

Anatomical Variations of Gonadal Veins in Sri Lankan Cadavers: A Case Series

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Abstract

Objective: Gonadal veins carry venous blood from gonads. The right gonadal vein (RGV) drains into inferior vena cava (IVC) directly while left gonadal vein drains into the left renal vein (LRV). However, numerous anatomical variations of gonadal veins which accounts for pathological conditions such as varicocele and pelvic congestion syndrome have been reported. In this study we report such variations observed during a routine cadaver dissection for the first-year dental undergraduates.

Methods and material: Dissection was carried out in ten cadavers by the investigators following observation of the variations.

Results: Three cadavers out of ten were observed to have variations of the gonadal veins in relation to the number and site of drainage. There were right gonadal veins draining to right renal vein as well as double gonadal veins were observed.

Conclusion: A clear understanding of these variations is important for clinicians and radiologists in recognizing and avoiding complications in interventional procedures in the retroperitoneal region. Therefore, we recommend carrying out further studies using a larger sample of Sri Lankan population.

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Introduction

Gonadal veins (ovarian veins in female and testicular veins in male) drain the blood from the ovaries in female and testicles in male to the inferior vena cava (IVC) or the renal vein. Renal and gonadal vessels are among the most variable structures in the human body. However, gonadal veins are bilateral single veins, where the left gonadal vein drains into the left renal vein (LRV) and the right gonadal vein drains to the IVC directly.

The embryological development of the renal vein and IVC are both directly related to the development of the gonadal vein. The renal segment of the IVC is formed by the bilateral anastomosis of the supra- and sub-cardinal veins. The caudal portion of the sub-cardinal vein gives rise to the gonadal vein, which drains into the supra-sub cardinal anastomosis. Right gonadal vein often drains into the IVC because of the supra-sub cardinal anastomosis and the incorporation of a tiny section of the sub-cardinal vein into the creation of IVC on the right side. This supra-sub cardinal anastomosis creates a portion of the LRV where the left gonadal vein empties on the left side (1).

Even though there are studies around the world for abnormal gonadal drainage, case studies are lacking in Sri Lanka. Also, most of the literature shows the right gonadal vein variations are less common than of left. But here we report right gonadal vein variations encountered during cadaver dissections.

Materials and Methods

During the dissection practical sessions in the abdomen, conducted for dental undergraduates in the Department of Basic Sciences, Faculty of Dental Science, University of Peradeniya it was noticed to have variations in the gonadal vein drainage in number of cadavers. Therefore, fine dissection was carried out by staff members and photographed using a digital camera.

Observations

Among ten cadavers dissected, three cadavers showed variations in gonadal veins.

Case 1:

An 84-year-old female was having a right ovarian vein draining to the right renal vein (RRV). Although it is out of the scope of this article, it is interesting to report an observation of triple renal arteries on right side of this cadaver, in which two were superior to the RRV and the other one was running inferior to RRV and passing superficial to the IVC to join with the abdominal aorta (Figure 1).

Case 2:

A 68-year-old male cadaver was having bilateral variations. The right testicular vein was draining to RRV (Figure 2A). On left side, double testicular veins were observed, and both were draining to LRV (Figure 2B).

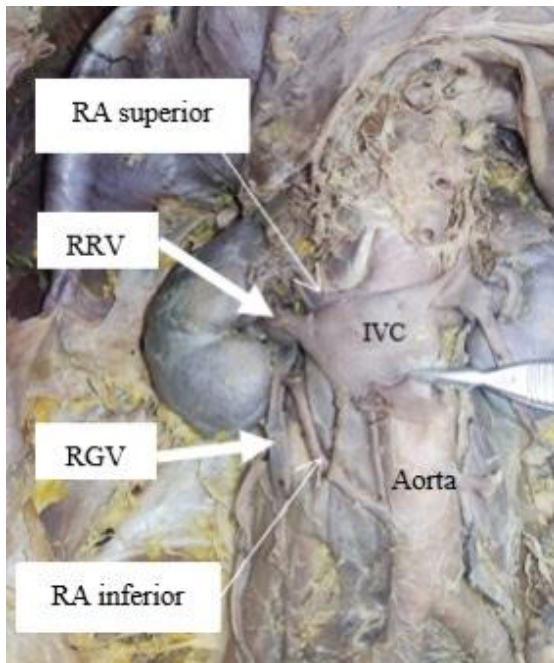


Figure 1: Variations of RGV and Right Renal Artery

Right ovarian vein drains to RRV and three RRAs were observed, two superior and one inferior to the RRV.

