

Terminal Bifurcation of the Right Testicular Vein and Left Testicular Arterio-Venous Anastomosis

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ABSTRACT

The testis is the organ upon which the survival of the human species depends. Abnormalities of testicular vessels may lead to loss of gametogenesis and hormone production. Reported here is a case of bilateral variations of the testicular vessels observed in a male cadaver during the first year MBBS dissection classes. The right testicular vein bifurcated into two veins just before its termination and both the branches terminated into the inferior vena cava. The left testicular artery arose from the abdominal aorta just above the level of origin of the inferior mesenteric artery. There was an arterio-venous anastomosis between the left testicular vein and the left testicular artery. The arterio-venous anastomosis might be functionally important as it can change the quality of the blood entering the testis.

KEY WORDS

Arterio-venous anastomosis, bifurcation, testicular vessels

Citation

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INTRODUCTION

The testicular arteries are the branches of abdominal aorta. They arise from the ventral aspect of the abdominal aorta just below the level of the renal arteries. The variations of the testicular arteries are common and have been reported. The testicular arteries may vary at their origin, they may be missing, or one or both the arteries may arise from the renal artery, suprarenal artery or lumbar artery. Also, they may arise from a common trunk or be doubled, tripled or quadrupled.¹ The venous blood from the testis is drained through the pampiniform plexus of veins which condense to form four veins at the superficial inguinal ring, two veins at the deep inguinal ring and one testicular vein at variable levels. The right testicular vein drains into the

inferior vena cava and the left testicular vein drains into the left renal vein. Congenital variations of the testicular vein include variation in the course, areas of drainage and termination.² The anatomical variations of the testicular veins are attributed mainly to their embryologic origin. The testicular veins are derived from the subcardinal veins, which have a common origin with the renal veins.³ In the present study, bilateral variations of the testicular vessels were observed and these variations are of some clinical significance. The bifurcated right testicular vein might be a predisposing factor for the right sided varicocele and the arterio-venous anastomosis on the left side might change the quality of the blood flowing into the left testis.

CASE REPORT

During the dissection classes for undergraduate Medical students, variations of the right testicular vein and left testicular vessels were found in a cadaver aged approximately 55 years. The right testicular vein had a normal course. However, about 3cm before its termination, it bifurcated into two veins of almost equal size. Both these veins terminated into the inferior vena cava (Fig 1 and 2). The right testicular artery and the right testis were normal. The left testicular artery had a low origin from the abdominal aorta, just above the level of origin of the inferior mesenteric artery (Fig 1 and 2). The left testicular vein had a normal course and termination. There was an arterio-venous anastomosis between the left testicular vessels, located just below the level of the lower pole of the left kidney (Fig 1, 2 and 3). The caliber of the anastomosing vessel was a little smaller than that of the left testicular artery. The left testis was of normal size and appeared to be healthy.

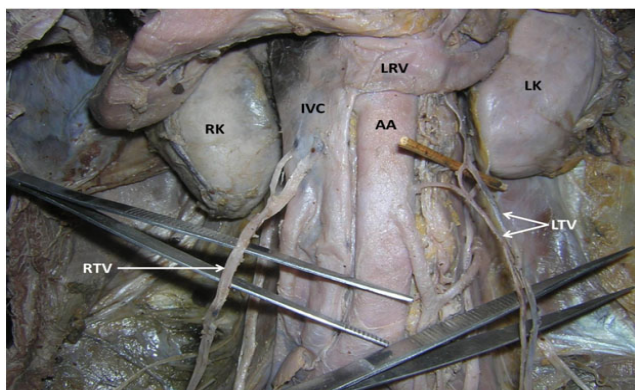


Figure 1. Dissection of the vessels at the posterior abdominal wall (showing bifurcation of the right testicular vein 3 cm before its termination into inferior vena cava and left testicular arterio-venous anastomosis).

