

Isolated Late Recurrence of Renal Cell Carcinoma in the Inferior Vena Cava

Mircelal KAZIMI¹, Alper UGUZ¹, Savas YAKAN¹, Deniz NART², Murat ZEYTUNLU¹, Erdem GOKER³, Ahmet COKER¹

¹ Ege University Faculty of Medicine, Department of General Surgery

² Ege University Faculty of Medicine, Department of Pathology

³ Ege University Faculty of Medicine, Department of Medical Oncology, Izmir, TURKEY

ABSTRACT

Renal cell carcinoma is an urologic malignancy with poor prognosis. Local invasion and distant metastasis determine the prognosis of the disease. Dissemination to inferior vena cava via renal vein is seen in 4-10% of the patients. The role of radiotherapy and chemotherapy is limited, surgery is the only curative treatment option and patients with liver metastasis also benefit from surgery. In patients with vena cava thrombosis, cavotomy and thrombectomy should be done to prolong survival, if nodal or visceral metastasis is not present. Surgical procedure differs according to location of thrombus in inferior vena cava. In our case report, a patient treated with right nephrectomy due to renal cell carcinoma 3 years ago who was re-operated for vena caval thrombus is mentioned. Operation was done without using Pringle technique (clamping of hepatic pedicle) by mobilization of the liver with piggy back technique, and after cavotomy and thrombus excision, defect in vena cava was reconstructed with PTFE prosthetic graft. Here, we report this case and discuss it in the light of current literature.

Keywords: Renal cell carcinoma, Inferior vena cava, Cavotomy, Thrombus

ÖZET

Böbrek Hücreli Karsinomun İzole Inferior Vena Cava Tutulumuyla Görülen Geç Rekürrensi

Böbrek hücreli karsinom (BHK) prognozu kötü olan ürolojik malignitedir. Hastalığın prognozunu tümörün lokal yayılımı ve uzak metastazları belirlemektedir. %4-10 olguda renal ven aracılığıyla inferior vena cavaya (VCI) yayılım görülmektedir. Hastalığın tedavisinde radyoterapi ve kemoterapinin rolü sınırlı olduğundan tek tedavi şekli cerrahidir ve karaciğer metastazlı olgularda cerrahi tedaviden yarar görür. VCI trombüsü olan olgularda eğer nodal yada visceral metastaz yok ise sağ kalım avantajı elde etmek için cavotomi+trombektomi yapılması gerekmektedir. Trombüsün VCI'daki yerleşimine göre cerrahi teknik farklılık göstermektedir ve literatürde farklı teknikler sunulmaktadır. Çalışmamızda 3 yıl önce böbrek hücreli karsinom nedeniyle sağ nefrektomi uygulanan olguda pringle manevrasını (hepatik pedikül klempajı) kullanmaksızın karaciğer mobilizasyonu için piggy back tekniği kullanılarak cavotomi+trombüs eksizyonundan sonra cava'daki defekt PTFE prostetik greft ile rekonstrükte edilen olgu sunulmuş ve literatür eşliğinde tartışılmıştır.

Anahtar Kelimeler: Böbrek hücreli karsinom, Inferior vena cava, Kavotomi, Trombüs

INTRODUCTION

Renal cell carcinoma (RCC) is the most widely seen malignant tumour of kidney, and it constitutes 90% of renal malignities in adults and 3% of all malignities. During diagnosis, there is distant organ metastasis in 30%

of the patients.^{1,2} It is reported that tumour thrombus penetrates into inferior vena cava(VCI) through renal vein in 4-10% of patients with RCC.³ Unless there is nodal or visceral metastasis in patients with VCI thrombus, it is reported that cavotomy and thrombectomy prolongs survival.⁴

The first nephrectomy and total thrombectomy case in a patient who developed VCI thrombus due to RCC was reported in 1913 by Berg.⁵ Since that time, surgery has been applied as a standard in the treatment of RCC patients with VCI thrombus and the rate of perioperative mortality has been reported to be 2.7-13%.^{6,7} While pathological stage is the most important prognostic factor for renal cell carcinoma, it is reported that direct invasion of vein wall is a more important prognostic factor than cephalic spread of tumour thrombus in VCI and that when there is not an invasion in the vein wall, the 5 year survey is 69% and due to a direct invasion of VCI wall, the 5 year survey is 25%.^{7,8} It is reported that metastasectomy prolongs survival in patients with renal cell carcinoma who have liver metastasis.^{9,10} In our case report, the surgical technique for the treatment of a patient who developed retrohepatic VCI thrombus after right nephrectomy due to renal cell carcinoma 3 years ago is mentioned, and discussed in the light of current literature.

