

**Original article:**

## **Cadaveric study of left renal vein : a rare anomaly of the left renal vein draining into the left common iliac vein**

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### **Abstract:**

Variations are frequent in the Abdominal veins due to errors of embryological development. This case study was done on 50 adult cadavers during routine dissection for undergraduates at Stanley medical college. In this study, the incidence of Retro aortic left renal vein was 2%. It was terminating into the Left Common iliac vein which is a very rare variant. Retro aortic left renal vein is the developmental anomaly, which can lead to Left Renal Vein hypertension (Nutcracker syndrome). Knowledge of such variation is important for surgeons, which can cause technical difficulties during renal and aortoiliac surgeries. Thus, we can avoid severe injuries and catastrophic sequelae following surgeries.

**Key words:** Left renal vein, retro aortic left renal vein, inferior vena cava, left common iliac vein

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### **INTRODUCTION:**

Venous anomalies of Retro Peritoneal region are common due to complex embryological development and they also have important clinical implications. In order to avoid retro peritoneal complications during surgeries and radiological interventional procedures, the knowledge of anatomical variations and congenital anomalies is very important. A left renal vein coursing behind the Aorta is termed as Retro aortic left renal vein. In the present study, the Left renal vein was studied under the Origin, Course and Level of Termination. We found a case of Retro aortic Left Renal Vein draining into the Left Common Iliac Vein (2%), which is a very rare variant of Left Renal Vein. From various studies, the incidence of Retro aortic Left Renal Vein has been reported from 0.5% - 3.6%.

### **MATERIALS AND METHODS:**

The present study was conducted in 50 formalin fixed adult cadavers (30 male and 20 female) allotted to

undergraduate and postgraduate students at Government Stanley Medical College, Chennai during year 2015-2017. The dissection of Retro peritoneal region was done, according to the methodology given in the Cunningham's manual of Practical Anatomy. Variations of Left Renal Vein were observed.

### **OBSERVATION:**

In this study, out of 50 adult cadavers in one male cadaver, the retro aortic left renal vein passed obliquely downward and joined the Left common iliac vein at the level of LV4-LV5 junction. The incidence of Retro aortic Left Renal Vein in the present study was 2%. The Origin, course and Level of termination of Right Renal vein were normal.

### **DISCUSSION:**

<sup>1</sup>During Inferior Vena Caval development anastomotic communications are formed between Subcardinal and Supracardinal veins. They form a collar of veins which encircle the aorta. The ventral portion of the Circumaortic

collar persists as the normal left renal vein. If the dorsal vein of this collar persists, the Left Renal Vein lies dorsal to aorta, forming Retro aortic Left Renal Vein. Anomalies of Inferior Vena Cava includes duplication of Inferior Vena cava, transposition of Inferior Vena Cava, circumaortic left renal vein, Retro Aortic Left Renal Vein. <sup>2</sup>The Left Renal Vein has a more complex embryological developmental process compared to the Right renal vein. Posterior cardinal vein, subcardinal and supracardinal venous channels pairs play an important role in the developmental process of the Inferior Vena Cava. Anastomotic links are present between the venous channels. These links form a circumaortic venous circle through which the aorta passes, between sub-supra cardinal channels and inter subcardinal anastomoses. While the bilateral symmetric cardinal system transforms into the unilateral right sided IVC, the right sub-supra cardinal anastomosis forms the Right renal vein. The left part of the circumaortic venous circle has two components - Ventral and Dorsal – in this transformation. While the dorsal arm atrophies, during the normal developmental process, the ventral arm continues to develop and form the normal LRV

with a Preaortic course. In cases when the ventral part atrophies and the dorsal arm continues to develop, a retro aortic Renal vein abnormalities emerges. <sup>3</sup>The Left Renal Vein anomalies can be classified into 4 types according to their drainage site :

Type I: RLRV joining the IVC in the Orthotopic position

Type II: RLRV joining the IVC at LV4-LV5

Type III: Circumaortic or Circumcollar LRV, containing anterior and posterior LRVs

Type IV : RLRV joining the Left Common Iliac Vein

Development of Renal Vein starts from 4<sup>th</sup> week ends by 8<sup>th</sup> week. Inferior Vena Cava forms from a network of pairs of parallel veins - the subcardinal, posterior cardinal and supracardinal vein.

