Radical nephrectomy with cavotomy and thrombectomy: technical aspects


• ABSTRACT

Introduction: Renal tumors make up 2-3% of all diagnosed malignant diseases. Between 4-15% of these tumors have associated tumor thrombus in the renal vein or in the inferior vena cava. Tumor thrombus is associated with poor biological behavior, but not necessarily with poor prognosis. Radical surgery is the only curative treatment.

Objective: To demonstrate technical aspects of radical nephrectomy with cavotomy and thrombectomy in the treatment of renal tumor with tumor thrombus in the vena cava.

Case presentation: Patient is a seventy-six-year-old man whose present illness began four months before with terminal gross hematuria with filiform clots. Computed tomography scan showed right 7 x 7 cm renal tumor located in upper pole and hilar region with thrombus in vena cava (level II). Right radical nephrectomy with cavotomy and thrombectomy was carried out.

Conclusions: Radical surgery is the only potentially curative treatment in cases of renal tumor with thrombus. No other effective alternative therapy exists.

Keywords: Radical nephrectomy, cavotomy, thrombectomy, Mexico.

• RESUMEN

Introducción: Los tumores renales suponen entre 2% y 3% de todas las enfermedades malignas diagnosticadas. Entre 4% y 15% de estos tumores tienen trombo tumoral asociado en la vena renal o en la vena cava inferior (VCI). La presencia de trombo tumoral está asociada a peor comportamiento biológico pero no necesariamente a peor pronóstico. La cirugía radical es el único tratamiento curativo.

Objetivo: Demostrar aspectos técnicos de la nefrectomía radical con cavotomía y trombectomía, en el tratamiento del tumor renal con trombo tumoral en vena cava.

Presentación del caso: Hombre de 76 años, inicio padecimiento actual hace cuatro meses con hematuria macroscópica terminal con coágulos filiformes. TC: Tumor renal derecho de 7 cm por 7 cm localizado en polo superior y región hilar con trombo en vena cava (nivel II). Se decidió realizar nefrectomía radical derecha con cavotomía y trombectomía.

Conclusiones: La cirugía radical es el único tratamiento curativo potencial en los casos de tumor renal con trombo, porque no hay otra terapia alternativa eficaz.

Palabras clave: Nefrectomía radical, cavotomía, trombectomía, México.
INTRODUCTION

Renal cell carcinoma (RCC) represents 2-3% of all solid neoplasms and is the third most common tumor of the urinary tract with an incidence of 6-12 cases per 100,000 inhabitants in Western countries. There has been an increase worldwide in RCC incidence attributed to earlier diagnosis from the use of imaging techniques for non-urological problems. It is more frequent in men than in women (1.5:1) with peak incidence between 60-70 years of age. One of the characteristics of RCC is its capacity to invade the venous system extending to the renal vein in 23% of cases and to the inferior vena cava in 7% of cases. Prognostic factors have been established to predict survival in RCC patients. These factors have been classified as anatomical, pathological, clinical, and molecular. Anatomical factors include tumor size, renal capsule invasion, adrenal gland compromise, venous invasion, and metastasis to lymph nodes or distant metastasis. Pathological stage is the most important predictive survival factor in RCC patients. Approximately one third of patients present with distant metastatic disease at the time of diagnosis, resulting in poor prognosis. The presence of tumor thrombus is associated with poor biological behavior but not necessarily with poor prognosis. Preoperative radiological study for determining tumor and thrombus extension is necessary for defining surgical approach. Cranial extension of the thrombus is essential for defining the need for cardiopulmonary by-pass (CPB). Computed tomography (CT) is the standard for determining diagnosis and Nuclear Magnetic Resonance (NMR) can be important for achieving improved tumor thrombus detail and for evaluating vascular wall invasion.

Because the choice of surgical approach depends on tumor thrombus level, a consistent system of surgical staging is fundamental for precise preoperative planning. Neves and Zincke described a staging system based on the following three anatomical reference points: the renal vein, the suprahepatic veins, and the diaphragm. A similar system was proposed by Novick. Disease-specific survival at 5 years after radical nephrectomy and thrombectomy is 40-65% in patients with thrombus in the cava without distant metastasis and 6-28% in patients with distant metastasis at the time of its presentation. For these reasons, radical surgery is currently the best treatment alternative for this type of tumor.

OBJECTIVE

To demonstrate technical aspects of radical nephrectomy with cavotomy and thrombectomy in the treatment of renal tumor with tumor thrombus in the vena cava.

CASE PRESENTATION

Patient is a 76-year-old man, born and living in Mexico City, who is Catholic, married, and works as a driver. Past medical history includes prostatic adenectomy 8 months prior, type 2 diabetes mellitus, and high blood pressure. Present illness began 4 months after adenectomy with terminal gross hematuria with filiform clots. Physical examination: right GII varicocele. Computed tomography (CT) scan: 7 x 7 cm right kidney tumor located in the upper pole and hilar region with thrombus in the vena cava (Image 1). Nuclear magnetic resonance (NMR) image: right kidney tumor with thrombus in vena cava at level II (Image 2). Thoracic CT scan: no sign of metastasis. There were no alterations in liver function tests and bone scintigram was negative. It was decided to carry out right radical nephrectomy with cavotomy and thrombectomy.

Procedure description: Initial Chevron incision was carried out followed by en bloc medial mobilization of the colon, duodenum, and pancreatic head.

Image 1. In both images, urotomography scan shows heterogeneous mass in the right kidney.
(Cattell-Brasch maneuver) (Image 3) along with the section of falciform, round, coronal, and triangular hepatic ligaments so the liver could be moved, exposing the vena cava from the subhepatic portion to the infrarenal portion. Right renal pedicle was controlled by ligature of the artery and clamp on the left renal vein and the vena cava at the infrarenal level superior to the thrombus (Image 4). A 4 cm cavotomy with thrombectomy of 3 cm thrombus was carried out (Image 5). Cavotomy was closed with prolene 3:0 biplane running suture (Image 6). There was 500 mL blood loss. Procedure presented with no complications. Closed drain was removed after 48 hours. Patient tolerated oral food intake and was ambulatory 24 hours after surgery. His postoperative progression was good and he was released four days after surgery. Histopathological study reported clear cell tumor of the right kidney and Fuhrman II with renal vein invasion (T3bNoMo).

**DISCUSSION**

Surgical management of this disease is complex and depends on tumor thrombus level, presence of metastasis, and patient functional state. Despite RCC’s aggressiveness, surgery plays an important role in treatment of RCC with tumor thrombus with or without distant metastasis. Treatment should be individualized for each patient based on tumor biology and patient functional state.

Due to its complexity, surgery should be carried out by a team that has experience with this type of procedure, and includes anesthesiologists, urologists, and on certain occasions hepatic and cardiovascular surgeons.

Successful thrombus removal in the renal vein and vena cava results in improved long-term survival rate.

Important advances in surgical technique, anesthesia, and intensive care unit development have been
cornerstone in treating kidney tumors and inferior vena cava thrombi. However, surgical technique refinement and technical advances have been complemented by improvement in preoperative imaging studies for locating tumor and defining thrombus extension.

**CONCLUSIONS**

Despite its morbidity and mortality risks, radical nephrectomy with thrombectomy should be carried out in cases of renal carcinoma with tumor thrombus because it is the most effective treatment and offers the possibility of local control and increased survival.

**BIBLIOGRAPHY**