CASE REPORT

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Bilateral high origins of testicular arteries: a rare variant

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Abstract

We report a very rare case of bilateral high origins of testicular arteries in a 66-year-old Chinese male cadaver. The arteries originated from the antero-lateral aspect of the abdominal aorta, cranially to the origins of ipsilateral renal arteries. Approximately 1.1 cm after its origin, the right testicular artery gave off the middle suprarenal artery. During its course, the artery crossed anterior to the right renal vessels. The left testicular artery coursed posterior to the left suprarenal vein, anterior to the left renal vessels. Variants of the origin and course of the testicular artery are important during renal and testicular surgeries.

Keywords: testicular artery, origin, variant, clinical significance.

Introduction

The testicular arteries are paired vessels that most commonly arise from the abdominal aorta (AA) at the level of the second lumbar vertebra. Each artery passes obliquely downwards and posterior to the peritoneum. Descending on the posterior abdominal wall, it passes through the inguinal canal on the antero-lateral wall of the abdomen and enters the spermatic cord. Along their course, the testicular arteries are accompanied by the testicular veins. The testicular artery supplies the perirenal fat, ureter and external iliac lymph nodes; while in the inguinal canal, it supplies the cremaster muscle [1].

However, anomalies of the testicular artery are often observed during routine dissections, including the origin [2–4], course [5, 6], number [7–11] and even branches [12]. Variations were noticed in 4.7% of cases in a study of 150 cadavers [13].

Pai MM *et al.* [14] dissected 34 cadavers of the South Indian population and found 14.7% of the cases showed various anomalies of the testicular artery. The testicular artery may arise from the renal artery [2, 15–19] or the suprarenal artery [20]. They may also arise from a common trunk or be doubled, tripled, or quadrupled [21].

Materials and Methods

The present study involved abdominal dissection of a 66-year-old male cadaver in the Department of Anatomy of Jining Medical University, Shandong, China. The dissection was carried out according to the instructions described in Cunningham's Manual of Practical Anatomy [22].

The abdominal cavity was opened by routine dissection of the abdominal wall. The intestines, lymph nodes and connective tissue around the great vessels and their branches and tributaries were removed to provide a clear vision. The testicular arteries were observed and photographed, in particular for their origins and courses. The cadaver was preserved by the injection of 10% formalin and stored at -4^0C. The origins and lengths of the testicular arteries were measured with a vernier caliper.

Results

In the present cadaver, the right testicular artery (RTA) originated from the lateral aspect of AA at the level of the first lumbar vertebra, 1.2 cm above the origin of right renal artery (RRA). The RTA ran posterior to the inferior vena cava and at 1.1 cm distal to its origin; it branched off into the middle suprarenal artery (MSA) that supplied the right suprarenal gland (RSG). The RTA progressed in an oblique course outwards, crossing anterior to the right inferior suprarenal artery (ISA), RRA, right renal vein (RRV) and psoas major muscle into the inguinal canal (Figure 1).

The right ISA also originated from the AA, 0.5 cm below the origin of the RTA. It ran obliquely upper right, posterior to the RTA and supplied the lower part of RSG (Figure 1).

The left testicular artery (LTA) took origin from the antero-lateral aspect of the AA, 1 mm above the origin of left renal artery (LRA). The LTA ran posterior to the left suprarenal vein (LSV), then coursed anterior to the left renal vein (LRV) and psoas major muscle into the inguinal canal (Figure 2).

Discussion

The persistence of a cranial lateral mesonephric artery may result in a high origin of the gonadal artery [23]. Ciçekcibaşi AE *et al.* [24] pointed out that the middle group of lateral mesonephric arteries gave rise to

a gonadal artery that originated from the renal artery, while that of the cranial group gave rise to a gonadal artery may originate from the suprarenal artery or a more superior aorta level. According to their origins, there were two kinds of classification of the testicular artery variations [24, 25] (Table 1).

