RESEARCH ARTICLE

A STUDY OF MORPHOLOGY OF COELIAC TRUNK IN 100 CADAVERS

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ABSTRACT

Background: The coeliac trunk is an integral part of the circulatory system as it delivers blood from the heart to major organs within the abdominal cavity. The blood that it delivers is oxygenated and carries essential nutrients and immune system particles that can aid in life sustaining processes and can also prevent the development of diseases and complications from illnesses.

Aims & Objective: (1) To study the anatomy of coeliac trunk, through its diameter, length related to their branches and distance from superior mesenteric artery. (2) To study the clinical implication of coeliac trunk in case of the variations and anomalous formation of coeliac trunk.

Material and Methods: Morphology of coeliac trunk was studied in 100 formalin embalmed cadaver, aged between 50 to 80 years. Dissection method was use for this study.

Results: Measurement of the length of the coeliac trunk up to the left gastric, Measurement of the length of coeliac trunk up to common hepatic and/or splenic artery, Measurement of coeliac trunk diameter, Distance between coeliac trunk and the superior mesenteric artery were taken.

Conclusion: Knowledge of variations concerning the coeliac trunk is of extreme clinical importance in the areas of the laparoscopic surgery, and radiological procedures in the upper abdomen, and should be kept in mind by clinicians to avoid complications.

Key-Words: Coeliac Trunk; Left Gastric Artery; Common Hepatic Artery; Splenic Artery

Introduction

The coeliac trunk is an important part of the arterial system as it supplies blood to not only the stomach, but the spleen, liver, and other aspects of the digestive tract, as well. The abdominal oesophagus, the pancreas, and the duodenum receive blood that is delivered from the heart and the aorta through the coeliac trunk. Arterial systems such as this help to provide the entire abdominal cavity with the oxygen required to perform basic life sustaining actions. It has been found that these structures are related to the embryonic foregut, and develops early within the fetus of an unborn human. It has been found that any obstruction within the coeliac trunk may lead to necrosis of all organs, tissues, and muscles that are supplied with blood from the coeliac artery.

Materials and Methods

This study was conducted on 100 cadavers in the dissection laboratory with age range of 50 to 80 years. The cadavers were embalmed through carotid arterial perfusion or femoral arterial perfusion with formaldehyde solution, spirit, water, glycerine, phenol crystal, eosin and then preserved in weak formalin solution before dissection. The dissection was performed in dissection laboratories of Smt. NHL Municipal Medical College; BJ Medical College; AMC MET Medical College, Ahmedabad, Gujarat, India during period of 2008 to August 2011.

Dissection method was employed for this study. Explore the peritoneal cavity and lift up the greater omentum. Identify the gastro-epiploic arteries in the greater omentum, 2-3 cm from its junction with the greater curvature of the stomach. Cut through the anterior layers of the greater omentum 2-3 cm inferior to the arteries to open the lower part of the omental bursa. Explore the bursa. Pull the liver superiorly and tilt its inferior margin anteriorly to expose the lesser omentum. Trace the left gastric artery towards the oesophagus till it curve posteriorly round the

superior surface of the omental bursa. Trace the right gastric artery to the proper hepatic artery; expose the proper hepatic artery and its branches to the porta hepatis. Remove the remainder of the lesser omentum. Examine the coeliac trunk.

Results

Measurement of the length of the coeliac trunk up to the left gastric, Measurement of the length of coeliac trunk up to common hepatic and/or splenic artery, Measurement of coeliac trunk diameter, Distance between coeliac trunk and the superior mesenteric artery shows in Table 1 (Figure 1 & 2).

Table-1: Length of Coeliac Trunk Related to Other Arteries and Diameter of Coeliac Trunk

Measurements	Minimum (cm)	Maximum (cm)	Mean (cm)
Measurement of the length of the coeliac trunk up to the left gastric	0.40	2.00	1.18 ± 0.27
Measurement of the length of coeliac trunk up to common hepatic and/or splenic artery	01.00	3.00	1.70 ± 0.32
Measurement of coeliac trunk diameter	0.40	0.90	0.62 ± 0.14
Distance between coeliac trunk and the superior mesenteric artery	0.10	1.70	1.14 ± 0.32

