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ORIGIN, COURSE AND DISTRIBUTION OF THE V. AZYGOS DEXTRA IN THE RABBIT

(With 1 Table and 4 Figures)

By

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(Received at 7/1/1991)

منشأ ومسار وتوزيع الوريد الفردي الأيمن
في الأرانب

زين العابدين يادم

تم في هذا البحث دراسة منشأ ومسار وتوزيع الوريد الفردي الأيمن في الأرانب وقد تبين من الدراسة أنه ينشأ من الوريد الأجويف القطني الأيمن عند مستوى الضلع الرابع ويسير على الجانب الظهري الوحشي للأبهر الصدري حتى مستوى الضلع الثامن ثم بعده يسير في خط وسطي بين الأبهر الصدري والفقرات الصدرية حتى ينتهي بين النتوء المستعرض للفقرة القطنية الأولى والحافة الليلية للضلع الأخير وذلك بالوريد القطني الظهري الأول على الجانبين. هذا وقد تبين من الدراسة أن الوريد الفردي الأيمن في الأرانب ينشأ عنه الوريد الشعبي المريء، وهو فردي كما ينشأ عنه أيضا الأوردة الوريدية الظهرية من الخامس حتى الحادي عشر الأخير على الجانبين. وقد لوحظ أن مسار هذه الأوردة تحت الغشاء البلوري يتناقص تدريجيا بينما تنتهي الأوردة من الخامس حتى الثامن على مسافات تقل تدريجيا حتى تقترب من الفراغات بين الغضاريف. هذا وقد ثبت أن تلك الأوردة ينشأ عنها فرع أو فرعين صغيرين لايحدث من خلالها تفاعل مع الأوردة الوريدية البطنية. كما لوحظ أن الأوردة من التاسع إلى الحادي عشر تنتهي في الفراغات بين الغضاريف وينشأ عن كل منها فروع صغيرة يحدث فيما بينها وبين الأوردة الوريدية البطنية تفاعل ملحوظ. كما تشارك هذه الأوردة في تصريف الدم من الحجاب الحاجز والعضلات البطنية المستعرضة والمستقيمة. وقد تم تسجيل مسار هذه الأوردة بدقة ووضعها في الجدول رقم (1) وقد أوضحت الدراسة أيضا أن كل الأوردة الوريدية الظهرية ينشأ عنها فرع ظهري والذي يقوم بدوره في تصريف الدم من العضلات الظهرية لمنطقة الصدر والذي ينشأ عنه أيضا الوريد بين الفقاري. هذا وقد تبين من هذه الدراسة أن الوريد الضلعي البطني الظهري لاينشأ من الوريد الفردي الأيمن بينما ينشأ من الوريد الأجويف الليلي وقد لوحظ أيضا غياب الوريد الفردي النصفي في كل للجالات التي أجريت عليها الدراسة. كما نوقشت هذه النتائج مع ممثلاتها في الحيوانات الأخرى.

SUMMARY

The V.azygos dextra was examined in 15 injected specimens of baladi rabbit. Its origin, course and distribution were fully studied. It releases the V.broncho-esophagea as well as the Vv.intercostales dorsales. V-XI, and terminates caudal to the last rib as V.lumbalis I. The subpleural course of the Vv.intercostales dorsales decreased gradually as far caudad as the last one. Their approach to the interchondral spaces, on the other

hand, is gradually increased from 5th through 8th ones. However, the last three vessels are nestled in these spaces. The course of each one is measured and recorded in table (1). The collateral branches of the former group of veins, reveal no anastomoses, however those of the last three ones present a conspicuous anastomoses with the Vv.intercostales ventrales.

INTRODUCTION

Recently, attention has been paid to the rabbit as an important source of meat production and because of its value in the experimental field of science. However, the meagre informations about the vasculature of different systems in the rabbit, attracted the attention of the author to throw the light on the V.azygos dextra as one of the main venous trunks in this animal.

MATERIALS and METHODS

The present study was carried out on 15 adult baladi rabbit of both sexes and of different ages. They were bled through the A.carotis communis then thoroughly washed by normal saline via the V.femoralis. Eight specimens were freshly injected by blue coloured gum milk latex through the preceding vein. However, the rest of them were previously injected with 10% formalin solution. The specimens were then preserved in formalin solution for 24 hours before dissection was done. The nomenclature used was adopted according to the N.A.V. (1983).