CASE REPORT

The patient, who is 74 years old, admitted to our clinic with a complaint of pain particularly in his right upper quadrant and right costovertebral area, which began approximately 4 months ago. He had a history of right nephrectomy due to renal cell carcinoma 3 years ago in the urology clinic and in pathological examination he had T2N0M0 clear cell carcinoma as a pathological stage which did not reach renal capsule. In abdominal computed tomography (CT), a heterogeneous tumour thrombus in the size of about 5 x 4 cm in VCI, which was invasive to caudate lobe of liver and an adjacent mesenteric fatty tissue were found. In the analysis of the case with a doppler ultrasonography, a hypoechoic mass of a 5 x 4 cm in diameter, whose intrahepatic-extrahepatic distinction cannot be made, was seen in liver segment 1 localization. The mass is adjacent to the VCI medial wall and the wall facing the lumen has irregular contour. It was also seen that there is not a adjacency of the mass to the other major vascular structures. Portal vein and its intrahepatic branches and hepatic veins are open. Liver size and parenchymal echo in other areas are reported to be normal. After examinations, the patient was taken to operation with the preoperative diagnosis of liver caudate lobe and VCI metastasis in an operated renal cell carcinoma. Tumour loca-

lization and vein adjacency were consistent with preoperative examinations in the exploration (Figure1). The mass was at VCI wall and it was exerting pressure on the caudate lobe of liver. The Piggy Back Technique was used during mobilization of liver. Also total clamping of suprarenal VCI (intrahepatic vein clamping) prevented the tumour embolus to atrium and along with it, there was not a pause in portal flow. The defect in VCI after thrombectomy + partial VCI resection after cavotomy was reconstructed with PTFE prosthetic graft (Figure 2). The patient, whose postoperative period was free of problems, was discharged on the 5th day.

DISCUSSION

Renal cell carcinoma (RCC) constitutes 3% of all malignities in adults and 90% of renal malignities.^{1,2} As in the other malignities, in renal adenocarcinoma the etiology is not exactly known. A lot of reasons from chromosome anomalies to environmental factors, from nutritional habits to smoking, and from workers in metal industry to the ones who are exposed to asbestos and cadmium are considered to be the reasons as etiological factors. During diagnosis, there is distant organ metastasis in 30% of the patients. Metastases can be by direct invasion, hematogenous and lymphogenous ways. The tumour, which was initially intrarenal, develops expansively and pushes the peripheric tissue and corrupts its contour. Similarly, it causes pelviciceal deformation by pushing the calyces and the pelvis. In time it passes the renal fibrous capsule and reaches perirenal fatty tissue, Gerota fascia and surrounding tissues and organs, and the kidney becomes a fixed mass. Most frequently, distant metastases can be hematogenously in the order of lung, liver, bone, brain and other organs. The tumour usually infiltrates intrarenal veins in early stages. In 4-10% of RCC patients, thrombus was found in inferior vena cava (VCI).³

Thrombus was classified according to its level in VCI and four levels were determined: the diameter of Level I (or renal) thrombus is <2 cm and in the renal vein lumen, the head of Level II (or retrohepatic) thrombus is at a lower level than suprahepatic vein, Level III (or suprahepatic) thrombus is at the lumen of suprahepatic vein, and the Level IV (or atrial) thrombus is located at the right atrium.¹¹ Massive pulmonary embolism, total obstruction of tricuspid valve and liver failure due to Budd-Chiari syndrome can

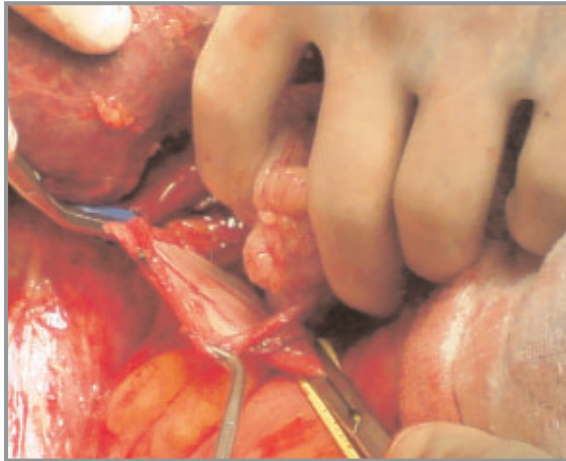


Figure 1. Intraoperative appearance of tumoral invasion of vena cava wall and cavotomy

be seen as early and late period complications in patients who had tumour thrombus in VCI.

