

MORPHOLOGICAL FEATURE OF THE NASAL CAVITY AND LARYNX IN THE COMMON MOORHEN (*Gallinula Chloropus*) BIRDS

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ABSTRACT

This study was conducted to clarify the anatomical features of nasal cavity and larynx in Common Moorhen (*Gallinula Chloropus*) Birds. Five healthy birds were employed for anatomical study. The head of the birds were section sagittally and transversely in a rostro-caudal succession, the nasal cavity was formed rostrally by the nostrils which were two holes, slit-like in shape located laterally at the upper part of the beak, the nasal cavity possess two conchae (rostral and middle), the rostral nasal conchae located opposite to the nostrils. The larynx of birds showed as a triangular shaped - mound in the caudal part of the oropharyngeal cavity. It formed by the single (cricoids and procricoid) cartilages and paired arytenoid cartilages.

INTRODUCTION

The anatomy of avian respiratory tract is obviously unlike the mammals. The nasal cavity of avian species extends from the nostrils to the choana, and has several anatomical features such as conchae and meatuses ⁽¹⁾. The *nostrils* at the upper part of the beak are over hung by (operculum) or enclitic by a thick cere as in psittacines. The nasal cavity is separated into two halves by medium septum, each one containing three common conchae are exhibit in most avian species a rostral, middle and caudal nasal conchae. The three common conchas are exhibit in domestic birds, the rostral nasal conchae absent in Sulidae ⁽²⁾ and quail ⁽³⁾. The middle nasal conchae absent in hooded Crow ⁽⁴⁾, and the caudal nasal concha lacks in

Psittacus⁽⁵⁾. In avian species, the larynx which lacks vocal cord and epiglottis⁽⁶⁾, the skeleton of larynx appeared to consist of ossified (cricoids, procricoide and arytenoids cartilages)⁽⁷⁾.

MATERIALS AND METHODS

Five healthy male adult common moorhen (*Gallinula chloropus*) were used in this study. They were collected from the market in Baghdad city. Birds were anesthetized by Inhalation anesthesia which achieved by chloroform in closed glass chamber. The heads were sectioned sagittally and transversely in a rostro-caudal sequence. And thoracic cavity was dissected and larynx was exposed by a mid-ventral incision, these structures were described and photographed using dissecting microscope, canon digital camera Japan and lens.

RESULTS

The present study showed the anatomical properties of nasal cavity and larynx of common moorhen birds. The entrance of nasal cavity begins with nostrils (external naris) which are two holes, slit-like in shape with no operculum and located laterally at the caudal third of upper beak (fig.1). The nasal cavity contains two nasal conchae (rostral and middle) (fig.2). The rostral concha is positioned opposite to the nostril. The medium septum of nasal cavity extend caudally to divide the nasal cavity fully into equal halves (right and left), the rostral part of nasal septum was cartilaginous while the caudal part was bony in nature (Fig 3.4).

The rostral concha has a C shape which is attached to the ventral nasal meatus. In transverse section, it was C-shaped projected from lateral wall of the nasal cavity (Fig.3.4). The middle nasal conchae which forms the major part and fills the middle respiratory area of nasal cavity, appears as scroll shape protrude from the ventral wall of cavity that turned laterally, the anterior extremity attached to the superior wall of the nasal cavity. (Fig.3.4.). The infraorbital sinus appeared as a triangular cavity located at the lateral region of the upper jaw and beneath the eye. (Fig.3,4). The pharynx was not separated into nasal part and oral part and has a single cavity named oropharynx, due to the absence of the soft palate. The choana opening in the upper palate is to connect the nasal cavity with oropharynx, that consists of a wide elongated triangular slit rostrally, and slit-like short caudal part (Fig.5)

The larynx lies at the bottom of the pharynx, beyond the tongue, rostrally to the first ring of tracheal and caudally the entrance of the esophagus. The laryngeal mound in the moorhen appeared as elevated triangular shaped with middle laryngeal glottis and with the absence of epiglottis (fig.6).

On the right and left side the laryngeal mound there were thirty laryngeal conical papillae arranged transversally at the caudal end of the laryngeal mound (fig.6). Glottis is the rostral inlet of the larynx in moorhen, exhibited a slit like opening supported by an arytenoids cartilage from cranial to caudal sides, appeared as an inverted triangular shaped. The laryngeal cartilages consisted from ossified single cricoids and procricoid cartilages and paired arytenoid cartilages. (fig.7).

