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منشأ وتوزيع الشرايين بين الضلعية الظهرية فى البغل

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يبلغ عدد الشرايين بين الضلعية الظهرية فى البغل سبعة عشر زوجا ، ينشأ الزوج الأول من الشريان العنقى الفائر والثانى من الشريان اللوى الظهرى ومن الثالث الى الخامس من الشريان بين الضلعي العلوى . أما باقى الشرايين بين الضلعية الظهرية فانها تخرج من الابهر الصدرى .

هذا وقد وجد ان الشرايين بين الضلعية الظهرية من الثانى الى الثانى عشر أو الثالث عشر تتحد مع الفروع بين الضلعية البطنية الناشئة من الشريان الصدرى الداخلى أو الشريان العضلى الحجابى ، أما الشرايين بين الضلعية الظهرية من الثالث عشر أو الرابع عشر الى الاخير فانها قبل أن تصل الى القوس الضلعي فان كل منها ينقسم الى فرع امامى وفرع خلفى ، يتصل الفرع الامامى للشريان الثالث عشر مع الشريان العضلى الحجابى ، اما الفرع الخلفى فانه يتصل بالفرع الامامى للشريان بين الضلعي الظهرى الرابع عشر وهكذا تتصل الافرع الامامية والخلفية مكونة اقواسا ومن الجهة المحدبة لكل قوس تنشأ افرع عضلية حيث تغذى وتنتهى فى العضلة البطنية المستعرضة .

هذا ويخرج من الشرايين بين الضلعية الظهرية من الخامس الى الاخير فروعا تنتظم فى ستة صفوف لتغذية الجلد فى منطقة الصدر .

## DORSAL INTERCOSTAL ARTERIES, ORIGIN AND DISTRIBUTION IN MULE (WITH ONE FIGURE)

BY

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### SUMMARY

The origin and distribution of the dorsal intercostal arteries in mule were completely examined. The differences between mule and other domestic animals specially horse were discussed. In addition, the distribution of the lateral cutaneous branches of the dorsal intercostal arteries and the vasculature of the thoracic wall were examined.

### INTRODUCTION

The vasculature of the thoracic and abdominal wall was studied by BRADLEY (1947) in horse, SUZUKI (1961) in dog, SEIDLER (1964) in cattle as well as ROOT and TASHJIAN (1971) in calves. However, the vasculature of the thoracic wall and the distribution of the dorsal intercostal arteries in the mule was not examined. The aim of this work is to give complete study on the intercostal arteries.

### MATERIAL AND METHODS

This work was carried out on ten adult healthy mules. The animals were bled and injected at first with 10% formalin solution, after about one week the animals were reinjected by gum milk (Latex) colored with Vulkanosol red through the common carotid artery. The nomenclature used in this work is that adopted by the *Nomina Anatomica Veterinaria* (1973).

### RESULTS AND DISCUSSION

The dorsal intercostal arteries are represented by seventeen pairs.

#### A. intercostalis dorsalis I:

The first dorsal intercostal artery is detached from the deep cervical artery (1/8) similar to that stated by GHOSHAL (1975) in horse, WILKENS and MUNSTER (1976) as well as LESBRE (1903) and ATTIA (1980) in camel. In ruminants the artery arises from the supreme intercostal as stated by WILKENS and MUNSTER (1976). It forms a gentle dorsally directed curve to descend along the caudal border of the first rib and is distributed in the intercostal muscles and pleura.

#### A. intercostalis dorsalis II:

The second dorsal intercostal artery (1/9) arises from the dorsal scapular artery (1/7) similar to that found in horse and pig as stated by WILKENS and MUNSTER (1976) and SIMOENS ET AL. (1979).

#### Aa. intercostales dorsales III - V:

The third to the fifth dorsal intercostal arteries (1/10) arise from the supreme intercostal artery (1/6) similar to that found in horse and pig as stated by WILKENS and MUNSTER (1976) as well as SIMOENS ET AL. (1979). The second to the fifth arteries pass ventrally between the intercostal muscles, then descend subpleurally along the caudal border of the corresponding ribs between the homonymous vein cranially and nerve caudally. They join the corresponding postcostal branches of the second to the fifth ventral intercostal branches. Muscular branches are detached to the intercostal muscles and serratus ventralis thoracis as well as twigs to the pleura and ribs.

