

Retro-aortic left renal vein draining into left common iliac vein: A rare renal vein anomaly and its significance

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ABSTRACT

INTRODUCTION: Anomalies of renal vessels are rare and asymptomatic. It poses a great challenge during renal and retroperitoneal surgeries. Injury to anomalous renal vessels can lead to major morbidity and even mortality. Preoperative imaging like CT scan, MRI scan helps to identify these vessels and helps in planning of surgery avoiding injury.

CASE REPORT: A 59-year-woman, a diagnosed case of carcinoma endometrium underwent extra fascial hysterectomy with bilateral pelvic lymph

node dissection and para aortic dissection. Intra operatively a rare anomaly of Left renal vein was identified. Left renal vein was coursing posterior and lateral to aorta and caudally draining into Left common iliac vein. Para-aortic lymph node dissection was done safely, securing the anomalous left renal vein.

CASE DISCUSSION: Various anomalies of renal vein were described in literature. Pre-operative identification of anomalous vessels and careful dissection intra-operatively can help in avoiding injury to these vessels. Awareness of such an anomaly has to borne in mind, although rare, it can prevent catastrophes.

Key Words: Left renal vein (LRV); Left common iliac vein; Para-aortic lymph node dissection; Inferior vena cava (IVC)

INTRODUCTION

Renal veins form an important land mark intraoperatively for gynaecological malignancies, urological malignancies, aorto-caval vascular surgeries and retroperitoneal surgeries. Renal veins extend from the hilum and course in front of the renal artery as a single vein and drain into Inferior Vena Cava (IVC) at right angle. Left renal vein (6-10 cm) is three times longer than the right renal vein (2-4 cm) [1]. Left renal vein also receives drainage from the left adrenal and gonadal veins and it courses horizontally in a plane between the abdominal aorta and superior mesenteric artery. Renal vein develops during fourth to eighth week of intra uterine life. It is formed by complex developmental process with inferior vena cava. Any deviation from normal course of developmental process produces various anomalies in IVC and renal veins [2-4]. The incidence of renal vein anomalies is 5.65% [5]. The anomalies of the Left renal vein are more frequent than right renal vein as it is longer and has a more complex embryogenesis [6,7]. These variations are frequently diagnosed and assessed with multidetector computed tomography (CT) [8]. The preferred modality of choice for diagnosis of renal anomalies is gadolinium enhanced T1 weighted MRI with 3D gradient echo pulse sequence [9].

Renal vein anomalies usually are asymptomatic but can present with flank pain, dysuria, haematuria. Anatomy of normal and anomalous vessels is important during retroperitoneal surgeries especially during Para-aortic lymph node dissections. Injury to anomalous vessels may lead to significant morbidity and even death [10,11].

EMBRYOGENESIS OF LEFT RETRO-AORTIC RENAL VEIN DRAINING INTO LEFT COMMON ILIAC VEIN ANOMALY

Kidney development starts in the pelvic cavity and ascends into lumbar region. The vascular supply of pelvic kidney shifts to abdominal vessels as the kidneys attain lumbar position from pelvic position [2]. During fifth to seventh week, 3 pairs of parallel veins are formed, the posterior cardinal veins, the sub cardinal veins (which mainly drain the kidneys) and the supracardinal veins (which drain the lower extremities). These veins undergo anastomosis and regression to form IVC and normal renal veins [12]. Left renal vein is formed by anastomosis of pair of subcardinal veins (Figure 1). The

