
ORIGINAL RESEARCH ARTICLE**Incidence of Additional Renal Veins in Human Cadavers***Nilesh Bhosale¹, Anjana Gaikwad² Swati Pandhre³ and Anjali Gosavi⁴*

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Abstract:**Introduction:**

Knowledge of anatomy of renal veins & its anatomic variations is very important for surgeons during various surgeries like nephrectomy, renal transplantation, surgeries of abdominal aortic aneurysm & also for radiologists for various diagnostics procedure.

Materials and Methods:

The study was conducted on 40 adult cadavers (21 males & 19 females). Each cadaver was dissected according to the guidelines of “Cunningham’s manual of practical anatomy”. Renal veins were identified. Their number and pattern of drainage were observed on both sides and compared with available literature.

Results:

In present study, Single right renal vein drains into inferior vena cava in 35 cases(87.5%) , two right renal veins drains into inferior vena cava in 3 cases(7.5%) , two right renal veins reunite to form single vein and it drains into inferior vena cava in 2cases(5%) While single left renal vein drain into inferior vena cava in 38 cases(95%) cases, two left renal veins reunite to form single left renal vein and it drains into inferior vena cava in 2 cases(5%). There was no statistically significant difference found in males & females on both right & left side.

Conclusion:

Present study shows that incidence of variations of additional renal veins more on right side (12.5%) as compared to left side (5%). Such variations are important in renal transplantation, renal surgeries, and other therapeutic and diagnostic procedures.

Keywords:

Cadavers, Inferior vena cava, renal vein

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Introduction:

The renal veins lie anterior to the renal arteries and drain into the Inferior vena cava. The left vein is longer, slightly at a higher level than the right vein. Left vein also receives the left gonadal vein inferiorly and left suprarenal vein superiorly. (Which usually receives one of the left inferior phrenic veins) ⁽¹⁾

Knowledge of anatomy of renal veins & its anatomic variations is very important for surgeons during various surgeries like nephrectomy, renal transplantation, surgeries of abdominal aortic aneurysm & also for radiologists for various diagnostics procedure ⁽²⁾.

Material & methods:

Variations in the renal vein were studied with meticulous dissection and observation.

Study Sample: - The present study was conducted on 40 adult cadavers (21 males & 19 females). Any cadavers which showed signs of any trauma or surgical scars on the abdomen were excluded from the study.

Source: - Cadavers were procured from Department of Anatomy Byramjee Jeejeebhoy Government Medical College and Sassoon General Hospital, Pune with prior permission.

Study period: - two years.

Instrument used: - Scissor (pointed, blunt, curved, 4" and 6" size), Scalpel (blade no. 23), Forceps (plane, toothed)

Dissection study:

The dissection of renal vein was carried out in 40 embalmed cadavers. Each cadaver was kept in supine position, it was numbered & its sex was noted. Each cadaver was dissected according to the guidelines of "Cunningham's Manual of Practical Anatomy" ⁽⁴⁾. Various skin incisions were taken to study the renal veins. A first midline skin incision was taken from the xiphisternal junction to the pubic symphysis, encircling the umbilicus. Second skin incision was from the xiphoid process along the costal margin to a point on the midaxillary line. Third transverse skin incision from the umbilicus to the midaxillary line. Fourth skin incision from pubic symphysis to anterior superior iliac spine was taken which extended posteriorly to a point on the midaxillary line. The skin was reflected from medial to lateral aspect in four quadrants towards the midaxillary line. Anterior abdominal wall was dissected layer

by layer. Muscles of anterior abdominal wall were incised and reflected laterally. Peritoneal cavity was opened. Then as dissection proceeded, different organs of abdomen were removed & finally renal vein were identified. Their number and pattern of drainage were observed on both sides and compared with available literature.

Statistical methods:

- a) Frequency and percentage were calculated for qualitative data & data was analyzed by chi-square test as test of significance. .
- b) A 'P' value of < 0.05 is deemed statistically significant.

Observations & Results:

Present study was carried out on 40 adult embalmed cadavers (21 males & 19 females) following observations were noted.

