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ANOMALIES OF THE RENAL, PHRENIC AND SUPRARENAL ARTERIES: CASE REPORT

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## ANOMALIES OF THE RENAL, PHRENIC AND SUPRARENAL ARTERIES: CASE REPORT

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### ABSTRACT

**This is a case where multiple anomalies of the posterior abdominal wall arteries were found. These were accessory renal, a pre-hilar division of the renal, a unilateral origin of the inferior phrenic artery from the renal and aberrant suprarenal arteries. The accessory renal and the pre-hilar branch of the renal resembled polar arteries that supplied the upper and lower poles and similar segments of both kidneys.**

### INTRODUCTION

Variations in the number of the renal arteries and their position with respect to the renal veins are common; and so are the variations of the suprarenal arteries (1). Accessory renal arteries are commonly derived from the renal, abdominal aorta, common iliac and superior mesenteric arteries. Rarely they originate from the external iliac, lumbar, spermatic, ovarian, inferior mesenteric, superior suprarenal, inferior phrenic, right colic, subcostal, contralateral renal, splenic and the thoracic aorta (2-4).

Usually a single inferior phrenic artery arises from the abdominal aorta on each side of the body. They might originate by a common trunk from the aorta, the celiac trunk or independently from the same sources. The inferior phrenic may arise from the renal, left gastric, superior mesenteric, suprarenal; or rarely from the hepatic artery (5-9).

The suprarenal glands are supplied by multiple branches from the inferior phrenic, aorta and renal arteries from above downwards (10). Rare origins from the ureteral and gonadal arteries have been described (11).

### MATERIALS AND METHODS

The findings belong to a single male German cadaver during routine dissection in the dissection room (Anatomy Department, College of Medicine, K.F.U., Dammam). The subject was about 50 years old and had an average body weight and height. He seemed to have no injuries and there were no wounds, ulcers and or scratches on the surface of the skin. His face, eyes, nose and mouth were normal and there were no other congenital abnormalities apart from those mentioned above. The cause of death could be due to pulmonary edema or pneumonia as the right lung looked dark black and showed multiple infarcts and clots.

### RESULTS

*On the right side:* The renal artery trifurcated into three branches: an upper inferior phrenic artery, a middle pre-hilar branch and a lower renal artery proper (Figure 1). The inferior phrenic artery passed upwards on the right psoas muscle to the under surface of the right dome of diaphragm. During its course it gave multiple aberrant inferior suprarenal arteries.

The pre-hilar branch divided into upper and lower branches in front of the hilum of the right kidney. The upper branch entered the upper pole of the kidney while the lower branch passed downwards in front of the renal artery to the lower pole of the kidney. It terminated into two branches that entered the lower pole of the kidney. The renal artery itself divided into three terminal branches at the hilum of the kidney.

### Figure 1

*Posterior abdominal wall on the right side*

A= Aorta. R=Renal artery. I=Inferior phrenic artery.  
P=Pre-hilar branch of the renal  
S=Suprarenal artery

**Figure 2**

*Posterior abdominal wall on the left side*

A=Aorta. C=Celiac trunk. I=Inferior phrenic artery.  
AC=Accessory renal artery. R=Renal artery.  
S=Suprarenal artery

*On the left side:* The left inferior phrenic artery originated from the aorta above the origin of the celiac trunk and passed upwards to the left dome of diaphragm (Figure 2).

A large accessory renal artery originated from the aorta above the origin of the left renal artery; passed downwards in front of the left renal artery to the lower pole of the left kidney. It gave a large aberrant suprarenal branch to the gland and terminated into three branches that entered the lower pole of the kidney. The left renal artery divided into three branches at the hilum. The upper branch gave the inferior suprarenal branch to the left gland

**DISCUSSION**

In this case both phrenic arteries, irrespective of their variable origin, ramified into similar branches under the domes of the diaphragm on each side. They did not penetrate the diaphragm or anastomose with any artery fact that excludes their origin from the nearby vessels like the adrenal artery.

The pre-hilar branch of the right renal artery supplied both upper and lower poles of the right kidney, while the accessory renal artery on the left side supplied only the lower pole of the left kidney. Both arteries seemed to have supplied the lower segments in each kidney as well. It is known that the renal arteries divide to give apical, superior (anterior), middle (anterior), inferior (anterior) and posterior branches to supply segments of the same name of each kidney. It therefore seems that the normal segmental blood supply of both kidneys is disturbed by these ectopic vessels. This needs further radiological investigations to clarify the intrarenal distribution of these polar vessels as well as the renal arteries.

The accessory renal artery and the pre-hilar branch, despite of their variable origin, resembled polar arteries

that supplied the upper and lower poles of both kidneys. Both vessels or their branches crossed in front of the renal arteries and the ureters to reach the lower pole of each kidney. Such an abnormal course might press on the renal arteries causing ischaemia or on the ureters leading to obstruction and calculi formation.

The polar arteries, accessory renal and the pre-hilar branch are due to persistence of embryonic vessels (12). The abnormal inferior phrenic in this case is due to developmental changes of the right supracardinal artery.

This is a case where multiple anomalies of the posterior abdominal wall arteries were found namely: an accessory renal, a pre-hilar division of the renal, a unilateral origin of the inferior phrenic from the renal and aberrant suprarenal arteries. The accessory renal and the pre-hilar branch resembled polar arteries that supplied the poles and the lower segments of the kidneys. The intrarenal distribution of the renal arteries and these polar vessels require further radiological investigations.

In conclusion vessels having variable origin supplied similar segments of both kidneys. Anomalous vessels crossing in front of the hilar of the kidneys may press on the underneath structures and cause severe pathological conditions.

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