The cricoid cartilage is the largest cartilage of larynx, extends from the roof of the larynx. It found as single hyaline cartilage that consists of ventral and dorsal part (fig.8). The dorsal part has two wings that articulated with the procricoid cartilage while the ventral part of cricoids cartilage has two surfaces (convex) ventrally and (concave) dorsally (fig.7,8).

The procricoid cartilage is a smallest, unpaired hyaline cartilage, found at the caudal segment of the larynx, it forms with arytenoid cartilage to constitute glottis. The arytenoid cartilage appears as right and left paired hyaline cartilages that connect together caudally to compose the roof of the larynx. The procricoid cartilage and cricoid cartilage articulate with the body of arytenoids cartilage

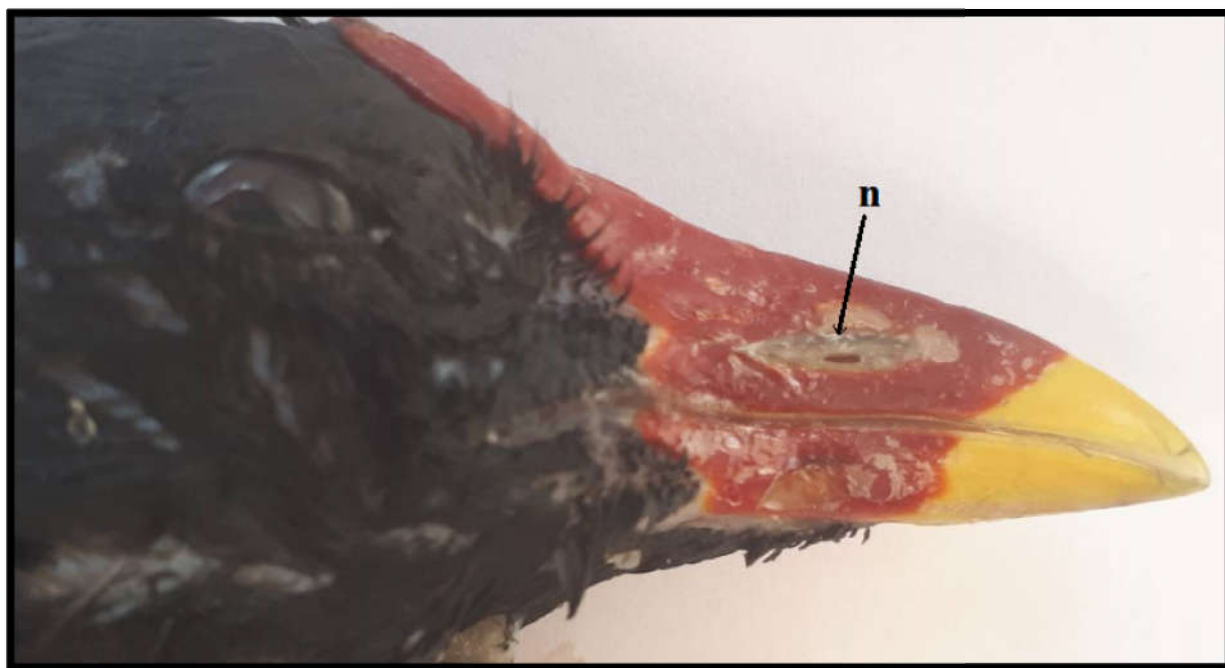


Figure 1: Lateral view of the upper beak of moorhen; (n) naris

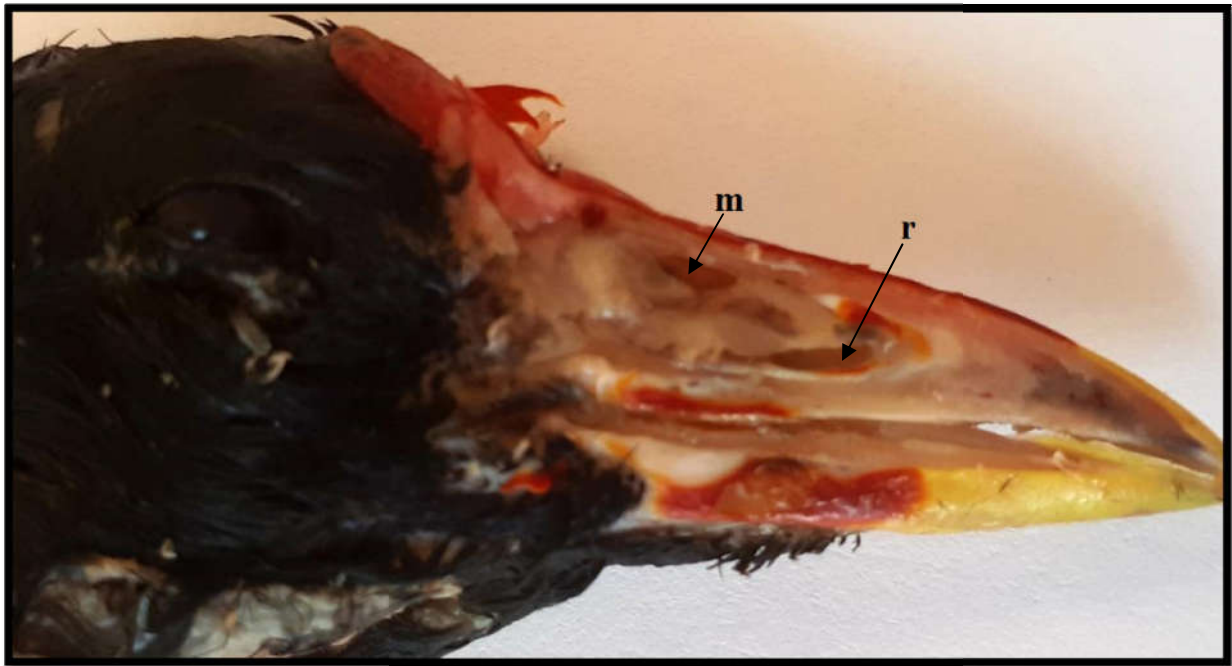


Figure 2: Sagittal section through the head of moorhen ; (r) rostral conchae, (m) middle conchae

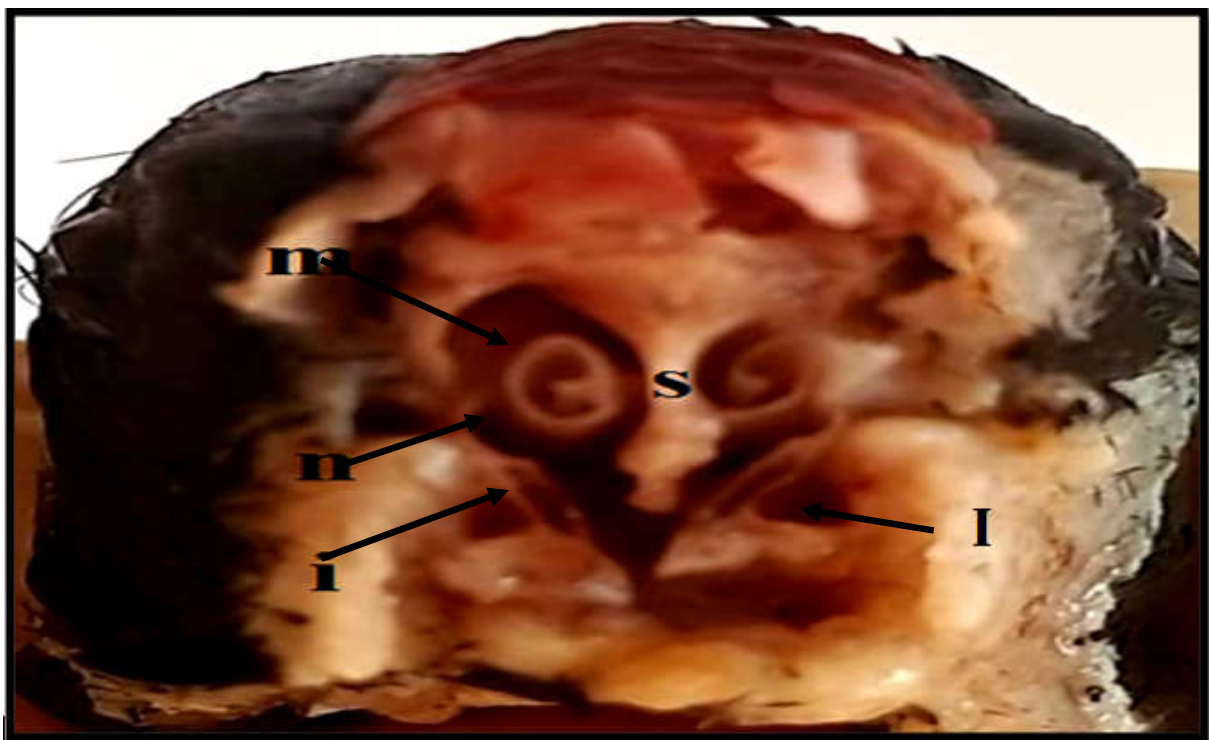


Figure 3: Transverse view of cross section; (s) nasal septum , (m)middle conchae, (n)nasal meatus,(i)inferior nasal meatus,(I)infraorbital sinus