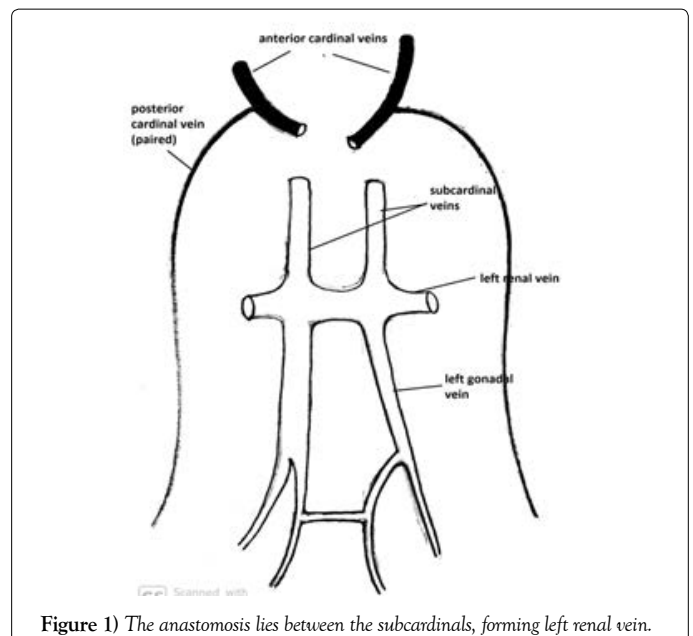


Figure 1) The anastomosis lies between the subcardinals, forming left renal vein.

anastomosis between the sacro cardinal veins forms the Left common iliac vein. When this communication has been established, the left sub cardinal vein disappears, and only its distal portion remains as the left gonadal vein. Hence the right sub cardinal vein forms the renal segment of the inferior vena cava. When the left sacro cardinal veins communication persists with the sub cardinal veins, then it leads to the Left renal vein draining into the Left common iliac vein, leading to the presented anomaly (Figure 2) [13].

CLASSIFICATION OF RENAL VEIN ANOMALIES

Many variations of the Left renal vein have been described in literature.

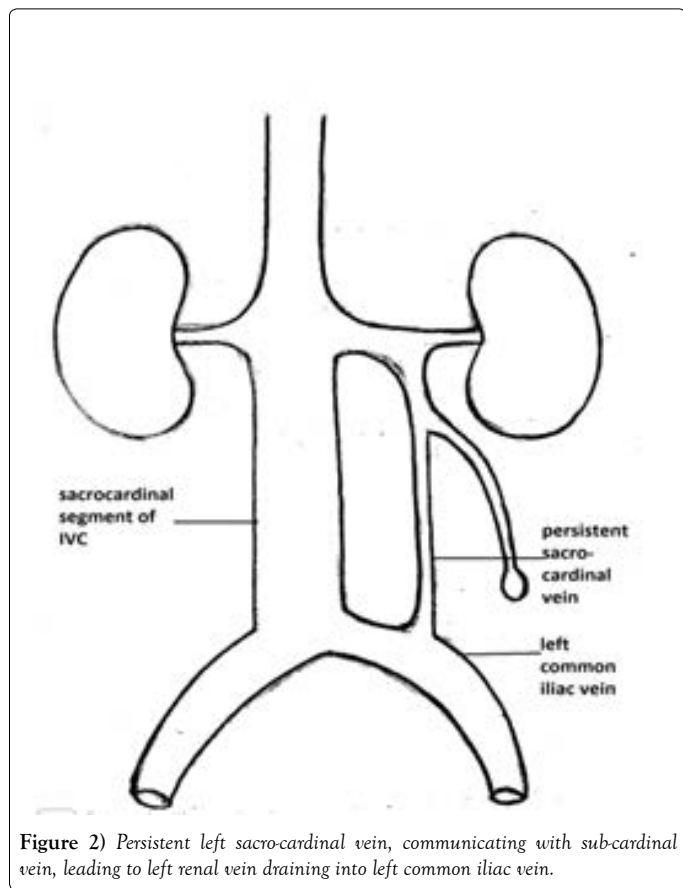
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Authors classified renal vein anomalies based on intra-operative findings during retroperitoneal surgeries like aortic surgeries, radiological findings, or renal angiograms, or autopsy studies. For example Chuang et al., classified anomalies of Left renal vein into pre-aortic, circum-aortic, retro-aortic based on the course of Left renal vein in relationship with aorta [6]. Retro aortic renal vein is an uncommon anomaly with incidence of 1.8%-2.4% of the normal population [9,14-16]. Table 1 shows different types of renal vein anomalies as described in literature.

