



Uncommon branching pattern of the celiac trunk: origin of seven branches

Published online April 21st, 2011 © <http://www.ijav.org>

Rajesh B. ASTIK +
Urvi H. DAVE

Department of Anatomy, GSL Medical College, Rajahmundry, District – East Godavari,
Andhra Pradesh, INDIA.



+ Dr. Rajesh B. Astik
Associate Professor
Department of Anatomy
GSL Medical College
NH-5, Rajahmundry
District – East Godavari
Andhra Pradesh, 533206, INDIA.
☎ +91 883 2484888
✉ astikrajesh@yahoo.co.in

Received August 13th, 2010; accepted April 14th, 2011

ABSTRACT

Variations in the branching pattern of the celiac trunk are well documented. We are reporting a case of unusual origins of left superior suprarenal, left middle suprarenal, gastroduodenal and right inferior phrenic arteries from the celiac trunk in addition to its usual left gastric, splenic and common hepatic arteries. This type of rare variation has significant importance in surgical and radiological procedures. © IJAV. 2011; 4: 83–85.

Key words [celiac trunk] [splenic artery] [left superior suprarenal artery] [abdominal aorta]

Introduction

The celiac trunk is the first ventral branch of abdominal aorta, arises just below the aortic hiatus at the level of T12/L1 vertebral body. It is 1.5-2 cm long and passes almost horizontally forwards and divides into the left gastric, common hepatic and splenic arteries. Gastroduodenal artery is usually the first branch of the common hepatic artery. The inferior phrenic arteries usually arise from the abdominal aorta, just above the level of the celiac trunk. Each inferior phrenic artery gives origin to superior suprarenal artery. The middle suprarenal artery arises from the lateral aspect of the abdominal aorta at the level of origin of the superior mesenteric artery [1].

Celiac trunk supplies the parts of the foregut. Variations in the branching pattern of the celiac trunk are therefore having immense surgical importance.

Case Report

We described an unusual branching pattern of the celiac trunk during routine educational dissection of a 50-years-old male cadaver of Asian origin in the Department of Anatomy, GSL Medical College.

The celiac trunk arose from the abdominal aorta at the level of the twelfth thoracic vertebra. The left superior suprarenal and the left middle suprarenal arteries arose from the celiac

trunk at its origin, instead of from the left inferior phrenic artery and abdominal aorta, respectively. After 3 cm of curved course towards the right side, the celiac trunk gave the splenic, common hepatic, left gastric and gastroduodenal arteries (Figure 1). Just before the origins of splenic, common hepatic, left gastric and gastroduodenal arteries, the celiac trunk gave origin to right inferior phrenic artery from its back (Figure 2).

Left gastric artery gave origin to the left inferior phrenic artery. The course and branching pattern of the rest of the arteries were found as per described in the standard textbooks of anatomy.

Discussion

Anatomical variations in the branching pattern of the celiac trunk are of considerable importance in liver transplants, laparoscopic surgery, radiological abdominal interventions and penetrating injuries to the abdomen [2].

The classic description of normal celiac trunk anatomy is that the main trunk trifurcates into the left gastric, splenic and common hepatic arteries, which was found in 86%. Generally, additional branches of the celiac trunk other than its usual branches are referred to as collaterals [3]. We found gastroduodenal artery, inferior phrenic arteries, left superior and middle suprarenal arteries as collateral branches.