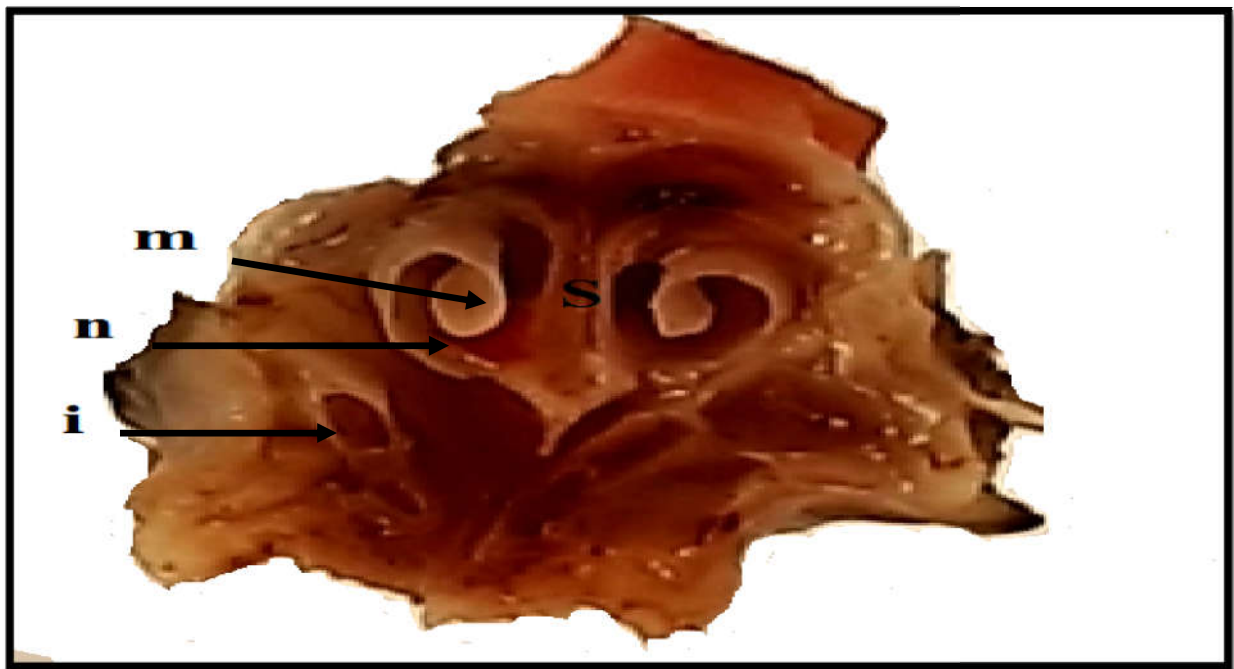


Figure 3: Transverse view of cross section; (s) nasal septum , (m)middle conchae, (n)nasal meatus,(i) inferior nasal meatus.