RESULTS

The V.azygos dextra (Figs. 1/1, 2/2, 3/1 & 4/1) arises from the V.cava cranialis dextra (Figs. 1/6 & 2/1) at the level of the 4th rib and crosses the right face of the trachea and esophagus as well as the Aorta thoracica. It traverses the right dorso-lateral aspect of the latter at the 6th and 7th intercostal spaces. At the 8th rib, the V.azygos dextra behaves a median course dorsal to the Aorta thoracica and ventral to the thoracic vertebrae, upto its termination caudal to the last rib as V.lumbalis I. From the 9th rib as far caudad as the last one, the vessel is related laterally to the psoas muscles (Fig. 4/8). It traverses the Hiatus aorticus at the level of the last rib.

Along its course, the V.azygos dextra has the following tributaries:

1- V.broncho-esophagea (Figs. 1/2 & 2/4): is represented by a slender branch springing from the ventral aspect of the parent vessel at the 4th intercostal space. It proceeds cranio-ventrally, soon it splits into bronchial and esophageal branches. In only one case, this vessel stems as two branches.

2- Vv.intercostales dorsales, V-XI of both sides are departed from the dorso-lateral aspect of the V.azygos dextra. They run dorso-laterally to gain the caudal border of the corresponding ribs, accompanied with the homonymous arteries and

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nerves. About 0.7-1 cm. from its origin and just lateral to the corresponding thoracic vertebra, each V.intercostalis dorsalis detaches a ramus dorsalis (Figs. 3/3 & 4/9) which continues to drain the muscles of the dorsal thoracic wall. The ramus dorsalis issues a small V.intervertebralis (Fig. 3/5) which directs medially to gain the vertebral canal via the corresponding intervertebral foramen. In two cases, the V.azygos dextra issues the V.intercostalis dorsalis IV on both sides and in only one case it also detaches the third one on the right side.

The Vv.intercostales dorsales, V-VIII; pursue a gradually decreased subpleural course of about 0.4-1.8 cm. and a gradual approach and termination above the interchondral spaces (0.7-3 cm.). These data are individually expressed in table (1). Each of these vessels sends 1-2 offshoots near its termination. No conspicuous anastomoses could be traced neither with the adjoining ones nor with those of the Vv.intercostales ventrales. The Vv.intercostales dorsales, IX-XI; run dorso-laterally medial to the corresponding psoas muscle to gain its usual site. They pursue a short and a gradually decreased subpleural course (0.1-0.5 cm.) and continues further ventrad to gain the interchondral space. Within the latter, each vessel releases 3-4 small collateral branches which ramify on the costal part of the diaphragm as well as the M.transversus abdominis and M.rectus abdominis. An obvious anastomoses can be recognized peculiarly with those of the Vv.intercostales ventrales.

3- Vv.lumbales I. (Figs. 1/4, 2/7 & 4/4) are paired slender branches representing the caudal termination of the V.azygos dextra. They proceed dorso-laterally to gain an area between the vertebral end of the last rib and the first lumbar transverse process where they behave similar to the preceding Vv.intercostales dorsales. They descend a short distance of about 0.7-1.2 cm. to ramify into 2-3 fine branches to drain the upper portion of the M.transversus abdominis and M.obliquus externus abdominis.

It is worth to mention that:

- (1) The V.hemiazygos could not be observed in all examined cases.
- (2) The Vv.intercostales dorsales I-IV of both sides are stemmed from the V.intercostalis suprema.
- (3) The Vv.costoabdominales dorsales (Fig. 4/5) are not issued from the V.azygos dextra but released from the dorso-lateral aspect of the V.cava caudalis.

DISCUSSION

It was established that the V.azygos dextra in the rabbit was departed from the V.cava cranialis. Such a result was convenient to the findings of GHOSHAL, KOCH and POPESKO (1981) and WILKENS and MUNSTER (1981) in the dog and cat as well as THAKUR and PURANIK (1984) in the rabbit. On the other hand, MILLER, CHRISTENSEN and EVANS (1964) in the dog and SALEH, MOHAMMED and WAHBA (1981) in the rabbit, grey fox and albino rat considered it as the direct continuation of the V.lumbalis mediana. However, TYLOR and WEBER (1956) in the cat revealed that it arose from the junction of several small veins that drained the musculature of the cranial part

of the dorsal abdominal wall.

The present investigation revealed that the V.azygos dextra issued the Vv.intercostales dorsales V-XI of both sides. This was simulated to those of the left side of the rabbit (SALEH *et al.*, 1981), however those of the right side are III-XI. In this respect, THAKUR and PURANIK (1984) in the same animal decided only the four or five caudal ones (VII or VIII-XI). McCLURE, DALLMAN and GARRETT (1973) in the cat, however stated that it received the right and left Vv.intercostales dorsales without limitation to their numbers. On the other hand, GHOSHAL *et al.* (1981) and WILKENS and MUNSTER (1981) observed that the V.azygos dextra detached the Vv.intercostales dorsales III-XII in the cat and IV-XII in the dog.

