The branches of the arteria celiaca in the porcupine (*Hystrix cristata*)

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ABSTRACT: This study is aimed at an investigation of the A. celiaca and its branches in the porcupine. Nine adult porcupines (5 males, 4 females) were injected a coloured latex mixture from the aortic arch for the demonstration of the arteria celiaca. The results indicated that the A. celiaca gave off the A. phrenica caudalis after approximately 1 cm from its origin. The A. celiaca was divided into two branches as the A. lienalis and A. hepatica. The A. hepatica was a continuity of celiac artery. The ramus pancreaticus, which was the most important artery for pancreas vascularization, arose from the A. lienalis. The ramus gastrolienalis and the Aa. gastricae breves were observed. The first branch of the A. hepatica was the A. gastrica dextra. The thickest branch of hepatic artery was the A. gastrica sinistra that separated two branches: the ramus visceralis and the ramus parietalis. In summary, in the present study the branches of the A. celiaca in porcupines were studied for the first time. The results of this study may contribute to the data in this area of science.

Keywords: arteries; *Hystrix cristata*; celiac artery; porcupine

List of abbreviations: A – arteria, Aa – arteriae

The rodents (*Rodentia*) are the largest order of placental mammals and comprise more than a half of the mammals known at present. The porcupine belongs to the Hystricidae family, which constitutes a small group of the order *Rodentia* (Weichert, 1970; Kuru, 1987; Demirsoy, 1992).

Relatively more information on the arteria celiaca of both domestic (Kneller *et al*., 1972; Cadette-Leite, 1973; Smallwood and Sis, 1973; Dursun, 1996) and laboratory animals (Green, 1963; Cook, 1965; Favre, 1967; Blondeau, 1972; Orsi *et al*., 1977) was published. However, our literature investigation showed that there was no information on the arteria celiaca of porcupines.

Therefore this investigation was focused on the branches of the arteria celiaca in porcupines for the first time to extend the knowledge in this field.

MATERIAL AND METHODS

Nine adult (5 males and 4 females) porcupines were studied. Deep anaesthesia of animals was induced by initial injection of (1.5 cc *i.m.*) cetanes (ketamine HCL) followed by (3.0 cc *i.m.*) rompun (xylazine HCL). Coloured latex was injected into the arcus aorta by opening the thoracic cage after the removal of blood via the a. carotis communis. A dissection procedure was performed after 24 hours in 10% formaline and findings were photographed.

RESULTS

Arteria celiaca (Figures 1 and 2), which was the first main branch of the aorta abdominalis, arose from the ventral wall of the aorta abdominalis. After nearly 1 cm from its starting point, it gave off a thin branch known as the A. phrenica caudalis to the diaphragm. The vessel then coursed to the ventral approximately 4 cm and separated into two main branches: A. lienalis and A. hepatica.

Arteria lienalis (Figures 1–4): Arteria lienalis, after approximately 2 cm from its origin, gave off a branch to the corpus pancreatis known as ramus pancreaticus (Figure 1). The A. diverticuli, which

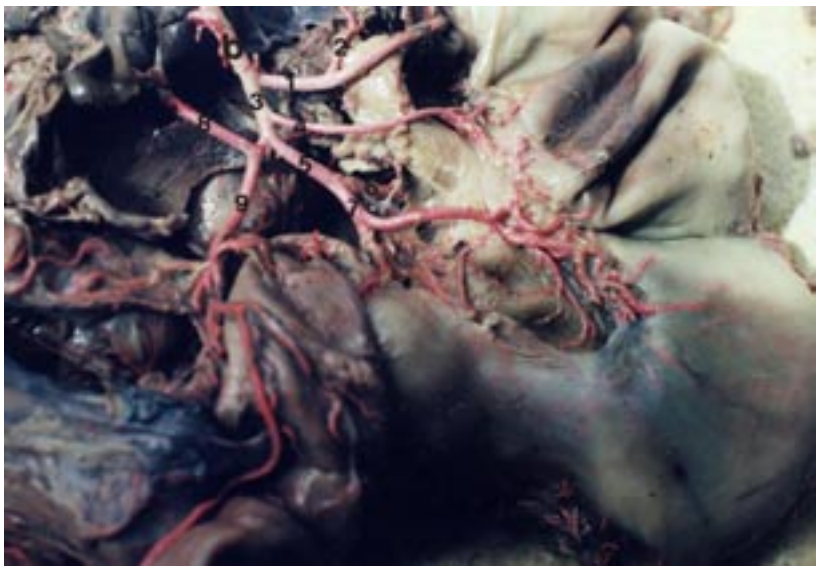

Figure 1. Arteries of the parietal surface of the stomach of the porcupine. b = a. celiaca, 1 = a. lienalis, 2 = r. pancreaticus, 3 = a. hepatica, 4 = a. gastrica dextra, 5 = a. gastrica sinistra, 6 = r. visceralis, 7 = r. parietalis, 8 = a. hepatica (continuation), 9 = a. gastroduodenalis

