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ARTERIA CAROTIS EXTERNA IN THE RABBIT
(With 3 Figs.)

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الشريان السباتى الخارجى في الأرنب

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على عبد القادر

أجرى هذا البحث على عشرة أرانب بالغة من كلا الجنسين وذلك لدراسة منبع ومسار وتفرعات الشريان السباتى الخارجى ، وقد وجد أن الشريان السباتى الخارجى ينشأ من الشريان السباتى العام بعد منشأ الشريان السباتى الداخلى . ويعطى الشريان السباتى الخارجى كلا من الجزغ اللسانى الوجيى والشريانى القذالى وجزغ مشترك للشريان الأذنى الخلفى والشريان الصدغى السطحى . وقد بين البحث أن الشريان الوجيى يعطى على سطح الوجه الشريان الشفوى السفلى ويستمر كالشريان الشفوى العلوى . وقد وجد أيضا من الدراسة أن التفرعات الأذنية الوحشية والوسطى والداخلية تغذى السطح المحدب للغضروف الصيوانى وتتحد بالقرب من قمته . وقد تم مناقشة النتائج مع مثيلاتها في الحيوانات الأخرى

SUMMARY

In rabbit the external carotid artery is the larger of the two terminal branches of the common carotid artery. It detaches the linguofacial trunk, occipital artery and a common stem for the caudal auricular and the superficial temporal arteries, then the parent vessel continues as the maxillary artery. On the surface of the face, the facial artery gives off the inferior labial artery then continues as the superior labial artery. The lateral, intermediate and medial auricular branches ramify on the convex aspect of the auricular cartilage and anastomose near its apex.

INTRODUCTION

During recent years attention has been paid by some investigators to expand the meagre knowledge at hand on the anatomy of the rabbit. Among of these WALKER (1970), THAKUR/PURANIK (1984) as well as AHMED, IBRAHIM & ABDEL-MONEIM (1984). Therefore, the aim of this work is to throw a light on the A. Carotis externa of this animal in comparison with that of the other animals.

MATERIAL and METHODS

This study was carried out on 10 adult balady rabbits of both sexes. They were anaesthetized by chloroform in a suitable glass box and bled through the common carotid artery. Five of these animals were injected with mixture of gum milk latex and Indian ink. Another five specimens were injected with 10% Formalin solution then with red coloured gum milk latex after about one week. The nomenclature used is that adopted by the N.A.V. (1983).

RESULTS**A. carotis externa:**

The external carotid artery (1, 2/3) is the larger of the two terminal branches of the common carotid artery. It arises from the latter artery nearly at the level of the atlantoaxial articulation. It passes rostradorsad in the parotid region medial to the N. hypoglossus and the tendon of origin of the M. digastricus. On reaching the level of the angular process of the ramus of the mandible, the external carotid artery continues its course as the A. maxillaris after detaching a common stem for the A. auricularis caudalis and the A. temporalis superficialis. Along its course, the external carotid artery detaches the Truncus linguofacialis and the A. occipitalis.

Truncus linguofacialis:

The linguofacial trunk (1, 2/4) originates from the ventral aspect of the external carotid artery 0.5 cm rostral to its origin. It passes rostroventrally for about 0.7 cm medial to the N. hypoglossus and the M. pterygoideus medialis, then it divides into the A. lingualis and the A. facialis. Moreover, the linguofacial trunk gives off a thin vessel; the A. pharyngea ascendens (2/5), which distributes in the lateral wall of the pharynx.

A. lingualis:

The lingual artery (2/6) runs rostrally and ventrally dorsal to the hypoglossal nerve then medial to the M. hypoglossus to reach the root of the tongue, where it courses rostrally as the A. profunda linguae between the aforementioned muscle and the M. genio-glossus. The latter artery continues its course in the same direction near the midline of the tongue to terminate 0.3 cm caudal to the free border of its apex by anastomosing with that of the opposite side.

Along its course the lingual artery detaches the A. palatina ascendens and the A. sublingualis. The deep lingual artery gives off 8-9 Rr. dorsales linguae which vascularize the Dorsum linguae, and 4-5 small muscular branches for the muscles of the tongue.

A. palatina ascendens:

The ascending palatine artery (2/7) arises from the dorsal aspect of the lingual artery directly after its origin from the linguofacial trunk. It passes dorsally crossing the lateral aspect of the M. styloglossus to reach the lateral wall of the pharynx where it supplies the pharynx, the soft palate as well as the palatoglossal arch.

