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Left-Sided Inferior Vena Cava with Renal Carcinoma: A Case Report

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ABSTRACT

The authors present a rare case of left-sided inferior vena cava (IVC) in a patient with renal cell carcinoma of the right kidney. The anomalous IVC poses significant challenge to the surgeon. Preoperative identification of this congenital anomaly prevents complications during the surgical procedure. In this patient, the suprarenal portion of the IVC is on the right side and the infrarenal portion is on the left side, with the cava taking a left to right turn at the level of the renal veins anterior to the aorta.

KEYWORDS : Left Inferior vena cava; Nephrectomy; Renal cell carcinoma

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INTRODUCTION

Renal cell carcinoma (RCC) accounts for 2% to 3% of all adult malignant neoplasms. Surgical management by radical nephrectomy is the standard treatment for RCC. Radical nephrectomy has the potential for major intraoperative hemorrhage from the inferior vena cava (IVC) and aorta. Typically, vena caval hemorrhage during a radical nephrectomy occurs due to an avulsion or laceration of a large yet fragile vein entering the IVC at predictable locations. The association of an RCC and a congenital anomaly of the IVC mandate an adequate preoperative assessment of retroperitoneal anatomy to avoid intraoperative injury. Modern imaging modalities facilitate an in-depth preoperative assessment of retroperitoneal anatomy [1]. In one study, overall prevalence of major venous and renal anomalies was 5.6% and detection rate of computerized tomography (CT) correlated with the autopsy studies [2].

Preoperative identification of a congenital anomaly of the IVC is critical for an uneventful completion of retroperitoneal surgery [3]. In the context of urologic surgery, there are reports of left-sided IVC in patients undergoing retroperitoneal lymph node dissection for testicular cancer [4, 5] and donor nephrectomy [6, 7]. The authors of the present report add to 3 case studies in the literature [8-10] by describing a patient with a left-sided IVC and a right renal cell carcinoma.

CASE REPORT

A 58-year-old male presented with a five-week history of hematuria, asthenia, and back pain. An ultrasonogram of the abdomen revealed a solid mass lesion in the right kidney. A CT scan of the abdomen showed a left-sided IVC and a 10 cm tumor located in the midportion of the right kidney (Figure 1a; Figure 1b). The suprarenal portion of the IVC was located on the right side and the infrarenal portion was on the left side. Imaging also showed the segment of the IVC crossing from the left to the right side. There was no thrombus in the renal vein or IVC. The patient was a member of the religious organization known as Jehovah's Witnesses and refused blood products; however, he agreed to intraoperative cell salvage.

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Figure 1. CT Reconstruction Showing the Left-Sided Infra Renal Portion.

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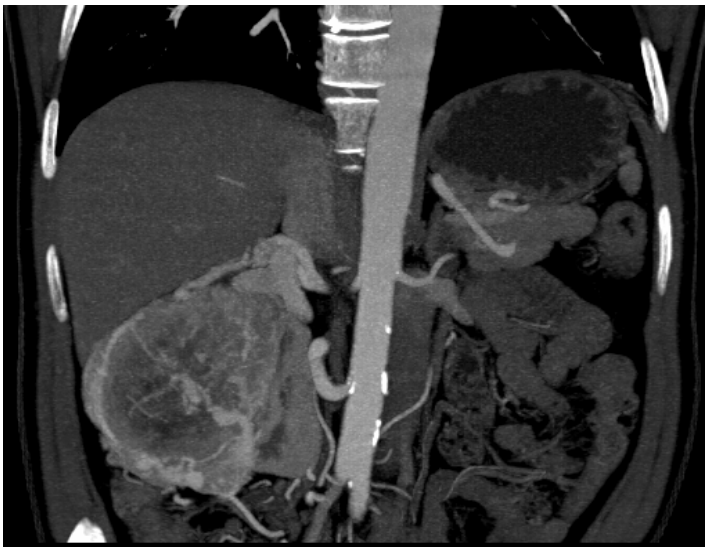

Figure 2. Transverse CT Section Showing the IVC on the Left Side.

