A Complex Variation of the Parietal and Visceral Branches of the Abdominal Aorta

INTRODUCTION

Aorta, the main artery of circulation, is divided into three according to its course; ascending aorta, arch of aorta and descending aorta. Passing through aortic hiatus underside the face of Th 12, aorta lies as abdominal aorta which is 13 cm long and ends underside of L 4. The branches of the abdominal aorta can be classified as single-double or visceral-parietal. Double visceral branches are (middle suprarenal artery, renal artery, testicular artery (ovarian artery), single visceral branches are (coeliac trunk, superior mesenteric artery, inferior mesenteric artery), double parietal branches are (inferior phrenic artery, lumbar arteries), and single parietal branch is median sacral artery (Standring, 2005).

Knowledge of such case has important clinical significance in an abdominal operation or invasive arterial procedure, that is by procedure and liver transplantation, laparoscopic surgery, and radiological procedures in the upper abdomen.

CASE REPORT

Variations in the branches of the abdominal aorta were determined during a routine abdominal region dissection of a 70-year-old male cadaver at the Anatomy Department of Meram Medical Faculty, Selcuk University. Left gastric artery arose as the first branch (2.71mm thick) from antero-lateral side of the aorta 49.01mm under the diaphragm and after 14.07mm, the left inferior phrenic artery originates (2.03mm thick) (Figs. 1,2). The coeliacomesenteric trunk originates as a thick branch (16.89mm thick) 57.88mm after diaphragm. The coeliacomesenteric trunk originates 8.87mm distal from the left gastric artery. After 29.9mm, the coeliacomesenteric trunk bifurcated as coeliac trunk and superior mesenteric artery. Coeliac trunk bifurcated as splenic artery and common hepatic artery. These multiple variations which change the normal anatomic structure of the abdominal aorta have to be kept in mind by surgeons, radiologists and anatomists.

KEY WORDS: Abdominal aorta; Coeliacomesenteric trunk; Anatomical variation.
(3.11 mm thick) and superior segmental artery (3.82 mm thick) after 14.14 mm (Figs. 1, 3). The right inferior phrenic artery bifurcated after 50.23 mm and both branches distributed inferior of the diaphragm (Fig. 3).

**DISCUSSION**

The coeliac trunk, a wide ventral branch just below the aortic hiatus, passes almost horizontally forwards and slightly right above the pancreas and the splenic vein, dividing into the left gastric artery, common hepatic artery and splenic artery (Standring). Van Damme & Bonte (1985) reported in an angiographic study the trifurcation of coeliac trunk occurred in the 86% of the cases; bifurcation of coeliac trunk (common hepatic and splenic arteries) was 12%. In our case, the coeliac trunk bifurcated as common hepatic artery and splenic artery.

Left gastric artery, the smallest coeliac branch, ascends to the left, posterior to the omental bursa, to the cardiac end of the stomach. It is near the inferior phrenic artery and medial
or anterior the suprarenal gland (Standring). The left gastric artery arose in about 90% of all cases from the coeliac trunk (Yildirim et al., 1998; Hitawashi & Yoshida, 2003). In dissection studies of cadavers where the left gastric artery arose separately from the aorta, different rates were reported 1.9-15 (Lipshutz, 1917; Van Damme & Bonte; Yildirim et al.). Saga et al. (2005) reported a case with left gastric artery (outer diameter 3mm) originated from the right margin of the mid-half of the abdominal aorta and Yamaki et al. (1995) reported cases with left gastric artery (outer diameter 4mm) originating from the anterior surface of the abdominal aorta. In our case, it was observed that left gastric artery originated from the left lateral side of the abdominal aorta and its outer diameter was 2.71 mm.

The inferior phrenic arteries usually arise from the abdominal aorta, just above the level of the coeliac trunk. Occasionally the arteries originate from a common aortic origin with the coeliac trunk, from the coeliac trunk itself or from the renal artery. They contribute to the arterial supply of the diaphragm (Standring). There are cadaver studies (2-2.9%) (Piao et al., 1998; Loukas et al., 2005) and radiological studies (0.65-3.7%) (Gwon et al., 2007; Ozbulbul et al., 2009) reporting that left inferior phrenic artery is a branch of the left gastric artery. In this study we observed that left inferior phrenic artery is a branch of the left gastric artery.

The right inferior phrenic artery originates of the renal artery which has been reported in cadaver studies (4.3-17%) (Piao et al.; Loukas et al.) and radiological studies (7.7-15%) (Hitawashi et al.; Gwon et al.; Ozbulbul et al.). We established that right renal artery gives origin to the right inferior phrenic artery at 14.14mm after it left abdominal aorta and this artery supplies the diaphragm after 50.23mm in our case.

The vitelline arteries, initially a number of paired vessels supplying the yolk sac, gradually fuse and form the arteries located in the dorsal mesentery of the gut. In adult, the arteries are represented by the coeliac trunk, superior and inferior mesenteric arteries. These vessels supply the derivatives of the foregut, midgut, and hindgut, respectively (Kahraman et al., 2001; Saeed et al., 2003; Cicekcibasi et al., 2005a). In rare cases, the coeliac trunk and the superior mesenteric artery may be fused to a coeliacomesenteric trunk (Cavdar et al., 1997; Detroux et al., 1998; Agarwal et al., 2000; Cicekcibasi et al., 2005b; Yi et al., 2007). A common origin of coeliac trunk and superior mesenteric artery from the abdominal aorta is extremely rare. It has been reported in 0.5% of the population on the basis of 200 visceral arteriograms and %0.25 on the basis of 500 anatomic dissections (Ruzicka & Rossi, 1968; Mitchels et al., 1995). We observed a coeliacomesenteric trunk distant from (57.88mm) the diaphragm. This common branch bifurcated into coeliac trunk and superior mesenteric artery at 29.90mm. In this case, the celiac trunk bifurcated in the common hepatic artery and the splenic artery.

The renal arteries are two of the largest branches of the abdominal aorta and originate laterally from the vessel just below the origin of the superior mesenteric artery. The right renal artery is longer and usually originates slightly higher than the left (Standring). However, some studies reported that both arteries originated at the same level from the aorta (Kosinski, 1994; Bergezi et al., 1999; Cicekcibas, 2005b). Renal arteries originated at the same level in our study. It was observed that the right inferior phrenic artery and superior segmental artery are branches of the right renal artery.

The number and the form of these multiple variations of abdominal aorta in a single cadaver have not been reported previously. These multiple variations which change the normal anatomic structure of the abdominal aorta should be considered by surgeons, radiologists and anatomists.
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