Table1: Observations of Adult Right renal vein

	Single vein	Two veins	Two veins reunite to form single vein
Males(21)	18 (85%)	2(10%)	1 (5%)
Females(19)	17(90%)	1(5%)	1(5%)
Total(40)	35(87.5%)	3(7.5%)	2 (5%)

Table 1 Shows out of 40 adult cadavers single vein drains into inferior vena cava in 35 cases

(87.5%), two renal veins drains into inferior vena cava in 3 cases(7.5%), two renal veins

reunite to form single vein and it drains into inferior vena cava in 2 cases(5%).

P value (by chi square test) for single vein (0.81) , two vein (0.31) (not significant).

There was no statistically significant difference found in between males (single

right renal vein 85 % and double right renal vein 10% & two veins uniting to form single vein 5%) and females (single right renal vein 90% & Double right renal vein 5 % & two veins reuniting to form single vein 5%) in adult cadavers.

Table 2: Observations Adult left renal vein.

	Single vein	Two veins	Two veins reunite to form single vein
Males	20(95%)	0(0%)	1(5%)
Females	18(95%)	0(0%)	1(5%)
Total	38(95%)	0(0%)	2(5%)

Table 2 Shows out of 40 adult cadavers single left renal vein drain into inferior vena cava in 38 cases (95%) , two left renal veins join to form single left renal vein and it drain into inferior vena cava in 2 cases (5%).

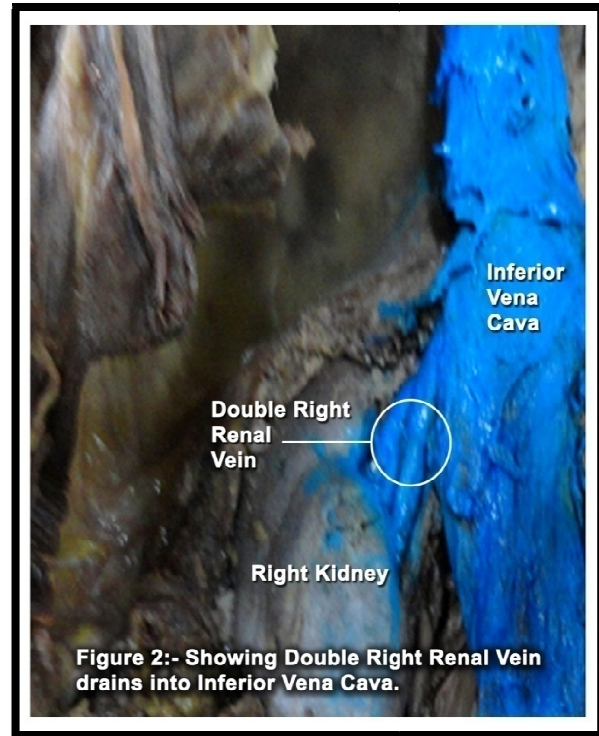
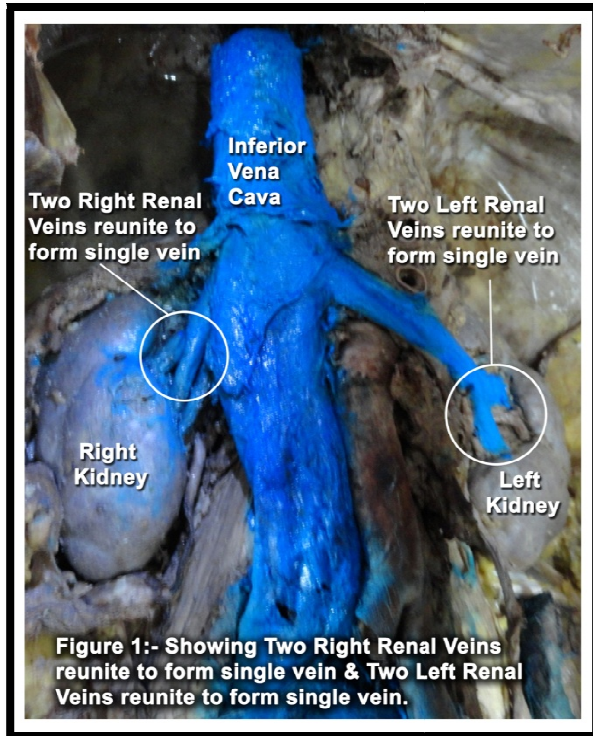
P value (by chi square test) for single vein (0.63) (Not significant)

There was no statistically significant difference found in between males (single vein 95 % & two veins reuniting to form single vein 5%) & females (single vein 95 %& two veins reuniting to form single vein 5%) in adult cadavers.

