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LINGUAL MUSCLES IN CHICKEN

(With one Table & one Fig.)

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عضلات اللسان فى الفراخ

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تنقسم عضلات اللسان على اساس اتساعها إلى مجموعتين المجموعه الاولى تشمل ثلاث عضلات متسعه تتميز باتصالها بالعظم الخيشومى الاساسى الامامى . والمجموعه الآخرى ضيقه وتتميز بأنها مكونه من جزئين جزء لحمى وآخر ليفى. وعلى أساس الاتصال تنقسم عضلات اللسان إلى مجموعتين كذلك. المجموعه الاولى وتشمل على ثلاث عضلات تندغم وتبدأ فى الأجزاء المختلفه للعظم اللامى وتؤثر اساسًا على قمة اللسان. أما المجموعه الآخرى وتشتمل على عضلتين وتمتد هذه العضلات بين العظم اللامى من ناحية والحنجره والفكى السفلى من الناحيه الاخرى.

SUMMARY

The lingual muscles in chicken are investigated brifly, They may be classified according to their width into two classes. The first class includes three wide muscles characterizing by their attachment to the rostral basibranchial bone These muscles are the lateral hypoglossal, laryngeal basibranchial and serpihyoid. The second class consists of two narrow muscles characterizing by their division into a fleshy and tendinous parts. These muscles are the medial hypoglossal and the ceratoglossal. According to their attachment, the lingual muscles can be also divided into two groups. The first group includes three muscles arising and inserting in the different parts of the hyoid bone, These muscles are medial and lateral hypoglossal as well as ceratoglossal, they act mainly on the apex of the tongue. The second group is represented by two muscles extending between the hyoid bone and the larynx (laryngeal basibranchial muscle) or the mandible (Serpihyoid muscle). The ceratoglossal muscle is the longest lingual muscle but the lateral hypoglossal is the shortest one.

INTRODUCTION

In the last years the chicken has a great economic importance in Egypt. In spite of this importance, the available literature about the myology of this bird especially that of the head are meagre. Therefore the present work amis to investigate the lingual muscles in chicken concerning the position, origin, insertion and the line of attachment. In addition to the determination of the length, width and thickness of the examined muscles.

MATERIAL and METHODS

This work was carried out on 15 adult healthy chicken of both sexes. The examined birds were bled and 12 of them were preserved about one week in 10% formalin solution before investigation. The remaining birds were dissected in fresh state. The dimensions (in mm) including length, width and thickness of each muscle were measured. The nomenclature used is that adopted to *Nomina Anatomica Avium (1979)* as it was possible.

RESULTS

The lingual muscles in chicken are M. hypoglossus medialis, M. hypoglossus lateralis M. ceratoglossus, M. basibranchialis laryngeus and M. Serpihyoideus.

M. Hypoglossus medialis:

The medial hypoglossal muscle (Fig. 1) is relatively small muscle measuring 13.30 mm long as shown in table (1). It lies mainly ventral to the entoglossal bone and medial to the tendinous part of the M. ceratoglossus. The fibers of this muscle have a longitudinal direction.

This muscle can be subdivided into two parts, a rostral tendinous and a caudal fleshy parts. The tendinous part is flattened dorsoventrally, measures 6.20 mm long, 0.30 mm thick and 1.20 mm wide. The fleshy part is 7.10 mm long, 0.60 mm thick and 1.50 mm wide. Consequently the length of the tendinous and fleshy parts are nearly equal.

The medial hypoglossus muscle has a grossly fleshy origin attaching the ventrolateral aspect of the rostral basibranchial bone. The line of attachment is 4.60 mm long. Caudally, the origin of this muscle is covered partially by M. hypoglossus lateralis.

The tendon of insertion of the medial hypoglossal muscle attaches to the ventral surface of the rostral part of the entoglossal bone about 4.40 mm behind its free end. It lies medial to the insertion of the ceratoglossal muscle.

M. Hypoglossus lateralis:

The lateral hypoglossal muscle lies generally lateral to the preceding muscle, extends between the cornu of the entoglossal bone rostrally and the caudal end of the rostral basibranchial bone caudally. Its fibers run rostrolaterally. The muscle is related ventrally to the ceratoglossal muscle.

This muscle is the shortest lingual muscle in chicken measuring about 8.40 mm in length. The thickness of the muscle is 0.40, 0.70 and 0.90 mm at the origin, the middle and the insertion respectirely. The width of the muscle is 3.00, 2.40 and 2.30 mm at the foregoing levels respectively. These measurements indicate that the muscle is wider at its origin than at its insertion, on the other hand it is thicker at the insertion than at the origin.