In various literatures, variations of the Left Renal Vein have been mentioned.

<sup>4</sup>In Gray's Anatomy(2010), it has been stated that the Left Renal Vein may be double, one vein passing posterior, the other anterior to the Aorta before joining the Inferior Vena Cava ( Renal collar). The anterior vein may be absent so that there is a single RLRV.

In <sup>5</sup>Last's Anatomy(2012), and <sup>6</sup>Hollinshead's textbook of Anatomy(1997) also the occurrence of RLRV have been mentioned.

In <sup>7</sup>Rutherford's Vascular surgery(2010), the incidence of RLRV was given from 0.5 – 3% According to <sup>8</sup>Skandalaki's Surgical Anatomy(2004), the incidence of RLRV is 0.5%

<sup>9</sup>Chandra Prakash et al (2014), in a radiological study, reported a case of anomalous RLRV draining into the LCIV.

<sup>10</sup>Kazushige Kawai et al(2016) reported a case of Sigmoid colon cancer with a rare anomaly of the RLRV draining into the LCIV. <sup>11</sup>B Karaman et al(2007) in a radiological study, found RLRV (type IV) in 0.16% of cases <sup>12</sup>H.Yekappa Suma, Kulkarnipooja reported a case of RLRV, draining into IVC 1.5cm distal to the point of entry of RRV. <sup>13</sup>R.K.Singla et al(2010) presented a case report of RLRV with LSRV draining into the IVC in a male cadaver. <sup>14</sup>K.Hemalatha et al(2008) in a radiological study, reported RLRV in 0.5% of cases <sup>15</sup>Kuldeep singhet (2011) in cadaveric study reported RLRV in 2.4% of cases. <sup>16</sup>Raghu Jetti(2008) et al reported a case of RLRV draining into the LCIV. <sup>17</sup>Jong Kil Nam et al(2010) in a radiological study, found RLRV in nine patients. <sup>18</sup>NBS Parimala et al( 2015) in a cadaveric study, reported RLRV in 6.6% of cases

<sup>17</sup>Cheng Lin Hsieh et al(2012) in a radiological study, reported 3 cases of RLR. <sup>18</sup>Turgut HB et al (1996) reported a case of RLRV joining the LCIV.

In the present study, the incidence of Retro aortic Left renal vein was 2%.

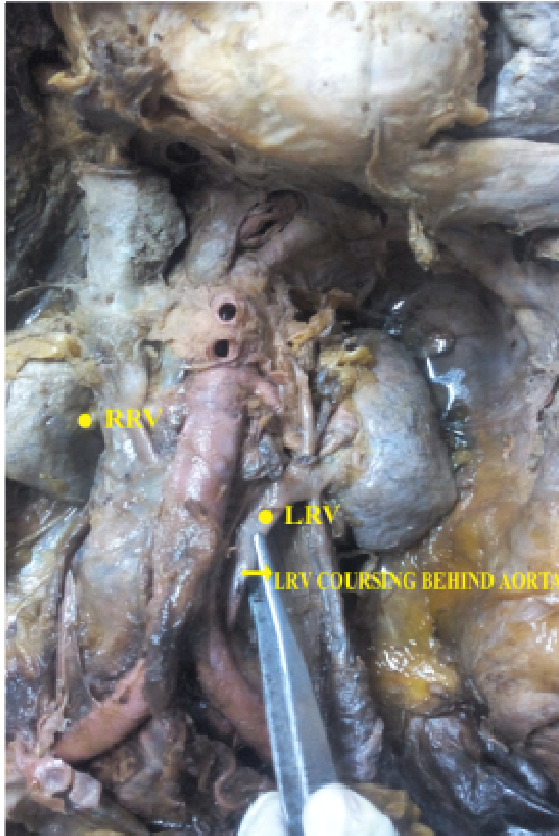


Fig1: LRV Coursing Behind the Abdominal Aorta



Fig2: LRV Draining into the LCIV at the Level of LV4-LV5

**LEGEND:**

- RLRV – Retroaortic Left Renal Vein
- AA – Abdominal Aorta
- IVC – inferior vena cava
- LRV –left renal vein
- LIPV- left inferior phrenic vein
- LSRV – left supra renal vein
- LCIV- left common iliac vein
- LTV – left testicular vein
- RRV – right renal vein

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