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الأوعية الدموية والأعصاب للبنكرياس فى الجمل وحيد السنم

صلاح الدين مصطفى ، على الدين هبد الباسط ، سعيد عمار ، محمد أحمد

تمت هذه الدراسة على عشرون بنكرياسا تم احضارهم من السلخانة من جمال فى صحة جيدة .  
ولقد تم حقن الشرايين والأوردة بمحلول المطاط الملون .  
أما العدد العصبى فلقد تم دراستها على ستة جمال بعد اعدادها للتشريح بالطرق التقليدية .  
تم فى هذا البحث وصف العدد الشريانى والرجوع الوريدى وكذلك الأعصاب المغذية للبنكرياس  
وبأتى العدد الشريانى عن طريق الشريان الكبدى والشريان المساريقى الرأسى أما الأوردة  
البنكرياسية فتصب الوريد البابى .  
العدد العصبى للبنكرياس يأتى عن طريق العصب الحشوى الكبير والعصب الحائر ولقد  
نوقشت النتائج وقورنت مع مثيلاتها فى الحيوانات الستأنسة .





BLOOD VESSELS AND NERVES OF PANCREAS OF THE CAMEL  
(CAMELUS DROMEDARIUS)  
(With Two Figures)

By

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SUMMARY

The arterial supply, venous drainage and innervation of the pancreas of the one humped camel were described in detail. The arterial supply comes via A. hepatica and A. mesenterica cranialis, while the venous drainage is mainly to V. portae. The innervation of this organ is through N. splanchnicus major and N. vagus. The results were discussed with other domestic animals.

INTRODUCTION

The pancreas as an endocrine and exocrine organ needs a lot of blood supply in order to perform its function in a good condition. Tracing the literature on this problem in the camel it was found to be meagre. HEGAZI (1945) and YOUSSEF (1973) gave only little knowledge about the blood supply of such organ in common with their description of the coeliac branches in the camel. On the other hand, the nerve supply of the pancreas have not attracted the attention of previous authors. However, our aim in this work is to reveal some anatomical knowledge about the blood and nerve supply of the pancreas in the camel.

MATERIAL and METHODS

Work was carried on 20 organs collected from the slaughter house of Zagazig from the one humped healthy camels. The specimens were gathered with parts of the coeliac and the cranial mesenteric arteries in addition to the radicles of the portal vein. They were thoroughly flushed with normal saline solution prior to their injection with 60% gum milk latex colored with carmine for the arterial injection and ultra marine blue for the venous side. The specimens were then fixed in 10% formalin, 4% phenol and 2% glycerine and carefully dissected after a week preservation. Conformation for this and for the study of the nerve supply was performed on six adult camels in the dissecting room for the post graduate students.

RESULTS

I - The arterial supply of pancreas:

a- Arteries to Corpus pancreatis:

- 1- From the convexity of A. hepatica 2 to 3 small Rr. pancreatici are given (Fig. 1/5,6). They proceed forward through the right part of Corpus pancreatis.
- 2- R. pancreaticus of A. gastrica dextra (Fig. 1/8) is given shortly after it emerges from A. hepatica, proceeds forward to be distributed by 5 or 6 small branches to the left part of Corpus pancreatis.
- 3- Rr. pancreatici of A. gastroduodinalis (Fig. 1/9, 10). Three branches are given to the middle part of Corpus pancreatis. The most caudal one originates at the beginning of A. gastroduodinalis. It supplies Corpus pancreatis (left and middle parts), in addition to accessory part that communicates the left lobe to the body. The middle branch passes ventral to V. portae, supplies the left half of Corpus pancreatis and Annulus pancreatis and terminates into the most cranial part of Lobus pancreatis dexter. The third one (most cranial) supplies the middle part of Corpus pancreatis.
- 4- From the dorsal parietal branch of the right gastropiploic artery (Fig. 1/13, 14, 15) is given several pancreatic branches to the body of the pancreas. They anastomose with the cranial pancreatico duodenal artery.
- 5- R. pancreaticus of A. pancreatico duodinalis cranialis (Fig. 1/11, 12). It turns around its satellite vein



and terminates into the anterior aspect of the right portion of Corpus pancreatis. They anastomose with the preceding branches given from the parietal of the gastroduodenal artery.

