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Celiac trunk and the variability of its branches in goats

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Abstract

Celiac trunk and the variability of its branches studied in ten goats of different age and sex and weighing about 20-30 kg. During dissections, celiac trunk was originated separately from the ventral aspect of abdominal aorta by 0.5 to 1 cm before the origin of cranial mesenteric artery at the level between the first and second lumbar vertebrae, while in one case it was arisen from abdominal aorta by common stem about 2 cm in length 0.5 cm in width with cranial mesenteric artery. Celiac trunk gave rise to hepatic, splenic and left gastric arteries. The significant variability of these branches was discussed. Such as left ruminal artery, reticular artery and hepatic artery showed variations, deviations in their branching and distribution. It was also established that the left ruminal artery was much more frequently the branch of splenic artery than of left gastric artery. Reticular artery arose two variants were observed, most frequently this artery was shown to be the branch of left ruminal artery in most cases and left gastric artery in one case. There was an obvious variability where a hepatic branch was detached from left gastroepiploic artery in one case.

Key words: Anatomy, Celiac trunk, Goat, Variation.

INTRODUCTION

The celiac trunk is a wide, ventral visceral branch of the aorta arising from just below the aortic hiatus above the pancreas. The celiac trunk supplies the liver, stomach, pancreas and upper part of the duodenum, variations of these arteries and their relationship to surrounding structures are, therefore, of particular importance from a surgical perspective[7, 16] in ruminant[6, 15, 22] in human. The trifurcation of celiac trunk into three common branches are left gastric, splenic and hepatic arteries [9, 12, 16, 20] in ruminant [4, 5, 19, 22] in humans. Many patterns of variations of celiac trunks have been described. In rare cases, the celiac trunk and superior mesenteric artery may be fused with a celiaco-mesenteric trunk [3, 17] in sheep [1, 4, 6, 8, 11] and in humans. The aim of this study is to describe the variations observed in celiac trunk branches.

MATERIALS AND METHODS

Our study was conducted on ten Egyptian Baladi goats of different ages and sex and weighing between 20 kg and 30 kg.

Routine dissection of celiac artery

Ten goats under study after being bled were injected by the ordinary routine method of preservation using 10% formalin, 2% phenol and 1% glycerin. To study the course and distributions of arteries goats were injected with gum milk latex coloured red with carmine stain via the common carotid artery [21]. Then muscles were being removed and the abdominal cavity was opened, the course and variability of arteries were followed, investigated and photographed.

Radiographic study

One live goat was subjected to lateral radiography by using the urograffin as contrast materials. It was employing 25-40 KV energy source along with a current of 12-20 million pers for 0-2 second's diandon a distance of 60-80 cm.

RESULTS

Celiac trunk (Fig. 1/2 & Fig. 7) was originated separately from the ventral aspect of abdominal aorta by 0.5 to 1 cm before the origin of cranial mesenteric artery at the level between the first and second lumbar vertebrae, while in one case it was arisen from abdominal aorta by common stem about 2 cm in length 0.5 cm in width with cranial mesenteric artery (Fig. 2/14). Celiac trunk was passed ventrally and curved cranially between rumen and pancreas on the left and the right crus of diaphragm and caudal vena cava on the right, after about 1cm long celiac trunk was divided into main three branches hepatic, splenic and left gastric arteries.

Hepatic artery (Fig. 1/3 & Fig. 2/4) originated from celiac trunk and proceeded cranioventrally and crossed caudal vena cava and passed with portal vein toward porta hepatic where it gave off the following branches:

Cystic artery (Fig. 1/6 & Fig. 5/2) which was arisen from hepatic artery, it was divided into two cranial branches(Fig. 1/7) ramified on the wall of gall bladder(Fig. 5/3a) and cystic duct(Fig. 5/3b) and one caudal branch (Fig. 1/8) ramified in the distal 2/3 of the right lobe of liver.

Right branch (Fig. 1/9&Fig. 5/5) was divided into two branches one to the caudate lobe and one to the right lobe of liver.