(AA – abdominal aorta; IVC – inferior vena cava; LRV – left renal vein; RK – right kidney; LK – left kidney; RTV – right testicular vein; LTV – left testicular vessels)

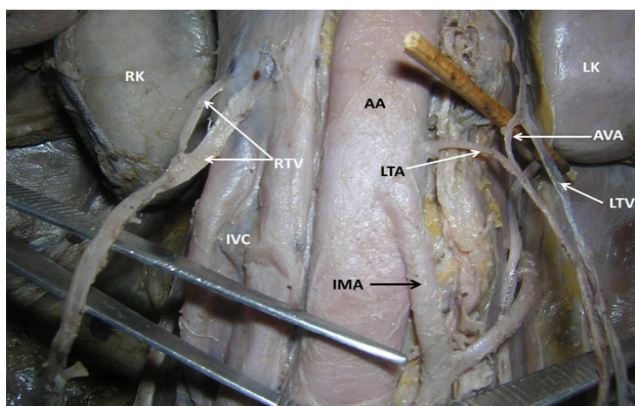


Figure 2. Closer view of the vessels at the posterior abdominal wall (showing terminal bifurcation of the right testicular vein and low origin of left testicular artery with left testicular arterio-venous anastomosis).

(AA – abdominal aorta; IVC – inferior vena cava; RK – right kidney; LK – left kidney; RTV – right testicular vein; LTV – left testicular vein; LTA – left testicular artery; AVA – arterio-venous anastomosis; IMA – inferior mesenteric artery)

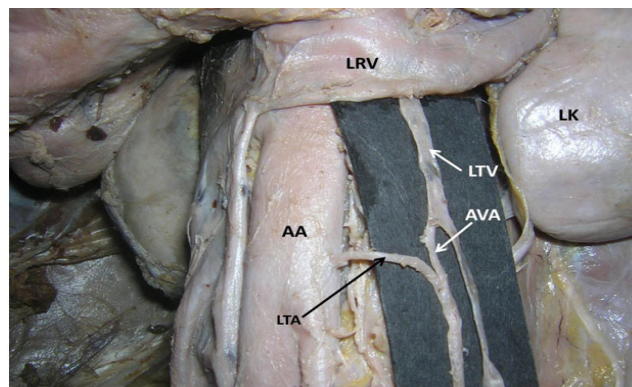


Figure 3. Closer view of the left testicular arterio-venous anastomosis.

(AA – abdominal aorta; LK – left kidney; LRV – left renal vein; LTA – left testicular artery; LTV – left testicular vein; AVA – arterio-venous anastomosis)

DISCUSSION

The anatomy of the testicular vessels has assumed importance because of the development of new operative techniques within the abdominal cavity for operations such as varicocele and undescended testes.⁴ During laparoscopic surgery of the male abdomen and pelvis, most of the complications are due to unfamiliar anatomy in the operative field.⁵ Awareness of variations of the testicular vessels, such as those being reported here, becomes important during the above mentioned surgical procedures. In one of the studies in the past, the right testicular artery variation was found to be more common compared to that of the left.² Cicekcibasi et al reported the origin of the gonadal artery from the renal artery in 5.5% of cases.⁶ High level of origin of the testicular artery has been noted and in most of such cases, the testicular artery arched over the renal vessels.^{7,8} Developmentally, the high origin of the testicular artery is because of the persistence of one of the cranial mesonephric arteries and in the early course such artery passes anterior to subcardinal anastomoses.⁹ This may be the explanation of high origin and arching course of the testicular artery. In the current case, the left testicular artery had a low origin. This may be the indication that it developed from one of the very caudal mesonephric arteries.

Testicular veins can also have variations with regards to their number, course and termination. Favorito et al have reported that the variability of the right testicular vein with reference to its number was 15%, with the relevant incidence on the left side being as high as 18%.¹⁰ Asala et al have done an extensive study on the gonadal vessels and have found that the variation of testicular vein was more common on the left side. In their study, the variations were found in 21.3% of the specimens.² Regarding the variable number of testicular veins on each side, a duplicated right testicular vein was noticed in four percent of specimens in a study and in 15% of population in another study.^{10,11} The duplicated left testicular vein has been observed in 15% of specimens studied.¹² Variations in the terminations of the testicular veins have also been reported. The right

testicular vein might drain into right renal vein, accessory renal vein or lower part of the inferior vena cava.^{2,12-14}

