

## Case Report

# ANOMALOUS LEFT TESTICULAR ARTERY ARISING FROM LEFT ACCESSORY RENAL ARTERY AND ITS CLINICAL IMPLICATIONS

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## ABSTRACT

Origin of the Testicular Artery variations were found during routine dissection of abdomen of the middle aged cadaver in the Dept of Anatomy, Govt. Medical College Jammu. On the left side there were two renal arteries, One of them was the main Renal artery which was originating from the anterolateral aspect of abdominal aorta and running to the hilum of the kidney in front of the renal vein The other was the Accessory Renal artery which was originating from anterolateral aspect of aorta 5mm above origin of main renal artery and going to the upper pole of the kidney. The origin of accessory renal artery and main renal artery was 4.2 and 9.2mm below the level of origin of superior mesenteric artery. The left testicular artery was originating from the accessory renal artery and crossing the renal artery and the renal vein anteriorly before following its usual course in the posterior abdominal wall. Only one renal artery was seen on the right side arising from the anterolateral aspect of aorta. The right testicular artery originated 52mm below the origin of right renal artery and followed its normal course This anomaly is explained by embryological development of both kidneys and gonads from intermediate mesoderm of mesonephric crest. Further the vasculature of kidneys and gonads is derived from lateral mesonephric branches of dorsal aorta .Even though the condition presents as a silent renal anomaly (Undiagnosed throughout life and revealed only on autopsy) the surgical implications are noteworthy, which too have been highlighted in this report.

**KEYWORDS:** Anomalous testicular artery; Accessory renal artery; Renal artery, Renal vein; Mesonephric crest.

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## INTRODUCTION

Renal arteries and testicular arteries arise from the lateral or anterolateral aspect of abdominal aorta. Variations relating to origin, course & number of these arteries have been reported in a number of studies. The embryological basis of these variations has also been well established. From the published studies and reports about accessory renal arteries it can be concluded that average rate of occurrence is approximately 30% Machnicki & Grzybiak examined the variation of testicular artery in fetuses and adults . According

to their site of origin from the aorta or renal arteries four main types of testicular arteries have been identified [1].

Type 1- A single testicular artery arising from the aorta.

Type 2- A single testicular artery arising from the renal artery.

Type 3-Two testicular arteries arising from the aorta and penetrating the same gonad.

Type 4- Two testicular arteries penetrating the testes. One arising from the aorta and other from the renal artery.

Pai et al studied 34 adults male cadavers for variation in origin, number and course of the testicular artery. They found that testicular artery was normal in origin and course in 85.3% of cases. In 14.7% of cases variations in origin, number and course were found [2].

In a study of Notkovich including 405 testicular or ovarian arteries the gonadal arteries of renal origin were found in 14% taking their origin from principal renal artery, from its branches or from an accessory renal artery [3].

Shoja et al reported that gonadal artery originated from main or accessory renal artery and origin from inferior polar artery was the most common finding [4].

Siniluoto et al observed inflammation of left testes secondary to Tran catheter embolization of malignant left renal tumor with absolute ethanol [5]. This was probably due to testicular artery arising from the renal artery and its branches.

Though mostly undiagnosed throughout the life the aberrant vasculature could provide a formidable challenge during surgery in this region. Preoperative aortography is often required to visualize the uncertain anatomy of the anomalous renal artery to minimize the risk of preoperative and postoperative hemorrhage associated with the vascular surgery.

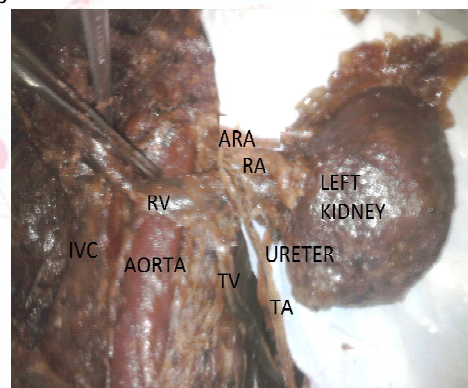
The present case report not only aims at explaining the possible embryological basis of this congenital anomaly but also the risk factors associated with surgical interventions in this region. The knowledge of the atypical anatomical presentation has gained importance with the advent of newer surgical and operative techniques.

### CASE REPORT

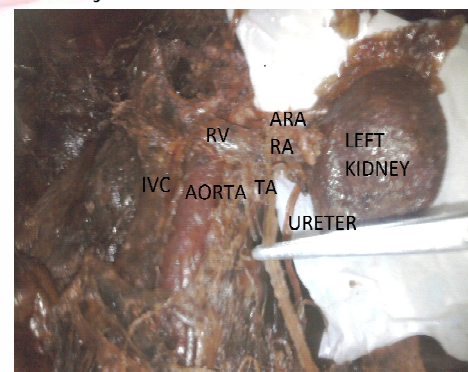
One accessory renal artery superior to main Renal artery was observed during routine abdominal dissection of a middle aged male cadaver on the left side. The accessory renal artery originated from the anterolateral aspect of abdominal aorta 4.2mm below the origin of superior mesenteric artery and ran into the upper pole of left kidney The main renal artery originated from the anterolateral aspect of abdominal aorta 9.2mm below the origin of superior mesenteric artery and ran into the

middle pole (hilum) (fig-1) The renal artery was crossing the left renal vein anteriorly (fig-2). On the right side there was a single renal artery arising from the anterolateral aspect of abdominal aorta 11.3mm below the origin of superior mesenteric artery and going into the hilum of kidney The left testicular artery was arising from the accessory renal artery and then crossing the renal artery, renal vein, psoas, ureter, & external iliac artery (fig-3). The right testicular artery was arising from the anterolateral part of aorta 2.5cm caudal to the renal artery and then going obliquely downwards and laterally behind peritoneum into pelvic cavity. During its course it lies anterior to inferior vena cava, Psoas, Ureter and external iliac artery.