Left branch (Fig. 1/10 & Fig. 5/6) was considered the largest branch of hepatic artery. It run cranioventrally along the visceral surface of liver and gave off three branches to papillary process (Fig. 1/11), quadrate (Fig. 1/12) and left lobes (Fig. 1/13) and it gave off right gastric artery (Fig. 1/14) in all cases under study, where the right gastric artery passed in the lesser omentum along

the duodenum to the lesser curvature of the abomasum and anastomised with left gastric artery (Fig. 1/15 & Fig. 2/16).

Gastroduodenal artery (Fig. 1/16) was the terminal branch of hepatic artery. It was divided into cranial pancreaticoduodenal (Fig. 1/17) and right gastroepiploic (Fig. 1/18) arteries. Cranial pancreaticoduodenal artery was run caudally between the right lobe of pancreas and duodenum where it anastomized with the caudal pancreaticoduodenal of cranial mesenteric artery. While right gastro epiploic artery passed ventrally and crossed the medial surface of duodenum and passed in the lesser omentum on the greater curvature of abomasum and anastomized with the left gastroepiploic artery of left gastric artery.

Splenic artery (Fig. 1/4) gave off the following branches:

Pancreatic branch (Fig. 2/7).

Epiploic branch (Fig. 1/19) was run caudally on the greater omentum.

Right ruminal artery (Fig. 1/20) was larger than the continuation of splenic artery. It gave off branch to ruminal antrum (Fig. 1/28) and passed caudoventrally to the right longitudinal groove of rumen. It gave off branches to the dorsal and ventral ruminal sacs (Fig3/8), dorsal and ventral right coronary arteries and passed to the left in the caudal groove where it gave off dorsal and ventral left coronary arteries and anastomized with the left ruminal artery.

Left ruminal artery (Fig. 1/21) was run ventrally on the right surface of rumen to the cranial groove and through this groove passed to the left longitudinal groove to follow caudally. It gave off reticular artery (Fig. 2/10 & Fig. 3/6) which it passed craniodorsally on rumen and complete in the left side on the ruminoreticular groove. It gave off esophageal branch (Fig. 3/5) and follow to the lesser curvature of reticulum.

Left gastric artery (Fig. 1/5) was the continuation of celiac trunk. It passed ventrally and cranially then gave off the following branches:

Reticular artery was originated from left gastric artery in one case (Fig. 1/23)

Left gastroepiploic artery (Fig. 1/24) this was originated from left gastric artery between rumen and omasum. It run on the curvature of omasum and followed to the lesser curvature of abomasum and anastomized with right gastroepiploic artery which came from gastroduodenal artery. There was an obvious variability