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The sublingual artery (2/8) originates from the lingual artery about 1.5 cm rostral to its origin. It courses in a rostroventral direction lateral to the M.genioglossus, and pierces the M.mylohyoideus to gain its lateral aspect. After that, the artery continues its course rostrally medial to the body of the mandible to terminate within the M.mylohyoideus. The sublingual artery detaches the A.submentalis and twigs to the M.genioglossus as well as the Frenulum linguae.

A. submentalis:

The submental artery (2/9) is a weakly developed vessel which arises from the sublingual artery nearly 0.7 cm rostral to its origin. It courses rostrally in the mandibular space along the ventral border of the M.genioglossus to terminate in the skin of the mentum. It was observed that only in one case the submental artery originated from the lingual artery directly rostral to the origin of the sublingual artery.

A. facialis:

After its origin from the linguofacial trunk, the facial artery (2/10) crosses the tendon of origin of the M.digastricus to gain its ventral aspect along which the artery runs rostroventrally till it reaches the level of the last molar cheek tooth. Here the facial artery curves around the ventral border of the body of the mandible. It then passes rostrorodorsally along the rostral border of the M.masseter, crossing the lateral aspect of the M.buccinator to gain its dorsal border where it continues its course as the A.labialis superior.

Along its course the facial artery detaches the R.massetericus, the A.labialis inferior, 4-5 small muscular branches to the Mm. pterygoideus medialis, masseter and buccinator as well as 1-2 Rr.glandulares to the Gl.mandibularis.

R. massetericus:

As the facial artery curves around the ventral border of the body of the mandible it gives off the masseteric branch (1, 2/11). The latter ascends with slight caudal inclination crossing the ventral border of the M.masseter to gain the lateral aspect of its rostroventral portion to ramify within its texture after 2 cm course.

A. labialis inferior:

The inferior labial artery (1, 2/12) originates from the facial artery opposite to the second premolar cheek tooth. It passes firstly in a rostrorodorsal direction dorsal to the homonymous vein and lateral to the caudal portion of the M.depressor labii inferioris. Then it continues its course rostrally along the ventral border of the M.buccinator till reaching the level of the angle of the mouth where it completes its course within the texture of the inferior lip and terminates by anastomosing with that of the opposite side.

Along its course, the inferior labial artery detaches the A.angularis oris, and twigs to the M.depressor labii inferioris, buccinator and mentalis as well as the inferior lip.

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Moreover, in two cases, the inferior labial artery gave off a considerable branch which runs rostrally along the ventral border of the M.depressor labii inferioris to terminate in the inferior lip.

A. angularis oris:

The angular artery of the mouth (1, 2/13) is a small vessel which arises from the dorsal aspect of the inferior labial artery about 1 cm caudal to the level of the angle of the mouth. It passes rostradorsally lateral to the M.buccinator towards the angle of the mouth where it distributes. On the left side of one examined case the A.angularis oris was represented by 2 small vessels.

A. labialis superior:

In accordance to the course and diameter, the superior labial artery (1, 2/14) is considered as the direct continuation of the facial artery. It passes rostrally along the dorsal border of the M.buccinator, and it enters the substance of the superior lip to terminate near the labial fissure.

Along its course the superior labial artery gives off twigs to the Mm.buccinator, levator nasolabialis as well as the superior lip. It anastomoses with the infraorbital artery through 1-2 anastomotic branches; R.anastomaticus cum a. infrorbitali (1, 2/15). Besides, the superior labial artery detaches two small vessels, one of them passes rostradorsally within the superior lip towards the lateral angle of the nostril where it terminates. The other vessel ascends along the labial fissure to distribute within the planum nasale.

A. occipitalis:

The occipital artery (1, 2/16) arises from the external carotid artery 1 cm rostral to the origin of the latter artery. It passes dorsally and slightly cranially medial to the M.sternocephalicus to reach its dorsal border, detaches a caudodorsally directed branch to the M.splenius, and continues its course as the R.occipitalis. Along its course, the occipital artery detaches the A.condylaris and a small muscular branch to the M. sternocephalicus.

A. condylaris:

The condylar artery (2/17) is a weakly developed vessel which originates from the rostral aspect of the occipital artery deep to the M.sternocephalicus. It passes rostral dorsal to the N.hypoglossus then medial to it to enter the cranial cavity through the Canalis nervi hypoglossi where it shares in the vascularization of the Dura mater of the brain.

Along its course, the condylar artery detaches a muscular branch which supplies the Mm.rectus capitis ventralis and obliquus capitis cranialis.

R. occipitalis:

The occipital branch (1, 2/18) is considered as the direct continuation of the occipital artery. It passes rostradorsally on the lateral aspect of the M.semispinalis

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capitis till reaching the poll of the occipital region where it terminates by distributing within the muscles of this region. In one examined case the occipital branch was relatively developed and detached the R.auricularis medialis.

