

Common celiaco–mesenterico–phrenic trunk and renal vascular variations

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ABSTRACT

The knowledge of vascular variations like other anatomical variations, is important during the operative, diagnostic, and endovascular procedures in abdomen. This report describes multiple variations in the upper abdominal vessels as found during the routine dissection in a 60-year-old male cadaver. The variations found were; presence of a celiaco-mesenterico-phrenic trunk, a common inferior phrenic trunk, 2 right renal arteries originating from abdominal aorta, 2 suprarenal arteries originating from the lower right renal artery, 3 right renal veins opening separately into inferior vena cava, and termination of right testicular vein into the lowest vein among the 3 right renal veins. The existence of a celiaco-mesenterico-phrenic trunk has not been reported yet. Although, other variations reported in this case exist as individual variations, a concomitant variation of them has not been reported yet. The knowledge of such variations is quite useful in planning any upper abdominal surgery.

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Celiac artery is a ventral branch of abdominal aorta. Both the left and right kidneys receive their arterial supply from one renal artery each from the abdominal aorta. Inferior phrenic arteries are usually the lateral branches of abdominal aorta. The supra renal glands received their arterial supply through the 3 suprarenal arteries; one from inferior phrenic artery, one from the abdominal aorta, and the other from the renal artery. The right testicular vein is a tributary of the inferior vena cava. Variations in all these vessels have been reported earlier.

Case Report. During the gross anatomy dissection of the abdomen of a 60-year-old male cadaver, we observed multiple variations in the upper abdominal vessels. The celiac trunk, superior mesenteric artery, and a common trunk of 2 inferior phrenic arteries originated together as a celiaco-mesenterico-phrenic

trunk (**Figure 1**). This trunk was approximately 2 cm long (usual length of celiac trunk is approximately 1.25 cm as available in the medical literature) and trifurcated to give a celiac trunk, a superior mesenteric artery, and an inferior phrenic trunk. The further course and branches of the celiac and superior mesenteric arteries were normal. However, the celiac trunk had approximately 2 cm course before its termination. The inferior phrenic trunk divided into 2 inferior phrenic arteries, which coursed to the corresponding domes of the diaphragm (**Figure 1**). This variation was associated with variations of the right renal and suprarenal vessels. There were 2 renal arteries of equal size on the right side (**Figure 1**). The upper renal artery are divided into 3 branches before entering the kidney. The lower renal artery crossed the upper renal artery near the hilum. It entered the kidney with the superior renal vein. It gave 2

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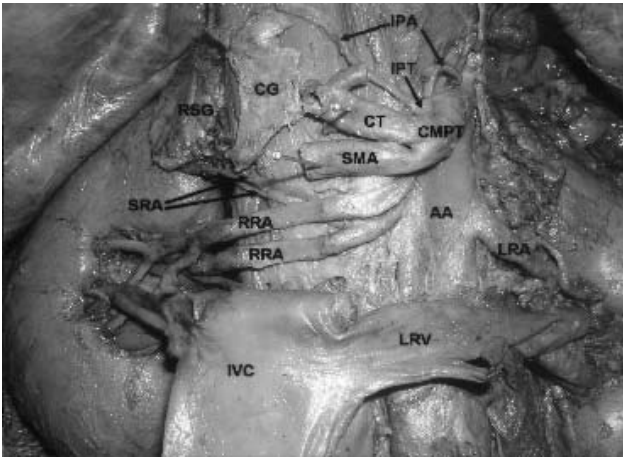


Figure 1 - Dissection demonstrating the variations of celiac trunk and renal arteries. CMPT – celiaco-mesenterico-phrenic trunk, CT – celiac trunk, SMA – superior mesenteric artery, IPT – inferior phrenic trunk, IPA – inferior phrenic arteries, RRA – renal arteries of right side, SRA – suprarenal arteries, AA – abdominal aorta, IVC – inferior vena cava, LRV – left renal vein, RSG – right suprarenal gland, CG – celiac ganglion, LRA – left renal artery.

suprarenal branches, which coursed upwards and to the right deep of the upper renal artery (**Figure 1**). There were 3 renal veins on the right side; 2 of them passed anterior to the renal arteries and renal pelvis, however, the third one passed deep to the branches of the superior renal artery (**Figure 2**). All the 3 renal veins terminated into the inferior vena cava (**Figure 2**). The right testicular vein terminated into the lowest among the 3 right renal veins (**Figure 3**). Branching of the left renal vessels was normal.