The incidence of bifurcation of the right testicular vein as observed in the present case is very rare. The right testicular vein develops from the lower part of the right subcardinal vein. The terminal bifurcation of the right testicular vein might be due to the bifurcation of the right subcardinal vein during its development. Functionally it may not cause any problems but it might cause confusions in assessing the radiological findings or during retroperitoneal surgeries. The arterio-venous anastomosis between the left testicular vessels is also extremely rare. No such report was available on this type of anastomosis as revealed by literature survey. If the blood is shunted to the vein from the artery through this anastomosis, it might hinder the upward flow of blood in the vein, resulting in varicocele. As such, the left testicular varicocele is more common than the right; the

current case might be a high risk case for the occurrence of varicocele. The surgeons must be aware of such a unique predisposing factor for varicocele. If the blood is shunted from the vein to the artery, that might result in lack of proper oxygen supply to the testis resulting in its decreased function or degeneration. Possibility of this type of anatomical variation cannot be overlooked in patients with complaints of infertility.

CONCLUSION

The terminal bifurcation of the right testicular vein and the arterio-venous anastomosis between the left testicular vessels may be clinically, radiologically, surgically and functionally important. These variations when present might increase the possibility of varicocele and infertility in the patients.

REFERENCES

1. Bergman RA, Cassell MD, Sahinoglu K, Heidger PM Jr. Human doubled renal and testicular arteries. *Anat. Anz* 1992; 174: 313-5.
2. Asala S, Chaudhary SC, Masumbuko-Kahamba N, Bidmos M. Anatomical variations in the human testicular blood vessels. *Ann Anat* 2001; 183:545-9.
3. McClure CFW, Butler EG. The development of the vena cava inferior in man. *Am J Anat* 1925; 35:331-84.
4. Brohi RA, Sargon MF, Yener N: High origin and unusual suprarenal branch of a testicular artery. *Surg Radiol Anat* 2001; 23: 207-8.
5. Cussnot O, Desgrandehamps F, Bassi S, Teillae P, Lassau JP, Le Due A. Anatomic basis of laproscopic surgery in the male pelvis. *Surg Radiol Anat* 1993; 15: 265-9.
6. Cicekcibasi AE, Salbacak A, Seker M, Ziyilan T, Buyukmumcu M, Uysal II. The origin of gonadal arteries in human fetuses: anatomical variations. *Ann Anat* 2002; 184(3): 275-9.
7. Rusu Mc. Human bilateral doubled renal and testicular arteries with a left testicular arterial arch around the left renal vein. *Rom J Morphol Embryol* 2006; 47:197-200.
8. Mamatha Y, Prakash BS, Latha PK, Ramesh BR. Variant course of left gonadal artery. *International Journal of Anatomical Variations (IJAV)* 2010;3: 132-3.
9. Keibel F, Mall FP. Mesonephric arteries, Manual Of human embryology. Vol.2. Lippincott;Philadelphia:1912.pg820-5.
10. Favorito LA, Costa WS, Sampaio FJ. Applied anatomic study of testicular veins in adult cadavers and in human fetuses. *Int Braz J Urol* 2007; 33(2): 176-80.
11. Shafik A, Moftah A, Olfat S, Mohi-el-Din M, el-Sayed A. Testicular veins: anatomy and role in varicocelogenesis and other pathologic conditions. *Urology* 1990; 35(2):175-82.
12. Xue HG, Yang CY, Ishida S, Ishizaka K, Ishihara A, Ishida A et.al. Duplicate testicular veins accompanied by anomalies of the testicular arteries. *Ann Anat* 2005; 187(4): 393-8.
13. Seyed Hadi Anjamrooz, Hassan Azari, Mehdi Abedinzadeh. Abnormal patterns of the renal veins. *Anat Cell Biol* 2012; 45:57-61.
14. Bensussan D, Huguet JF. Radiological anatomy of testicular vein. *Anat Clin* 1984; 6(2): 143-54.