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**THE ARTERIA MAXILLARIS IN RABBIT**  
(With One Table & One Fig.)

By

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الشريان الفقي في الأرنب

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أجري هذا البحث على عشرة أرانب بلدية لدراسة منشأ ومسار وتوزيع تفرعات الشريان الفقي ومن خلال هذه الدراسة اتضح ما يلي : - أن الشريان الفقي هو الاستمرار المباشر للشريان السباتي الخارجي بعد ما يعطى فرع مشترك للشريان الصيواني الخلفي والشريان الصدغي السطحى - ينتهي الشريان الفقى فى الأرنب بانقسامه الى فرعين انتهائيين هما الشريان الحنكى الهابط والشريان تحت الحجاجى - ينشأ الشريان الحنكى المغير من الشريان الفقى مباشرة - ينشأ الشريان الأنفى الوحشى من الشريان تحت الحجاجى هكذا وقد تم مناقشة النتائج المستخلصة مع مثيلاتها فى الحيوانات الأخرى .

**SUMMARY**

The maxillary artery is the direct continuation of the external carotid artery; It can be divided into two parts by the alar foramen; the maxillary artery terminates by detaching the descending palatine and continues as the infraorbital artery. In the present work the lesser palatine artery originates from the maxillary artery and the lateral nasal artery originates from the infraorbital artery.

**INTRODUCTION**

IBRAHIM, *et al.* (1990) gave a detailed study on the A.carotis externa in rabbit. On the continuation of this work the present study aimed to describe the course and distribution of A.maxillaris in rabbit as the available literature lacks any information about this vessel. The obtained results were compared with that of the similar animals.

## MATERIAL and METHODS

This work was carried out on ten adult healthy Balady rabbits of both sexes and of different ages. The animals were firstly anaesthetized by chloroform in a suitable glass box, then bled through the common carotid artery. After complete bleeding the animals were injected by 10% formalin solution for preservation. In order to study the course and distribution of the maxillary artery the animals were injected through the common carotid artery with 60% gum milk latex coloured red and black by bests carmine and indian ink respectively.

The nomenclature used is that adopted by the Nomina Anatomica Veterinaria (1983) as possible.

## RESULTS

### A. maxillaris:

The maxillary artery (1/4) is the direct continuation of the external carotid artery after detaching a common stem for the caudal auricular and the superficial temporal arteries. It passes at first rostradorsally undercover of the M. pterygoideus medialis till reaching the alar foramen through which it emerges to pass in a rostroventral direction lateral to the maxillary nerve and towards the maxillary tuberosity. After that the maxillary artery enters the pterygopalatine fossa where it detaches the A. palatina descendens then continues its course as the A. infraorbitalis.

The maxillary artery can be subdivided by the alar foramen into two parts, the first part before passing through the foramen and the second one after emerging from it.

The first part of the maxillary artery gives off:

### A. alveolaris inferior:

The inferior alveolar artery (1/5) is given off the ventral aspect of the maxillary artery 1.5 cm after its origin. It passes rostroventrally medial to the ramus of the mandible to enter the mandibular canal through the mandibular foramen. Within the canal the inferior alveolar artery courses rostrally following the ventral border of the body of the mandible then it emerges from the canal through the mental foramen as the A. mentalis (1/5'). The latter vessel passes rostrally within the inferior lip to distribute within the texture of the mentum.

During its course within the mandibular canal, the inferior alveolar artery detaches twigs to the roots of the lower cheek teeth and other twigs to the bone of the mandible. In addition, before the parent artery leaves the canal, it gives off small dental

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branches which pass rostrally within the bone of the body of the mandible to terminate at the incisor teeth.

### A. Tympanica rostralis:

The rostral tympanic artery (1/6) is represented by a thin vessel which is given off the dorsal aspect of the maxillary artery 0.5 cm after the origin of the aforementioned artery. It passes dorsally rostral to the Bulla tympanica to enter the middle ear through a small foramen located rostral to the Bulla tympanica.

### Rami pterygoidei:

The pterygoid branches (1/7) are represented by three branches; two of them arise from the maxillary artery 1 cm after the origin of the rostral tympanic artery however, the third one originates by a common stem with the middle meningeal artery. The three branches are distributed within the pterygoid muscles.

### A. Meningea media:

The middle meningeal artery (1/8) springs by a short common stem with the ramus pterygoideus from the dorsal aspect of the maxillary artery. It passes dorsally and slightly caudally to enter the cranial cavity through the Foramen lacerum to supply the cerebral dura mater.

