Original Research Paper

Volume - 11 | Issue - 01 | January - 2021 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Anatomy

# CADAVERIC STUDY OF GONADAL VEINS -THEIR CLINICAL IMPORTANCE AND ANATOMICAL SIGNIFICANCE

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**ABSTRACT** **OBJECTIVE:** The objective of this study is to present an analysis on the anatomical variations in gonadal veins. The anatomical criteria considered are number of gonadal veins and location of drainage. **METHODS:** Twenty embalmed human cadavers were dissected and studied for variations from classical anatomical description. **RESULTS:** 90% of the cadavers show single vein drainage while 10% show double vein drainage; 85% of the veins drain into the normal sites and 15% show a variation from the classical locale of drainage of gonadal vein. **CONCLUSION:** In the male cadavers, 13.5% variation was found both numerically and in termination of the testicular veins. Similarly ,in the female cadavers, 20% variation was found in locale of termination of ovarian veins. Knowledge of these variations is essential for laparoscopic surgery , transplantation of kidney ,varicocele embolization and treating ovarian vein syndrome.

**KEYWORDS :** Gonadal vein; Kidney transplantation; Ovarian vein; ovarian vein syndrome; Testicular vein; Varicocele

## INTRODUCTION

Deviations from normal anatomical venous drainage of the gonads cannot be overlooked upon.[1] Gonadal veins drain the deoxygenated blood from the primary reproductive organs (testes in males and ovaries in females) and take it to the heart via the systemic venous system -the renal veins and the inferior vena cava. Adequate knowledge of vascular anomalies of testicular veins will help the radiologists and surgeons in recognition and protection of these veins which play major roles in the thermo-regulation ,which is essential for the efficient functioning of testes on which ,the survival of the human species depends.[2]

The venous drainage of the testes is done by the PAMPANIFORM PLEXUS OF VEINS. It is located anterior to the vas deferens in the spermatic cord. They occupy the major bulk in the spermatic cord. The pampiniform plexus begins as a network of about 200-250 small veins. These veins consecutively coalesce as they ascend along the spermatic cord and form about 3 – 4 veins in the superficial inguinal ring. At the level of the deep inguinal ring ,they fuse to become 2 veins. As they ascend up the pelvis anterior to the ureter and the psoas major ,it fuses into 1 vein and drains into the inferior vena cava (IVC) on the right side and the left renal vein on the left side.[3]

The ovarian vein is the female counterpart of the testicular vein. It is located in the suspensory ligament of the ovary ,located inferior to the ovarian artery. This vein forms an ovarian plexus in the broad ligament of the uterus and communicate with the uterine venous plexus.[3]

In this study ,we analyse the mode of termination of gonadal veins under two anatomical criteria– number of veins and location of drainage.

## MATERIALS AND METHODS

Twenty human cadavers (15 males and 5 females) were dissected in the Department of Anatomy ,Government Medical College ,Omandurar Government Estate ,Chennai -2 ,with prior permission from the Head of The Department and other committees involved. The adult cadavers were received from body donation after obtaining written informed consent. The cadavers were embalmed through femoral artery perfusion. Volume 2 of the 16th edition of Cunningham's practical manual of Dissection[4] was used for the dissection of the cadavers and the exposure of the gonadal veins.

## RESULTS

17 out of the 20 (85%) of cadavers have normal gonadal vein anatomy of the total cadavers showed classical gonadal vein drainage. The right gonadal vein was single in number and drained into the inferior vena cava. The left gonadal vein was single in number and drained into the left renal vein. 13 out of the 15 male cadavers (86.5%) had normal testicular vein anatomy ,while 4 out of the 5 female cadavers (80%) showed typical ovarian vein drainage in terms of number and locale of drainage.

In our study ,we saw 5 variations -2 in number and 3 in location of termination in 3 cadavers (2 male and 1 female),10% of the cadavers show double vein drainage and 15% show a variation from the classical locale of drainage.

In one of the male cadavers ,we observed an ipsilateral variation in both number and locale. Two testicular veins are present on the right side ,the medial testicular vein has a classical mode of termination into Inferior Vena Cava (IVC) .The lateral vein drains into the Right Renal Vein more proximally and a communicating vein exists between them ,as shown in Figure 1.

In another male cadaver, we observed a bilateral variation. On the left side two veins drain into the Left Renal Vein. On the right side ,a single vein splits into two and drains into the Left Renal Vein and at the junction between the left renal vein and the IVC.

In a female cadaver (Figure 2) ,there is a unilateral variation on the left side. The left ovarian vein just before it's termination, fuses with the left accessory renal vein, forms a common trunk which in turn drains into the left renal vein about an inch from the IVC. Thus the left ovarian vein drains in the junction of left accessory renal vein and left renal vein, by forming a common trunk with the left accessory renal vein.