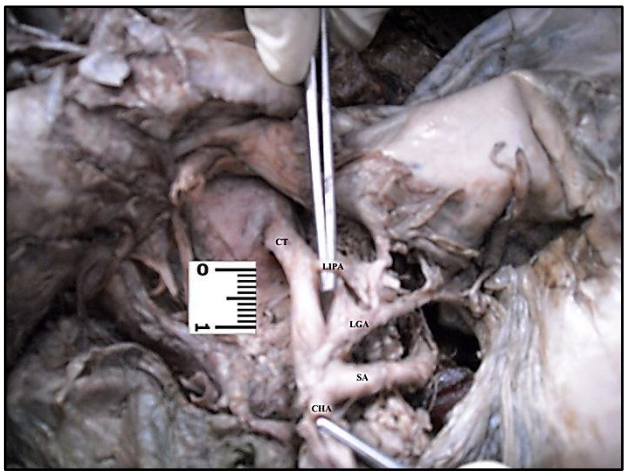

Figure-1: Measurement of length from the coeliac trunk to left gastric artery and to common hepatic and/or splenic artery (CT: Coeliac Trunk, LGA: Left Gastric Artery; SA-Splenic Artery; CHA: Common Hepatic Artery; LIPA: Left Inferior Phrenic Artery)

In 18 (18%) cadavers with the coeliac trunk presenting its three arteries, left gastric, splenic, common hepatic, trifurcating at the same level, forming the Haller's tripod (Figure 3). The left gastric artery, as the first branch of the coeliac trunk, was observed in 66 (66.00%) out of the 100 cadavers (Figure 4). The origin of the inferior

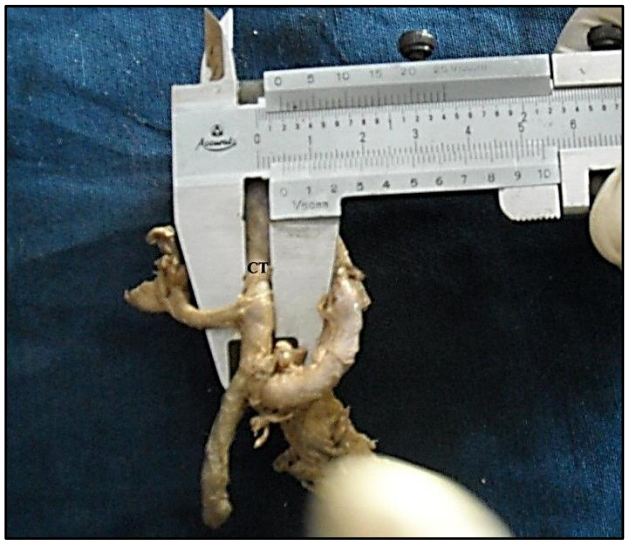

Figure-2: Measurement of Coeliac Trunk Diameter (CT: Coeliac Trunk)

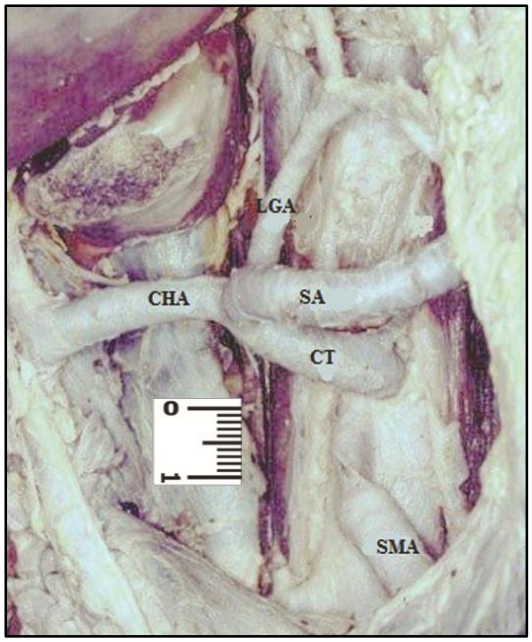

Figure-3: Haller's tripod & Distance between coeliac trunk and superior mesenteric artery (CT: Coeliac Trunk; LGA: Left Gastric Artery; SA: Splenic Artery; CHA: Common Hepatic Artery; SMA: Superior Mesenteric Artery)