### A. Temporalis profunda caudalis:

The caudal deep temporal artery (1/9) is the largest one among those of the first part of the maxillary artery. It arises from its dorsal aspect before it enters the alar foramen. It passes dorsally rostral to the tempromandibular articulation to enter the texture of the temporal belly of the M. temporalis where it ramifies. Shortly after its origin the parent artery detaches a rostrally directed branch to the orbital belly of the M. temporalis, in addition it gives off two twigs to the M. pterygoideus lateralis.

The second part of the maxillary artery gives off:

### A. Ophthalmica externa:

The external ophthalmic artery (1/10) is a well developed vessel which originates from the dorsal aspect of the maxillary artery directly after its emergence from the alar foramen. It passes in a dorsal direction crossing the lateral aspect of the maxillary nerve, then it curves slightly rostrally to enter the apex of the pyramid of the eye muscles after piercing the periorbita.

### A. Buccalis:

The buccal artery (1/11) arises from the ventral aspect of the maxillary artery about 0.8 cm caudal to the maxillary tuberosity. It courses rostrally ventral to the

zygomatic process of the maxilla to enter the deep aspect of the cheek where it distributes.

About 0.5 cm after its origin, the buccal artery detaches a considerable vessel which passes rostrally lateral to the caudal part of the maxillary tuberosity, then it perforates the wall of this tuberosity and continues for about 1.5 cm where it terminates. This vessel detaches 4-5 small branches to the upper cheek teeth and also 3-4 twigs to the maxilla.

#### **A. Palatina minor:**

The lesser palatine artery (1/12) is a small vessel which arises from the ventral aspect of the maxillary artery directly caudal to the maxillary tuberosity. It passes ventrally and slightly rostrally with its homonymous nerve in a groove ventromedial to the aforementioned tuberosity to terminate in the soft palate.

#### **A. Palatina descendens:**

The descending palatine artery (1/13) is one of the terminal branches of the maxillary artery. It passes rostrally within the pterygopalatine fossa for a short distance till reaches the caudal palatine foramen where it divides into the A.palatina major and the A.sphenopalatina.

#### **A. Palatina major:**

After its origin from the descending palatine artery, the greater palatine artery (1/14) passes ventrally and slightly rostrally through the caudal palatine foramen to enter the palatine canal within which it continues its course in the same direction. It then leaves this canal through the rostral palatine foramen to enter the substance of the hard palate where it courses in a rostral direction accompanied by the corresponding vein and nerve. About 0.5 cm caudal to the incisors the greater palatine artery terminates by anastomosing with that of the other side. During its course, the greater palatine artery detaches side twigs which vascularize the hard palate.

#### **A. Sphenopalatina:**

The sphenopalatine artery (1/15) is the second vessel of the descending palatine artery. It passes rostromedially for a short distance to enter the nasal cavity through the sphenopalatine foramen. Within the nasal cavity, the sphenopalatine artery courses rostrally and slightly medially for about 1 cm then divides into 2 arteries, A.nasalis caudalis and A.nasalis lateralis et septalis.

#### **A. Infraorbitalis:**

The infraorbital artery (1/16) is considered the direct continuation of the maxillary artery. It passes rostrally ventral to the infraorbital nerve to enter the extremely short

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infraorbital canal after passing through the maxillary foramen. After leaving the infraorbital canal, the artery continues its course rostrally lateral to the superior labial nerve, then enters the substance of the superior lip where it terminates. Along its course the infraorbital artery detaches the A.malaris and the A.lateralis nasi. During its course in the canal, the artery gives off 2-3 small dental branches to the upper cheek teeth.

### A. Malaris:

The malar artery (1/17) springs from the infraorbital artery directly after its entrance in the infraorbital canal. It ascends medial to the maxillary tuberosity then inclines slightly caudally to enter the orbit. Within the orbit the artery travels between the periorbita and the rostromedial wall of the orbit towards the medial canthus of the eye where it distributes in the lower and upper eyelids as well as the nictitating membrane. During the course of the malar artery medial to the maxillary tuberosity it gives off a small vessel which runs caudally within the orbit to terminate in the periorbita near its apex. In addition, the malar artery detaches two delicate branches which enter the nasal cavity, one of them passes rostrally for a short distance dorsal to the nasolacrimal duct then terminates within it, however, the other branch supplies the maxillary sinus.

### A. Lateralis nasi:

The lateral nasal artery (1/18) is given off the dorsal aspect of the infraorbital artery about 1.5 cm in front of the infraorbital foramen. It passes rostradorsally under cover the M.levator nasolabialis to reach the lateral nasal region where it distributes.