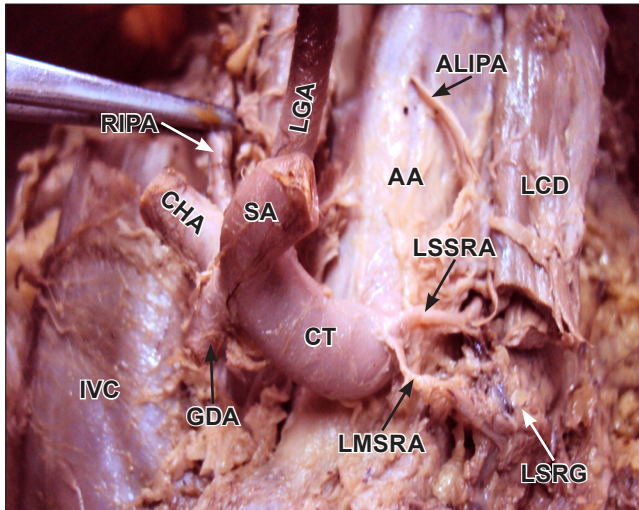


Figure 1. Seven branches arising from the celiac trunk (CT). These branches are: LGA: left gastric artery; SA: splenic artery; CHA: common hepatic artery; GDA: gastrooduodenal artery; RIPA: right inferior phrenic artery; LSSRA: left superior suprarenal artery; LMSRA: left middle suprarenal artery. (AA: abdominal aorta; ALIPA: accessory left inferior phrenic artery; LCD: left crus of diaphragm; IVC: inferior vena cava; LSRG: left suprarenal gland)

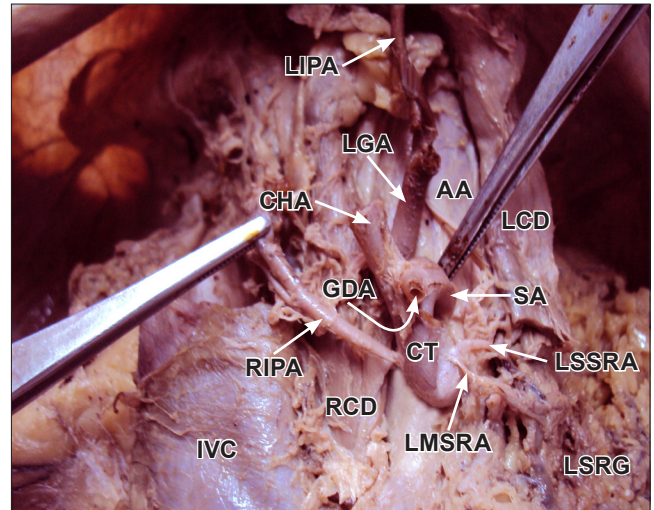


Figure 2. Right inferior phrenic artery (RIPA) arising from the celiac trunk (CT). (LGA: left gastric artery; CHA: common hepatic artery; SA: splenic artery; GDA: gastrooduodenal artery; LSSRA: left superior suprarenal artery; LMSRA: left middle suprarenal artery; LIPA: left inferior phrenic artery; AA: abdominal aorta; IVC: inferior vena cava; LCD: left crus of diaphragm; RCD: right crus of diaphragm; LSRG: left suprarenal gland).

Gastrooduodenal artery arose from the celiac trunk in 3.61%, 3.3% and 0.2% [4-6]. Gastrooduodenal artery is used for cannulation in hepatic arterial chemotherapy. Knowledge of varied origin of gastrooduodenal artery from the celiac trunk as in our case may prevent chances of gastrooduodenal artery steal syndrome during liver transplantation [7].

Inferior phrenic arteries arose from celiac trunk in 13%, 28.2% [8,9]; and from the left gastric artery in 2.9% [9]. The left inferior phrenic and left gastric arteries arose from the celiac trunk via a common trunk [10,11]. We found origin of the left inferior phrenic artery from the left gastric artery and right inferior phrenic artery from the celiac trunk directly. The knowledge of this type of variation is important for the surgeons performing kidney transplants and suprarenal surgeries.

Manso et al. observed origin of the left or right middle suprarenal artery from the celiac trunk in 3.3% [12]. Yalcin et al. reported origin of the left middle suprarenal artery as the first and smallest branch from the celiac trunk [11]. We found origin of the left superior and left middle suprarenal arteries from the celiac trunk; the origin of the superior suprarenal artery from the celiac trunk was not documented hitherto.

