Anatomical Study of Anomalous Testicular Artery

Thaer M. Farhan *FIBMS.*

Abstract

Background: The testicular artery arises from aorta below the level of renal arteries, most commonly at the level of L2 vertebra.

Variations in the site of origin of the testicular artery may be accounted; it may arise from anomalous origin rather than aorta, or may originate from aorta higher than L2 level or arises from the main renal artery or accessory one.

Objectives: study the sites of origin of testicular artery and its clinical importance.

Materials & Methods: study the origins of 40 testicular arteries, in both sides of 20 male cadavers in the anatomical laboratory prepared and embalmed for teaching purposes in the medical college. Examine both sides to see the possible origins of the testicular arteries either from aorta or from somewhere else.

Results: During dissection of 20 male cadavers, examining 40 testicular arteries on both sides, a different site of origin of the testicular artery was encountered. The right testicular artery was found originated from the right main renal artery. On the other hand, the left testicular artery was found originated from the left accessory renal artery in two cases out of twenty. In the other 17 cases, all the testicular arteries whether right or left were originated from abdominal aorta.

Discussion: Variation in the renal and gonadal vasculature has been known since early days of human autopsy. The anomalous origin of testicular artery from accessory renal vessel has important clinical implications, since any surgical intervention with the kidney, during transplantation for example, may lead erroneously to injury of the anomalous testicular artery leading to atrophy of the male gonad.

Conclusion:

- Testicular artery may originate from anomalous origin rather than aorta.
- The anomalous testicular artery is the aberrant one, and no more accessory artery present.
- The encountered anomalous origin may comprise a potential risk of bleeding from injured artery during surgery.

Keywords: accessory renal arteries, testicular artery, vascular variation.

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Introduction

The renal arteries usually arise from anterolateral or lateral aspect, at right angle from abdominal aorta [1],at the level of L2 vertebra, precisly at the level of L1-L2 intervertebral disc, inferior to the origin of superior mesenteric artery[2].The left renal artery is shorter than the right ,crosses the left crus of diaphragm and psoas muscle ,behind the renal vein ,both left renal artery and vein being covered by tail of pancreas and the splenic vessels.

Dept. Human Anatomy, College of Medicine,Al-Nahrain University.
Adress Correspondence to: Dr. Thaer Mahmood Farhan, Kadhimiya, Baghdad – Iraq, P.O.Box:14222,
Mobile: 009647901611092
E-mail: aljomaili2005@yahoo.com
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The longer right renal artery crosses the right crus and psoas muscle behind the inferior vena cava and the right short renal vein.each artery reach the hilum of kidney to supply the renal segments. Each renal artery gives off small suprarenal and ureteric branches.

One or two accessory renal arteries arise frequently from the aorta, above or below the main artery [3,4].

The testicular artery usually arises from near the front of aorta, below the origin of renal artery and well above the origin of inferior mesenteric artery, the testicular artery arises most commonly from abdominal aorta at the level of the second lumbar vertebra [5, 6], then it travels through the retroperitoneal space and the entire length of the cord to the testicle [7].

In the abdomen the testicular artery supplies the perirenal fat, ureter, and iliac lymph node in the inguinal canal, it supplies the cremasteric muscle (خطأ! الإشارة المرجعية غير معرّفة.).

The testicular veins originated from a plexus in the scrotum called the pampiniform plexus (8-12 veins)which usually unite at the level of internal inguinal ring and drain into the inferior vena cava on the right and the left renal vein on the left (خطأ! الإشارة المرجعية غير معرّفة., 8).

Variations in the pattern of renal and gonadal arteries have been reported more frequently than other large vessels in the literatures and alternative nomenclatures have been used to describe the same. These include aberrant artery (9), supernumerary artery, any artery arising from the aorta in addition to the main renal artery should be named "accessory" and the renal arteries arising from sources other than aorta should be called "aberrant. The frequency of aberrant renal arteries has been reported to be much lower than accessory renal arteries (10). The testicular arteries may have anomalous origin rather than from aorta, or it may have a high aorta origin above the level of L2 vertebra in about 5-20% of cases, on the other hand, the testicular artery may arises from renal artery; main or accessory renal artery, in about 5-6% (خطأ! الإشارة المرجعية غير معرّفة., 11).