CASE PRESENTATION

A 59-year-old lady, diagnosed to have carcinoma endometrium. The planned procedure was total laparoscopic hysterectomy, bilateral salpingo-oophorectomy with pelvic and paraaortic nodal dissection which is a standard surgical procedure for carcinoma endometrium. During Paraaortic lymph nodal dissection it was found to have an anomalous Left renal vein. A retro aortic Left renal vein coursing posterolaterally and draining into the left common iliac vein was found. Left renal vein was elongated in course, running till sacral promontory where it was draining into the Left common iliac vein (Figure 3). Extra fascial hysterectomy with bilateral pelvic lymph node dissection and Para-aortic lymph node dissection was completed uneventfully, preserving Left renal vein. The postoperative course was uneventful. Retrospectively multi-slice spiral CT images were retrieved with vascular reconstruction (Figure 4).

DISCUSSION

Anatomy of abdominal vessels is important for various diagnostic, interventional, surgical procedures. Renal vein anomalies are usually asymptomatic congenital anomalies [17]. The prevalence of retro-aortic renal vein anomalies is 0.77%. But only 6%-7% of its present with symptoms [18]. Retro-aortic renal vein can present with symptoms like Haematuria, pain, thrombosis, left renal vein hypertension, and varicocele [19].

The first case of left renal vein draining into Left common iliac vein anomaly was reported by Turgut et al. [20]. Brancatelli et al. reported a similar case of a retro-aortic left renal vein (LRV) draining into the Left common iliac vein in a 27-year-old man [21]. Karaman et al. reported 3 cases of Left renal vein draining into Left common iliac vein out of 1856 patients in a study based on CT-Angiography [16]. Parimala et al. reported the incidences of different types of renal vein anomalies based on Karaman classification (Table 1) [1]. Type 1, type 2 and type 3 incidences were 6.6%, 1.6%, 3.3% respectively and

TABLE 1
Various classifications of renal vein anomalies

Author	Year	Classification based on	Types
1. Chuang et al. [6]	1974	Course of renal vein in relation to aorta (case reports:2 undergone renal angiogram and 1 based on intraoperative findings)	1. Preaortic (normal) 2. Retro-aortic 3. Circumaortic
2. Brener et al. [9]	1974	Intraoperative findings of abdominal aortic surgeries	1. Transposition of IVC (0.2%-0.5%) 2. Duplication of IVC (0.2%-3%) 3. Circum-aortic left renal vein (1.5%-8.7%) 4. Retroaortic left renal vein (1.8%-2.4%)
3. Hoeltl et al. [14]	1990	4,520 Retroperitoneal CT scans, anatomical studies of autopsy material of 354 cases and intraoperative observations made during 215 majors retroperitoneal procedures.	1) Circumaortic left renal vein 2) Type I -retroaortic left renal vein, (vein joins the inferior vena cava in orthotopic position) 3)Retroaortic left renal vein, type II (joins the testicular (or ovarian) and ascending lumbar vein before joining the inferior vena cava at the level of L4 to L5) 4) Reduplication of the inferior vena cava; and 5) Transposition of the inferior vena cava
4. Satyapal et al. [15]	1999	104 venograms,148 live kidney donor intraoperative findings, 525 Abdominal aneurysmal surgeries	1) Type 1A -most common type, consisted of two primary tributaries only an upper and lower, while Type 1B had in addition, a posterior primary tributary 2) Type II A displayed more than two primary tributaries; e.g. upper, middle and lower, while Type IIB had in addition a posterior primary tributary 3) Type III consisted of any of the above classification patterns as well as displaying an additional renal vein
5. Karaman et al. [16]	2007	Evaluation on 1856 patients with Multidetector computed tomography (MDCT) angiography with urological symptoms	1) Retro-aortic LRV joining the inferior vena cava (IVC) in the orthotopic position; (3.6%), 2) Retro-aortic LRV joining the IVC at level L4-L5 (1.4%) 3) Circumaortic or collar left renal vein (1.2%) 4) Retro-aortic LRV joining the left common iliac vein (0.9%)

type 4 was not observed in their study [1]. Kawai et al. reported drainage of two tributaries of left renal vein draining into IVC and left common iliac vein in a known case of carcinoma colon [22].