Murakami et al. proposed that the celiacomesenteric system develops from six sets of paired left and right vessels -subphrenic, upper ventricular, middle ventricular, lower ventricular, upper intestinal and lower intestinal arteries- which are modified during the later stages of fetal development. Collaterals may be result of either the persistence of some parts of the longitudinal channels that

normally disappear or disappearance of parts that normally persist [13].

Vascular variations are usually asymptomatic. They may become important in patients undergoing celiacography for gastrointestinal bleeding, celiac axis compression syndrome, prior to an operative procedure or transcatheter therapy; chemoembolization of pancreatic and liver tumors. Careful identification and dissection of celiac trunk branches is therefore important to avoid iatrogenic injury.

Conclusion

In the current case seven branches arose from the celiac trunk that was not documented in earlier literatures. Knowledge of this type of rare variation is very useful in surgical, oncologic or interventional procedures and should be kept in mind to avoid complications.

Acknowledgements

Our sincere thanks to all the people who helped and supported during the writing of this manuscript. We would thank our institution for allowing us to dissect cadaver.

References

- [1] Williams PL, Bannister LH, Berry MM, Collins P, Dyson M, Dussek JE, Ferguson MWJ. Gray's Anatomy. 38th Ed., Edinburgh London, Churchill Livingstone. 1995: 1548–1558.
- [2] Munshi IA, Fusco D, Tashjian D, Kirkwood JR, Polga J, Wait RB. Occlusion of an aberrant right hepatic artery, originating from the superior mesenteric artery, secondary to blunt trauma. J Trauma. 2000; 48: 325–326.
- [3] Vandamme JP, Bonte J. The branches of the coeliac trunk. Acta Anat (Basel). 1985; 122: 110–114.
- [4] Lipshutz B. A composite study of the coeliac axis artery. Ann Surg. 1917; 65: 159–169.

- [5] Mburu KS, Alexander OJ, Hassan S, Bernard N. Variations in the branching pattern of the celiac trunk in a Kenyan population. *Int J Morphol*. 2010; 28: 199–204.
- [6] Bergman RA, Afifi AK, Miyauchi R. Illustrated Encyclopedia of Human Anatomic Variation: Opus II: Cardiovascular System. Variations in origin of gastroduodenal artery. <http://www.anatomyatlases.org/AnatomicVariants/Cardiovascular/Images0001/0017.shtml> (accessed August 12th, 2010).
- [7] Nishida S, Kadono J, DeFaria W, Levi DM, Moon JI, Tzakis AG, Madariaga JR. Gastroduodenal artery steal syndrome during liver transplantation: Intraoperative diagnosis with Doppler ultrasound and management. *Transpl Int*. 2005; 18: 350–353.
- [8] Pick JW, Anson BJ. The inferior phrenic artery: origin and suprarenal branches. *Anat Rec*. 1940; 78: 413–427.
- [9] Piao DX, Ohtsuka A, Murakami T. Typology of abdominal arteries, with special reference to inferior phrenic arteries and their esophageal branches. *Acta Med Okayama*. 1998; 52: 189–196.
- [10] Cavdar S, Gurbuz J, Zeybek A, Sehirli U, Abik I, Ozdogmus O. A variation of coeliac trunk. *Kaibogaku Zasshi*. 1998; 73: 505–508.
- [11] Yalcin B, Kocahiyik N, Yazar F, Ozan H, Ozdogmus O. Variations of the branches of the celiac trunk. *Gulhane Tip Dergisi*. 2004; 46: 163–165.
- [12] Manso JC, DiDio LJ. Anatomical variations of the human suprarenal arteries. *Ann Anat*. 2000; 182: 483–488.
- [13] Murakami T, Mabuchi M, Giavarasteanu I, Kikuta A, Ohtsuka A. Coexistence of rare arteries in the human celiaco-mesenteric system. *Acta Med Okayama*. 1998; 52: 239–244.