



Case Report

## **Bilateral Variations in the Branching Pattern of Abdominal Aorta - A Case Report**

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### **ABSTRACT**

**Aim/Objectives:** To study the branching pattern of abdominal aorta in human cadaver and compare them with the previous studies.

**Materials & Methods:** During routine Dissection in a 60 years old male cadaver for Medical under graduates, we came across a bilateral variation in the branching pattern of abdominal aorta. The variations were photographed.

**Results:** Variations regarding the branching pattern of the aorta was important in different laparoscopic surgeries and kidney transplantation. We observed bilateral accessory renal arteries arising from abdominal aorta; coeliac trunk gives rise to a common arterial trunk, which divides into left inferior phrenic and Left middle suprarenal arteries. Left superior suprarenal artery was arising from left inferior phrenic artery and left inferior suprarenal artery normally arising from left renal artery. We also came across the right inferior phrenic artery was arising from abdominal aorta below the origin of Coeliac trunk, and gives rise to right superior suprarenal artery. Right inferior suprarenal artery was arising from right accessory renal artery; right middle suprarenal artery was absent. We also observed Right gonadal artery was arising from ventral surface of abdominal aorta and left gonadal artery was arising from right accessory renal artery.

**Conclusion:** The awareness of these variations is useful for appropriate radio diagnostic interventions and is helpful to decrease complications like vascular bleeding while legating blood vessels, which is an integral part of many abdominal surgeries.

**Key words:** Coeliac trunk, Inferior phrenic, Supra-renal, Accessory renal and gonadal arteries.

### **INTRODUCTION**

The abdominal aorta was continuation of thoracic aorta at the median Osseo aponeurotic hiatus in the diaphragm, at the level of lower border of 12th thoracic vertebra. It continuous downwards until the level of the fourth lumbar vertebra and bifurcates into the right and left common

iliac arteries. The branches of abdominal aorta are grouped into anterior, lateral and dorsal branches. [1] The celiac trunk is the first anterior branch of abdominal aorta arises below the aortic hiatus at the level of T12-L1 vertebra and gives rise to the left gastric, Splenic and common hepatic arteries by supplying forgut derivatives. Superior

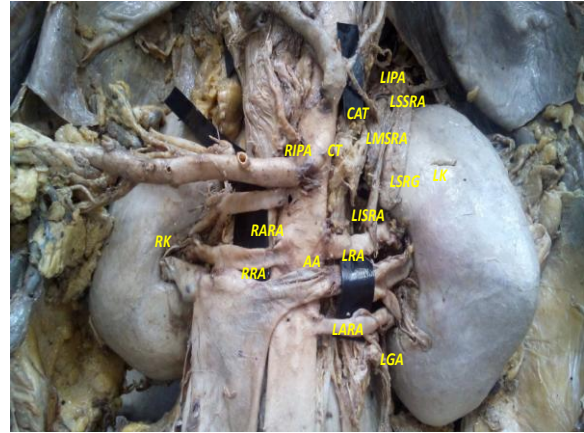
mesenteric artery originates 1cm below the coeliac trunk, at the level of the L1-L2 intervertebral disc and supplies midgut derivatives. The inferior mesenteric artery arises from the anterior aspect of the abdominal aorta at the level of L3 and supplies hindgut derivatives. [2] The lateral branches of the aorta, i.e. renal arteries and gonadal vessels supply the urogenital system. The posterolateral branches, i.e. inferior phrenic arteries and the lumbar arteries supply the body wall, inferior aspect of the diaphragm and posterior abdominal wall. [3] Variations in abdominal aorta and its branches are frequently observed and they occur due to embryological developmental changes.

## MATERIALS & METHODS

During routine Dissection for Medical under graduates in Basaveshwara medical college, Chitradurga, Karnataka. We came across the following bilateral variations in the branching pattern of abdominal aorta in a 60 years old male cadaver; the data obtained was compared with the previous studies.

## RESULTS

We observed left accessory renal artery was arising from abdominal aorta below the origin of left renal artery; right accessory renal artery was arising from abdominal aorta above the origin of right renal artery. The Coeliac trunk was arising from abdominal aorta and gives rise to a common arterial trunk, which was dividing into left inferior phrenic artery and ascending up to supply diaphragm and left middle supra renal artery coursing obliquely down to supply left supra renal gland, left superior suprarenal artery was arising from left inferior phrenic artery and left inferior suprarenal artery was normally arising from left renal artery (Figure.1).