was observed in two porcupines, arose from the A. lienalis nearly 3 cm after the ramus pancreaticus and the A. diverticuli dispersed to the diverticle of stomach (Figure 2). The A. lienalis gave off another thick branch just before reaching the extremitas dorsalis of the spleen. This vessel, which was known as ramus gastrolienalis, sent one of its thin branches to the beginning part of the curvatura ventriculi major of stomach and the other branches of it dispersed to the hilus lienis (Figure 4).

The A. lienalis gave off the rami lienales to the spleen as well as it sent 9 or 10 thin branches to the curvatura ventriculi major of stomach, which are named the Aa. gastricae breves (Figure 3). The A. lienalis after from the extremitas ventralis of the spleen through to the curvatura ventriculi major of the stomach named as the A. gastroepiploica sinistra. The A. gastroepiploica sinistra ended at the last part of the fundus ventriculi by anastomosing with the A. gastroepiploica dextra of the A. gastroduodenalis, which arose from the A. hepatica.

Arteria hepatica (Figures 1 and 2): This vessel was observed as the continuity of the A. celiaca. The A. gastrica dextra was the first branch of the A. hepatica and it was a thin vessel (Figure 1). This artery dispersed to the facies parietalis of the cardia ventriculi and just above the cardia it anastomosed with a thin branch of the A. gastrica sinistra, originating from the ramus parietalis.

The A. gastrica sinistra, the thickest branch of the A. hepatica, arose from 2–3 mm after the A. gastrica dextra (Figures 1 and 2). The main artery

Figure 2. Arteries of the visceral surface of the stomach of the porcupine. b = a. celiaca, 1 = a. lienalis, 2 = a. diverticuli, 3 = a. gastrica sinistra, 4 = r. visceralis, 5 = a. gastroduodenalis, 6 = a. gastroepiploica dextra, 7 = a. pancreaticoduodenalis cranialis, 8 = a. hepatica, 9 = ramus sinister, 10 = ramus dexter

Figure 3. Lienal artery and its branches of the porcupine. 1 = a. lienalis, 2 = aa. gastricae breves, 3 = rr. lienales

of the stomach was the A. gastrica sinistra, which separates into two branches as the ramus visceralis and ramus parietalis. The ramus visceralis dispersed to the visceral surface of the stomach and the ramus parietalis dispersed along to the distal of the parietal surface of the stomach by giving off thin branches (Figure 1).

The A. hepatica, just after giving off the A. gastrica sinistra, gave off the A. gastroduodenalis, which is a thick artery (Figures 1 and 2). The A. gastroduodenalis separated into two branches on the ampulla duodeni. One of these branches was the A. gastroepiploica dextra, which dispersed to the curvatura ventriculi major of the stomach. The other branch of the A. gastroduodenalis was the A. pancreaticoduodenalis cranialis (Figure 2). While this vessel sent some of its thin branches to the corpus pancreatis, it also sent a lot of thin branches to the duodenum descendens. The A. pancreaticoduodenalis cranialis ended by anastomosing with the A. pancreaticoduodenalis caudalis on the flexura duodeni caudalis.

After occurring the A. gastroduodenalis, the A. hepatica gave off two branches that are named as the ramus dexter and ramus sinister just before reaching the porta hepatis. These branches dispersed to the liver. The A. cystica and the A. lobi caudati arise from the ramus dexter in porcupines (Figure 2).

All of these findings were consistent both in female and male porcupines.