The lateral hypoglossal muscle originates from the lateral border and the adjacent area of the ventral surface of the caudal third of the rostral basibranchial bone. The line of

attachment is about 3.30 mm long. Some fibers extend Caudally to be attached in the lateral aspect of the branchial cornu.

The grossly fleshy insertion of the lateral hypoglossal muscle attaches to the caudal aspect of the cornu of the entoglossal bone. The line of attachment is 2.30 mm long and lying lateral to the tendinous part of the ceratoglossal muscle.

M. Ceratoglossus:

The ceratoglossal muscle is the longest lingual muscle in chicken (Fig.1)measuring about 36.80 mm long. It extends between the entoglossal bone rostrally and the caudal part of the ceratobranchial bone caudally.

This muscle can be subdivided into two parts; a rostral tendinous and a caudal fleshy part. The tendinous part is 11.70 mm long, lies on the ventrolateral aspect of the entoglossal bone and the rostral part of the rostral basibranchial bone. It is related medially to the medial hgpoglossal muscle and dorsally to the lateral hypoglossal muscle. The thickness of the tendinous part is 0.50 mm directly rostral to the its junction with the fleshy part and is 0.30 mm immediately caudal to its insertion. Consequently the thickness of this part decreases rostralwards.

The fleshy part measures 26.10 mm long. It lies dorsal to the ceratobranchial bone undercover the serpihyoid and the laryngeal basibranchial muscles. At its middle the thickness of this muscle is 1.10 mm and the width is 1.80 mm.

The ceratoglossal muscle has macroscopically fleshy origin attaching to the dorsomedial aspect of the ceratobranchial bone, and also it extends outwards to be attached to the lateral margin of this bone. The line of attachment is relatively long measuring about 20.50 mm. The muscle is attached to most ofthe foregoing bone except a short caudal part about 5.20 mm long. The medial side of this muscles blends rostrally with the origin of the ceratohyoid muscle.

The tendon of insertion of the ceratoglossal muscle is thin and nearly rounded attaching to the ventrolateral aspect of the entoglossal bone about 6.30 mm caudal to its free tip. It lies medial to the insertion of the medial hypoglossal muscle.

M. basibranchialis laryngeus:

It is a relatively long muscle (Fig. 1) measuring 21.20 mm long and has a longitudinally arranged fibers. The muscle begins rostrally nearly at the level of the transverse row of

lingual papillae, extending caudally underlying the mucous membrane of the rostral part of the pharyngeal floor. Here the muscle is related ventrally to the rostral basibranchial bone and ventrolaterally to the serpihyoid muscle. At the level of the rostral end of the caudal basibranchial bone the muscle continues caudally over the latter bone and the ceratohyoid muscle till reaching the laryngeal region where it terminates.

The right and left muscles begin rostrally close to each other medially and connecting with connective tissue, they stay in this condition till reaching the rostral end of the body of the cricoid cartilage where they diverge. Rostrally, the line of connection between the two muscles is marked ventrally by a groove which is formed due to the projection of the median ridge from the dorsal surface of the rostral basibranchial bone.

The thickness and width of the laryngeal basibranchial muscle from rostral-to caudalwards is 1.50 mm and 1.60 mm immediately caudal to the origin, 1.10 mm and 3.80 mm at the middle of the muscle as well as 0.80 mm and 4.70 mm at the level of cricoid cartilage (at the region of insertion) respectively. These measurements indicate that there is a remarkable increase in the width of the muscle in the direction of the insertion, therefore the width at the insertion is three folds that at the origin. On the contrary, the muscle increases in thickness in the direction of origin therefore its thickness at the origin is about one and half fold that at the insertion.

The laryngeal basibranchial muscle originates from the dorsal aspect of the rostral extremity of the rostral basibranchial bone directly caudal to its junction with the entoglossal bone. The line of attachment is about 1.60 mm long.

The muscle has a different insertions generally into the cricoid cartilage of the larynx. The rostrodorsal insertion attaches to the lateral border of the cartilagenous tip of the cricoid cartilage, This insertion is closely attached to the overlying mucous membrane. The caudodorsal insertion attaches to the dorsolateral aspect of the cricoid wing, here some fibers of this muscle blend with the M. sternohyoideus lateralis. The ventral insertion attaches to the ventral aspect of the cricoid body. In addition to the foregoing insertions, the muscle sends caudally directed fibers to blend with the ventral aspect of the M. sternohyoideus medialis.