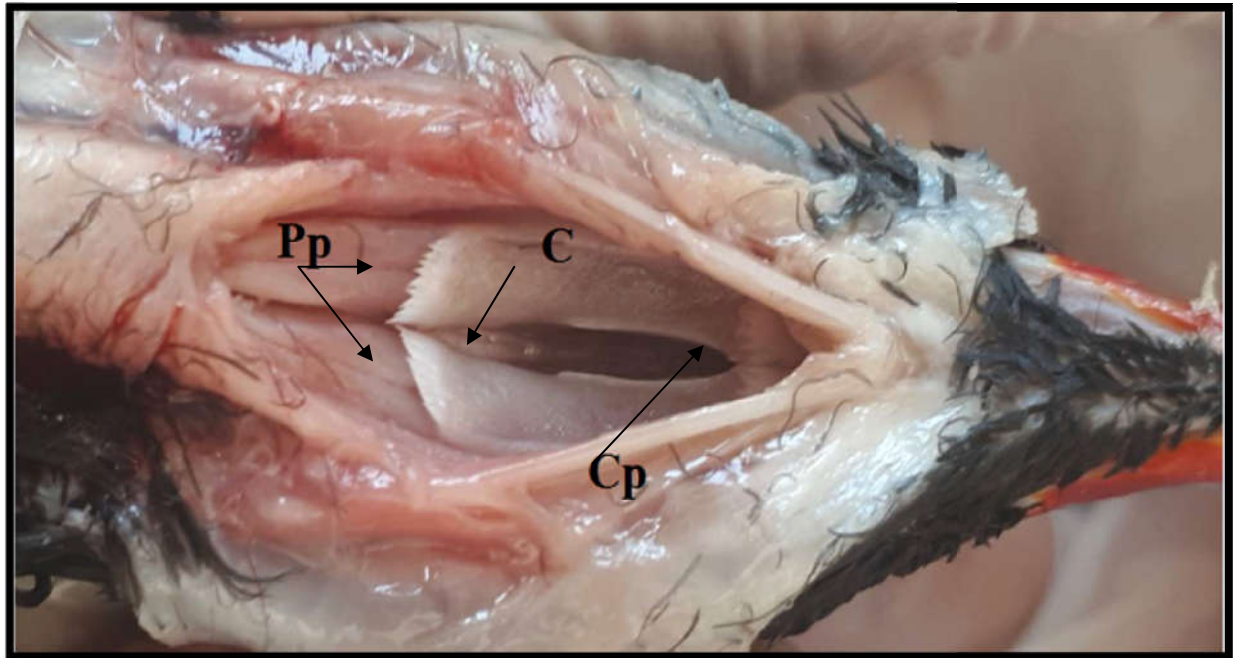


Figure 5: The oropharynx roof; (C) Choanal cleft ,(C p)row of palatine conical papilla, (Pp) row of pharyngeal conical papilla

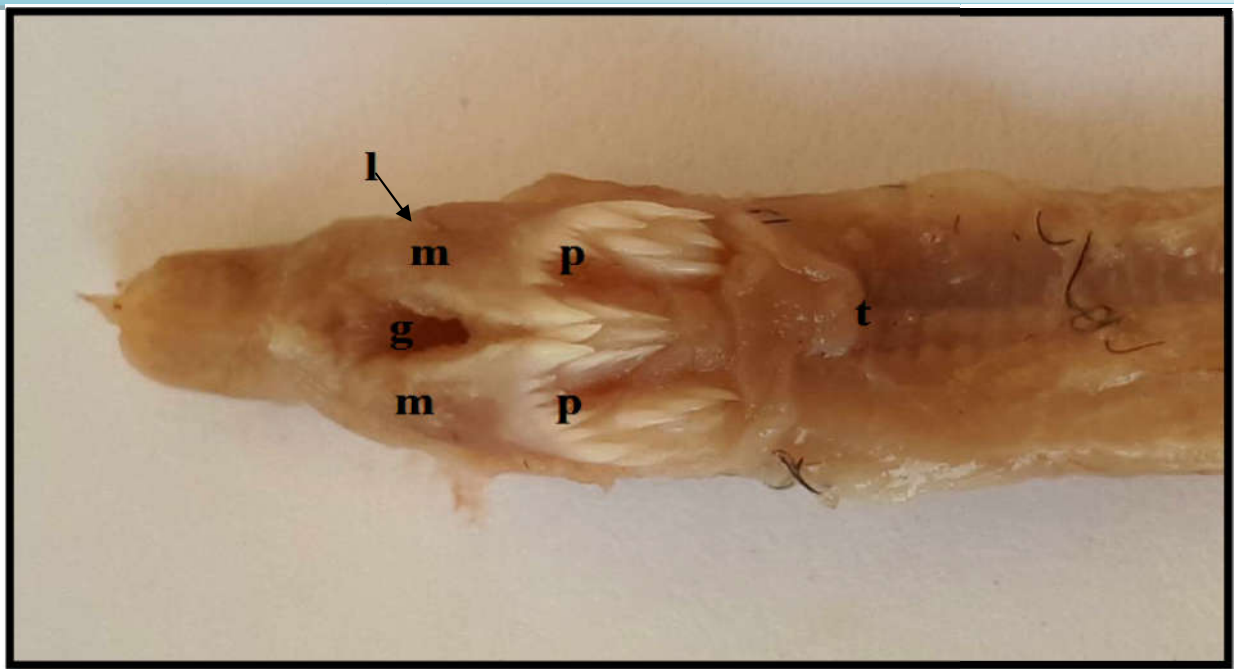


Figure 6:Dorsal view of larynx:(l)larynx,(m)laryngeal mound,(g)glottis, (p)laryngeal papilla, (t)trachea.