## DISCUSSION

The present study showed considerable species variation in the sequence in which subsequent branches of the maxillary artery arise, as shown in table (1).

In the present work as in cat (HARRISON, 1962; McCLURE/DALLMAN/GARRETT, 1973) and dog (DYCE/SACK/WENSIG, 1987) the maxillary artery is the direct continuation of the external carotid artery. Moreover, the maxillary artery in rabbit can be subdivided by the alar foramen into two parts, a result which correspond to that recorded in the same animal by WALKER (1970) and THAKUR/PURANIK (1984). However, in dog MILLER/CHRISTENSEN/EVANS (1964) and TELSNER (1971) stated that the maxillary artery attains the pterygopalatine fossa after passing through the alar canal, and may be divided by the canal into mandibular, pterygoid and pterygopalatine portions. On the other hand, the maxillary artery in cat forms a network known as Rete mirabile a.maxillaris near the oval foramen as described by WILKENS/MUNSTER (1981) who added that the main artery itself being traceable through this network as a stouter vessel.

Rabbit	Carnivores	Pig
a.alveolaris inferior	a.alveolaris mandibularis	a.meningea media
a.tympanica rostralis	a.temporalis profunda caudalis	a.temporalis profunda caudalis
rr.ptergoidei	a.tympanica rostralis	rr.pterygoidei
a.meningea media	a.meningea media	a.alveolaris mandibularis
a.opthalmica externa	rete mirabile a.maxillaris (cat)	a.buccalis
a.buccalis	a.temporalis profunda rostralis	a.temporalis profunda rostralis
a.palatina descendens	rr.pterygoidei	a.opthalmica externa
a.infraorbitalis	a.opthalmica externa	a.malaris
a.malaris	a.temporalis profunda rostralis (dogs)	a.infraorbitalis
	a.buccalis	a.palatina descendens
	a.infraorbitalis	a.malaris
	a.palatina descendens.	

**Table 1:** Show the sequence in which subsequent branches of maxillary artery arise in rabbit, carnivores and pig modified after WILKENS/MUNSTER (1981).

In the present work as in cat (HARRISON, 1962; McCLURE/DALLMAN/GARRETT, 1973) and dog (DYCE/SACK/WENSIG, 1987) the maxillary artery is the direct continuation of the external carotid artery. Moreover, the maxillary artery in rabbit can be subdivided by the alar foramen into two parts, a result which correspond to that recorded in the same animal by WALKER (1970) and THAKUR/PURANIK (1984). However, in dog MILLER/CHRISTENSEN/EVANS (1964) and TELSER (1971) stated that the maxillary artery attains the pterygopalatine fossa after passing through the alar canal, and may be divided by the canal into mandibular, pterygoid and pterygopalatine portions. On the other hand, the maxillary artery in cat forms a network known as Rete mirabile a.maxillaris near the oval foramen as described by WILKENS/MUNSTER (1981) who added that the main artery itself being traceable through this network as a stouter vessel.

DAVIS/STORY (1943) in cat and SIMOENS/DE VOS/LAUWERS (1978-1979) in dog reported that the rostral tympanic artery originates from the maxillary artery and gains the middle ear via petrotympanic fissure, while in rabbit the rostral tympanic artery passes dorsally rostral to the Bulla tympanica and enter the middle ear through a small foramen rostral to the bulla.

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In agreement to that described by BRADLEY/GRAHAME (1948) in dog and GHOSHAL (1975) in pig, the caudal deep temporal artery, in the present work, is detached from the maxillary artery, while in sheep and goat it arises with the rostral deep temporal artery by common vessel from the maxillary artery as reported by NICKEL/SCHWARZ (1963). The temporal muscle in rabbit is divided into temporal and orbital bellies as mentioned by ALAM EL-DIN/IBRAHIM/ABDEL-MONIEM/MANSOUR (1986), accordingly the caudal deep temporal artery in the present work detaches a branch to the orbital belly and other to the temporal belly.