A. auricularis caudalis:

The caudal auricular artery (1,2/19; 3/1) originates by common stem with the superficial temporal artery from the external carotid artery before the latter continues its course as the maxillary artery. It ascends in the parotid region towards the base of the external ear where it detaches the R.auricularis lateralis. After that the parent vessel passes caudodorsally around the base of the external ear for about 1.3 cm where it terminates by dividing into R.auricularis intermedius and R.auricularis medialis. Before the termination of the caudal auricular artery, it detaches two small muscular branches to the Mm. auriculares caudales.

R. auricularis lateralis:

The lateral auricular branch (3/2) passes along the lateral border of the auricular cartilage and terminates near its apex by anastomosing with the A.auricularis intermedius.

During its course the lateral auricular branch detaches 2-3 muscular twigs to the Mm.auriculares caudales as well as side twigs to the lateral part of the external surface of the auricular cartilage and its covering skin.

R. auricularis intermedius:

The intermediate auricular branch (3/3) is the largest terminal branch of the caudal auricular artery. It ascends on the middle part of the convex aspect of the auricular cartilage and terminates about 1 cm from its apex by anastomosing with the medial as well as the lateral auricular branches.

During its course the intermediate auricular branch detaches side branches to the skin covering the convex aspect of the auricular cartilage, moreover, these branches anastomose with the corresponding ones of the lateral and medial auricular branches.

R. auricularis medialis:

The medial auricular branch (3/4) is the smallest terminal branch of the caudal auricular artery. In one case it originated from the R.occipitalis of the occipital artery. The medial auricular branch passes in a rostral direction around the base of the ear to gain the deep aspect of the Scutiform cartilage, leaves the latter cartilage and ascends on the cranial aspect of the auricular cartilage caudal to the tendon of the Mm.scutuloauriculares superficiales to terminate near the apex of the auricular cartilage by anastomosing with the intermediate auricular branch.

During its course, the medial auricular branch detaches the A.auricularis profunda, and anastomoses with the rostral auricular artery. It detaches side twigs to the medial part of the auricular cartilage and its covering skin, besides, it vascularizes the Mm. auriculares rostrales.

A. auricularis profunda:

The deep auricular artery (3/5) originates from the medial auricular branch 0.5 cm rostral to its origin. It ascends on the convex aspect of the auricular cartilage for a short distance, pierces this cartilage to gain its internal aspect, and passes in a dorsal direction undercover the skin where it distributes.

A. temporalis superficialis:

The superficial temporal artery (1, 2/20) passes dorsally and slightly rostrally rostral to the base of the ear for about 1 cm and divides into the A.transversa faciei and the A.auricularis rostralis. Moreover, the superficial temporal artery detaches the A.masseterica as well as 2-3 Rami parotidei to the GI.parotis.

A. masseterica:

The masseteric artery (1, 2/21) originates from the rostromedial aspect of the superficial temporal artery directly before its terminal division. It passes ventrally along the caudal border of the ramus of the mandible to gain the lateral aspect of the M.masseter where it continues its course rostroventrally to terminate within the substance of this muscle.

Along its course the masseteric artery detaches 4-5 side branches to the caudoven-tral portion of the M.masseter, in addition it gives off 2 muscular twigs to the M.ptery-goideus medialis.

A sort of anastomosis between the masseteric artery and the muscular branches of the transverse facial artery as well as the masseteric branch of the facial artery is observed within the texture of the M.masseter.

A. transversa faciei:

The transverse facial artery (1, 2/22) is the largest terminal branch of the super-ficial temporal artery. It passes rostroventrally on the lateral aspect of the M.masseter parallel to the jugal process. About 1 cm caudal to the rostral border of the M.masseter, the artery pierces this muscle and ends within it after dividing into 3-4 terminal branch-es. In addition, the transverse facial artery detaches along its course 4-5 small muscular branches to the M.masseter and several twigs to the skin covering this region.

A. auricularis rostralis:

The rostral auricular artery (1, 2/23) passes dorsally on the rostral aspect of the base of the ear till reaching the rostral border of the scutiform cartilage where it inclines to pass caudomedially undercover this cartilage where it terminates.

During its course the rostral auricular artery furnishes muscular twigs to the M.temporalis and auriculares rostrales. Moreover, it anastomoses with the medial auri-cular branch of the caudal auricular artery.