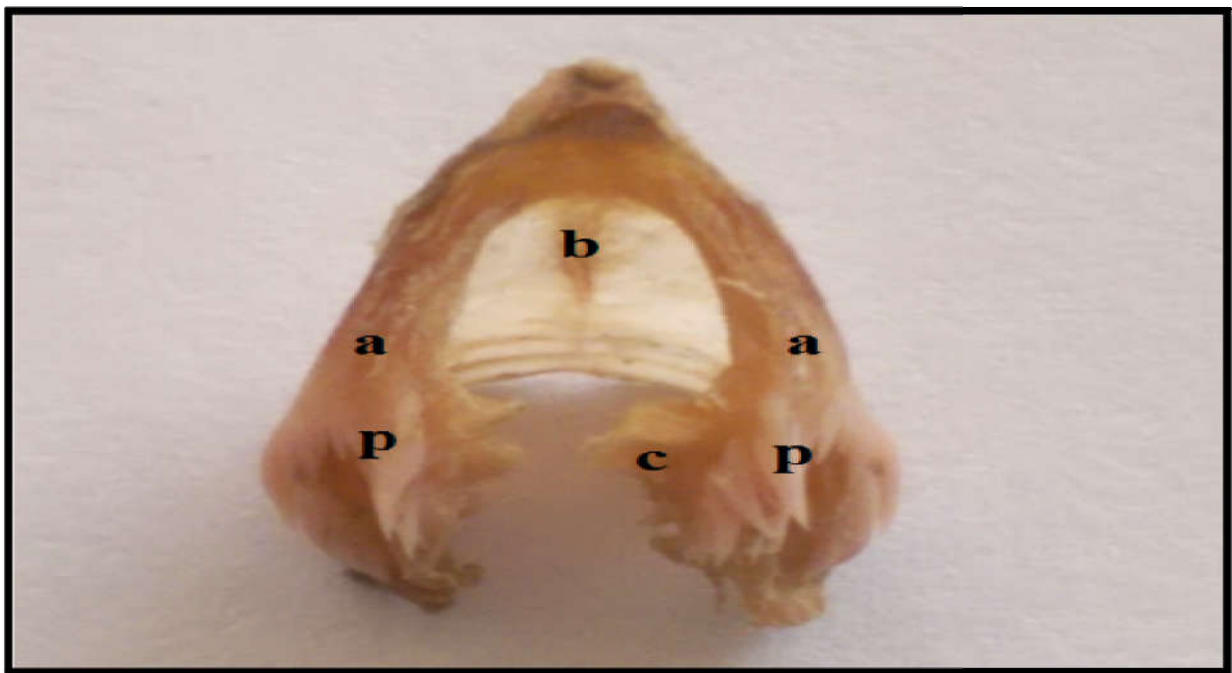


Figure 7: Dorsal view of laryngeal cartilages; (a)arytenoids cartilages, (b)cricoids body , (c) procricoid cartilage, (p)laryngeal papilla.