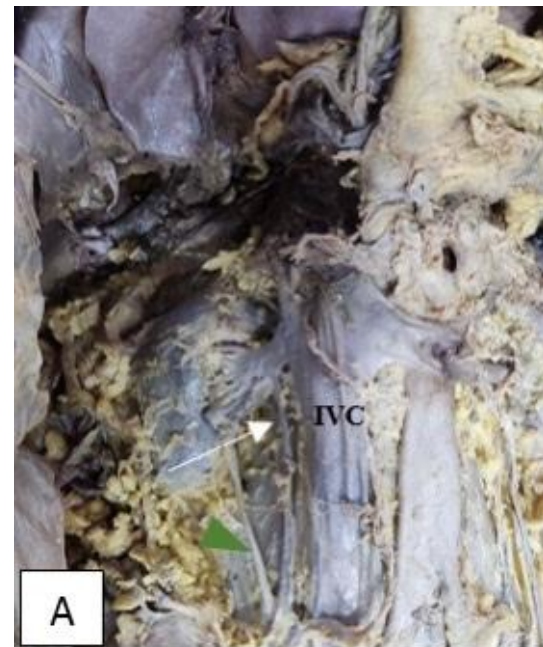


Figure 2A: Variations of RGV and Left Renal Artery

Right testicular vein drains to RRV

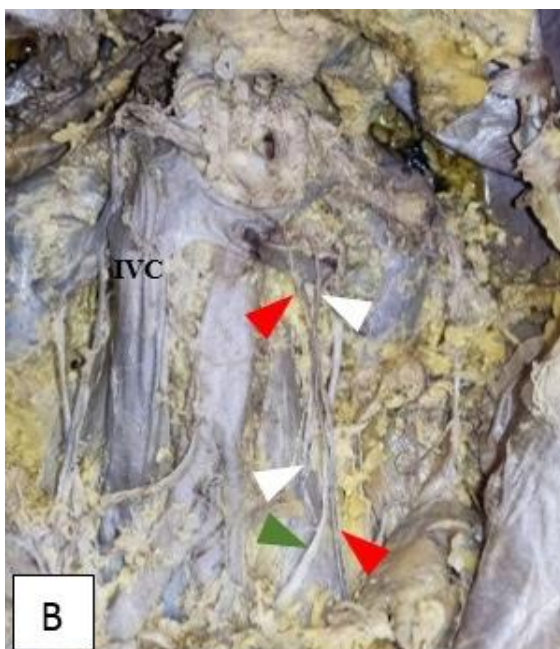


Figure 2B: Variations of RGV and Left Renal Artery

Two left testicular veins drain to LRV

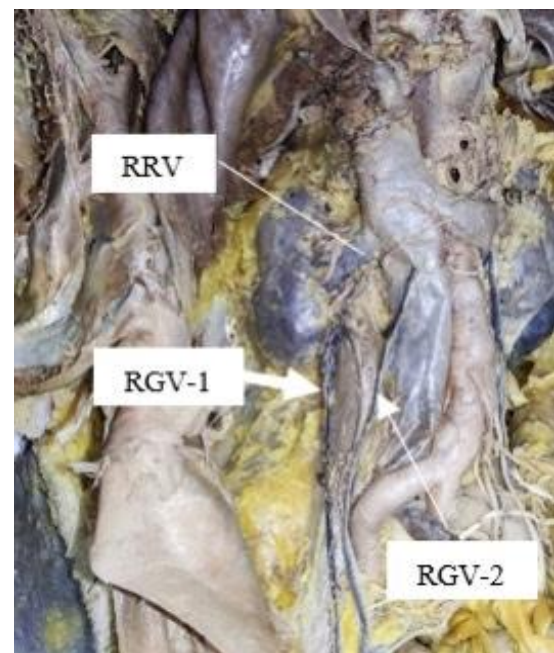


Figure 3: Double testicular veins on right side

One RGV drains to RRV and a second RGV drains to IVC

Case 3:

A 67-year-old male cadaver was having double testicular veins on right side, and one vein was draining to RRV and the other was draining to IVC (Figure 3).