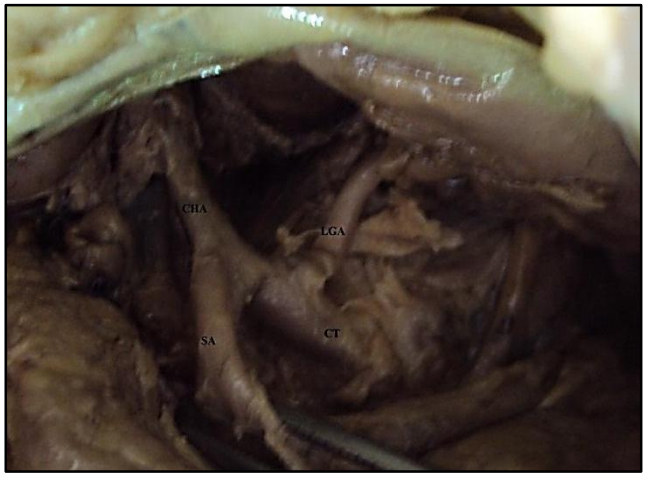

Figure-4: Left gastric artery, as the first branch of coeliac trunk (CT: Coeliac Trunk; LGA: Left Gastric Artery; SA: Splenic Artery; CHA-Common Hepatic Artery)

phrenic arteries was in 16 (16%) out of 100 cadavers. The common hepatic artery was present in 28 (28%) cadavers as the last artery, the splenic artery in 6 (6%) and both arteries at the same level, as terminal branches, in 48 (48%) out of the 82 studied cadavers.

Discussion

In present study, the minimum length between coeliac trunk and left gastric artery was 0.40 cm, the maximum 2.0 cm and the mean of 1.18±0.27 cm, and the left gastric artery, as the first branch of the coeliac trunk, was observed in 66 (66.00%) out of the 100 cadavers. In previous studies the most frequent type of coeliac trunk is that originating the left gastric artery as a collateral branch before the bifurcation into hepatic and splenic artery (Eaton[1]; Pignataro[2]; Latarjet & Ruiz- liard[3]). The left gastric artery, as first branch of the coeliac trunk was found in 66% of the cadavers analyzed in this study, which is in agreement with the 62.10% of Eaton[1] and with 66.67%o of Rio Branco[4]. Lipshutz[5] verified the splenic artery as first branch of the coeliac trunk in 2.41%.

In present study, the length from coeliac trunk up to common hepatic and/or splenic artery had a mean of 1.7 ± 0.32 cm, with minimum length of 1.0 cm and maximum 3.0 cm in 100 cadavers and the common hepatic artery was present in 28 (28%) cadavers as the last artery, the splenic artery in 6 (6%) and both arteries at the same level, as terminal branches in 48 (48%) out of the 82 studied cadavers. These results are in agreement with that of the Rio Branco[4] who reported a length from 5 to 40 mm and Michels[6], who observed 8 to 40 mm and differ from that of Orts Llorca[7], who found up to 12 mm, that of Latarjet & Ruiz- Liard[3], who observed 10 to 15 mm. Also, in present study, the coeliac trunk did not reach a length of 4.5 cm, as observed by Yuksel & Sargon[8].

In present study, the Diameter of the coeliac trunk in 100 cadavers had a mean of 0.62±0.14 cm, with a minimum diameter of 0.4 cm and maximum 0.9 cm. Rio Branco[4], who observed variations from 4 to 10 mm; Michels[6] from 3 to 12 mm; Pignataro[2] from 10 to 12 mm; Fumagalli & Cavallotti[9], 7 mm; Latarjet & Ruiz Liard[3] a mean of 6 mm. A study in 21 cadaver by Luís Augusto da Silveira et al[10] reported that the possibility of a diameter reduction of the coeliac trunk main branches in the presence of anatomical variations. This should be taken into account on the selection for the liver transplantation donors.

In present study, Distance between coeliac trunk and the superior mesenteric artery in 100 cadavers, the minimum distance was 0.1 cm, maximum 1.70 cm and the mean of 1.14 ± 0.32 cm. Previous study show that 1 to 11 mm with a mean of 3.88 mm in 140 cadavers (Brunet et al[11]); 0.5 to 3.1 cm, 1.0 to 2.0 cm in 70 (Anson & McVay[12]) and a mean of 1.3 cm (Cauldwell & Anson[13]) and Michels[6,14,15] who reported a distance from 1 to 22 mm in 200 cadavers.

Conclusion

Knowledge of variations of the coeliac trunk is important in procedures such as liver transplants for appropriate vascular ligation and anastomosis. Vascular anomalies are usually asymptomatic; they may become important in patients undergoing diagnostic angiography for gastrointestinal bleeding, coeliac axis compression syndrome, or prior to an operative procedure or transcatheter therapy. Knowledge of variations concerning the coeliac trunk is of extreme clinical importance in the areas of the laparoscopic surgery, and radiological procedures in the upper abdomen, and should be kept in mind by clinicians to avoid complications.

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