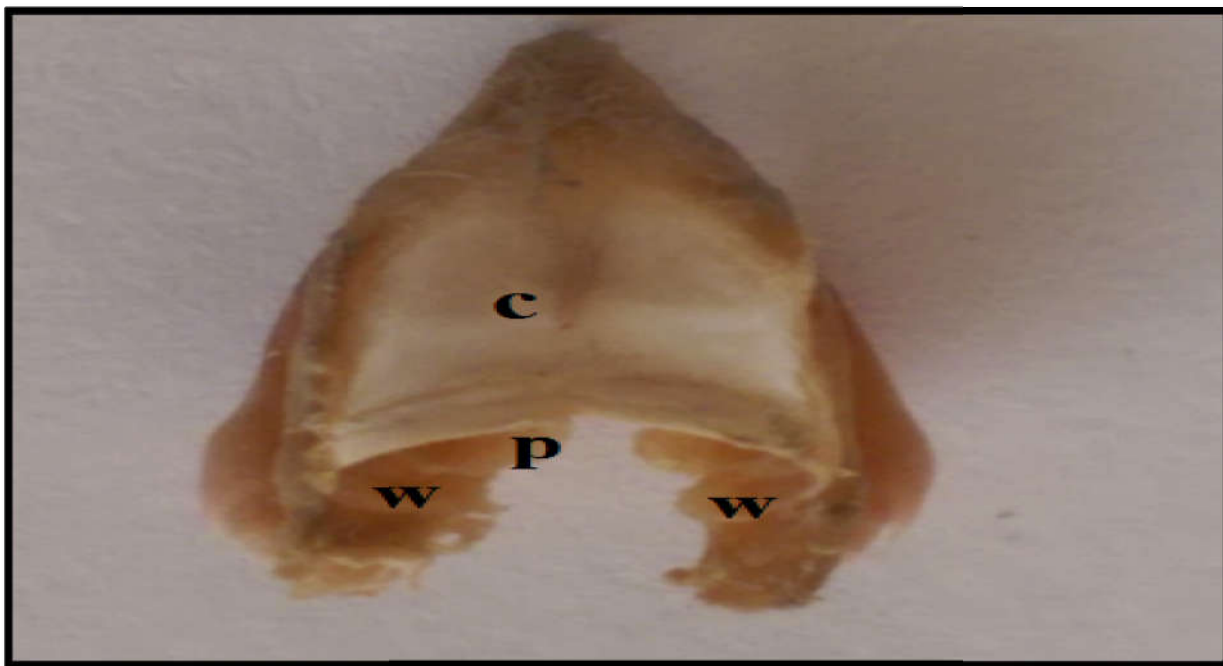


Figure 8:Ventral view of larynx cartage;(c)cricoid cartilage,(w)cricoid wings,(p) procricoid cartilage.

DISCUSSION

Nasal Cavity

The present study observed that the nasal cavity of common moorhen birds had two narrow longitudinal nostrils situated laterally at the upper part of the base of bill with no operculum, The medium septum split the nasal cavity totally into right and left halves. This result is similar to⁽⁸⁾ in Domestic Chickens, ⁽⁹⁾ in Japanese quails, whereas it disagrees with ⁽⁴⁾ that said the nostrils are circular opening lying on dorso-lateral side of the caudal third of the beak in hooded crow.

The size of the nostrils was reduced by nasal operculum in Japanese Quail ⁽⁹⁾, in current study recorded no nasal operculum on common moorhen and no cover by feather ,that agrees with ⁽⁴⁾ who reported that the hood crow does not have nasal operculum but it disagrees with that it is covered by fine feather.

The nasal cavity of common moorhen birds has two conchae (rostral and middle), and no caudal conchae, this result similar with ⁽¹⁰⁾in Brown Eared Bulbul, while ⁽⁹⁾in Japanese quail, and ^(11,12) in Kuttanad Ducks and ostrich observed that has three conchae. ⁽⁴⁾ who said that in hooded crow has two conchae (rostral and caudal). These results disagreed with ⁽¹³⁾ recorded that the absent of rostral nasal conchae in Quail ,and ⁽²⁾in sulidae, while ⁽⁹⁾ observed in

Japanese quail. ⁽¹⁾ who noticed the middle nasal conchae is not found in Phalacrocoracids, in Collocalia the caudal nasal conchae is absent ⁽²⁾.

Larynx:

The laryngeal mound appeared triangular in shape, rostro-caudally in direction, this result come in agreement with ⁽¹⁴⁾ in Black Francolin, while ^(15,16,17,18) demonstrated the laryngeal mound seemed as heart-shaped in the dorsal surface of the larynx, in chicken, long-legged buzzard and turkey, while ⁽¹⁹⁾ who stated that the laryngeal mound relatively elongated lozenge-shape in goose and duck, while ⁽²⁰⁾ explained that the laryngeal mound in west african guinea fowl appeared as roughly triangular in shape. This result uncoincided with laryngeal mound that not present in Ostriches ⁽²¹⁾.

The laryngeal glottis evidence as inverted triangular shaped, supported by paired arytenoid cartilages, it continuous caudally, these results match with ^(17,20,21) in the West African Guinea Fowl and Ostriches, and disagreed with ^(14, 16,18) that mention in turkey, domestic fowl and black francolin appeared as narrow slit-like opening. The laryngeal conical papillae which protruded in caudal part of laryngeal mound and These papillae are arranged transverse caudally.

الخصائص التشريحية للتجويف الانفي والحنجرة في طائر دجاج الماء

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الخلاصة

اجريت الدراسة لتوضيح الصفات التشريحية للتجويف الانفي والحنجرة في طائر دجاج الماء، استخدمت خمسة طيور خالية سريريا من الامراض، ولتوضيح ملامح التجويف الانفي قطعت الرؤوس طوليا وعرضيا من الامام الى الخلف وقد وجد ان تجويف الانف يبدأ من فتحتي الانف وهي عبارة عن فتحتان تشبهان شق ضيق طويل. يقعان في الجهة الوحشية من اعلى المنقار. يتكون التجويف من محارتين (الامامية والوسطى)، حيث تقع المحارة الامامية مقابل فتحة الانف. تشكل الحنجرة مرتفع مثلث الشكل في الجزء الخلفي من البلعوم الحنجري ويتألف من مجموعة الغضاريف المفردة (وهي الغضروف الحلقي وقبل الحلقي) ومن الغضروف الطرجهاري المزدوج