Materials and Methods

Twenty human cadavers (forty sides) are examined to study the possible variations in the origin of the testicular artery. The gender of cadavers is male. All cadavers are embalmed well and prepared for teaching purposes in the medical college. The bowel and its mesentry all are removed to view the posterior abdominal wall clearly and to make identification for the testicular artery easier.

By gross anatomical dissection, we try to identify the origin of fourty (40) testicular arteries on both sides, which may come from aorta directly or indirectly.

For those testicular arteries come directly from aorta we try also to verify if they are aberrant or accessory testicular arteries.

We use a 6 megapixels digital sony camera to take pictures of work.

Results

During examination of a 20 male cadavers (40 sides) in the anatomical laboratory, the testicular artery found to have more than one site of origin. In all of the cadavers examined. We found three cases when the testicular arteries not originate directly from abdominal aorta. One case out of twenty (40 testicular arteries examined) the right testicular artery arises from the right renal artery. In two cases out of twenty cases examined, the left testicular artery is originated from the left accessory renal artery. In the remaining cases the testicular arteries are originated directly from the anterolateral aspect of abdominal aorta.

In the three cases identified with abnormal origin testicular artery evidently it was the main artery and no more accessory testicular artery from abdominal aorta. This is defined as aberrant testicular artery.

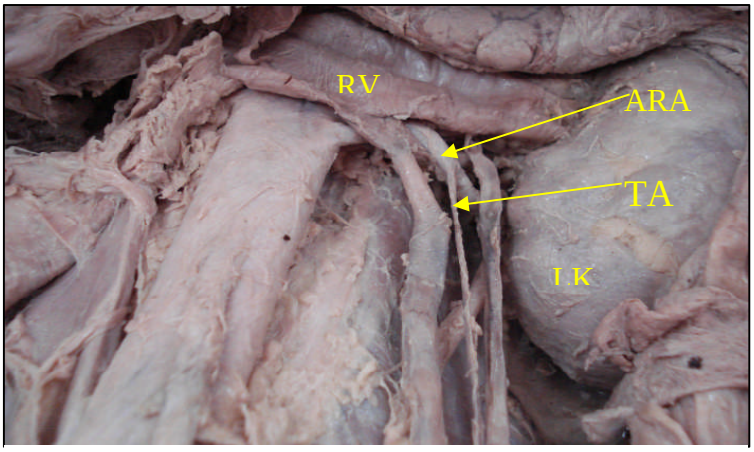

Figure 1: TA, anomalous testicular Artery, ARA, accessory renal Artery, RV, renal vein, LK: left kidney.

Figure 2: left testicular artery originated from left accessory renal artery, TA

The testicular artery arises at a right angle from the accessory renal artery in mid-distance of its course. *(Figure 1).*

Left accessory renal artery was found came from anterolateral aspect of abdominal aorta in three cadaver *(figure3)*.the accessory renal artery originated from abdominal aorta approximately 5 mm inferior to the origin of the main renal artery in two cases and runs toward the lower pole of the kidney

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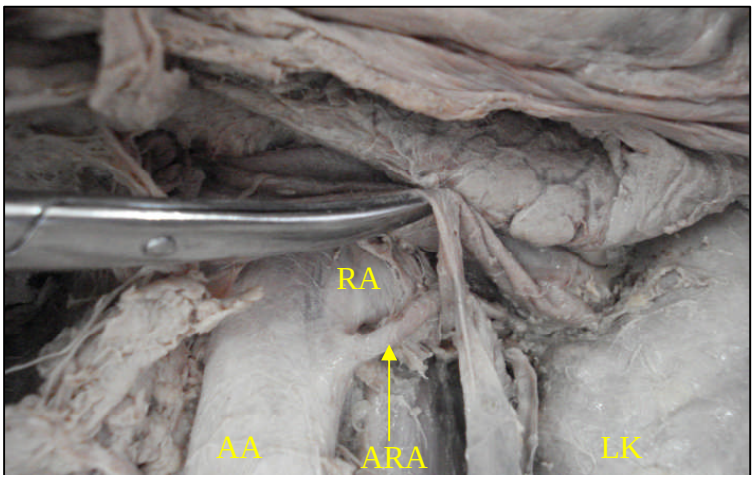

Figure 3: AA: abdominal aorta, RA: renal artery. LK: left kidney, ARA: accessory renal artery.