M. serpihyoideus:

The serpihyoid muscle (Fig. 1) is relatively long muscle measuring about 25.80 mm long(Table.1). It begins at the caudal process of the mandible rostral to the tendon of

insertion of the M. depressor mandibulae, runs rostroventrally and slightly medially to gain the dorsal aspect of the ceratobranchial bone. Here the muscle courses rostromedially dorsal to the ceratoglossal muscle and undercover the laryngeal basibranchial muscle till reaching the rostral basibranchial bone where it terminates.

The muscle is relatively thin measuring 0.70 mm in thickness and narrow measuring 2.60 mm in width. These dimemsions are taken at the middle of the muscle.

The serpihyoid muscle originates from the lateral aspect of the caudal process of the angular bone of the mandible. The area of attachment is small and lies directly rostral to the distal portion of the M. depressor mandibulae.

This muscle inserts on the dorsl surface of the caudal half of the rostral basibranchial bone lateral to the median ridge. The line of attachment begins immediately rostral to the caudal end of the before mentioned bone and extends rostrally for about 7.10 mm. Shortly before the insertion, a thin connective tissue sheath extends, from the caudal margin of the muscle, caudomedially to terminate on the dorsolateral aspect of the caudal end of the rostral basibranchial bone where it joins the branchial cornu. This sheath connects caudaly the ceratohyoid muscle.

DISCUSSION

In aggrement with the description of *MCLELLAND (1968)* the present work shows that the tongue of chicken has five pairs of muscles. These muscles are called by *NICKEL* et al. *(1977)* as extralingual system of the tongue. The latter authors added that, in the avian tongue there is no internal muscle system analogous to that characteristic structure of the mammalian tongue. In this respect *NICKEL* et al. *(1973) and SISSON (1975)* stated that the lingual muscles of the mammals may be divided into an intrinsic lingual muscle proper and extrinsic muscles. which are three in number. But the latter author added that the distinction between the two groups is more or less conventional, it is evident that much of what may be appear on cross sections of the tongue to be intrinsic muscle is in reality a part of extrinsic musculature.

In the present study the medial hypoglossal muscle inserts in the ventral surface of the entoglossal bone, this result was given also by *MCLELLAND (1968).* While this muscle inserts either in the ventrolateral aspect *(VANDEN BERGE, 1975)* or the lateral border *(NICKEL* et al., *1977)* of the latter bone.

The lateral hypoglossal muscle originates in the present work from the lateral border and the adjacent area of the

ventral surface of the caudal third of the rostral basibranchial bone. This muscle arises either from the ventral surface as reported by *VANDEN BERGE (1975)* or the lateral surface of the same bone as stated by *NICKEL* et al., *(1977)*. According to the current study the aforementioned muscle inserts in the caudal aspect of the cornu of the entoglossal bone. While *MCLELLAND (1968) and VANDEN BERGE (1975)* described this insertion in the ventral aspect of the cornu of the latter bone. But corresponding to the statement of *NICKEL* et al., *(1977)* this muscle terminates on the lateral border of the entoglossal bone.

According to *MCLELLAND (1968) and VANDEN BERGE (1975)* as well as the present study, the laryngeal basibranchial muscle attaches to the rostral basibranchial bone . But *NICKEL* et al , *(1977)* pointed up that this muscle attaches to the entoglossal bone in addition to the above mentioned bone. The latter authors considered the laryngeal basibranchial muscle as the cranial elongation of the sternohyoid muscle. In this condition, the current work indicates that the former muscle blends through some fibers with the lateral and medial sternohyoid muscles. The attachment of the muscle under discussion with the lateral sternohyoid muscle was also reported by *WHITE and CHUBB (1967)*.

The serpihyoid muscle inserts in the examined specimens in the dorsal aspect of the caudal half of the rostral basibranchial bone lateral to the median ridge. However, *MCLELLAND (1968)* mentioned that this muscle ends in the caudal part of the ridge of the foregoing bone,. Moreover, the present work shows that this muscle blends caudally, shortly before its insertion, with the ceratohyoid muscle, a case which was not observed in the obtained literature.