In diagnosis and staging of the disease, ultrasonography (US), doppler US, and computed tomography (CT), magnetic resonance angiography (MRA) are frequently used. Its treatment consists of surgery, embolization, and immunotherapy. Kidney cancer is radio-resistant. However, it can be applied for palliative. As for the chemotherapy; there is not an only or combined cytostatic agent which is distinctively effective for kidney cancer. Although many combined treatments have been tried, their effect is in the rate of 5-10% and of short duration. Immunotherapy is applied in metastatic disease as radical nephrectomy + interferon or IL-2 (Interleukin 2) and a prolongation of an average 16.7 months is seen in life span.¹² In recent years, drugs targeting at angiogenesis axis have been researched in RCC. In clear cell RCC, depending on high expression of angiogenesis proteins, a clinical effectiveness was observed in the inhibition of vascular epithelial growth factor (VEGF) with antibodies.¹³ Additionally, as a result of studies, a clinical effectiveness was also found in tyrosine kinase inhibition.^{14,15} Positive results in terms of decrease in tumour angiogenesis and as a result of this clinical response and survival were reported in these studies.

The standard treatment of RCC is surgical. The type of surgical treatment differs according to the spread of the tumour as radical nephrectomy or nephron protective surgery. The surgical application can differ according to the location of the thrombus in VCI

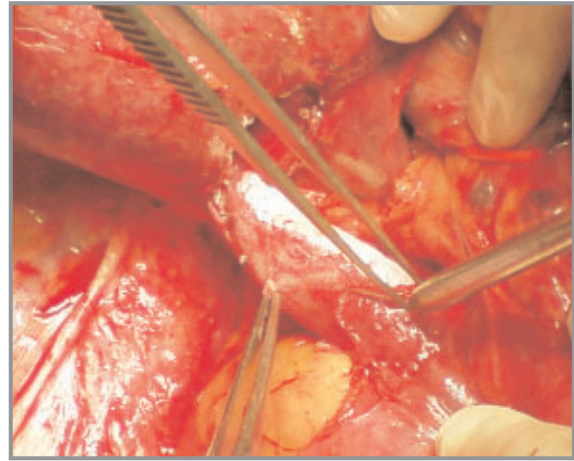


Figure 2. Intraoperative appearance of PTFE prosthatic graft reconstruction of defect in VCI after cavotomy + thrombectomy + partial VCI resection.

with tumoural mass or metastasis. In locally advanced stage kidney tumours which do not invade to the vein wall but which cause thrombus in vena cava, if there is not metastasis in lymph node or other solid organs, the only type of curative treatment which is cavotomy and thrombectomy with radical nephrectomy. According to preoperative MRA, two types of surgical approaches are determined considering the localization of the VCI thrombus. Accordingly, transabdominal excision for the thrombi under the major hepatic veins and cardiopulmonary bypass, deep hypothermia and circulatory arrest for the levels at or over major hepatic veins have become the preferred operation approaches.¹⁶ It is reported in literature that a cava filter is used in order to prevent pulmonary embolism in patients with thrombus in VCI before the surgical attempt.¹⁷

In our patient, thrombus in retrohepatic VCI (Level 2) and invasion in vein wall were found. That we used piggy back technique in liver mobilization made our attempt easy. Also total clamping of suprarenal VCI (infrahepatic vein clamping) prevented the tumour embolus to atrium and along with it, there was not a pause in liver portal flow. The defect in VCI after thrombectomy + partial VCI resection after cavotomy was reconstructed with PTFE prosthetic graft. It is reported in literature that in patients to whom partial VCI resection is applied after thrombectomy, if the defect cannot be repaired primarily, it can be repaired with PTFE graft.¹⁸

Liver resections which are applied in isolated liver metastasis of colorectal carcinomas are known to

prolong survival and to be able to have a potential cure chance for selected patients and their 5 year survival differs between the rates of 16-58%. This issue is colorectal metastases and even it provides much more survival after hepatic resection of non-gastrointestinal metastases than gastrointestinal metastases^{19,20} and controversial in non-colorectal hepatic metastases and any prospectively wide series are not available. However, in studies which have been published in last 2 years, it has been reported that hepatic resection in non-colorectal carcinoma metastases provides survival as much as or even more than colorectal carcinoma.^{19,20}

In conclusion, surgical attempt is the only treatment alternative for the metastatic invasion of retrohepatic (Level 2) VCI in RCC patients. In these patients, the mobilization of the liver should be done with piggy back technique in order to provide exposure and in order to prevent tumour thrombus from disseminating; infrahepatic vein clamping should be done. The most important advantage of this technique is that Pringle maneuver (hepatic pedicle clamping) is not applied and liver hemodynamics is not deformed.