b- Arteries to Lobus pancreatis dexter:

- 1- R. pancreaticus dexter of A. hepatica (Fig. 1/9, 10). It is of considerable size measuring about 2 inches, distributed into three primary branches that supply the cranial, middle and posterior portions of Lobus pancreatis dexter. They anastomose with each other and with those of A. gastroduodenalis and A. mesenterica cranialis.
- 2- R. pancreaticus of A. gastroduodenalis (Fig. 1/10). This branch is equal in size to the preceding, supplies the most cranial part of this lobe after traversing the ventral aspect of V. portae and anastomoses with R. pancreaticus dexter of A. hepatica.
- 3- From the first intestinal artery of A. mesenterica cranialis, a branch is given to the middle third of the lobe that anastomose with the right pancreatic branch of the hepatic. The trunk so formed the A. pancreatica-duodenalis passes caudally and gives branch to the caudal portion of the right lobe.

c- Arteries to Lobus pancreatis sinister:

- 1- R. pancreaticus of A. hepatica (Fig. 1/3) is of considerable size, arises singly from A. hepatica in 70% of cases while in 30% originates in common with R. pancreaticus dexter of A. hepatica. It is embedded into the left lobe forming an arch around the V. gastrodineal, the convexity of which faces cranially. It proceeds backward giving dorsal and ventral branches and terminates near the caudal end of this lobe, by joining one of the branches of A. lienalis caudalis.
- 2- Rr. pancreatici of A. lienalis (Fig. 1/22) and A. linealis caudalis are about 6 in number originating either separately or by a common trunk from the parent vessel. They are distributed to the dorsal border and ruminal surface of Lobus pancreatis sinister. They cross the splenic vein alternatively. The first three originates from the A. linealis while the rest from its caudal branch.

II-Venous drainage of Pancreas:

The venous tributaries that drain the pancreas pour their blood into V. portae as it proceeds rostro ventral through Annulus pancreatis. They comprise:

a- Veins from Corpus pancreatis:

- 1- Four to five small Rr. pancreatici drain the middle part of Corpus pancreatis join V. portae (Fig. 2/2) some one formed from 2-3 smaller tributaries.
- 2- From the left half of the Corpus pancreatis (Fig. 2/4) originate 5 to 6 small veins that join V. gastroduodenalis. Some of these veins (1 or 2) may join V. pancreaticodenalis cranialis instead of V. gastroduodenalis.
- 3- From the right half of the Corpus pancreatis (Fig. 2/6) springs 2 small veins that join V. pancreaticoduodenalis cranialis.

b- Veins from Lobus pancreatis dexter:

The venous drainage of this Lobus is divided into a cranial set (Fig. 2/8) consisting of 5 to 6 branches passing directly to V. portae and a caudal group (Fig. 2/18, 19) comprising 3 to 4 veins that join the caudal groups which is the large and joins the first intestinal vein instead of joining the V. pancreaticoduodenalis caudalis. The branches perform a venous plexus into the interlobular C.T. of Lobus pancreatis dexter. The accessory part of the pancreas is drained (Fig. 2/8, 11) by 3 or 4 tributaries that join V. portae.

c- Vein from Lobus pancreatis sinister:

This lobe is drained by a large single vein (Fig. 2/10) embedded in the texture of the gland coursing parallel to its ventral border. It follows the Ductus pancreatis up to the tail of the lobe. It drains the different parts of the lobe through innumerable branches. In the middle of the lobe, it anastomosis with another large branch embedded in the gland substance that joins the trunkus gastrolinalis. At the junction, between the caudal third and fourth of Lobus pancreatis sinister, emerges a large branch (Fig. 2/13, 14, 15) formed from the union of a superficial and deep branches. These unite before joining V. lienalis caudalis by a common trunk and drain the caudal third of this lobe. (Fig. 2/13). As the V. lienalis passes near the dorsal



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border of Lobus pancreatis sinister it receives 2 to 3 rami from the adjacent parts of the corresponding lobe. From the intestinal surface of this lobe is given two pancreatic branches that join V. mesenterica cranialis. This complex venous drainage of the lobus pancreatis sinister is due to the large size and complexity of this lobe as compared to the right one.