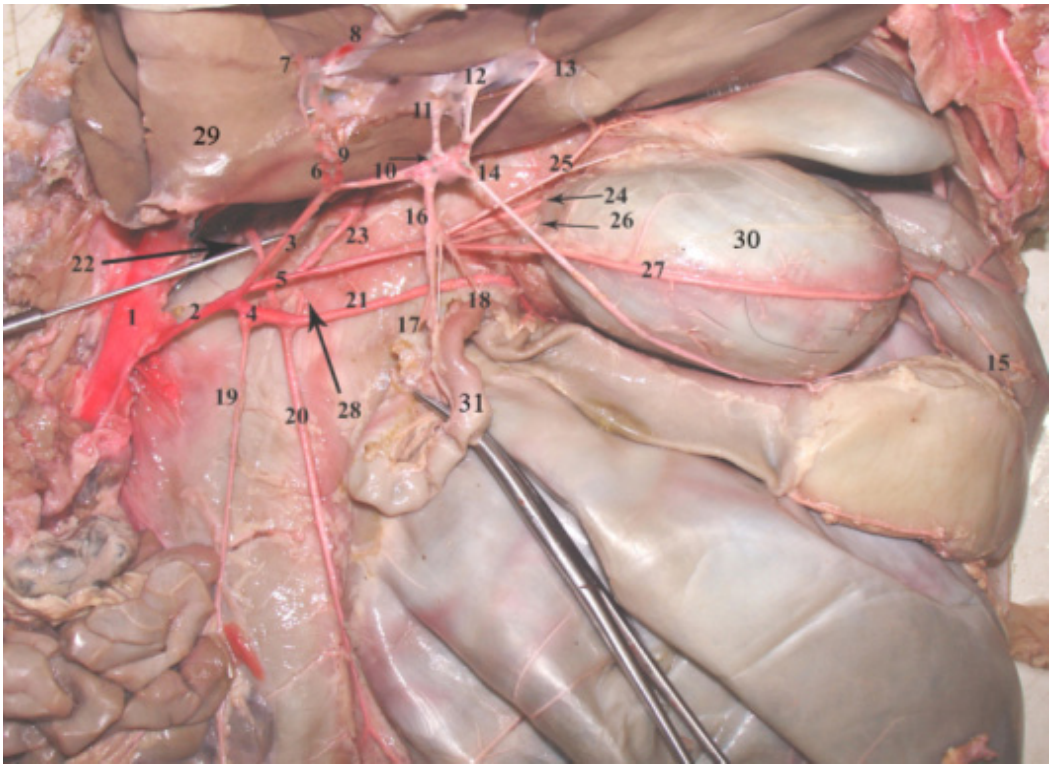

Figure1. Right view of abdominal cavity showed celiac artery and its branches.
1.Abdominal aorta. 2.Celiac trunk. 3.Hepatic artery. 4.Splenic artery. 5.Left gastric artery. 6.Cystic artery.7.Cranial branch of cystic artery. 8.Caudal branch of cystic artery. 9.Right branch of hepatic artery.10.Left branch of hepatic artery. 11.Branch to papillary process. 12.Branch quadrate lobe. 13.Branch of left lobe.14. Right gastric artery. 15. Anastomoses of left gastric artery with right gastric artery. 16.Gastroduodenal artery. 17. Cranial pancreaticoduodenal. 18.Right gastroepiploic. 19.Epiploic branch. 20.Right ruminal artery. 21.Left ruminal artery. 22.Proper splenic. 23.Reticular artery. 24.left gastroepiploic artery. 25.Accessory reticular artery. 26.Omasal branch. 27.Continuation of left gastric artery. 28.Branch to ruminal antrum. 29.Liver. 30.Omasum. 31.Duodenum.