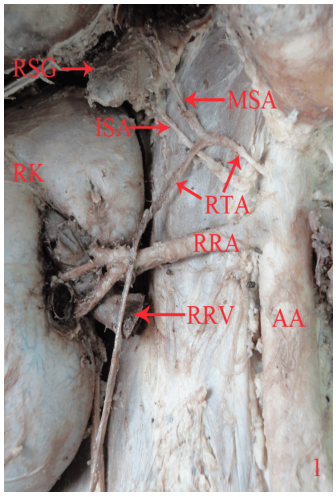

Figure 1 – ***Dissection of the right retroperitoneal space, anterior view: RTA: Right testicular artery; RRA: Right renal artery; RRV: Right renal vein; MSA: Middle suprarenal artery; ISA: Inferior suprarenal artery; RSG: Right suprarenal gland; RK: Right kidney; AA: Abdominal aorta.***

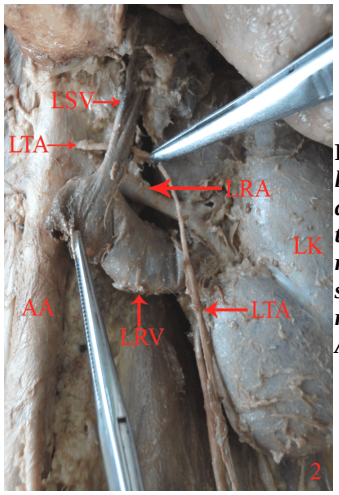

Figure 2 – ***Dissection of the left retroperitoneal space, anterior view: LTA: Left testicular artery; LRA: Left renal artery; LSV: Left suprarenal vein; LRV: Left renal vein; LK: Left kidney; AA: Abdominal aorta.***

Table 1 – ***Classifications of TA variations: the present report belongs to type A according to classification by Machnicki A and Grzybiak M, and type III according to classification by Çiçekcibaşi AE et al.***

Machnicki A and Grzybiak M [25]	Origin	Çiçekcibaşi AE *et al.* [24]
B: TA originating from the RA.	Renal artery (RA)	II: TA arising from the RA.
A: TA originating from the AA.	Abdominal aorta (AA)	III: TA of high origins from the AA.
C: two TAs from the AA supplying the same gonad.		IV: TA duplication originating from the AA or various vessels.
D: two TAs (AA+RA) supplying the same gonad.	AA+RA	
	Suprarenal artery (SA)	I: TA arising from the SA.

Nathan H *et al.* [26] reported a case that both the left and right testicular arteries arched over the left renal vein. Satheesha NB [27] found a left testicular artery entrapped between two divisions of a left renal vein, which was a similar case to arching. In a study of South African Negro, Grine FE and Kramer B [28] revealed that the frequency with the gonadal arteries following a recurrent course, upwards and arching over the renal vein before descending to the gonads, 17.2% on the left side and 22% on the right side. Nayak SR *et al.* [29] described a double testicular artery (middle and lateral) and the right inferior suprarenal artery aroused from the medial testicular artery. The right inferior phrenic artery and middle suprarenal artery took origin from a common trunk just above the origin of right renal artery. Mirapeix RM *et al.* [30] reported a right testicular retro-caval course, passing through a bifid right renal vein after arching over the superior arm of a "Y-shaped" division of the vein.

There are few reports about high origin of testicular artery in literature. Shinohara H *et al.* [31] once reported a left testicular artery originating 1 cm superior to the origin of the left inferior phrenic artery. It branched off and subdivided into a supernumerary inferior phrenic artery and a superior suprarenal artery. Brohi RA *et al.* [32] found a left testicular artery originating from the anterior surface of the abdominal aorta at the level of origin of the left renal artery. It ran parallel and just inferior to the left renal artery and gave off a branch, which supplied the left suprarenal gland. In a Turkish male, Onderoğlu S *et al.* [33] described that the right testicular artery originated from the aorta at near the same level and anterior to the renal artery. This testicular artery gave off the inferior phrenic and suprarenal arteries and was coursed below the inferior vena cava. Two more cases of higher origin of the testicular artery were reported by Ozan H *et al.* [34]. Furthermore, Xue HG *et al.* [35] reported a right testicular artery arising from the anterior surface of the abdominal aorta at the level of the left renal artery, while the left testicular artery arose from the abdominal aorta at a level of 5 cm below the origin of the right one. Paraskevas GK *et al.* [36] described a high origin of a left testicular artery originating from the anterolateral aspect of the abdominal aorta and branched off into the inferior suprarenal artery. It was very similar to the right testicular artery reported here, but the origin of contralateral testicular artery was different to this case.

Conclusions

The origin and course of the testicular artery must be carefully identified in order to preserve normal blood circulation and prevent testicular atrophy. Radiologists, urologists and oncologists should be familiar with testicular artery variants in order to provide an accurate diagnosis during pre-operative studies.

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