The male cadavers had 2 variations in the number of testicular veins and 2 variations from the normal location of drainage. Thus ,there is a 13.5% variation both in number and location of drainage as shown in table 1.

1 female cadaver had 1 variation in the location of termination. Thus ,there is 20% variation in location of ovarian vein drainage as shown in table 1.

Thus, a total of 10% variation is found in number of gonadal veins, and 15% variation was found in locale of drainage of gonadal veins in the 20 cadavers studied.

## DISCUSSION

There is a renewed interest in gonadal venous anatomy due to its potential use for renal vein lengthening in live donor kidney transplantation using laparoscopic kidney nephrectomy.[5] Knowledge of the variations of gonadal vessels may provide safety guidelines for these techniques and procedures in the pelvic ,perineal and abdominal regions.[2]

Various studies show similar variations ,although there are quantitative differences, with almost no variation in ovarian veins and preponderance on the left side.

90% of our cadavers show single vein drainage. The male cadavers

show a variation of 13.5% in both number and location of drainage ,whereas 20% of our female cadavers show a variation in locale of drainage. All female cadavers had normal ,single ovarian veins. Double gonadal vein drainage was reported in 10% of the cadavers.

Raman et al.[2] observed atypical drainage in 18% of the cadavers. Out of the 60 cadavers dissected , no variation was seen in ovarian veins. 82.5% testicular veins had single vein drainage ,which is comparable to our result. Kulesza et al.[6] and Favorito et al.[7] have gotten similar quantitative results.

Lalwani et al.[8], D Malar etal.[9] ,Dr Harshita at al,[10] and Alasa et al,[11] report around 90% single vein drainage ,not very different from our results.

Letcher et al.[12] reported 67.5% single vein drainage and Balkund et al.[13] reported a 96.7% single vein drainage and 3.3% double vein drainage.

During varicocele embolization ,lack of knowledge of testicular vein variations ,especially numerical variations can lead to complete failure of the procedure.[8] In laparoscopic surgery of abdomen and pelvis ,most of the complications are due to unfamiliar anatomy in the operative field.[2] Duplication also leads to increased chance of varicoceles.

Bifid ovarian vein increases risk of ovarian vein syndrome thus causing pain and pyelonephritis. In general, duplicated gonadal veins lead to increased chances of dilatation ,thrombi and even systemic and pulmonary emboli via the IVC and renal veins.[2]

## CONCLUSION

In the male cadavers ,13.5% variation was found both numerically and in termination of the testicular veins. Similarly ,in the female cadavers 20% variation was found in locale of termination of ovarian veins. Overall ,the variation is 10% in number of gonadal veins, and 15% in location of drainage of the same.

Understanding the variations from normal anatomy will prove truly of use to surgeons while performing important operations in the pelvic and abdominal areas which include laparoscopic kidney nephrectomy and varicocele embolization.

**Table 1: Comparison of normal gonadal vein anatomy vs. variations**

| Sex | Normal Anatomy | Variation In Number Of Veins | Variation In Location Of Drainage |
|---|---|---|---|
| **Male** | 86.5% | 13.5% | 13.5% |
| **Female** | 80% | Nil | 20% |

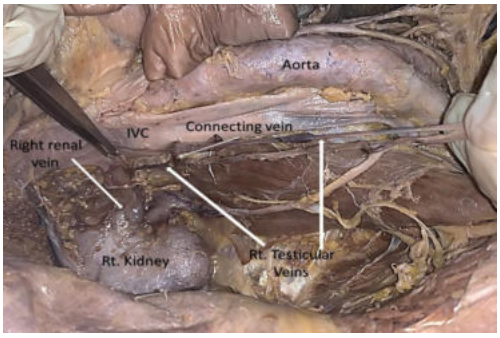


**Figure 1 Unilateral variation in number and locale of drainage of right testicular vein**

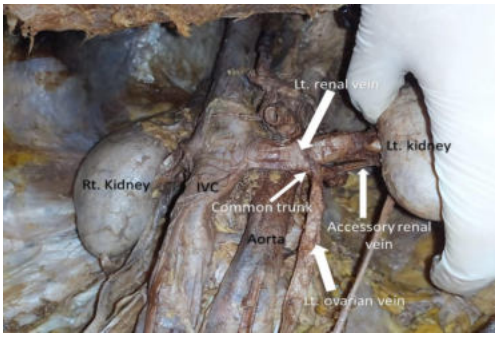


**Figure2 Unilateral variation in locale and drainage of left ovarian vein**

Rt. -Right, Lt. -Left, IVC -Inferior Vena Cava

**Conflict of interest:** nil

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