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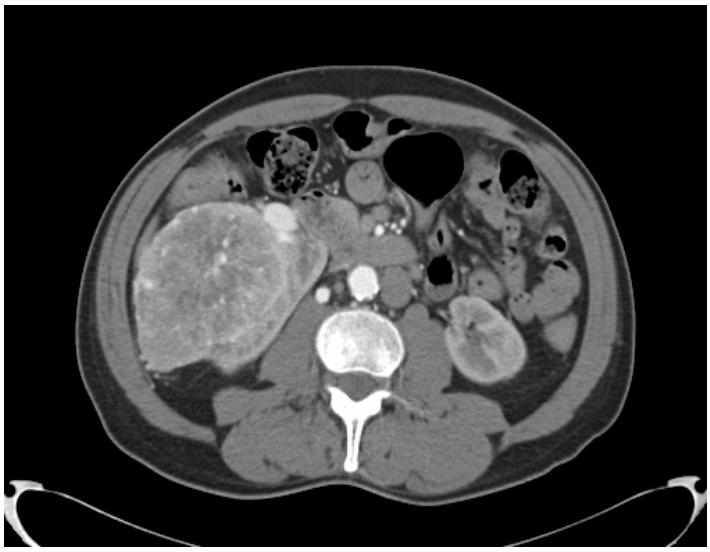

After a detailed discussion of all available treatment options, the patient elected to have an open right radical nephrectomy. The surgeon exposed the superior portion of the IVC on the right side after careful dissection and mobilization of the liver. The infrarenal IVC was seen on the left side running parallel to the aorta. After joining the left renal vein, the IVC crossed the aorta anteriorly to receive the right renal vein. The right gonadal vein drained into the right renal vein, close to the confluence of the renal vein and IVC. The surgeon noted a small remnant of IVC inferiorly on the right side. The surgeon carefully dissected the renal vein, gonadal vein, and IVC remnant to avoid inadvertent avulsion or laceration. The patient had two renal arteries arising separately from the aorta. Radical nephrectomy was completed uneventfully. The estimated blood loss was 100 cc and the patient was discharged after 5 days. There has been no evidence of disease recurrence after one year.

DISCUSSION

Congenital anomalies of retroperitoneal vasculature and renal vessels are common. Anomalies of IVC and its tributaries have been reported since 1793 [11]. In the human embryo, the definitive IVC develops on the right side from a plexus of fetal veins, between the sixth and tenth weeks of gestation [12]. Among the fetal veins, the posterior cardinal and supracardinal veins lie dorsally and the subcardinal vein lies ventrally. They form a collar through which the kidneys ascend to their normal anatomical location. The hepatic segment of a definitive IVC is derived from vitteline veins. The suprarenal portion comes from the right subcardinal vein and the renal segment from the right suprasubcardinal and postsubcardinal anastomosis. The infrarenal IVC forms from the right supracardinal vein [13]. The left supracardinal veins and the lumbar portion of the right posterior cardinal vein atrophy.

The prevalence of left IVC is 0.2% to 0.5% [1]. A left IVC results from regression of the right supracardinal vein with persistence of the left supracardinal vein. After joining the left renal vein, the infrarenal IVC typically crosses anterior to the aorta, uniting with the right renal vein to continue as a normal right-sided prerenal IVC [10, 12]. The left gonadal and adrenal veins drain directly into the IVC, and the right gonadal and adrenal veins drain into the right renal vein [12]. Chuang et al [14] classified the anomalous postrenal segment into four types: type A is a preureteral vena cava (persistence of the right posterior cardinal vein); type B is a normal IVC (persistence of the right supracardinal vein); type C is a left IVC (persistence of the right supracardinal vein); type BC is a duplicated IVC (persistence of both supracardinals).

The reports of congenital anomalies of IVC assume importance because failure to recognize these anomalies can result in significant intraoperative injury and hemorrhage. In addition, the anomalous vessels typically are more dilated and can be injured easily [3]. Advances in imaging modalities have greatly facilitated the diagnosis and treatment of solid renal masses. A contrast-enhanced spiral CT scan can reliably reveal venous

anomalies [2]. A 3-D CT reconstruction and/or MRI can provide further detail, if needed. The surgeon must carefully evaluate the tumor thrombus extension into the IVC, because the presence of a tumor thrombus can significantly alter the surgical plan. The surgeon must carefully dissect anomalous structures in relation to the tumor-bearing kidney before proceeding with the nephrectomy. However, extensive dissection of anomalies should be avoided [15].

CONCLUSION

IVC anomalies are rare. However, preoperative diagnosis of these congenital anomalies is essential in order to avoid inadvertent injury during radical nephrectomy and to provide optimal outcome following surgery.

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