REFERENCES

- Golimbu M, Joshi P, Sperber A, et al. Renal cell carcinoma: survival and prognostic factors. *Urology* 27: 291-301, 1986.
- Motzer RJ, Bander NH, Nanus DM. Renal-cell carcinoma. *N Engl J Med* 335: 865-875, 1996.
- Hatcher PA, Paulson DF, Anderson EE. Accuracy in staging of renal cell carcinoma involving vena cava. *Urology* 39: 27-30, 1992.
- Swierzewski DJ, Swierzewski MJ, Libertino JA. Radical nephrectomy in patients with renal cell carcinoma with venous, vena caval, and atrial extension. *Am J Surg* 168: 205-209, 1994.
- Berg AA. Malignant hypernephroma of the kidney, its clinical course and diagnosis, with a description of the author's method of radical operative cure. *Surg Gynecol Obstet* 17: 463-471, 1913.
- Nesbitt JC, Soltero ER, Dinney CP. Surgical management of renal cell carcinoma with inferior vena cava tumor thrombus. *Ann Thorac Surg* 63: 1592-1600, 1997.
- Hatcher PA, Anderson EE, Paulson DF, et al. Surgical management and prognosis of renal cell carcinoma invading the vena cava. *J Urol* 145 : 20-24, 1991.
- Guinan P, Sobin LH, Algaba F. TNM staging of renal cell carcinoma: Workgroup no. 3. Union International Contre le Cancer and the American Joint Committee on Cancer. *Cancer* 80: 992-993, 1997.
- Karavias D, Tepetes K, Karatzas T, et al. Liver resection for metastatic non-colorectal non-neuroendocrine hepatic neoplasms. *Eur J Surg Oncol* 28: 135-139, 2002.
- Detry O, Warzee F, Polus M, et al. Liver Resection for Noncolorectal, Nonneuroendocrine Metastases. *Acta chir belg* 103: 458-462, 2003.
- Neves RJ, Zincke H. Surgical treatment of renal cancer with vena cava extension. *Br J Urol* 59: 390-395, 1987.
- Staeher M, Rohrmann K, Bachmann A, et al. Therapeutic approaches in metastatic renal cell carcinoma. *BJU Int* 95: 1153-61, 2005.
- Yang JC, Haworth L, Sherry RM, et al. A randomized trial of bevacizumab, an anti-vascular endothelial growth factor antibody, for metastatic renal cancer. *N Engl J Med* 349: 427-34, 2003.
- Patel PH, Chaganti RS, Motzer RJ. Targeted therapy for metastatic renal cell carcinoma. *Br J Cancer* 94: 614-9, 2006.
- Motzer RJ, Michaelson MD, Redman BG, et al. Activity of SU11248, a multitargeted inhibitor of vascular endothelial growth factor receptor and platelet-derived growth factor receptor, in patients with metastatic renal cell carcinoma. *J Clin Oncol* 24: 16-24, 2006.
- Belis JA, Pae WE Jr, Rohner TJ Jr, et al. Cardiovascular evaluation before circulatory arrest for removal of vena caval extension of renal carcinoma. *J Urol* 141: 1302-1307, 1989.
- Grossi CJ, Swan TL, Cardella JF, et al. Quality improvement guidelines for percutaneous permanent inferior vena cava filter placement for the prevention of pulmonary embolism. *J Vasc Interv Radiol* 12: 137-41, 2001.
- Zini L, Haulon S, Leroy X, et al. Endoluminal occlusion of the inferior vena cava in renal cell carcinoma with retro- or suprahepatic caval thrombus. *BJU Int* 97: 1216-1220, 2006.
- Earle SA, Perez EA, Gutierrez JC, et al. Hepatectomy Enables Prolonged Survival in Select Patients with Isolated Noncolorectal Liver Metastasis. *J Am Coll Surg* 203: 436-446, 2006.
- Reddy SK, Barbas AS, Marroquin CE, et al. Resection of Noncolorectal Nonneuroendocrine Liver Metastases: A Comparative Analysis. *J Am Coll Surg* 204: 372-82, 2007.

Correspondence

Dr. Savaş YAKAN
 255 Sokak No: 1/7
 35270 Hatay, İZMİR / TURKEY
 Phone: (+90.533) 471 79 40
 Fax: (+90.232) 261 44 44
 E-mail: savasyakan@gmail.com