A.CAROTIS EXTERNA**DISCUSSION**

In agreement to that stated in the rabbit by WALKER (1970) and THAKUR/PURANIK (1984), and in the dog by MILLER, CHRISTENSEN/EVANS (1964) and SIMOENS, DE VOS/LAUWERS (1978-1979) the external carotid artery in the present work is the larger of the two terminal branches of the common carotid artery.

The present investigation indicates that, the lingual and facial arteries in the rabbit originate by a common trunk; Truncus linguofacialis from the external carotid artery. However, NICKEL/SCHWARZ (1963) as well as WILKENS/MUNSTER (1981) stated that in carnivores, and pig the lingual and the facial arteries arise separately from the external carotid artery, a case which was also pointed up in the cat by HARRISON (1962) and in the dog by EVANS/DELAHUNTA (1971) as well as GHOSHAL (1975).

In the examined cases of the rabbit the sublingual artery arises from the lingual artery. According to WILKENS/MUNSTER (1981) the sublingual artery also arises from the lingual artery in small ruminants and pig but in the dog from the submental artery. In the latter animal and after MILLER, et al. (1964) as well as SIMOENS, et al. (1978-1979) the sublingual artery originates from the facial artery.

Similar to that reported in the present study the submental artery arises in dog (MILLER, et al. 1964) from the sublingual artery. On the other hand TAYLOR/WEBER (1969) in cat and WILKENS/MUNSTER (1981) in carnivores mentioned that the submental artery originates from the facial artery.

The facial artery on the surface of the face in the dissected specimens of the rabbit detaches the inferior labial artery and terminates as the superior labial artery. In addition to the beforementioned arteries the facial artery in the dog gives off the angular artery of the mouth as recorded by MILLER, et al. (1964) and TELSER (1971). However, in the rabbit the latter vessel originates from the inferior labial artery. In this respect, WILKENS/MUNSTER (1981) stated that in carnivores the facial artery detaches, on the face region, the inferior labial artery, angular artery of the mouth, the superior labial artery and terminates as the angular artery of the eye. A similar description was given in the cat by NICKEL/SCHWARZ (1963).

The superior labial artery arises either from the facial artery as in the present work and carnivores (WILKENS/MUNSTER, 1981) or from the transverse facial artery as in small ruminants or from the buccal artery as in the pig (NICKEL/SCHWARZ, 1963; GHOSHAL, 1975; SIMOENS, et al. 1978-1979 and WILKENS/MUNSTER, 1981).

The current study reveals that, the occipital artery is the second branch of the external carotid artery. On the contrary in the rabbit (WALKER, 1970) and in the dog (MILLER, et al. 1964; WILKENS/MUNSTER, 1981; DYCE, SACK/WENSING, 1987) the occipital artery is the first branch of the external carotid artery. However, in the cat and the pig the latter authors stated that, the occipital artery originates

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from the internal carotid artery immediately after its origin. But according to NICKEL/SCHWARZ (1963) the occipital artery arises from the common carotid artery in the dog or by a common stem with the internal carotid artery from it in the cat.

The caudal auricular and the superficial temporal arteries in the rabbit arise by a common stem from the external carotid artery which continues its course as the maxillary artery. On the other hand, each of them originates separately from the external carotid artery as stated in the cat (HARRISON, 1962), the dog (MILLER, et al. 1964 and EVANS/DELAHUNTA, 1971) and in all domestic animal (WILKENS/MUNSTER, 1981). In addition, BRUCKNER (1909) in the dog, HEESCHEN (1958) in the sheep as well as NICKEL/SCHWARZ (1963) in all domestic animals pointed up that the caudal auricular artery arises directly from the external carotid artery, however, the superficial temporal and the transverse facial arteries originate from the external carotid by a common stem. In this connection, the current investigation shows that the superficial temporal artery terminates by dividing into the transverse facial and the rostral auricular arteries.

Corresponding to that mentioned in the dog by MILLER, et al. (1964) the lateral, intermediate and medial auricular branches of the caudal auricular artery ramify on the convex surface of the auricular cartilage and anastomose with each other near the apex of the ear. SIS (1962) mentioned that the lateral auricular branch in the dog divides into two vessels, in this respect SIMOENS, et al. (1978-1979) reported that this branch is frequently double especially in the cat, a same result was also given in the latter animal by WILKENS/MUNSTER (1981). The present work indicates that the lateral auricular branch is represented by a single vessel. The intermediate auricular branch in the rabbit is the main branch to the auricular cartilage. However, SIS (1962) stated that this branch in the dog did not always continue as a main branch to the apex of the pinna. According to SIMOENS, et al. (1978-1979) the medial auricular branch may arise from the intermediate auricular branch in the cat or deep auricular artery in the dog, but in the rabbit it springs from the caudal auricular artery as reported by WILKENS/MUNSTER (1981) in carnivores.