The upper cheek teeth in the examined cases of the rabbit receive their blood supply from two sources, the first one is the dental branches which arise from the infraorbital artery during its course within the extremely short infraorbital canal, however, the second source is through a considerable vessel which originates from the buccal artery. This may be due to the short course of the infraorbital artery within the infraorbital canal, so its dental branches are not enough to vascularize the upper cheek teeth therefore, these teeth need an additional arterial blood supply. In the cat as reported by WILKENS/MUNSTER (1981) the infraorbital canal is also extremely short and therefore the initial part of the infraorbital artery lies ventral in the orbit. They added that, the dental rami in the cat usually perforate the wall of the orbit ventrally. In this respect MILLER, *et al.* (1964) in the dog mentioned that the caudal (posterior) dorsal alveolar artery usually arises from the ventral surface of the infraorbital artery before the latter enters the infraorbital canal. They added that, this artery divides and runs directly to the alveolar canals of the last two molar teeth.

In agreement with that stated in carnivores by WILKENS/MUNSTER (1981) the infraorbital artery detaches in the rabbit the malar and the lateral nasal arteries. The present investigation shows that the infraorbital artery terminates within the superior lip, however, MILLER, *et al.* (1964) mentioned that in the dog the infraorbital artery terminates by dividing into the lateral and the dorsal nasal arteries.

The recent study indicates that the descending palatine artery in the rabbit divides into the greater palatine and the sphenopalatine arteries, however the lesser palatine is detached directly from the maxillary artery. A condition which is recorded in the cat by WILKENS/MUNSTER (1981), but in the other domestic animals as mentioned by the latter authors the descending palatine artery divides into the sphenopalatine, lesser palatine and the greater palatine arteries. Moreover, the independent origin of the lesser palatine artery from the maxillary artery was also reported in the dog by MILLER, *et al.* (1964).

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Fig. (1): Deep dissection of the lateral aspect of the face of rabbit.

- |                          |                                   |
|--------------------------|-----------------------------------|
| 1- A.carotis communis.   | 2- A.occipitalis.                 |
| 3- A.carotis externa     | 4- A.maxillaris.                  |
| 5- A.alveolaris inferior | 5'- A.mentalis                    |
| 6- A.tympanica rostralis | 7- Rami pterygoidei               |
| 8- A.meningia media.     | 9- A.temporalis profunda caudalis |
| 10- A.opthalmica externa | 11- A.buccalis                    |
| 12- A.palatina minor.    | 13- A.palatina descendens         |
| 14- A.palatina major     |                                   |
| 15- A.sphenopalatina     | 16- A.infraorbitalis              |
| 17- A.malaris            | 18- A.lateralis nasi              |

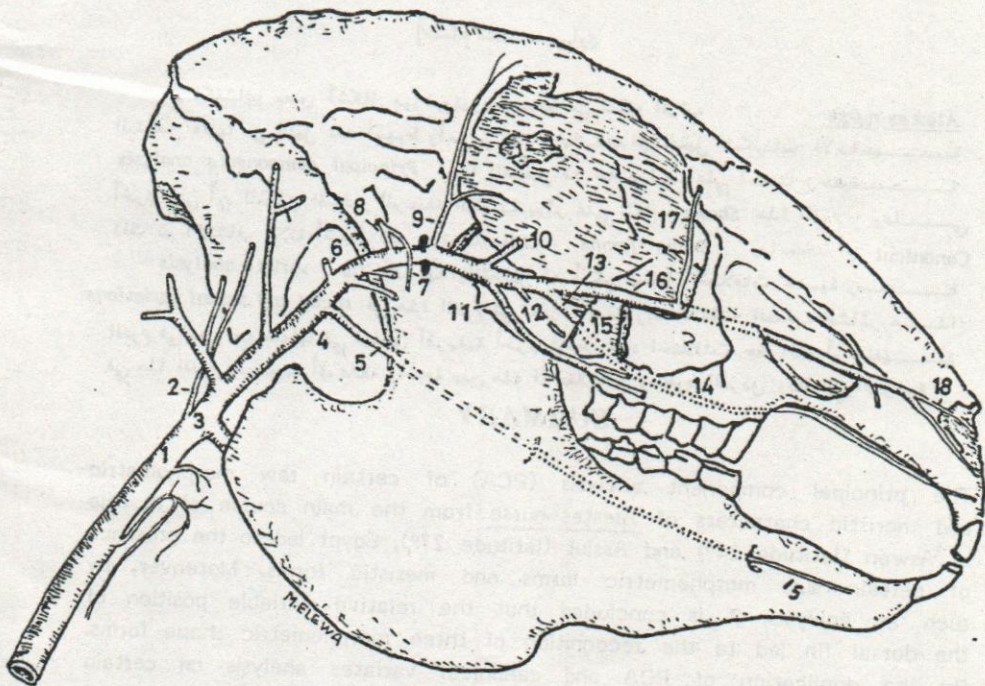


Fig. ( 1 )