Discussion

Literature reports that gonadal vessel variations are more common in veins than in arteries as well as the variations are more common in testicular veins and on left side (2, 3). R. Gupta *et al.*, (2015) has reported that they have observed no ovarian vein variations while 18 cases out of 60 cadavers had testicular vein variations. In addition, bilateral variations have been also reported (2,1). In our study two out of the three cadavers which have shown variations are of males however all three cadavers have shown variations on right side when only one cadaver having left side variations.

Studies have reported anatomical variations such as number of veins and differences in the location of drainage of these vessels. Asala *et al.*, (2001) has reported draining of right testicular vein into right renal vein in 2 out of 150 cadavers in his study (2). Lalwani *et al.*, (2017) has observed one right testicular vein draining into RRV and one left testicular vein draining to IVC out of 35 cadavers (3). Koc *et al.*, (2006) has reported 9.9% of right ovarian veins draining to RRV (4). Diwan *et al.*, (2013) reports a case of a male cadaver with right testicular vein draining to RRV and Parasekvas *et al.*, (2012) also reports a case of right testicular vein draining to RRV (5,6).

Phalgunan *et al.*, (2012) observed two male cadavers out of 20 with right testicular vein draining to RRV (7). In the current study 3 out of 10 (30%) cadavers have shown right gonadal vein draining to RRV. Although the literature suggests that left gonadal veins are having more variations R. Gupta *et al.*, (2015) also reports that variations on the location of drainage are more common with right gonadal veins, in which all the left gonadal veins drained into left renal vein while more than 83% of right gonadal veins were draining into the IVC (1). This supports our case presentations as in our study also all left gonadal veins were draining to LRV which is the normal anatomical location identified.

Double gonadal veins are also reported in literature. R Gupta *et al.*, (2015) has reported 30% on left side and 5% on right side double gonadal veins in a study done with 60 cadavers (1). In that right double testicular veins were draining to IVC and RRV whereas on left side both were draining to LRV. Diwan *et al.*, (2013) reports a case of left side double testicular veins and Parasekvas *et al.*, (2012) reports a case of a bifurcation of left testicular vein where one drains to LRV and the other to IVC (5,6). Luciano *et al.*, (2007) has observed 15% right double testicular veins in their study with 100 cadavers (8). Seven out of 15 were draining at the junction between RRV and IVC. On left side they have observed 82% single veins, 15% double veins and also 2% three veins and 1% four testicular veins, and regardless of the number all left veins were draining to the LRV. In the current study we observed double veins on right side (10%) and on left side (10%) and both were in male cadavers. The left side double veins were

draining to LRV whereas on right side, draining to both RRV and IVC was observed.

Knowledge of such abnormalities are clinically important in radiological procedures, surgical procedures, retroperitoneal therapeutic and diagnostic procedures, and renal transplantations. (9). Gonadal vessels also play an important role in thermoregulation of testis. Therefore, variations in the drainage of gonadal vessels can interfere with the spermatogenesis and infertility in males (9). Anatomical variations of the gonadal veins limit the endovascular embolization techniques for varicocele. There was 8-30% failure in the standard protocol of embolization due to gonadal vessel variations (3).

Variation of ovarian vein drainage causes pelvic congestion syndrome and pelvic varices. Pelvic congestion syndrome (PCS) is a major cause of the chronic pelvic pain in females (10). However, presence of pelvic varices has not shown exact correlation with the right ovarian vein drainage abnormalities (4).

Literature also signifies the importance of ample knowledge on possible variations of gonadal veins. However, to the best of our knowledge there are no detailed studies done on vascular variations of this region in a Sri Lankan population. Although 30% is a considerable number of variations that we have reported, as of the small sample size this may not reflect the actual situation in the said population. Therefore, we recommend carrying out further detailed studies using larger samples in Sri Lankan population.

Conclusion

Gonadal vein variations are not uncommon and despite having advanced technologies, it is important to consider the anatomical variations to avoid surgical and therapeutic complications of Sri Lankan population.

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