The present study showed that the V.azygos dextra terminated as Vv.lumbales I. However, GHOSHAL *et al.* (1981) and WILKENS and MUNSTER (1981) in the dog and cat added the Vv.lumbales II. The preceding authors as well as SALEH *et al.* (1981) in the rabbit, grey fox and albino rat decided the detachment of the Vv. costoabdominales dorsales from the V.azygos dextra. A result which was unlike to the present findings, whereas such a vessel was springed from the V.cava caudalis. In the present research, the V.broncho-esophagea was represented by a slender branch. However, GHOSHAL *et al.* (1981) in the dog and cat observed it frequently as paired branches. Furthermore, WILKENS and MUNSTER (1981) in the cat decided that this vessel was only found on the right side and derived from the V.cava cranialis. The absence of the V.hemiazygos presented in the current investigation was in coincidence with the observation of SALEH *et al.* (1981) in the rabbit, grey fox and albino rat. The V.hemiazygos sinistra, on the other hand, could be recorded by WILKENS and MUNSTER (1981) in the dog and cat.

Table (1): Different measurements for the course of the Vv.intercostales dorsales in the rabbit (in cm.).

Vv. intercostales dorsales	Subpleural course	Termination above the interchondral spaces.
v.	1.5 - 1.8	2.5 - 3
VI.	1 - 1.2	1.7 - 2
VII.	0.6 - 0.8	1 - 1.2
VIII.	0.4 - 0.7	0.7 - 1
IX.	0.3 - 0.5	They gain the interchondral spaces where they ramified.
X.	0.2 - 0.4	
XI.	0.1 - 0.3	

LEGENDS

Fig. (1): Diagrammatic representation showing the origin, course and distribution of the V.azygos dextra in the rabbit, *risbtaspect* lateral view:

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1-V.azygos dextra. 2- V.broncho-esophagea. 3- V.intercostalis dorsalis XI. 4- V.lumbalis I. 5- Aorta thoracica. 6- V.cava cranialis dextra.

Fig. (2): Diagrammatic representation showing the origin, course and distribution of the V.azygos dextra in the rabbit, ventral view: 1- V.cava cranialis dextra. 2- V.azygos dextra. 3- V.cava cranialis sinistra. 4- V.broncho-esophagea. 5- V.intercostalis dorsalis V. 6- V.intercostalis dorsalis XI. 7- V.lumbalis I.

Fig. (3): Diagrammatic representation showing the origin, course and distribution of the V.intercostalis dorsalis in the rabbit:

1- V.azygos dextra. 2- V.intercostalis dorsalis. 3- Ramus dorsalis. 4- Collateral branch. 5- V.intervertebrais. 6- Thoracic vertebra.

