



Case Report:

Unique Case of Entwined Left Testicular and Left Renal Artery Forming an Arterial Arch Over the Left Renal Vein

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Abstract: Testicular arteries are the main arteries supplying the testis. An anatomical variation in the course of the left testicular artery and left renal artery is presented in this case report, highlighting its clinical implications. The left testicular artery had a high origin from the anterior aspect of the abdominal aorta and took a recurrent course. On reaching the upper border of the left renal vein, it looped over it and descended in front of it. The left renal artery had normal origin and normal course of its proximal half. Thereafter, it arched over the superior border of renal vein and appeared on its anterior surface to reach the renal hilum, causing a mild tortuous course of the artery. This arching of testicular artery and renal artery over the left renal vein might compress the renal vein resulting in renal vein hypertension. This unusual course might also compress the testicular artery causing testicular and pelvic varicocele. Hence, an abnormal course of testicular artery often warrants clinical attention because of its importance in maintaining thermoregulation and proper spermatogenesis of the testis.

Key Words: Testicular artery, Renal artery, Renal vein, Varicocele

Introduction:

Testicular (gonadal) arteries (TA) are paired branches of the abdominal aorta, given off at the level of the second lumbar vertebra. In its usual course, it passes downward, laterally and retroperitoneally on the posterior abdominal wall, accompanied by the corresponding testicular vein on its lateral side towards the deep inguinal ring and supplies the testis.(1) The typical morphology of testicular vessels is essential in the fundamental process of reproduction and the achievement of thermoregulation of testis.

Many reports on the variant origin of TA are available in the scientific literature. Anatomical variation of the gonadal arteries is reported to be more common in females than in males as well as higher prevalent on the right side than on the left. (2) A case of variant right testicular vessels wherein, TA originating from the accessory renal artery and testicular vein draining into the right accessory renal vein instead of inferior

vena cava is reported by Royana et al.(3) Bilateral high origin of TA superior to corresponding renal arteries have been reported by Jing et al.(4) Hence, the variant origin of the testicular artery is considered to be a common vascular variation. However, looping or arching course of TA over neighboring vessels, particularly on renal vein has great clinical importance, as it may be an additional possible cause of the renal vein compression or such a course might lead to testicular artery compression resulting in testicular atrophy. Therefore, cautious identification of arched or looped TA is necessary for the radiologists, urologists, and oncologists to provide an accurate diagnosis during pre-operative studies.

Case Report

During routine posterior abdominal wall dissection for the first-year medical students, an abnormal course of the left testicular artery and left renal artery was noticed. The left testicular artery had a high origin from the anterior aspect of the abdominal aorta, about 2cm below the level of origin of renal artery. From its point of origin, it took a recurrent course, upwards and laterally, lying first between the left renal vein and the aorta and then between the left renal vein and the left renal artery. On reaching the upper border of the left renal vein, it looped over it and descended in front of it. In its subsequent course, it was accompanied by the left testicular vein on its medial side in contrary to the normal relation and proceeded till the deep inguinal ring.

The left renal artery had normal origin from the abdominal aorta and had the normal course of its proximal half. However, at its distal half, hereafter, it arched over the superior border of renal vein and appeared on its anterior surface to reach the renal hilum. Because of this, the proximal half of the renal artery was posterior to renal vein, and the distal half was anterior to it, causing a mild tortuous course in contrast to the usual straight course (Figure 1, Figure 2). These vascular variations were unilateral and found in adult male cadaver aged about 60 years.

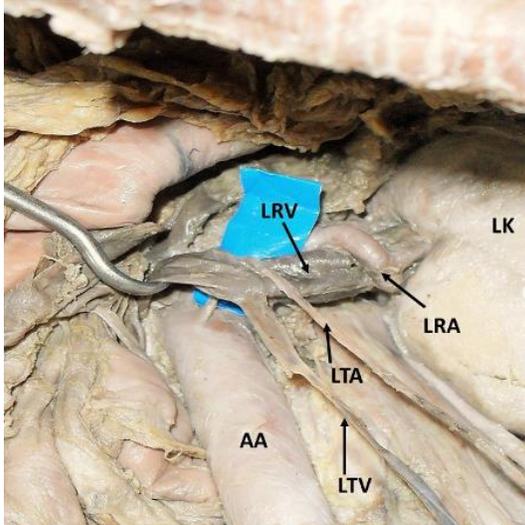


Figure 1: Dissection of the abdomen showing the high origin and looped pattern of left testicular artery (LTA) accompanied by the arched left renal artery (LRA) on the left renal vein (LRV). AA: Abdominal aorta, LTV: Left testicular vein, LK: Left kidney.