Renal transplant surgeons find difficulty with intraoperative surprises with renal vein anomalies especially in donor nephrectomy cases [23]. Major aortic surgeries carries 40% chance of injury to retro-aortic renal vein [9]. Endo-urological procedures also carry high risk of injury to anomalous renal pedicle especially in the treatment of disorders of the pelvi-ureteric junction. Vessels in front or behind the renal pelvis are the cause of pelvi-ureteric junction obstruction in 15%-52% of cases [24]. Lumbar veins sometimes drain into Left anomalous renal vein. This kind of drainage occurs in around 40% of patients with retro-aortic oblique course of renal vein. It can cause devastating hemorrhage with a potential to cause death if injured especially during the removal of retroperitoneal lymph nodes. The understanding of these variations is useful for safe approach during endovascular procedures, such as angioplasties and therapeutic embolization [25,26].

Retro-aortic left renal vein draining into left common iliac vein: A rare renal vein anomaly and its significance: A case report

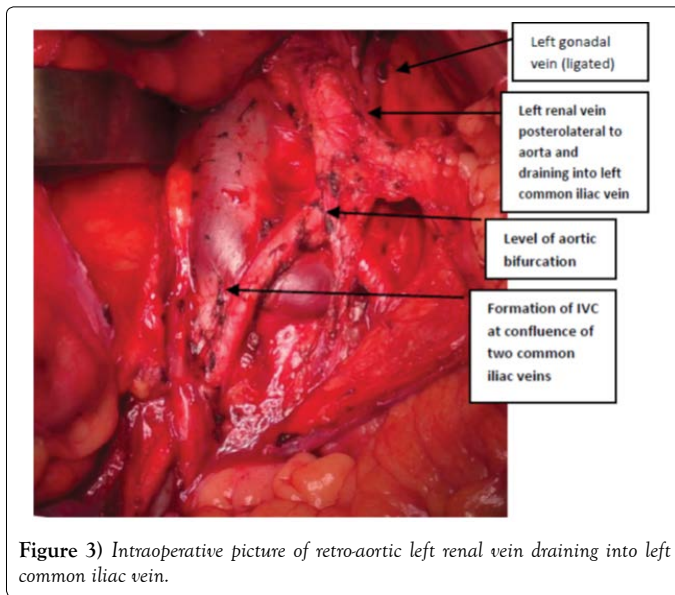


Figure 3) Intraoperative picture of retro-aortic left renal vein draining into left common iliac vein.

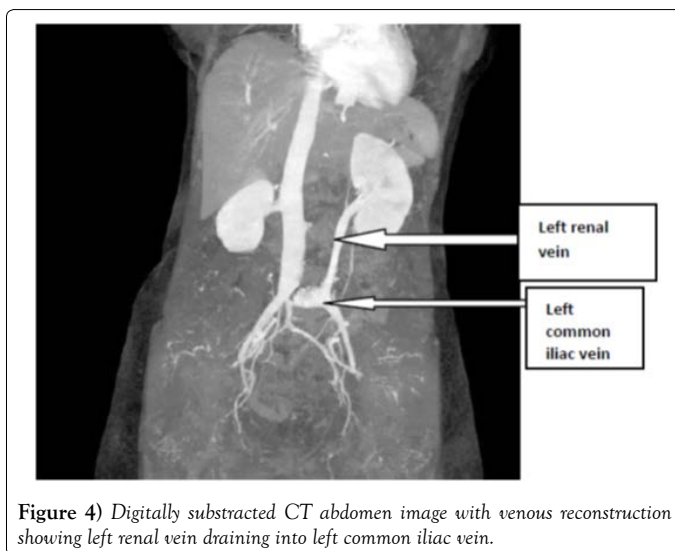


Figure 4) Digitally subtracted CT abdomen image with venous reconstruction showing left renal vein draining into left common iliac vein.

CONCLUSION

Preoperative assessment and intraoperative awareness of renal vein anomalies are important to prevent devastating vascular injuries. With the increasing use of preoperative imaging like CT, MRI, preoperative identification of these anomalies is possible and helps to alarm the operating surgeon in preservation of these vessels intraoperatively, thereby avoiding significant morbidity and even mortality to patient. Anatomical knowledge of the presented anomalies is of immense importance for the appropriate selection of operative techniques during surgical interventions.

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