

Duplication of Right Testicular Vein: Embryological and Clinical Consideration- A Case Report

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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. The gonadal veins are anatomically asymmetric and there are several anatomical variations involving them. In present case, a variation in draining pattern of right gonadal vein was observed during a routine dissection done at Department of Anatomy. Duplication of right gonadal vein near the point of drainage was found. One of the veins was draining in inferior vena cava and other into right renal vein. According to the reviewed literature, a case like this was rarely reported. There was no other vascular abnormality in this case. Variation in gonadal veins remains unnoticed clinically, but these variations are incidental findings during autopsy and surgeries. The presence of such variations can increase risk of varicocele and infertility in patients.

Keywords: Duplication, Gonadal vein (GV), Inferior vena cava (IVC), Left testicular vein (LTV), Right renal vein (RRV), Varicocele

CASE REPORT

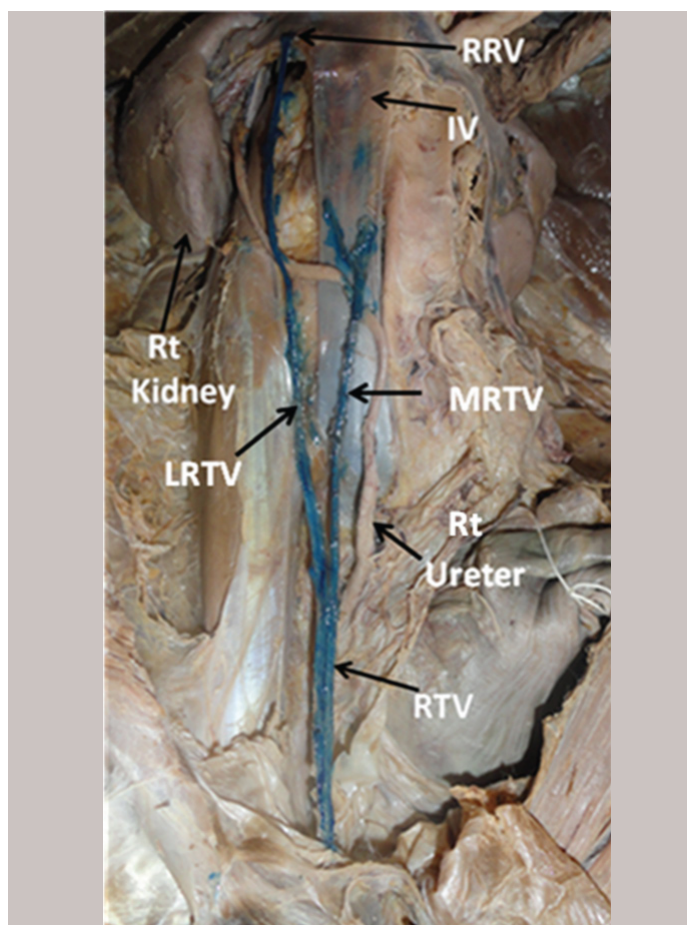
Duplication of right testicular vein was noted in a male cadaver during routine dissection for undergraduate students in Government Medical College and Hospital, Chandigarh. After duplication, medial vein was draining into inferior vena cava and lateral vein into right renal vein [Table/Fig-1] whereas on left side, gonadal vein was draining into left renal vein. Medial RTV (right testicular vein) was bifurcating into two before draining into IVC on its anterior aspect. The medial RTV was also seen lying anterior to IVC. The right ureter can be seen crossing anterior to IVC and posterior to medial RTV and then descending on the left side of IVC. Normally the right ureter lies lateral to (on the right side of) IVC.

DISCUSSION

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 [1]. On the right side, gonadal vein drain into inferior vena cava, and on left side into renal vein [2]. Bergman found right gonadal vein draining in the right renal vein in 1.5 % (4 out of 220 cases) [3]. Varicocele is regarded as one of the cause of male infertility. During radiological and surgical procedures such variation and duplication of gonadal vein is important to avoid diagnostic errors, and during ligation as, if unnoticed may cause recurrence of varicocele [4].

According to Gay et al., 40% of patients present multiple gonadal veins [5]. Variations of number of left side gonadal vein and their mode of termination are frequent [6]. According to a study done by Gupta et al., there were more variations of gonadal veins on left side with a male predominance [7]. In a study by Asala, 21.3% of cadavers had variations of gonadal veins, and in 18.8% of cases, variations were bilaterally present. It was also noted that variations were more common on left side [1]. Two gonadal veins were draining into left renal vein in another case [8]. Study by Diwan et al., showed medial and lateral testicular veins on left side, the left medial testicular vein was double the width of the left lateral testicular vein [9]. Right testicular vein was draining into right renal vein in 2 out of 150 cadavers [1].

Left renal vein is formed by anastomosis between sub cardinal veins. After the establishment of this communication left sub cardinal vein



[Table/Fig-1]: Diagram showing anomalous drainage of right gonadal vein into both inferior vena cava and right renal vein
 Inferior vena cava: IV
 Right renal vein: RRV
 Right testicular vein: RTV
 Right kidney: Rt kidney
 Medial right testicular vein: MRTV
 Lateral right testicular vein: LRTV

disappears and distal portion remains as left gonadal vein [10]. A portion of IVC is formed due to incorporation of a part of sub cardinal vein and anatomized supra-sub cardinal veins of right side. Thus gonadal vein drains into IVC on right side [11].