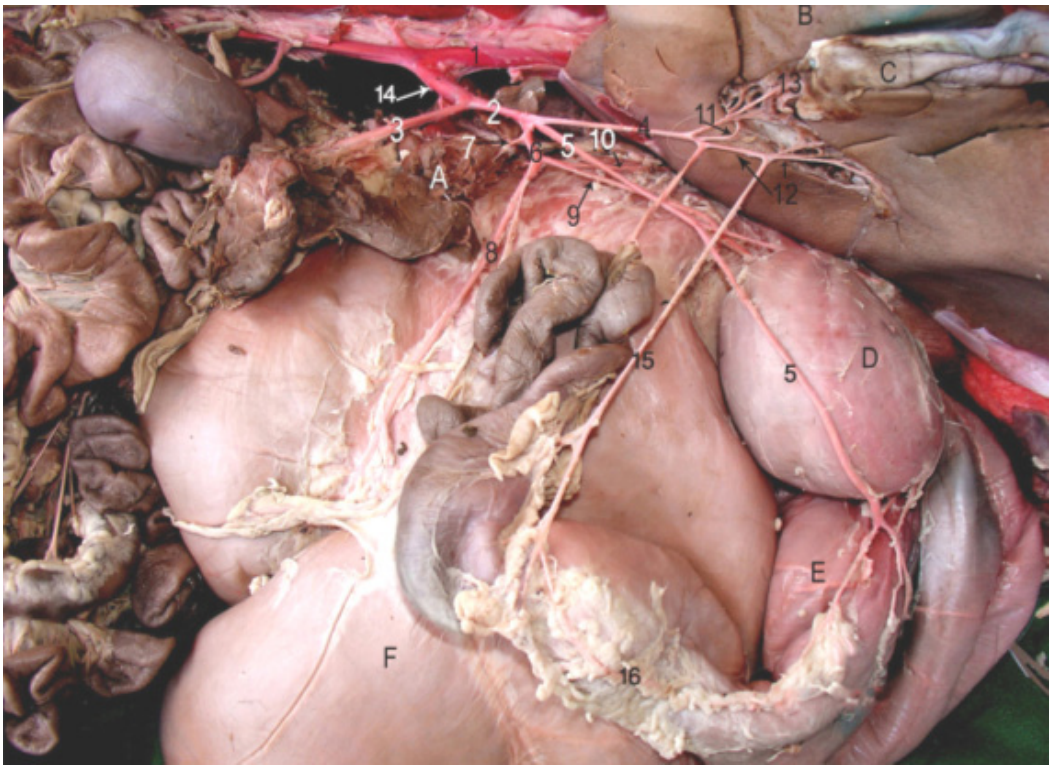

Figure2. Right view of abdominal cavity showed common stem of celiac and cranial mesenteric arteries.1.Abdominal aorta. 2.Celiac artery. 3.Cranial mesenteric artery.4.Hepatic artery.5.Left gastric artery. 6.Splenic artery. 7.Pancreatic branch. 8.Right ruminal artery. 9.Left ruminal artery. 10.Reticular artery. 11.Right hepatic artery. 12.Left hepatic artery. 13.Cystic artery. 14.Common stem of celiac and cranial mesenteric arteries. 15.Right gastric artery. 16.Anastomoses of the left gastric artery with the right gastric artery. A. Pancreas. B. Liver. C. Gall bladder. D. Omasum. E. Abomasum. F. Ventral ruminal sac.

in one case under study, a hepatic branch was detached from left gastroepiploic artery and was passed to the left lobe of liver (Fig. 6/6).

Accessory reticular artery (Fig. 1/25).

The continuation of left gastric artery (Fig. 1/27) passed on the curvature of omasum and the lesser curvature of abomasum, where it was divided into three branches left branch (Fig. 1/26) to omasum and right branch (Fig. 4/1) which divided into three branches the first to the curvature of omasum (Fig. 4/2), the second (Fig. 4/3) divided into two branches to the greater and lesser curvature of abomasum(Fig. 4/4) and one branch to the omasum(Fig. 4/5), the third branch of left gastric artery was the anastomising branch (Fig. 4/6) which anastomized with right gastric artery on the middle of the lesser curvature of abomasum.

DISCUSSION

In the present study, the celiac trunk arose from the ventral aspect of abdominal aorta beneath the level of between the first and second lumbar vertebrae similar to observations made in sheep[12] and [10] in goats. The celiac artery in the most cases originated separately from the aorta before the origin of cranial mesenteric by about 0.5 cm to 1 cm[3] in sheep and [10] in goats.

Celiac trunk divided into three main arteries, hepatic, left gastric and splenic arteries. Hepatic artery gave cystic, right hepatic and left hepatic arteries this finding was different from that stated by [12] who denoted that the celiac trunk of goats (ruminant) gives off the following five branches:

- hepatic artery
- right ruminal artery
- left ruminal artery
- left gastric artery
- splenic artery.

The left hepatic artery gave left gastric artery in the lesser curvature of the abomasum. The gastroduodenal artery was the terminal branch of the hepatic artery which divided into the cranial pancreaticoduodenal artery and right gastroepiploic artery and anastomised with the left one at the greater curvature of abomasums. Similar results were observed by [2, 12] in ruminants, by [13, 10, 18] in goats, while [10] recorded a different result where he reported that the right hepatic branch gave the cystic artery.

The left gastric artery gave reticular, left gastroepiploic, omasal and accessory reticular branches, which concurred with an observation denoted by [18] in sheep. The splenic artery was the third branch of the celiac artery which gave similar splenic, right ruminal and left ruminal artery results as those observed by [10, 14] in goats.