As the masseter muscle is the largest muscle of mastication in the rabbit (ALAM EL-DIN, IBRAHIM, ABDEL MONEIM/MANSOUR, 1986) the present work shows that this muscle receives its blood supply from three sources which are the masseteric artery of the superficial temporal artery, masseteric branch of the facial artery in addition, the transverse facial artery. The origin of the masseteric artery from the superficial temporal artery was also reported in the dog by MILLER, et al. (1964).

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L.A. BRAHIM, et al.**LEGENDS**

Fig. (1,2): Superficial and deep dissection of the A.carotis externa in the rabbit (Right side).

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| A- M. trapezius | B- M. sternocephalicus. | C- M. sternohyoideus |
| D- M. masseter. | E- M. depressor labii inferioris | |
| F- M. buccinator. | | |
| 1- A. carotis communis, | 2- A. carotis interna, | 3- A. carotis externa, |
| 4- Truncus linguofacialis, | 5- A. pharyngea ascendens, | 6- A. lingualis, |
| 7- A. palatina ascendens, | 8- A. sublingualis, | 9- A. submentalis, |
| 10- A. facialis, | 11- R. massetericus, | 12- A. labialis inferior, |
| 13- A. angularis oris, | 14- A. labialis superior, | |
| 15- R. anastomoticus cum a. infraorbitali, | | 16- A. occipitalis, |
| 17- A. condylaris, | 18- R. occipitalis, | 19- A. auricularis caudalis, |
| 20- A. temporalis caudalis, | | 21- A. masseterica, |
| 22- A. transversa faciei, | 23- A. auricularis rostralis | |
| 24- A. maxillaris | 25- A. infraorbitalis | |

Fig. (3): Diagram showing the distribution of the caudal auricular artery on the convex aspect of the auricular cartilage in the rabbit.

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|--------------------------------|------------------------------|
| 1- A. auricularis caudalis, | 2- A. auricularis lateralis, |
| 3- A. auricularis intermedius, | 4- A. auricularis medialis, |
| 5- A. auricularis profunda. | |

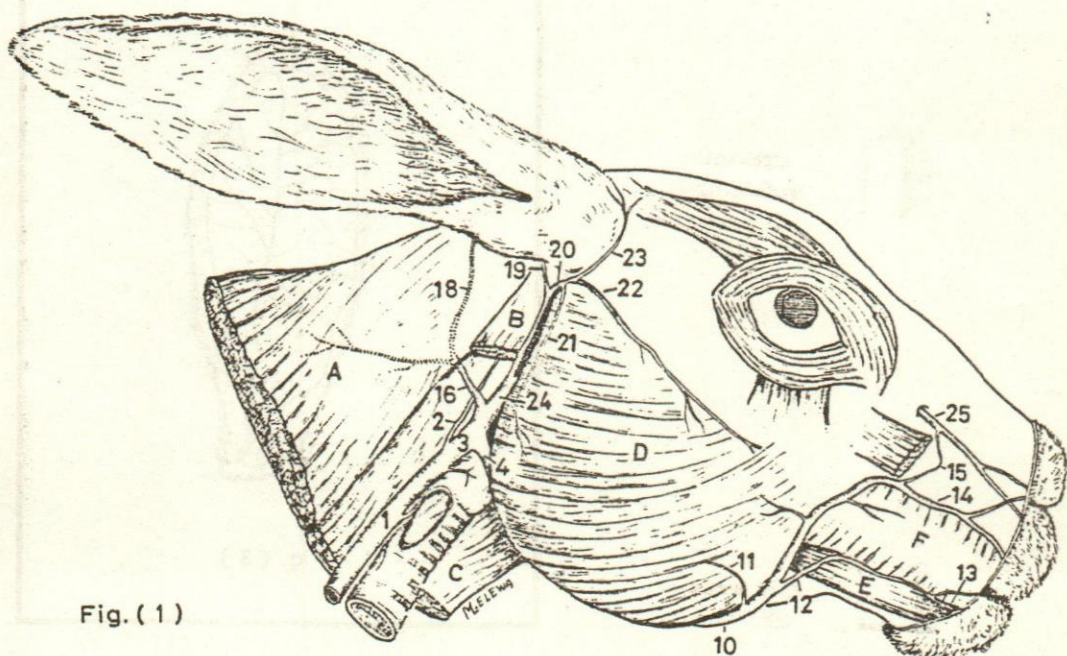


Fig. (1)