Corresponding to the available references there are different synonyms are used for descripition of the lingual muscles depending upon the relation, origin, insertion, action and direction of the fibers. For example the names of the medial and lateral hypoglossal muscles which are used in this work and by *FUJIOKA (1963)* depend upon the relation of these muscles to each other. Concerning to the direction of the fibers these muscles were named hypoglossus rectus and obliquus (*NICKEL* et al., *1977)*, but depending upon the origin and insertion they were called basibranchialis medialis and lateralis (*MELELLAND, 1968 and VANDEN BERGE, 1975)* respectively. Moreover *BERGER (1966)* described the muscles under discussion as hypoglossus anterior and obliquus. Corresponding to the action, the medial hypoglossus muscle was called depressor glossus *(HARVEY* et al., *1968)*, but the lateral

hypoglossal muscle was named by the latter authors as basientoglossus and by *GHETIE and ATANASUI (1962)* as depressor glossus, In this respect, *NICKEL* et al., *(1977)* stated that the medial hypoglossal muscle pulls down the tongue.

According to the their attachment, the lingual muscles can be classified into two groups. The first group consists of three muscles arising and inserting in the different parts of the hyoid bone, these muscles are medial and lateral hypoglossal, as well as the ceratoglossal muscles. The muscles of this group characterizing by their insertion in the most rostral part of the hyoid bone; entoglossal bone, consequently this group of muscles acts mainly on the apex of the tongue. The second group is represented by twomuscles extending between the hyoid bone and the larynx (laryngeal basibranchial muscle) or the mandible (Serpihyoid muscle). The muscles of the latter group are characterized by their attachment to the rostral basibranchial bone, therefore they act mainly on the root of the tongue.

As observed in this investigation the ceratoglossal muscle is the longest lingual muscle (36.80 mm)in chicken. Because this muscle extends between the most rostral part of the hyoid bone; entoglossal bone, and the most caudal part of the this bone; branchial horn. However, the lateral hypoglossal bone is the shortest muscle (8.40 mm) due to its extension between the most caudal portion of the entoglossal bone and the next bone which is the rostral basibranchial.

As a result from the measurements of the width of the lingual muscles, they can be divided into two classes. The first class includes three wide muscles (2.40-3.80 mm) which are lateral hypoglossal, laryngeal basibranchial and serpihyoid muscles. These muscles are characterized by their attachment to the rostral basibranchial bone. The second class consists of two narrow muscles (1.50-1.80 mm) including the medial hypoglossal and the ceratoglossal muscles. These muscles are characterized by their insertion in the entoglossal bone and their division into a fleshy and tendinous parts. The last character was also reported by *MCLELLAND (1968).*

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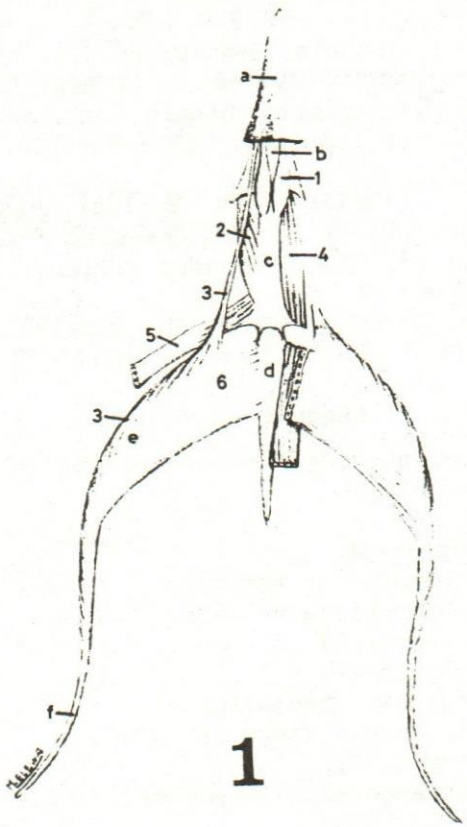
Legends

Fig. (1): A diagram showing the arrangment of the lingual muscles in chicken.

a- Tongue.
b- Os entoglossum.
c- Os basibranchiale rostrale.
d- Os basibranchiale caudale.
e- Os ceratobranchiale.
f- Os epibranchiale.
1- M. hypoglossus medialis.
2- M. hypoglossus lateralis.
3- M. ceratoglossus.
4- M. basibranchialis laryngeus.
5- M. serpihyoideus.
6- M. ceratohyoideus.

Table. 1: Showing the length, thichness and width (in mm) which are taken at the middle of the middle of the studied muscle.

Muscle	Length	Thickness	Width
Medial hypoglossal	13.30	0.60	1.50
Lateral hypoglossal	8.40	0.70	2.40
Ceratoglossal	3.80	1.10	1.80
Laryngeal basibranchial	21.20	1.10	3.80
Serpihyoid	25.80	0.70	2.60



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