Figure3. left view of abdominal cavity. 1. Esophagus. 2. Spleen. 3. Reticulum. 4. Ventral ruminal sac. 5. Esophageal branch. 6. Reticular branch. 7. Left gastroepiploic artery. 8.Branch to ventral ruminal sac.

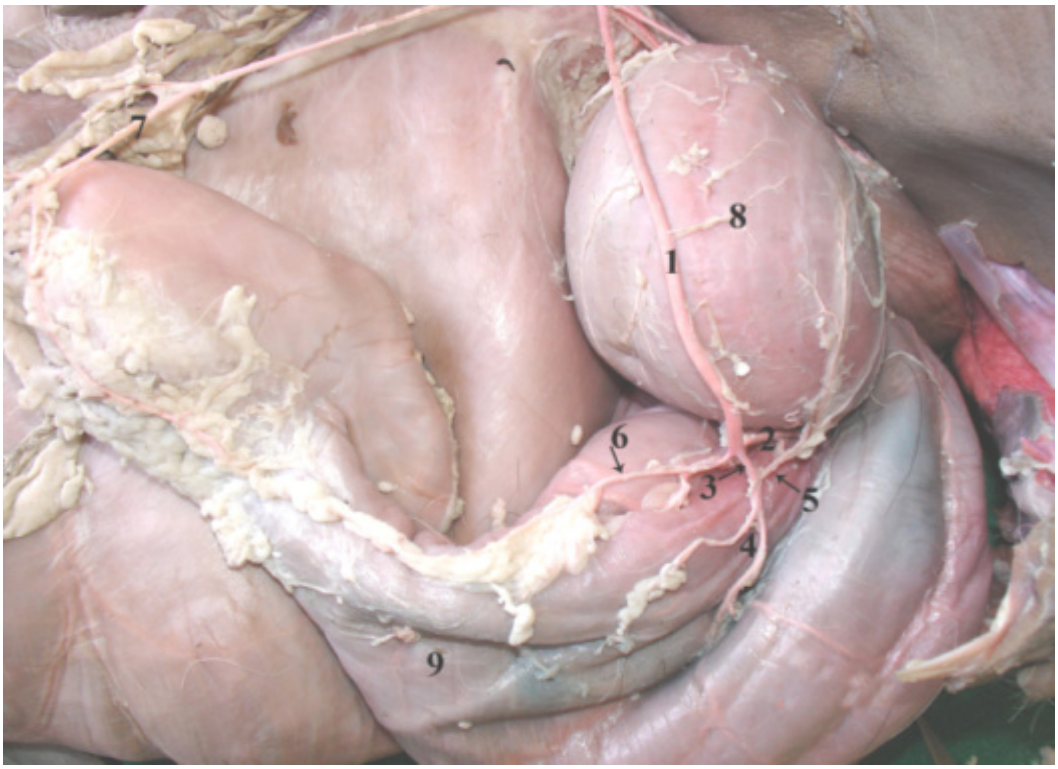

Figure4. left view of abdominal cavity showed the anastomoses of the left gastric artery with the right gastric artery. 1. Right branch of left gastric artery. 2. Branch to the curvature of omasum. 3. The second branch of right branch of left gastric artery. 4. Two branches to the greater and lesser curvature of abomasum. 5. Branch to omasum. 6.The anastomizing branch of left gastric artery with right gastric artery. 7. Right gastric artery. 8. Omasum. 9. Abomasum.

Figure5. Showing hepatic artery branches. 1. Hepatic artery. 2. Cystic artery. 3.a.Cranial branch of cystic artery to gall bladder. 3.b. Cranial branch of cystic artery to cystic duct. 4. Caudal branch of cystic artery. 5. Right hepatic artery.6.Left hepatic artery. 7. Branch to papillary process. 8. Branch quadrate lobe. 9. Branch of left lobe. 10. Gastroduodenal artery. 11. Right gastric artery. A. Right hepatic lobe. B. Gall bladder. C. Papillary process. D. Quadrate lobe. E. Left hepatic lobe.

