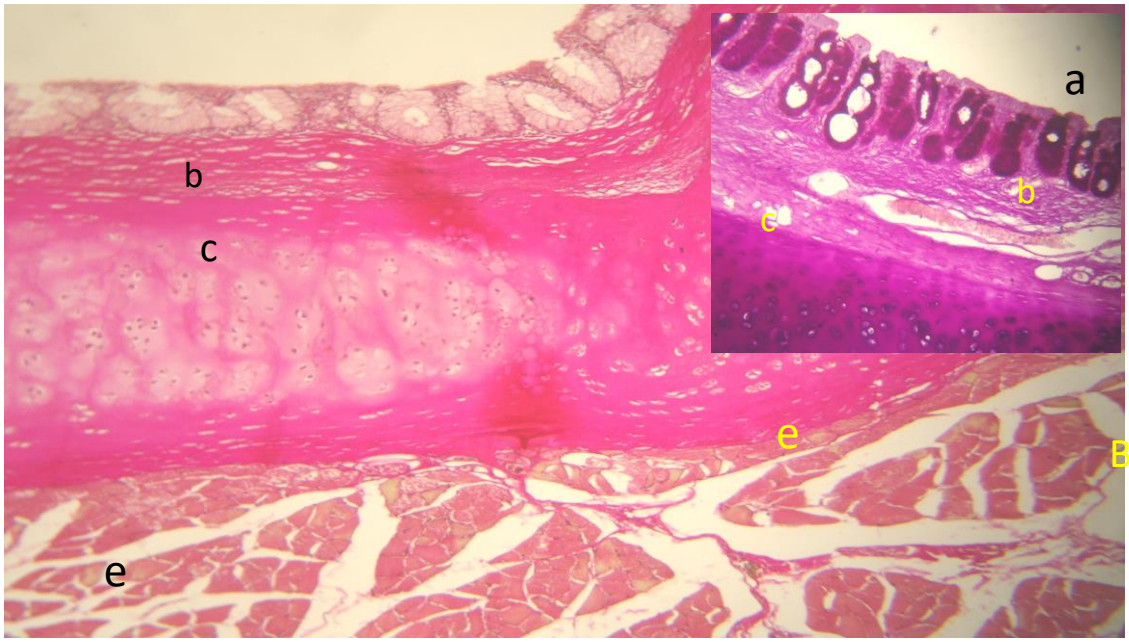

Fig. (3): Cross section of the wall of laryngeal cavity in the Turkey demonstrating the type of the connective tissue (A&B) showing: laryngeal cavity (a), simple tubular mucous acini (b), loose connective tissue with large bundles of collagen fibers in lamina propria-submucosa (c), perichondrium (d), hyaline cartilage of cricoid body (e), hyaline cartilage of cricoid wing (f), deep intrinsic laryngeal muscle (g).
V G stain X 100 A (Magnification zoom 4)

Discussion

The laryngeal mound covered by non-keratinized stratified squamous epithelium this epithelium was found over those surfaces that were submit to friction by food (5; and 6). Close to the glottis the epithelium converted gradually to ciliated, pseudostratified columnar epithelium with abundant various sizes mucous glands opened via epithelium toward laryngeal cavity these results agree with (7) and (8) in birds.The mucous salivary glands occurred on the lateral aspect of each side of the laryngeal mound under the submucosa to keep the mucous membrane of the mouth moist, and provide a protective and lubricant coat of mucous (5), these result harmonized with (9) in turkey, and not in agreement with him in chicken there were caudal and lateral laryngeal salivary glands, and with (6) who said there were caudal laryngeal salivary glands only in long legged buzzard. The mean thickness of the epithelium at the median mucosal ridge was (42 ± 3.3 µm) three times greater than the epithelium of laryngeal cavity was (14.4 ± 2 µm), thickness owing to aggregation of the lymphoid tissues and mucus glands. The cricoid cartilage solider than the other laryngeal cartilages due to it was fully ossified at the adult turkey, especially at the mucosal ridge was firstly ossified. The mean thickness of it at the mucosal ridge was (107±7.3 µm) two times more than the remainder part of this cartilage (51.4±0.9 µm), these results may be considered as strong prop of the larynx and site of tracheal and extrinsic laryngeal muscles connecting part. Numerous of the mucus laryngeal glands and lymphoid tissue at the laryngeal epithelium deemed as a very development defense system in this species (10).

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الخلاصة

تناول البحث دراسة تشريحية للحنجرة في الديك الرومي المربى محليا (*Meleagris gallopava*) بعمر سنة واحدة ومتوسط وزن (4715 ± 43.3 gm). للاستفادة منها في دراسة فسلجة التنفس والأمراض النسجية والتشخيص المبكر للأمراض التنفسية وفي الجراحة والتخدير. استخدم في هذه الدراسة خمسة طيور خالية من الأمراض التنفسية. بعد النزف الكامل استخرجت الحنجرة وغسلت بمحلول الملح الفسلجي ، ثم ثبتت مباشرة في 10% من الفورمالين ، وبعد ذلك حضرت للعمليات النسجية الروتينية. المرتفع الحنجري داخل التجويف الفموي مبطن بالظهارة الحرشفية المطبقة غير المتقرنة باتجاه مدخل الحنجرة يقل سمك هذه الظهارة تدريجيا وتتحول إلى العمودية المطبقة الكاذبة المهدبة مع الغدد المخاطية الأنبوبية المتفرّعة البسيطة. الطبقة تحت المخاطية من النوع النسيج الضام الرخو مسندة بالغضروف الزجاجي ألمتعضم جزئيا.