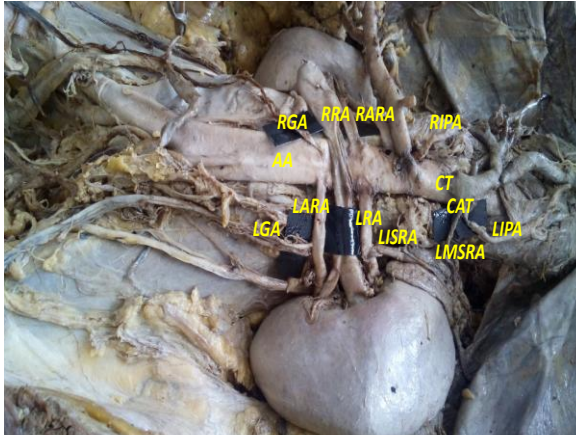
**Figure 1:** Showing origin of AA: Abdominal aorta, CT: Coeliac trunk, CAT: Common arterial trunk, LIPA: Left inferior phrenic artery, LSSRA: Left superior suprarenal artery, LMSRA: Left middle suprarenal artery, LISRA: Left inferior suprarenal artery, LRA: Left renal artery, LARA: Left accessory renal artery, LK: Left Kidney, LSRG: Left suprarenal gland, LGA: Left gonadal artery, RIPA: Right inferior phrenic artery, RARA: Right accessory renal artery, RRA: Right renal artery and RK: Right Kidney.



**Figure 2:** Showing origin of RIPA: Right inferior phrenic artery, RSSRA: Right superior suprarenal artery, RARA: Right accessory renal artery, RISRA: Right inferior suprarenal artery and also AA: Abdominal aorta and RSRG: Right supra renal gland

We also observed the right inferior phrenic artery was arising from abdominal aorta below the origin of Coeliac trunk and coursing obliquely up to supply diaphragm and gives rise to superior supra renal artery, right inferior supra renal artery was arising from right accessory renal artery and coursing upwards to supply suprarenal gland, right middle supra renal artery was absent (Figure.2) Right gonadal artery was arising from ventral surface of abdominal aorta and left gonadal artery was arising

right accessory renal artery and going to supply both the testis (Figure.3).



**Figure 3:** Showing origin of AA: Abdominal aorta, CT: Coeliac trunk, CAT: Common arterial trunk, LIPA: Left inferior phrenic artery, LMSRA: Left middle suprarenal artery, LISRA: Left inferior suprarenal artery, LRA: Left renal artery, LARA: Left accessory renal artery, LGA: Left gonadal artery, RIPA: Right inferior phrenic artery, RARA: Right accessory renal artery, RRA: Right renal artery and RGA: Right gonadal artery.

## DISCUSSION

Deficiency in the development of Mesonephric arteries results in more than one renal arteries. [4] During development, kidneys are situated in the pelvis and supplied by the branches of common iliac arteries, but later, when they ascend to the lumbar region; their arterial supply also shifts from the common iliac artery to the abdominal aorta. Accessory renal arteries were arising from the abdominal aorta, either above or below the main renal artery, and follow the latter to the Hilum. [5] Among the people transplanted with kidneys with multiple arteries, increasing rate of renal artery thrombosis, hemorrhage and segmental parenchymal infarction was found. [6] In our study Right accessory renal artery arises from abdominal aorta above the origin of Right renal artery and Left accessory renal artery arises from abdominal aorta below the origin of left renal artery. This is in agreement with the literature. [7] Cavdar et al reported a case, in which the left inferior phrenic artery and the left

gastric artery arise from the long coeliac trunk (4.3cm) via a common trunk. [8] Wadhwa A, Soni S. et al., reported the origin of inferior phrenic artery from abdominal aorta in 55% (R) and 65% (L), from coeliac trunk in 35% (R) and 30% (L), and from the renal arteries in 10% (R) and 5% (L) of the cases. However, in a radiographic study in 383 patients the incidence of origin of inferior phrenic artery was: coeliac trunk 39.7%, abdominal aorta 38.6%, renal artery 15.4%, and less commonly from left gastric, hepatic, superior mesenteric and even contra lateral inferior phrenic artery. [9] In this study left inferior phrenic artery and left middle supra renal arteries arises from a common arterial trunk coming from Coeliac trunk and right inferior phrenic artery arises from abdominal aorta below the origin of Coeliac trunk and gives rise to right superior supra-renal artery, right inferior suprarenal artery was arising from right accessory renal artery and right middle suprarenal artery was absent, these variations were not found in the literature.

A textbook by Moore et al. [10] describes the coeliac trunk, superior mesenteric, inferior mesenteric, renal arteries, gonadal arteries arises from abdominal aorta and aortic bifurcation as being placed at the level of T12, L1, L3, L1, L2, and L4, respectively, with reference to the human vertebral column. Right testicular artery originated from right upper renal artery while left testicular artery originated from left lower renal artery. [11] Brohi et al. reported a case with high origin of left testicular artery with unusual suprarenal branch from it. [12] Ozan et al. reported two cases, in which gonadal arteries and an accessory renal artery arises from abdominal aorta at higher level than usual. In our observations right gonadal artery arises from ventral surface of abdominal aorta and left gonadal artery arises from left accessory

renal artery. This type of variation is not noted in literature.

## CONCLUSION

Many observed variations and extensions can result in unnoticed haemorrhages as a result of cutting of the vessel, or ischemia caused by the ligation of a vessel during surgery. The awareness of these variations is of great importance for surgeons in order to be identified the early and preserved during interventions, as well as for radiologists for precise interpretation of arteriogram.

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