Aa. intercostales dorsales VI-XVII:

The sixth to the last dorsal intercostal arteries ( 1/10 ) originate separately from the dorsal aspect of the thoracic aorta. In seven examined cases, the right and left sixth and seventh dorsal intercostal arteries arose by a stem vessel and in two cases, a stem vessel was found for each pair from sixth to ninth dorsal intercostal arteries. In one specimen a stem vessel for both right and left sixth and seventh dorsal intercostal arteries was seen. The sixth dorsal intercostal artery passes craniodorsally while those from the seventh to the last are directed caudodorsally lateral to the body of the corresponding vertebra. Each vessel descends between the intercostal muscles in the proximal fourth of the corresponding intercostal space, and continues subpleurally along the caudal border of the corresponding rib. The sixth dorsal intercostal artery joins the R. postcostalis of the sixth ventral intercostal branch, while the seventh to the twelve or thirteenth ones join the corresponding ventral intercostal branches of the musculophrenic artery. A similar union between the dorsal and ventral intercostal vessels was described by SEIDLER (1966) in cattle and ATTIA (1980) in camel. Each of the last five (in six cases) or four (in four cases) dorsal intercostal arteries terminates about 2 cm proximal to the costal arch by dividing into a cranial and a caudal branch. These branches join each other to form arches. (1/16). The first arch is formed between the musculophrenic artery and the cranial branch of the 13th dorsal intercostal artery, while the last one is formed between the caudal branch of the last dorsal intercostal artery and the cranial branch of the costoabdominal artery. From the convexity of each arch a muscular branch (1/17) to the transverse abdominal muscle is detached. The arches formed by the last five or four dorsal intercostal arteries are not mentioned in other domestic animals (WILKENS and MUNSTER 1976). Each dorsal intercostal artery detaches a dorsal branch while each of the last five arteries, in addition to the dorsal one, gives lateral cutaneous and phrenic branches.

Rr. dorsales:

The dorsal branches of the dorsal intercostal arteries ( 1/11 ) are represented by seventeen pairs. The first thoracic spinal and a muscular branch which originates from the deep cervical artery. The second to the fifth dorsal branches arise separately from the supreme intercostal artery. In only two specimens the 2nd dorsal branch arose either from the dorsal scapular artery or the costocervical trunk. The last dorsal branch arises from the costoabdominal artery, while the rest of the dorsal branches originate from the corresponding dorsal intercostal arteries. Each dorsal branch emerges from the thoracic cavity through the proximal end of the corresponding intercostal space, except the last one which emerges between the last rib and the first lumbar transverse process. During its course, each dorsal branch detaches the spinal, interspinous and a muscular branches to the levator costarum muscles then pierces the longissimus thoracis muscle to supply the over lying skin as a medial cutaneous branch.

R. spinalis:

The spinal branch ( 1/12 ) is detached opposite to its corresponding thoracic intervertebral foramen. It passes medially to gain the vertebral canal through the before mentioned foramen to share in the vasculature of the spinal cord and its meninges.

R. interspinosus:

Each dorsal branch gives off the preceding interspinous one (1/13) about 1/2 cm dorsal to the origin of the spinal branch. Each branch passes craniodorsally crosses the root of its corresponding thoracic spinous process to distribute between it and the preceding one. It supply the multifidus and longissimus thoracis muscle.

Rr. cutanei mediales:

Each of the last twelve dorsal branches continues as a medial cutaneous branch which appears emerging from the substance of the longissimus thoracis muscle. These branches anastomose with the branches of the first row of the lateral cutaneous branches.

Rr. cutanei laterales:

The lateral cutaneous branches are detached from the fifth to the last dorsal intercostal arteries. They are arranged in six regular rows. The first row is detached from the eighth to the last dorsal intercostal arteries and appears between the longissimus thoracis and iliocostal thoracic muscle piercing the cranial and

## DORSAL INTERCOSTAL ARTERIES

caudal serratus dorsalis muscles, it supplies the before mentioned muscles, lumbodorsal fascia and the skin of the region. It is noticed that, the eighth branch is the largest one in this row, moreover, the branches of this row anastomose with the medial cutaneous branches. The branches of the second and third rows are detached from the sixth to the last dorsal intercostal arteries. They supply the serratus ventralis thoracis and latissimus dorsalis and reach the overlying skin. The branches of the fourth and fifth rows are detached from the fifth to the last dorsal intercostal arteries. The fifth and sixth lateral cutaneous branches of these rows penetrate the internal and external intercostal and serratus ventralis thoracis muscle to supply the overlying skin. The rest of the branches pierce only the internal and external intercostal muscles. The lateral cutaneous branches of the last row are given off the fifth to the last dorsal intercostal arteries. The first two branches appear at the interdigitations of the serratus ventralis and external oblique abdominal muscle, while the rest pierce the external oblique abdominal muscle to supply the outer fascia and skin.