There is one testicular artery and two veins accompanying the artery on the left side of the cadaver

Table.1: shows number of cases with anomalous testicular arteries in 40 testicular arteries examined.

No. of cases examined	Origin from aorta	Origin from main renal artery	Origin from accessory renal artery	Others
20 cases (40 testicular arteries)	37	1 (right testicular artery)	2 (left testicular artery)	

Discussion

Careful knowledge of the embryological basis of the renal and testicular vasculatures and structural development of kidney and tesitcles is essential to understand the multitude of anomalies that may occur .variations in the origin ,course and branches of the testicular arteries are attributed to the embryological development .during fetus development, the lateral splanchnic arteries on each side supply the mesonephros, metanephros ,the testis or ovary and suprarenal glands, all these structures develop ,either totally or in part from the intermediate mesenchyme of the mesonephric ridge.one testicular or ovarian artery and three suprarenal arteries persist on each side(خطأ! الإشارة المرجعية غير معرّفة.[12]).

Four main varieties of testicular arteries are identified according to the site of origin from aorta or renal vessels.

1. a single testicular artery arising from aorta(type A)

2. a single testicular artery arising from renal artery(type B)

3. two testicular arteries arising from aorta(type C)

4. two testicular arteries penetrating the testis ,one arising from the aorta and other from the renal artery(type D)[13]

Many descriptions of abnormal origin of left testicular artery are made, Shinohara et al describes the high origin from aorta, higher to the origin of left inferior phrenic artery [14] or higher to the level of L2 vertebra in 5-20%, or it may be originated from renal arteries, either from principle left renal artery or from accessory renal artery, as well in 5-6% (خطأ! الإشارة المرجعية غير معرّفة.,خطأ! الإشارة المرجعية غير معرّفة., 15).

The accessory renal artery has been known since the early days of human dissection and autopsy. It has been reported that it occurs in 26% of individuals and originates mostly directly from aorta [16, 17].

Rarely, the accessory renal artery arises from celiac or superior mesenteric arteries near the aortic bifurcation or from common iliac arteries (خطأ! الإشارة المرجعية غير معرّفة.).
In this study, the left testicular artery was found to be originated from accessory renal artery and we define it as aberrant testicular artery.
The anomalous origin of testicular artery from accessory renal vessel has important clinical implications.

Risk of renal ischemia, lower segment infarction due to injury of anomalous testicular artery during urological or oncological surgical intervention and renal transplantation. if the surgeon is not aware of such anatomical variation. Surgeon may face unexplained bleeding from the jeopardized anomalous testicular artery

Such variations in the testicular and renal arteries have clinical and surgical significance in regard to their in influence on the blood flow to the kidney and testis and hemorrhagic complications following retroperitoneal operations [18, 19]

In addition to that ,another risk of left testicular atrophy or infarction due to unexpected loss of blood supply because of erroneous ligation or division of renal artery and/or testicular artery is clearly hazardous to result in infarction of testicle since the main blood supply of testes comes from testicular artery although cremasteric artery and differential artery may share in blood supply (خطأ! الإشارة المرجعية غير معرّفة.,خطأ! الإشارة المرجعية غير معرّفة.,20).

Due to the emergence of such critical vascular anomalies, it is widely advisable to do angiographic examination of renal arteries prior to operation on the kidney,transplantation or nephrectomy to detect any such variation of testicular artery origin to preserve the blood supply to the testis(خطأ! الإشارة المرجعية غير معرّفة.).

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