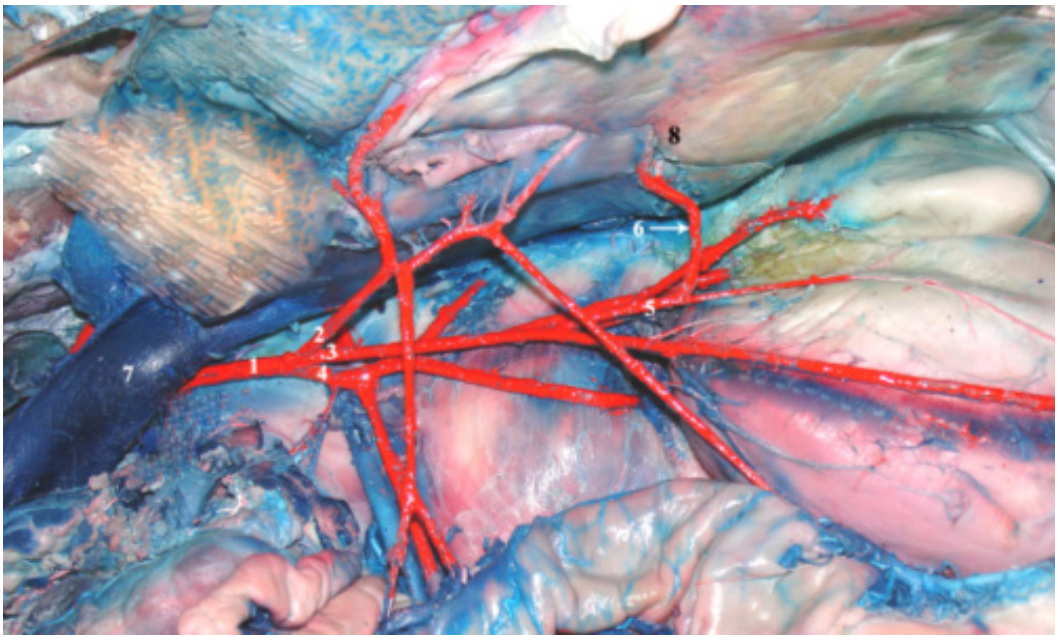

Figure6. Right view of abdominal cavity showed the hepatic branch to the left lobe of liver on case 3
1.Celiac trunk. 2.Hepatic artery. 3.Left gastric artery. 4. Splenic artery. 5.Left gastroepiploic artery. 6.Hepatic branch. 7.Caudal vena cava. 8.Left lobe of the liver

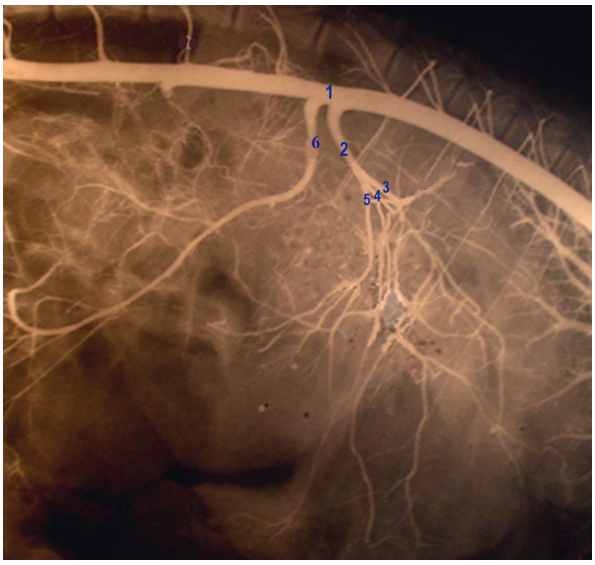

Figure7.lateral radiography showing celiac trunk and cranial mesenteric artery. 1.Abdominal aorta. 2. Celiac trunk. 3. Hepatic artery. 4. Splenic artery. 5. Left gastric artery. 6. Cranial mesenteric artery.

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