In another case, left testicular vein divided into 2 trunks, medial and lateral. Lateral trunk drained into ipsilateral renal vein, and medial one into inferior vena cava [12]. Nikolay Hr. Kyuchukov noted 3 divisions of right testicular veins—lateral, middle and medial. The right lateral testicular vein drained to right renal vein. The combined middle and medial testicular veins drained at an angle between inferior vena cava and right renal vein. The left testicular vein was duplicated and was composed of medial and lateral venous trunks which drained into regions of left renal vein [13].

In a study, 85.2% cases had single testicular vein, and 8.8% of cases had double gonadal veins [14]. There was a left sided predominance in case of duplication of gonadal veins [15]. A total of 5% of cases had double testicular veins on right side, and 15% on left side [16]. A 30% of cases showed duplication of testicular vein on left side, while only 5% on the right side [7]. Variations in the terminations of the testicular veins have also been reported. Nayak et al., has found terminal bifurcation of the single right testicular vein into two, each opening into IVC [17]. In another study, right testicular vein showed an abnormal termination in right renal vein instead of inferior vena cava [11]. Similar study was also done by Juliana Ruiz Fernandes which showed duplication of gonadal veins on both sides and were draining into inferior vena cava [8].

During surgical procedures variation of testicular vessels becomes important. As per literature and available data right testicular vein develops from lower part of right sub cardinal vein. The bifurcation of the right sub cardinal vein, during its development leads to the terminal bifurcation of the right testicular vein as in present case. During retroperitoneal surgeries or radiological assessment this variation must be kept in mind [17].

CONCLUSION

Variation noticed above have to be kept in mind during surgical procedures in the posterior abdominal wall. Such variations are discovered incidentally during surgeries or autopsies which remains silent clinically. These variations of gonadal vein can increase the risk of possible varicocele and infertility in patients.

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REFERENCES

- [1] Asala S, Chaudhary SC, Masumbuko-Kahamba N, Bidmos. M. Anatomical variations in the human testicular blood vessels. *Ann Anat.* 2001;183(6):545-49.
- [2] Standring S. *Gray's Anatomy; anatomical basis of clinical practice.* 40th ed. London: Elsevier; 2010:1262-64.
- [3] Bergman RA, Afifi AK, Miyauchi RM. *Anatomy Atlases - A digital Library of Anatomy Information.* (www. Anatomy). 26/06/07. 3.
- [4] Tubbs RS, Salter ES, Oakes WJ. Unusual drainage of the testicular veins. *Clin Anat.* 2005;18:536-39.
- [5] Gay SB, Armestead JP, Weber ME, Williamson BR. Left Infrarenal Region: anatomic variants, pathologic conditions, and diagnostic pitfalls. *Radiographics.* 1991;11(4):549-70.
- [6] Wishahi MM. Detailed anatomy of the internal spermatic vein and the ovarian vein. Human cadaver study and operative spermatic venography: clinical aspects. *J Urol.* 1991;145:780-84.
- [7] Gupta R, Gupta A, Aggarwal N. Variations of gonadal vein. *J Clin Diagn Res.* 2015; 9(2):8-10.
- [8] Juliana RF, et al. Bilateral duplication of gonadal veins: a case report. *Int. J. Morphol.* 2012;30(4):1487-89.
- [9] Diwan Y, et al. Bilateral variations of the testicular vessels: Embryological background and clinical implications. *Journal of Basic and Clinical Reproductive sciences.* 2013;2(1):60-62.
- [10] Sadler TW. *Langman's Medical Embryology.* 12th edition. Philadelphia: Lippincott Williams & Wilkins, Wolters Kluwer Business; 2012.
- [11] Sharma P, Salwan SK. Anomalous Right Testicular Artery and Vein. *J Clin Diagn Res.* 2011;5(8):1631-33.
- [12] Paraskevas GK, et al. Abnormal bilateral drainage of testicular veins: embryological aspects and surgical application. *Rom J Morphol Embryol.* 2012;53(3):635-38.
- [13] K Hr. Nikolay and D. Y. Stilyanka. Variations of the bilateral testicular veins. *J Biomed Clin Res Suppl.* 2009;2(1):176-78.
- [14] Duques P, Rodrigues JR, Silva Neto FB, Neto EMVS, Toledo ES. Estudo anatômico da veia renal esquerda de cadavers humanos brasileiros. *Medicina Ribeirão Preto.* 2002;35:184-91.
- [15] Favorito LA, Costa WS, Sampaio FJ. Applied Anatomic Study of Testicular Veins in Adult Cadavers and in Human Fetuses. *Int Braz J Uro.* 2007;33(2):176-80.
- [16] Lechter A, Lopez G, Martinez C, Camacho J. Anatomy of the gonadal veins: a reappraisal. *Surgery.* 1991;109(6):7335-39.
- [17] Nayak BS, Rao KGM, Shetty SD, Sirasanagandla SR, Kumar N, Guru A. Terminal Bifurcation of the Right Testicular Vein and Left Testicular Arterio-Venous Anastomosis. *Kathmandu Univ Med J.* 2013;42(2):168-70.

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