Discussion. The celiac trunk is a ventral splanchnic branch of aorta. It has a short course after which divides into splenic, hepatic, and left gastric arteries. Variations in branches of the celiac trunk are common. Yuksel et al,¹ reported a case of inferior phrenic trunk arising from the celiac trunk, and an aberrant right hepatic artery arising from the superior mesenteric artery. A common trunk of the left gastric and the left inferior phrenic arteries arising from the celiac trunk has been reported by Cavdar.² Bordei and Antohe,³ reported a separate aortic origin of all the 3 branches of celiac trunk. They also reported the presence of celiaco-mesenteric trunk, hepatosplenic, and hepatogastric trunks. Yildirim et al,⁴ reported the origin of the middle colic artery from the celiac trunk. The occurrence of a celiacomesenteric trunk is only in 1–2.7% of cases.⁵ The occurrence of a celiaco-mesenterico-phrenic trunk has not been reported earlier. Inferior phrenic arteries normally arise from the abdominal aorta just below the aortic, opening

of the diaphragm. Abnormal origins of these arteries also exist, including origin from the celiac trunk.⁶ Suprarenal arteries are multiple in numbers. The superior suprarenal arteries usually arise as several branches from the inferior phrenic artery, the middle from the abdominal aorta, and the inferior from the renal artery. Variations in the origin of these arteries have also been reported.⁷ Renal arteries arise from the aorta just below the level of origin of the superior mesenteric artery. Accessory renal arteries frequently

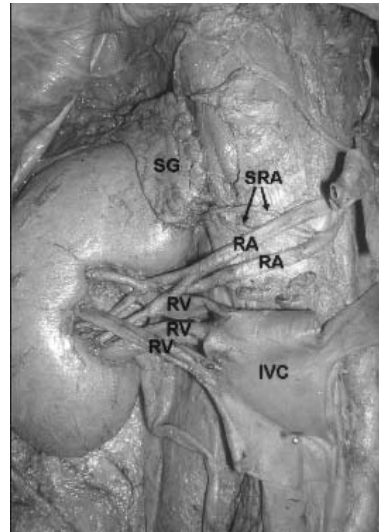


Figure 2 - Dissection demonstrating 3 right renal veins and 2 renal arteries. RV – right renal veins, IVC – inferior vena cava (reflected downward), RA – right renal arteries, SRA – suprarenal arteries, SG – suprarenal gland.

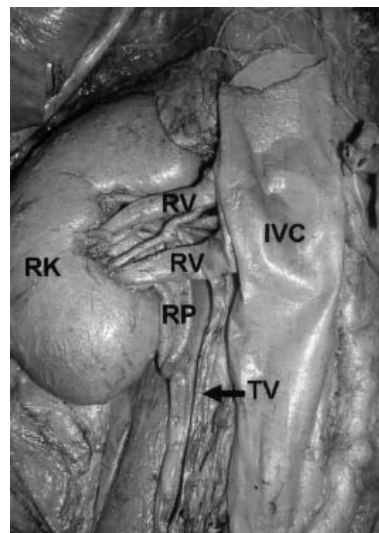


Figure 3 - Dissection demonstrating the right renal and testicular veins. IVC – inferior vena cava, RK – right kidney, RV – right renal veins, TV – testicular vein, RP – renal pelvis.

occur.⁸ They usually enter the kidney above or below the hilum, and their relations to nearby structures can vary. Bayramoglu et al⁹ reported the bilateral additional renal arteries originating from the abdominal aorta, and an additional right renal vein accompanying the additional right renal artery. These anomalies were associated with unrotated kidneys with extrarenal calices and pelves. All the additional vessels were found posterior to the ureter with a close relationship to the ureteropelvic junction on the right side

Renal veins are the tributaries of inferior vena cava. The right renal vein receives only blood from the right kidney, whereas the left renal vein receives blood from the left suprarenal gland, and the left gonad through suprarenal and gonadal veins. Variations of the renal veins are rare compared to the renal arteries. Variations of the right renal veins are more common than that of the left side. Janschek et al¹⁰ reported the cases of multiple renal veins. In their study, variations were more common on the right side (23%) than the left (6.7%). Right testicular vein is a tributary of inferior vena cava. Variations of the right testicular vein are very rare. Some of the variations, which are reported here have already been reported as individual cases of variations, but a celiaco-mesenterico-phrenic trunk has not been reported yet. The concurrent variation of celiac, superior mesenteric, inferior phrenic, renal, suprarenal arteries and renal, and testicular veins make this case rare and unique. The arterial variations like other anatomical variations can cause problems during operative procedures of the abdomen. Awareness of these variations in the origin of the arteries in renal hilar and para-aortic regions is of utmost importance for urologists performing nephron-preserving surgery, kidney transplantation, or management of renal vascular hypertension. These variations can be shown preoperatively by selective angiography. These variations may also

provide guidelines for endovascular procedures, like therapeutic embolization and angioplasties.

In this case report, the origins of the middle suprarenal and inferior suprarenal arteries from the right renal artery, further indicates that, this similar variation must be kept in mind in adrenal surgeries and renal transplantations. Due to implications for many therapeutical and diagnostic procedures in the retroperitoneal region, knowledge of these variations could be useful for clinicians in its recognition and protection.

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