## III- Nerve supply of Pancreas:

As all glandular tissue the pancreas is controlled through a neural and a humeral mechanisms. The neural control is through -autonomic innervation via the sympathetic and parasympathetic radicles. The sympathetic nerve reaches this organ through N. splanchnicus major as a post ganglionic fibers from Ggl. coeliace mesentericum. The parasympathetic innervation of the gland is through N. vagus via the same ganglion.

## DISCUSSION

The present work shows a great resemblance to that of HEGAZI (1945) and YOUSSEF (1973) with regard to the arterial supply of the pancreas in camel. Both authors stated that the pancreas is only supplied through A. hepatica. In addition the present investigation added another arterial blood source given from A. mesenterica cranialis via, the first intestinal branch that supply the middle third of Lobus pancreatis dexter which is continued after anastomosing with the right pancreatic branch as the A. pancreatico duodenalis caudalis as being observed by ANDO (1959) MILLER *et al.*, (1965) and CADETE LEITE (1973). However the pancreas of the camel resembles in its arterial blood supply that of the ox in which case the A. coeliaca and A. mesenterica cranialis share in the pancreatic blood supply (RAGHAVAN and KACHROO, 1964; EL HAGRI, 1967; SISSON and GROSSMAN, 1969 and GETTY, 1975).

Concerning the venous drainage of the pancreas of the camel, it was found that the pancreas drained by several tributaries that joins V. portae, V.gastroduodenalis, Vv. pancreaticoduodenalis cranialis et caudalis, V. lienalis, V. mesenterica cranialis and Truncus gastrolienalis. The latter statement was agreed with those given by OMAR (1978) in the same animal. Moreover it appears to be the same as seen in the ox (GETTY 1975) in the horse BRADLEY (1946) and RAGHAVAN and KACHROO (1964) in the dog (BRADLEY, 1959 and VITUMS, 1959). On the other hand, RAGHAVAN and KACHROO (1964) and EL HAGRI (1967) in the ox reported that the pancreas is drained exclusively by V. portae without giving any regional differentiation.

It is to added that the intrapancreatic tributaries in each pancreatic lobe were given in the present investigation.

The pancreatic innervation simulates greatly those of ox and horse as revealed by RAGHAVAN and KACHROO (1964) EL HAGRI (1967) SISSON and GROSSMAN (1969) and GETTY (1975). In addition RAGHAVAN and KACHROO (1964) added that the pancreas of the ox takes its nerve supply also from the splenic plexus.

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## DESCRIPTION OF FIGURES

Fig. (1): The arterial supply of pancreas.

- a) Porta hepatis.
- b) Corpus pancreatis.
- c) Lobus pancreatis dextr.
- d) Lobus pancreatis sinister.
- e) Lobus accessorius.
- 1- A. Coeliaca.
- 2- A. hepatica.
- 3- Rr. pancreaticus of (2).
- 4- Rr. pancreaticus of (2).
- 5- A. hepatica.
- 6- Rr. pancreaticus of (5).
- 7- A. gastrica dextra.
- 8- R. pancreaticus of (7).
- 9- A. gastroduodenalis.
- 10- Rr. pancreatici of (9).
- 11- A. pancreatico-duodenalis cranialis.
- 12- R. pancreaticus.
- 13- A. gastropiploica dextra.
- 14- Rr. dorsalis parietalis.
- 15- Rr. pancreatici of (14).
- 16- R. cranialis parietalis.
- 17- R. ventralis parietalis.
- 18- A. lienalis.
- 19- Rr. pancreatici of (18).
- 20- A. lienalis caudalis.
- 21- Rr. pancreatici of (20).
- 22- A. lienalis cranialis.
- 23- A. mesenterica cranialis.
- 24- A. pancreaticoduodenalis caudalis.
- 25- Rr. pancreatici of (24).
- 26- V. portae.
- 27- V. gastrosplenica.
- 28- V. lienalis of (27).
- 29- V. lienalis caudalis.
- 30- V. lienalis cranialis.
- 31- V. gastroduodenalis.