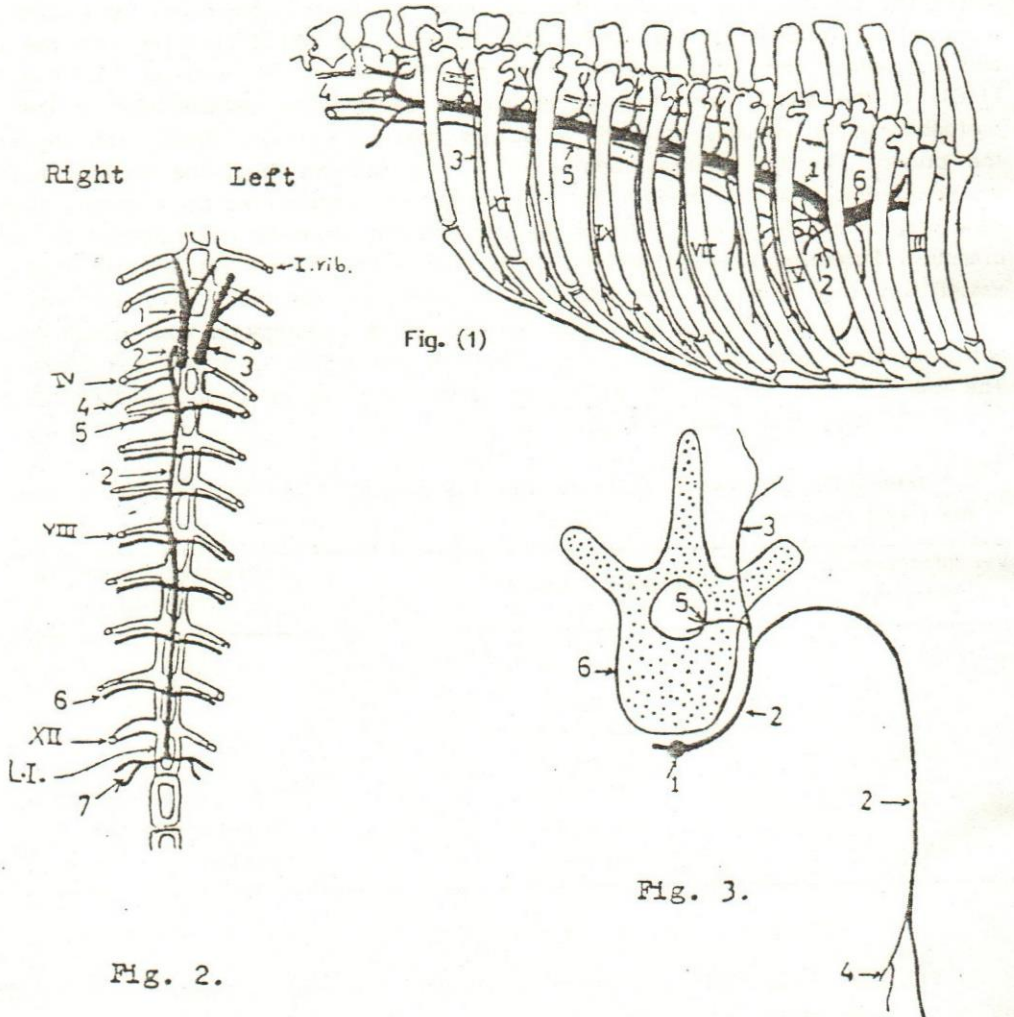


Fig. (4): A photograph, showing the origin, course and distribution of the V.azygos dextra in the rabbit; right side: 1- V.azygos dextra. 2- V.intercostalis dorsalis V. 3- V.intercostalis dorsalis XI. 4- V.lumbalis I. 5- V.costoabdominalis. 6- V.cava caudalis. 7- Aorta thoracica. 8- M. psoas major (cutted). 9- Ramus dorsalis of V.intercostalis dorsalis.

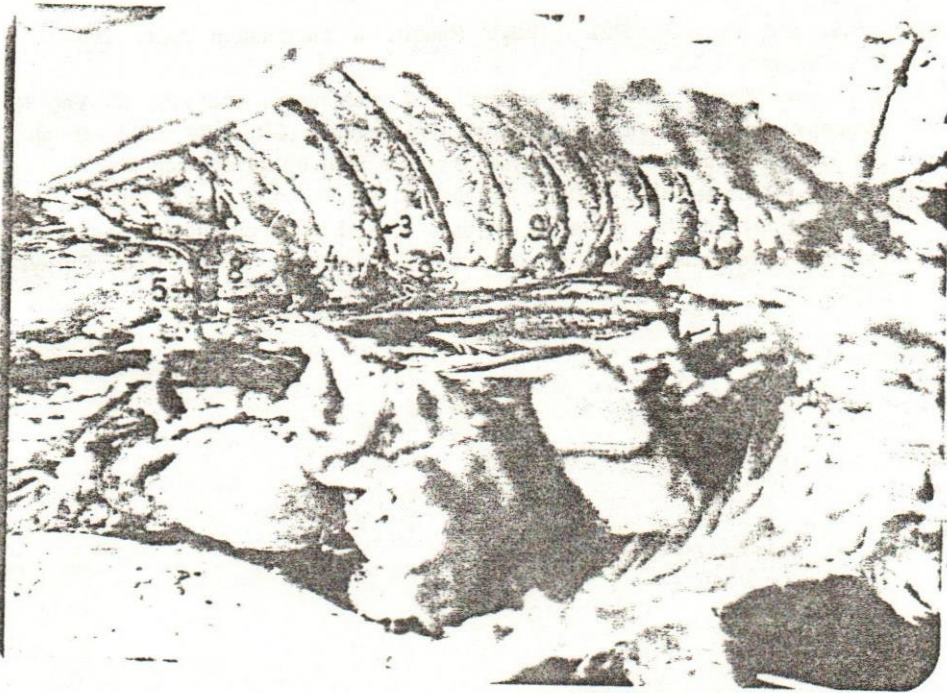


Fig. (4)

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