A different approach in the treatment of left renal cell carcinoma with tumor thrombus extension into the vena cava inferior

In this article, we report a case of advanced renal tumor with intracaval neoplastic extension, known as tumor thrombus treated with left subcostal (hemi-Chevron) abdominal incision instead of bilateral subcostal incision (Chevron technique), which is used for radical nephrectomy and tumor extirpation.

Key words: Renal cell carcinoma; subcostal incision; tumor thrombus.

CASE REPORT AND SURGICAL TECHNIQUE

A 63-year-old male patient was admitted to the outpatient clinic with complaints of fatigue and leg edema. Physical examination revealed hepatosplenomegaly and moderate pretibial edema. Abdominal ultrasonography examination showed a mass in the left kidney and an extending thrombus in the inferior vena cava (IVC). Echocardiography revealed a 3x9.5 cm mass in the right atrium extending and filling the IVC. Abdominal computed tomography and magnetic resonance imaging revealed a 6x6x6 cm mass invading the kidney capsule and a tumor thrombus extending through the IVC reaching up to the right atrium.

Tumor excision started with a subcostal laparotomy. The colon was medially mobilized with a hot compress. A left radical nephrectomy was performed after transperitoneal ligation of the left renal artery and vein. The abdominal aorta was anteriorly deviated, and the IVC was reached. The caudal segment of the IVC with normal venous flow was clamped. The abdominal aorta was cross-clamped at the same level for hemodynamic stability. A cavotomy was performed starting from the cul-de-sac of the renal vein, and the distal segment of the tumor thrombus was fixed with a prolene suture. The cavotomy was closed, and the clamps were removed. A median sternotomy was done without combining the laparotomic incision, and the diaphragm was protected.
The aorta and right atrium were cannulated with arterial and superior vena cava (SVC) cannulas, respectively. The IVC cannula was inserted from the right femoral vein, placing the tip distal to the renal vein. Snares were placed around the SVC and IVC. Extracorporeal circulation was maintained during cardiac arrest with cardiopulmonary bypass (CPB), and the ascending aorta was cross-clamped. A right atriotomy was performed after squeezing of the SVC snare, and the right atrium, now free of blood, was investigated. The proximal part of the tumor thrombus extending to the right atrium from the IVC was mobilized at the atriocaval junction. The patient’s body temperature was decreased to 20°C, and CPB was stopped. All of the tumor thrombus was everted and extracted by blunt dissection without liver deviation and cavotomy on the IVC body under complete circulatory arrest. The tumor was totally extirpated with gradual blunt dissection towards the cranium, and the tumor was removed from the right atrium with a prolene marker suture. The total duration of arrest was 13 minutes. The femoral vein cannula was again clamped, and CPB was started. Virtual channel identifier (VCI) flow to the right atrium was inspected carefully to ensure good flow. The aortic cross-clamp was then removed. The total cross-clamp time was 23 minutes. Next, the clamp on the femoral vein cannula was removed. Transesophageal echocardiography was performed to ensure that there was no air or thrombus inside the heart chambers. The atrial and caval incisions were closed. Cardiopulmonary bypass was stopped after normal temperature and pressure was maintained. The total CPB duration was 61 minutes. The heparin was then neutralized. The thoracic and abdominal incisions were closed after the bleeding was under control. The patient was extubated six hours after surgery in the cardiovascular intensive care unit (ICU). The mediastinal drains were removed at 48 hours postoperatively with a total of 650 mL drainage. Hemodynamic and renal functions were at normal limits, and the patient was discharged from the ICU on the third postoperative day. Pathological examination of the tumor mass revealed the origin of the tumor to be clear cell renal carcinoma. The patient’s hospital follow-up was uneventful, and he was discharged on the 18th postoperative day. A follow-up visit after one month was normal.

DISCUSSION

Renal cell carcinoma (RCC) constitutes 1-3% of all visceral malignancies and 85-90% of all kidney malignancies. Involvement of the renal vein or IVC...
occurs in approximately 5-10% of RCC patients and represents an adverse prognostic feature that impacts patient outcome.

Renal cell carcinoma with tumor thrombus is classified according to the extension level of the mass in the IVC starting from the infrahepatic renal vein (stage 1) to the right atrium (stage 4). The coexistence of the right atrial thrombus (stage 4) is less than 1%.\textsuperscript{1-3} Complete removal of the malignant renal tissue is the only curative option for the individual patient since medical therapy is not curative.\textsuperscript{4}

In general, the prognosis for patients with metastatic renal tumors is poor. Hatcher et al.\textsuperscript{5} showed a mean five-year survival of 69\% after complete resection. On the other hand, Skinner et al.\textsuperscript{6} found mean one, three, and five year survival rates of 56\%, 34\% and 25\%, respectively. Kaplan et al.\textsuperscript{7} found a 10-year survival rate of 71\% in patients with a tumor thrombus.

Respiratory and heart failure, sepsis, renal failure, bleeding, acute dementia, and pulmonary emboli were the most frequently seen complications after surgery.\textsuperscript{1-8} These factors are also determinants of the mortality and morbidity in the early postoperative period. An abdominal bilateral subcostal incision and thoracotomy are needed, especially in left renal tumors reaching up to the atrium. A combination of thoracic and abdominal surgery is the treatment of choice in cases of tumor thrombus, which leads to altered respiratory functions and infection. Smaller incisions and less invasive techniques may decrease these complications and effect morbidity positively.

For cavoatrial thromboses arising from renal tumors, a sternotomy is usually performed, and a chevron incision (bilateral subcostal) is frequently applied. However, a left "hemi-chevron" (unilateral subcostal) incision with a prolene marker suture and blunt dissection procedure, as in this case, may be suitable for removing the tumor and for caval approach. A limited incision aids in the control of pain and infection while also preserving respiratory functions.

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