REFERENCES

- 1-Bang, B. G. , Wenzel, B. M. (1985):** Nasal cavity and olfactory system. pp. 195-225. In: Form and Function in Birds (A.S. King and J. McLelland, eds.) Vol. 3. Academic Press, London.
- 2- Bang, B. G. (1971):** Functional anatomy of the olfactory system in 23 orders of birds. Acta Anat, 79, 1-76.
- 3- King AS, McLelland J (1984):** Birds: Their Structure and Function. 2nd ed. Bailliere Tindall, London
- 4- Hassan, S. A.(2012):** Gross anatomical features of the nasal cavity of the hooded crow (Corvus cornix). SCVMJ, XVII (2) .
- 5- Pohlmeier, K.; Kummerfeld, N. (1989):** Morphologie der Nasenhöhle und der nasen Nebenhöhlen sowie ihre klinische Bedeutung bei Grosspapageien. Kleintierpraxis. 34, 127-133.
- 6- Pesek, L. (2000):** The avian respiratory system. Winged Wisdom Pet Bird Magazine 1: 1-3.
- 7- Öcal K, Erden H(2002.)** Solunum sistemi. Evcil Kuşların Anatomisi. pp. 91-102. Medisan Publisher, Ankara,
- 8- Baumel, J.J., King, A.S., Breazile, J.E., Evans, H.E., and Vandan Berge, J.C. (1993):** Respiratory System. In: Hand book of Avian Anatomy Nomina Anatomica Avium 2nd ed: Club. Cambridge, Massachusetts. Pp: 257-299.
- 9- Demirkan, A.C., Kurtul, I. and Hazirolu, R.M. (2007a):** Gross Morphological Features of the nasal cavity in Japanese quail. Ankara Univ Vet Fak Derg, 54: 1-5.
- 10- Yokosuka, M., Hagiwara ,A., Saito, T.R., Aoyama, M., Ichikawa, M., and Sugita, S.,(2009):** Morphological and histochemical study of the nasal cavity and

fused olfactory bulb of the brown –eared bulbul, (*hypsipetes amaurotis*). Zoological Sci. 26:713-721.

- 11- Dar, F. A., Krishnan ,M. S., Chungath, J. J., and Pillai, A. N.(2014): A post- hatch developmental study of conchae in kuttanad ducks (*anasplatyrhynchos domesticus*)Indian J. Vet. Anat. 26 (2): 92-94.
- 12- McLelland, J., (1990): A Color Atlas of Avian Anatomy. Wolfe Publishing Ltd. Eng. Pp. 95-119.
- 13-A. Safwat.(2015):Gross anatomical studies on the nasal cavity of the ostrich
- 14-AL –Aameli, M. H. H. A-R.(2015): Histomorphological study histomorphological study of the larynx, of the larynx, syrinx and primary bronchi in male and f male and female black francolin francolinus francolinus) in Iraq .Ph.D. Thesis. Baghdad Uni. Vet. Med. College.
- 15-Bacha, W.J., and Bacha, L.M. (2000): Color Atlas of Veterinary Histology 2nd (ed.): Lippincott Williams & Wilkins. PP: 175-190.
- 16 -Kabak, M.; Hazirolu, R.M. and Orhan, I.O.(2007):The gross anatomy of larynx, trachea and syrinx in the long-legged buzzard (*buteo rufinus*). Anat. Histol. Embryol. 36(1): 27-32.
- 17- Frandson, R.D., Wilke, W.L., and Fails, A.D. (2009): Anatomy and Physiology of Farm Animals 7th ed. Wiley-Black Well Pp: 471-474.
- 18- AL-Mussawy, A. M., AL-Mehanna, N. H. , and AL-Baghdady, E. F.(2012): Anatomical study of the larynx indigenous male turkey (*Meleagris gallopava*). AL-Qadisiya J. Vet.Med.Sci. Vol. 11(1)
- 19- Getty, R. (1975): The Anatomy of the Domestic Animals. W.S. Saunders Co.Philadelphia Pp: 1884-1917.

- 20 -Lbe, C.S., Onyeausi, B.I., Salami, S.O., Umosen, A.D., and Maidawa, S.M.(2008):**
Studies of the major respiratory pathways of the west african guinea fowl (*numida
meleagris galeata*). the morphometric and macroscopic Aspects. Inter. J. Poul. Sci.
7 (10): 997-1000.
- 21- Tadjalli, M., Mansouri, S. H., and Poostpasand, A. (2008):** Gross anatomy of the
oropharyngeal cavity in the ostrich (*struthio camelus*). Iranian J. Vet. Resear. Shiraz
Univ 9 (4): 316-322.