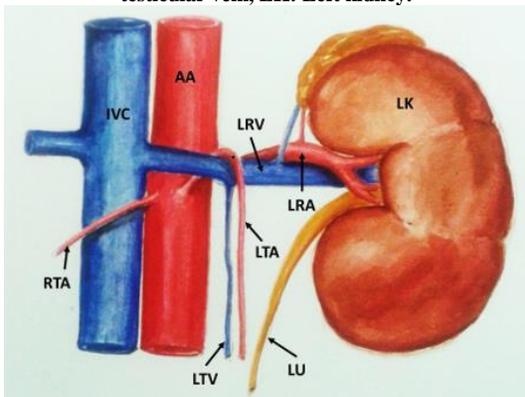


Figure 2: Schematic diagram showing the looped left testicular artery (LTA) and left renal artery (LRA) on the left renal vein (LRV). AA: Abdominal aorta, IVC: Inferior vena cava, LTV: Left testicular vein, RTA: Right testicular artery, LK: Left kidney, LU: Left ureter.

Discussion

Variations in the anatomical relationship of the testicular (gonadal) arteries to the renal vessels are frequently reported. However, reports on unusual course of testicular and renal arteries are scanty. An abnormal course of TA often warrants clinical attention because of its importance in maintaining thermoregulation and proper spermatogenesis of the testis. A rare presence of double TA (superior and inferior), with the presentation of superior testicular artery being hooked by left supra renal vein, has been reported by Jyothsna et al.(5) Mirapeix et al reported a peculiar course of right TA with retrocaval course and passing through the bifid renal vein.(6) A case of bifid testicular artery has been reported by Aithal et al.(7) High origin of left TA at the level of origin of the renal artery, associated with arching over the left renal vein at been reported before.(8,9) A case of entrapment of arched left TA between the main renal vein and abnormally persistent accessory left hilar renal veins was reported by Gabriel et al.(10) However, no arching of renal artery was reported in these cases.

The prevalence of recurrent course of gonadal arteries with subsequent arching over the renal vein is reported to be 17.2% on the left side and 22% on the right side.(11) While Machnicki & Grzybiak (12) and Cicekcibasi et al., (2) proposed two different categories of classification of TA on the basis of its origin or number, Notkovich (13) suggested three types of TA based on its relation to renal vein as follows:

Type I- TA passing posterior or inferior to the renal vein, without making contact with it

Type 2- Higher origin of TA crossing in front of renal vein

Type 3- TA coursing superiorly and around the renal vein

The looping pattern of TA in the present case is categorized under Type 3 classification of Notkovich and model of origin of TA in the present case falls under Type A classification of Machnicki & Grzybiak (i.e. TA originated from abdominal aorta) and Type III of Cicekcibasi et al (i.e. high positional origin of TA from AA) classification.

Morphological variations of testicular arteries are accredited to its embryological perspectives because of its origin from lateral splanchnic arteries of the aorta. Due to subsequent development of new splanchnic arteries because of descent of gonads, the higher branches undergo atrophy.(14) Abnormal persistence of higher branches or erroneous atrophy of lower branches tend to form the arched type of TA over the renal veins.

In addition to looping of TA with the renal vein, the present case also witnessed the peculiar course of the left renal artery in which its distal half arched the renal vein before its entry into the renal hilum. This appearance gave a mild touristy to the left renal artery.

This arching of testicular artery and renal artery over the left renal vein might compress the renal vein resulting in renal vein hypertension. Clinically, persistent left renal vein hypertension can cause the development of collateral veins, varicocele, orthostatic proteinuria and hematuria. (15) Thus, surgeons need to pay attention to the possible presence of arching testicular and renal arteries during surgical operation on the kidney to prevent acute hemorrhage resulting from their injury in renal hilar dissections and retroperitoneal surgical investigations.

Conclusion

The entrapment of the left TA between renal vein and abdominal aorta after that between renal vessels is clinically and surgically significant as these structures could compress the testicular artery causing testicular and pelvic varicocele. Additionally, higher origin of testicular artery and its arched pattern along with arched renal artery might lead to complications during nephrectomy procedures.

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