Rr. phrenicae:

Each of the last five or four dorsal intercostal arteries detaches a phrenic branch just before its bifurcation. These branches supply the costal part of the diaphragm. Similar phrenic branches were described in camel by ATTIA (1980).

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## LEGENDS

a) Heart, b) pulmonary trunk, c) left auricle, c') right auricle, d) 2nd rib, e) spinous process of 2nd thoracic vertebra.

1) Aortic arch, 1') thoracic aorta, 1'') abdominal aorta, 2) brachiocephalic trunk, 3) left subclavian artery, 4) costocervical trunk, 5) stem vessel for: 6) supreme intercostal artery and 7) dorsal scapular artery, 8) deep cervical artery, 9) 2nd dorsal intercostal artery, 10) 3-5 dorsal intercostal arteries, 10') aortic dorsal intercostal arteries, 11) dorsal branch, 12) spinal branch, 13) inter spinous branch, 14) precostal branch, 15) postcostal branch, 16) arch between 13 - 17) dorsal intercostal arteries, 17) muscular branch, 18) 1st lumbar artery, 19) cranial mesenteric artery, 20) costoabdominal artery.

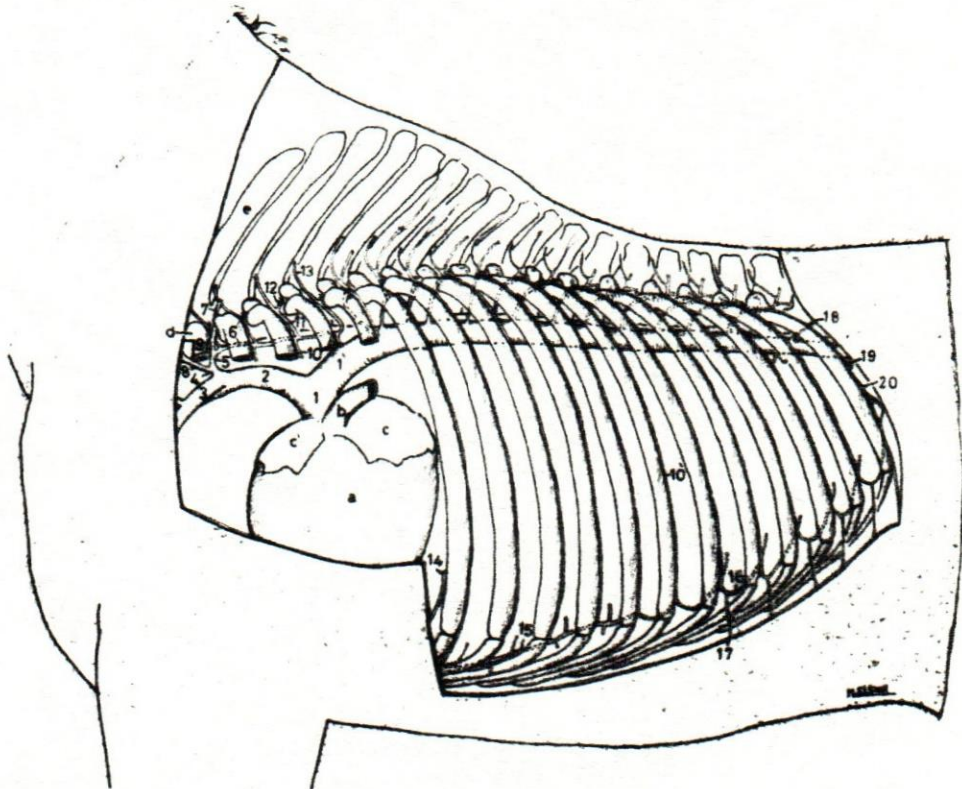


Fig. 1: Dorsal intercostal arteries in Mule