Case Report

RENAL CELL CARCINOMA EXTENDING INTO THE INFERIOR CAVAL VEIN:
Report of two cases

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ABSTRACT
Renal cell carcinoma (RCC) is rare neoplasm and rarely extends to IVC. Perinephric and venous system invasion is an important prognostic sign for RCC. The tumor may grow intraluminally into the renal vein and Inferior Vena Cava (IVC) as an extension of primary tumor. In this report, we present two unusual cases of venous system involvement, invasion of RCC into SVC. RCC with tumor thrombus extension into the IVC remains a difficult operative challenge. However, surgical intervention should be performed. Our cases were successfully operated and their post operative recovery was uneventful.

KEY WORDS: Renal cell carcinoma, Tumor thrombus, Inferior vena cava.

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CASE REPORT
Renal cell carcinoma (RCC), the most common primary renal neoplasm, affects approximately 31,800 people annually in the United States, accounting for 2% of all cancers. RCC occurs nearly twice as often in men as in women, and in the United States, it is slightly higher among blacks than whites. A tumor thrombus extending into the Inferior Vena Cava (IVC) is reported to be present in 4-10% of patients with renal cell carcinoma.1

RCC is the tumor most frequently associated with caval tumor extension. The presence of a tumor thrombus in the IVC associated with RCC does not change patient survival when the thrombus is totally excised and in the absence of nodular visceral metastases. However, patients with extension of the thrombus into the IVC still represents a great surgical challenge.2

The exact cause of RCC has not yet been determined though continued researches have
determined multiple risk factors. Tobacco use has been shown to increase risk relative to pack-year. As many as one third of the patients with RCC are rare smokers. Obesity is a recognized as a potentially causative factor, predominantly in women. Studies have been conducted in an attempt to determine the correlation between occupational and environmental factors. Steel plant workers who operate coal ovens and people exposed to petroleum products, heavy metals, and asbestos have increased frequency of RCC. A link has been shown between hypertension and antihypertensive medications in men women undergoing radiation treatment for uterine cancer may also have slight increase in and risk. The familial multiple–cancer syndrome von Hippel-Lindau disease has been shown to have a $40\%$ RCC rate and is a major cause of death in this patient’s population.

Renal Cell carcinoma extending into the VCI was first reported by Donald G et al. in 1972. The incidence of the IVC tumor thrombus is reported to be $4\% - 10\%$ in patients with renal cell carcinoma. Management of patients with level III/IV tumor thrombus is usually difficult. We report two cases of level III thrombus in our hospital.

**CASE PRESENTATION**

*Case-1:* This was a 65 years old man with renal cell carcinoma. He was diagnosed as right RCC with IVC thrombus after ultrasonography and Magnetic Resonance Imaging (MRI). The renal tumor was about 4.5cm in diameter and the upper limit of IVC thrombus reached the proximal of IVC. There was no other suspected distant metastasis. Patients had undergone radical nephrectomy and thrombectomy. No pre-operative arterial embolization was performed. Renal artery was ligated early during the course of surgery to decrease venous bleeding and to reduce the cephalad extension of vena cava thrombus. A subcostal approach was preferred. After the mobilization of the kidney, we mobilized the renal pedicle and ligated the renal artery. The kidney was mobilized out of Gerota’s fascia. Clamps were placed consecutively on infrarenal vena cava. Following the accomplishment of vascular control, vena cavotomy and extraction of thrombus was performed. The duration was 145 minutes with 500 ml blood loss. The patient had no per-operative complications. Pathological examination for the surgical specimens’ confirmed RCC along with the inferior vena caval thrombus. TNM staging was T3cN0M0.

*Case-2:* This was a 60 years old man with renal cell carcinoma. The patient presented with a history of anemia. A gastrointestinal evaluation for blood loss was with negative result. Several months later the patient returned to his physician with hematuria, palpitation and constipation. He also noted increasing abdominal girth lower extremity edema and dyspnea with exertion. A CT scans was ordered and showed ascites in the abdomen and a large left renal mass extending into his renal vein and IVC (Fig-1). The patient’s head CT scan was normal and the chest CT scan did not reveal any obvious pulmonary metastases. The patient underwent a left radical nephrectomy with vena cavotomy and extraction of the tumor–thrombus up to and including the right atrial mass. The tumor–thrombus surface was noted to be smooth suggesting that no portion had embolized. The tumor-thrombus was also noted to be free of all the wall of the IVC (Fig-2). Following the accomplishment of vascular control, vena cavotomy and extraction of thrombus was performed.

Fig-1: Intra operative photograph of the caval extension.
Renal Cell Carcinoma

performed. The duration was 165 minutes with 750 ml blood loss. The patient had no perioperative complications. Pathological examination of the surgical specimen’s confirmed RCC along with the inferior vena caval thrombus. TNM staging was T3cN0M0.

DISCUSSION

Renal cell carcinoma with tumor-thrombus invasion of the IVC is found in approximately 5% of patients undergoing radical nephrectomy. Approximately half of these patients can have prolonged survival if they are without detectable metastases.5

The aggressive surgical approach that has been adopted for RCC with caval extension is born out of the observation that tumor thrombus does not adversely impact on oncologic survival, and that complete resection of the tumor and caval thrombectomy allow for the best chance of cure.6 An effective operative strategy is predicted upon accurate preoperative imaging to assess the extent of tumor thrombus in the IVC. The need for hepatic mobilization, suprahepatic clamp, and Pringle maneuver can be determined preoperatively, allowing for expeditious conduct of the operation. Additionally close communication with the anesthesiologist is important to determine whether the patient is tolerating clamping of the inferior vena cava while clamping of the infrahepatic IVC is generally well-tolerated, occlusion of the suprahepatic IVC often causes hypotension secondary to the profound decrease in venous return.7

The five years survival rate varies depending on the cancer stage classification at the time of diagnosis. Patients with tumors confined to the organs of origin have an 89% survival rate. When regional involvement occurs the survival rate decreases by 61%.8 The prognosis of patients with distant or metastatic involvement is significantly lower at only 9% five years after diagnosis. The five year survival rate for all races has improved from 52% in 1974-1976 to 62% in 1992-1997.9

RCC with the invasion of the tumor into the renal veins or IVC is considered Stage-III. A radical nephrectomy is usually offered. Operative mortality is approximately 5% to 10%. Postoperative complications associated with surgical interventions for kidney cancer includes bleeding, infections, and internal urine leakage with partial nephrectomy and intestinal blockage with radical nephrectomy. The most common complications are acute renal failure found in 2.6% of patients, and urinary fistula or blockage, found in 2.3%.10

CONCLUSIONS

Radical nephrectomy with en bloc caval tumor thrombectomy remains the primary modality of treatment in patients with RCC and caval tumor thrombus extension. Preoperative imaging is essential in determining the approach for caval isolation and clamping. Technological advances in diagnostic imaging and the development of modern anesthetic techniques have facilitated the development of successful strategies for managing complex tumor thrombi associated with RCC. RCC remains primarily a surgical disease and the best outcomes are likely to be achieved via aggressive surgical resection.

REFERENCES


Fig-2: Photograph showing extracted caval tumor sized 7,5X5 cm.