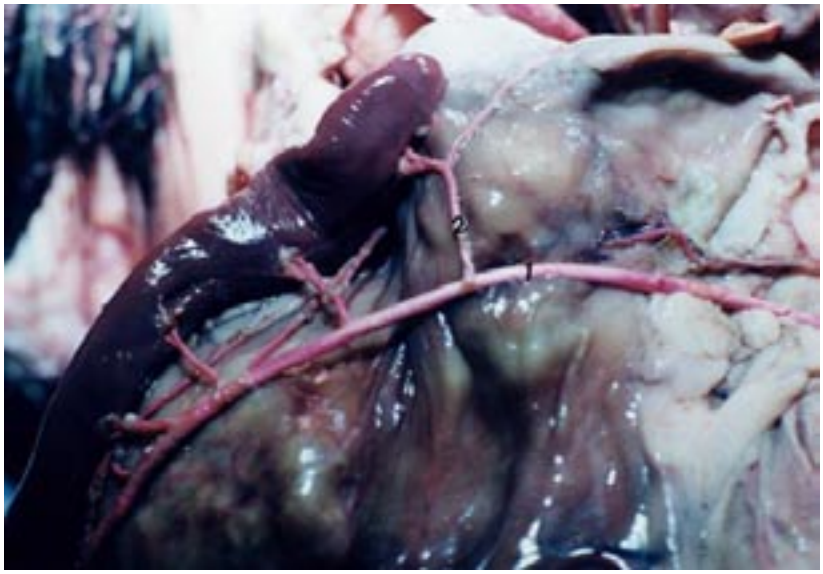

Figure 4. Lienal and gastrolienal artery of the porcupine. 1 = a. lienalis, 2 = r. gastrolienalis

DISCUSSION

Arteria phrenica caudalis arises from the arteria celiaca in pigs, cats (Nickel *et al*., 1981) and badgers (Yilmaz *et al*., 2003) while arising from the aorta abdominalis in rabbits (Perneczky, 1969; Cakir 1991). According to the results of the present study, the origin of the A. phrenica caudalis was the A. celiaca, which was similar to pigs and cats.

It was reported that the A. celiaca separated into three branches in the hamster (Orsi *et al*., 1977), and in the equids, ruminants and carnivores (Getty, 1975; Yilmaz *et al*., 2003) as the A. gastrica sinistra, A. lienalis and A. hepatica. On the other hand, the A. celiaca separates into two branches in rats and pigs as the A. lienalis and A. hepatica (Green, 1963; Nickel *et al*., 1981). In the porcupines, as observed in the present study, the A. celiaca separates into two branches as the A. lienalis and A. hepatica, which was similar to the rat and the pig.

The ramus pancreaticus was an artery reported only in the pig as two branches (Nickel *et al*., 1981) and in the guinea pig as one branch (Perneczky, 1969). While this artery dispersed to the caudal part of the pancreas in guinea pigs (Perneczky, 1969), it also dispersed to the left lobe of the pancreas in pigs (Nickel *et al*., 1981). In the porcupines, only one ramus pancreaticus was observed and it dispersed to the every part of the organ starting from the corpus of the pancreas.

Although the ramus gastrolienalis was previously known to exist only in pigs (Getty, 1975) and guinea pigs (Perneczky, 1969), we also observed that it was present in porcupines.

It was emphasized that the A. lienalis in pigs sends a vessel that was called the A. diverticuli, and it was dispersed to the diverticle of the stomach. This vessel is suggested only in pigs (Getty, 1975; Nickel *et al*., 1981). According to the results of this study, the A. diverticuli was found in three porcupines.

The rami lienales were reported to be divided into two or three branches before entering the hilus lienis of spleen in rabbits (Blondeau, 1972) and carnivores (Evans and Christensen, 1971; McClure *et al*., 1973; Dursun, 1996). Similar observations were also reported in porcupines.

While the A. hepatica separates into two branches just before reaching the porta hepatis in the equids, ruminants (Nickel *et al*., 1981) and rabbits (Cakir, 1991), it separates into three branches in the carnivores and pigs (Nickel *et al*., 1981). The A. hepatica in porcupines separates into two branches above to the porta hepatis, similarly like in the equids, ruminants and rabbits.

The A. gastrica sinistra arises from the A. lienalis in pigs (Getty, 1975), from the A. gastrolienalis in guinea pigs (Favre, 1967; Perneczky, 1969; Shively and Stump, 1975), from the A. celiaca in rabbits (Craigie, 1948) and other domestic animals (Getty, 1975; Nickel *et al*., 1981). In porcupines, this vessel originated from the A. hepatica.

In the equids (Nickel *et al*., 1981) and rabbits (Cakir, 1991) it is reported that the A. gastrica sinistra ends by separating into three branches: ramus visceralis, ramus parietalis, and ramus esophageus. According to the results of the present study, in porcupines the A. gastrica sinistra is divided into two branches as the ramus visceralis and ramus parietalis. However, the ramus esophageus was not observed.

In conclusion, the results of the present study represent the first report on the arteria celiaca of porcupines and may contribute to present knowledge in this field.

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