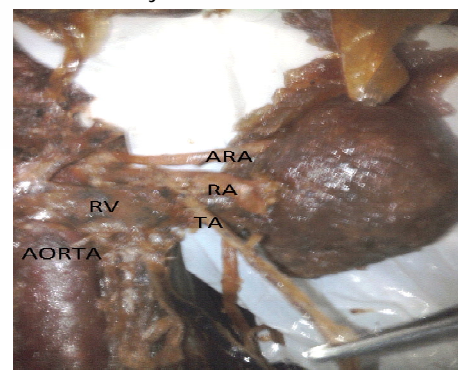
**Fig. 1:** Showing origin of accessory and main left renal artery from the aorta.



**Fig. 2:** Showing left renal artery crossing the left renal vein anteriorly.



**Fig. 3:** Showing left testicular artery arising from anomalous left renal artery.





## DISCUSSION

Anomalies of various vessels include variation in their course and number. Certain knowledge of embryology of renal vasculature and development of kidney is essential to understand the multitude of anomalies that may occur. With the complex development of kidney through three stages of pronephros, mesonephros and metanephros and the migration of kidney from pelvis to lumbar region along with its longitudinal location and simultaneous acquisition of a vascular supply there is a reason to understand why the possibility for anomalous development in kidney is greater than that for other organs in body [6].

Renal vasculature may be studied at various levels commencing with principal and accessory renal arteries. Their primary patterns of branching and areas of distribution suggest the presence of vascular segmentation. From the primary stems branch lobar, inter lobar, arcuate, inter lobular arteries, afferent and efferent glomerular arterioles and cortical intertubular capillary plexuses, cortical venous radicles drain them and also vasa recta and associated capillary plexuses of medulla to the renal veins.

The nomenclature of renal artery variation is still unclear. Nevertheless it is a misnomer to call such vessels accessory, aberrant, or even supernumerary because they are not extra but essential tissue sustaining arteries without anastomosis between them which correspond to the segmental branches of a single renal artery. So some authors name them as upper and lower hilar arteries regarding their relation with the renal hilum. Bordei et al found 54 double renal arteries originating from the aorta in 272 kidneys (20%) and 6 of them were bilateral (2.2%) [7]. Unfortunately no information about the arteries being hilar or polar was given. Bergaman et al reported the frequency of gonadal arteries originating from the renal artery as 15%(8). Cicekcbasi et al classified the gonadal artery originating from the renal artery as type ii with the frequency of 5.5% [9]. In their study all five cases in type ii had inferior polar origin. In the present study the left testicular artery is originating from the renal artery going to the upper polar region. Bordei et al found four cases of a single gonadal artery originating from

double renal arteries but did not give any information regarding laterality. The anatomy of gonadal arteries has assumed importance because of development of new operative techniques within abdominal cavity for operations like varicocele and undescended testis. During laparoscopic surgery of male abdomen and pelvis many complications occur due to unfamiliar anatomy in operative field. Thus it becomes imperative to carefully preserve the gonadal artery in order to prevent any vascular troubles of gonad, the gonadal artery being its unique source of blood supply. This indicates the importance of arteriography or Doppler ultrasound examination of renal hilum prior to any surgical procedure in this region.

### Embryological explanation

Felix [10] stated that the developing mesonephros, metanephros, suprarenal glands and gonads are supplied by nine pairs of lateral mesonephric arteries arising from dorsal aorta. Felix divided these arteries into three groups as follows:

The first and second are cranial arteries

The third to fourth are middle arteries

The sixth to ninth are caudal arteries

The middle group gives rise to renal arteries. The persistence of more than one arteries of the middle group results as multiple renal arteries. Thus the two renal arteries in this case are as a result of two persisting mesonephric arteries of the middle group. Felix also stated that although any of these nine arteries may become the gonadal artery it usually arises from the caudal group. In the present case the testicular artery has originated from accessory renal artery so we believe that it has been derived from middle group as well. Brenner explained that spermatic branches of renal origin were due to an early connection of a mesonephric artery with kidney which is normally lost [11]. Various growth/transcription factors and hemodynamic forces may take part in selection and persistence of a particular congenital vascular channel. The particular embryonic signals which lead to formation of accessory renal or aberrant gonadal artery are yet unknown.

## CONCLUSION

The present case report aims at highlighting an anatomic variation and its possible embryological variations. Even though the anomaly is revealed only on autopsy and may remain undiagnosed throughout life, the clinical implications are immense on proper diagnosis. Hence the anatomical knowledge of such anomaly would minimize the perioperative and postoperative morbidity related to surgical interventions and cadaveric transplantations procedures.

### List of Abbreviations:

ARA-Accessory renal artery

IVC-Inferior vena cava

RA-Renal artery

RV- Renal vein

TA-Testicular artery

TV-Testicular vein

**Conflicts of Interests: None**

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