Table 3: Comparison of incidence of Right & Left renal vein

	Right renal vein	Left renal vein
Single vein (Incidence)	87.5%	95%
Two veins (Incidence)	7.5%	0%
Two veins reunite to form single vein (Incidence)	5%	5%

Table3 shows that incidence of variations of additional renal veins more on right side (12.5%) as compared to left side (5%).



Discussion:

In present days, acute and chronic renal failure is on the rise at an alarmingly high rate. Renal transplantation has become quite common, hence an approach of renal veins during kidney resection from donors is inevitable and a sound knowledge of this regional anatomy is very essential for surgeons.

Renal veins variations are very important in various clinical aspects. Renal vein can be catheterized via femoral vein & blood taken to measure renin. This may be of value in assessing the haemodynamic significance of a renal artery stenosis. Venography will demonstrate renal vein

thrombosis & invasion by tumour⁽²⁾.

Renal vein should be ligated during nephrectomy. Thus renal surgeons should pay attention for presence of double renal vein otherwise one additional vein would be left unligated and massive haemorrhage could occur⁽²⁾.

Knowledge of venous variations of kidney, important before any abdominal surgeries like surgeries of abdominal aortic aneurysm⁽³⁾.

Embryological basis^(5 6):

In the embryo, on each side the anterior and posterior cardinal veins (drain the body wall) join with each other and form the

right and left common cardinal veins before entering the respective sinus horn of developing heart (in the 4th week of intrauterine life). During the 5th to 7th week of the embryo the subcardinal veins, forms in the ventromedial parts of the mesonephric ridges. They terminate cranially and caudally in the corresponding posterior cardinal veins to which they are also connected by numerous transverse anastomotic channels. Along with the enlargement of the metanephros, the venous drainage of the mesonephric ridge is assumed by subcardinal veins. The subcardinal veins intercommunicate forming intersubcardinal anastomotic channel, which later constitutes the part of left renal vein. The left subcardinal vein cranial to the intersubcardinal anastomoses is incorporated into the left supracardinal vein. Most of the right subcardinal vein is retained as renal segment of Inferior vena cava.

Present study shows that incidence of variations of additional renal veins more on right side (12.5%) as compared to left side (5%).

Our findings similar to other study^(7, 8,9,10). Bhattarai C, Poudel P P, Baral P⁽²⁾ During dissection of approximately 48 years male cadaver found that double left renal vein and one left renal vein passed behind the aorta called retroaortic left renal vein.

Pick and Anson⁽⁷⁾ found that high incidence of multiple renal veins has been reported on the right (27.8 %) than on the left side (1%). These observations were the outcome of a comprehensive study carried out on 215 dissections – room specimens (430 body halves).

Kotra and Castellino⁽⁸⁾ found that a higher incidence of the multiple renal veins on the right (10 %) than on the left (1-3 %) side has also been put forth by (17).

Satyapal KS, Rambiritch V, Pillai G.⁽⁹⁾ found that single additional renal veins were common on the right side (26%), while it was rare on the left side (2.6%), Second additional renal veins occurred infrequently on the right side (5%), on study of one hundred fifty-three morphologically normal en bloc renal specimens were randomly selected from post-mortem examinations.

Pushpa Dhar, ML Ajmani⁽¹⁰⁾ found that the incidence of multiple renal veins being more common on the right (12.0 %) than on the left (3.0 %) side on 59 dissected cadavers.

Nayak B S⁽¹¹⁾ found that variations of the right renal during routine dissection in a 65-year-old male cadaver. The variations found were: presence of two right renal veins and the termination of the right testicular vein into the right renal vein.

Conclusion:

Present study shows that incidence of variations of additional renal veins more on right side (12.5%) as compared to left side (5%). In view of the practical importance such variations are useful in renal transplantation, renal surgeries, and other therapeutic and diagnostic procedures.

Conflict of interest: None to declare

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