Fig. (2): The venous drainage of pancreas.

- a) Porta hepatis.
- b) Corpus pancreatis.
- c) Lobus pancreatis dextr.
- d) Lobus pancreatis sinister.
- e) Lobus accessorius.
- f) Spleen.
- g) Duodenum.
- 1- V. portae.
- 2- Rr. pancreatici of (1).
- 3- V. gastroduodenalis.
- 4- Rr. pancreatici of (3).
- 5- V. pancreaticoduodenalis cranialis.
- 6- Rr. pancreatici of (5).
- 7- V. gastropiploica dextra.
- 8- Rr. pancreatici of (1).
- 9- V. gastrolienalis.
- 10- Rr. pancreaticus of (9).
- 11- V. Lienalis.
- 12- V. lienalis caudalis.
- 13- Rr. pancreatici of (12).
- 14- Rr. profundi of (13).
- 15- R. superficialis of (13).
- 16- V. lienalis cranialis.
- 17- V. mesenterica.
- 18- V. pancreatico duodenalis caudalis.
- 19- Rr. pancreatici of (18).

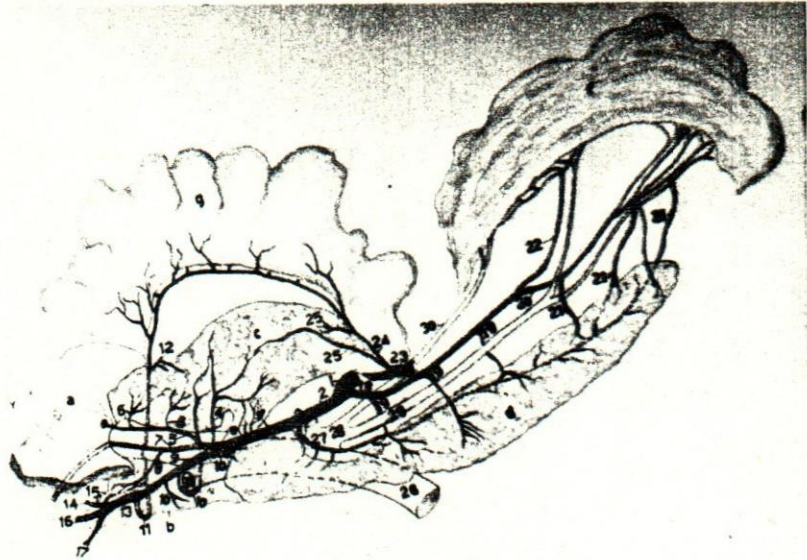


Fig. (1)

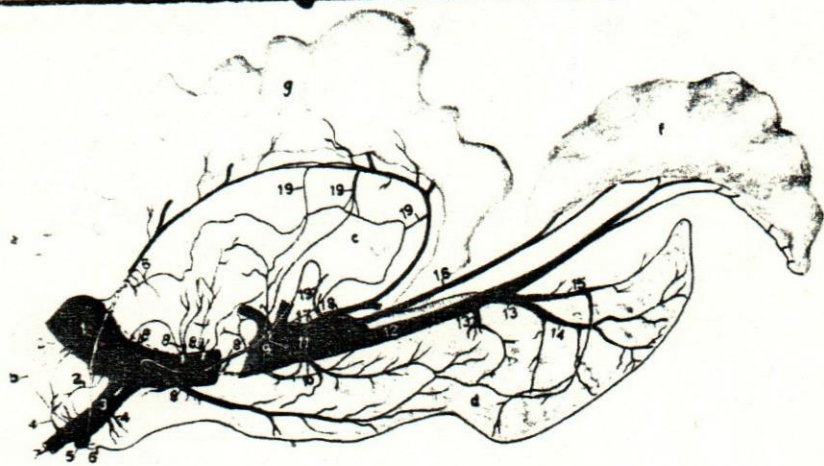


Fig. (2)

