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Research Letters

Endovascular Extraction of Caval Tumor Thrombus to Facilitate Minimally Invasive Cyto-reductive Nephrectomy for Metastatic Kidney Cancer

We report the first case of endovascular extraction of inferior vena cava (IVC) tumor thrombus (IVCT) to facilitate

subsequent minimally invasive cyto-reductive nephrectomy (CN) in a patient with metastatic renal cell carcinoma (mRCC) and IVC involvement.

A 60-yr-old man presented with hematuria and weight loss. A computed tomography scan of the abdomen showed an 8-cm right renal mass with level 2 IVCT and innumerable lung nodules, consistent with mRCC. The patient desired a

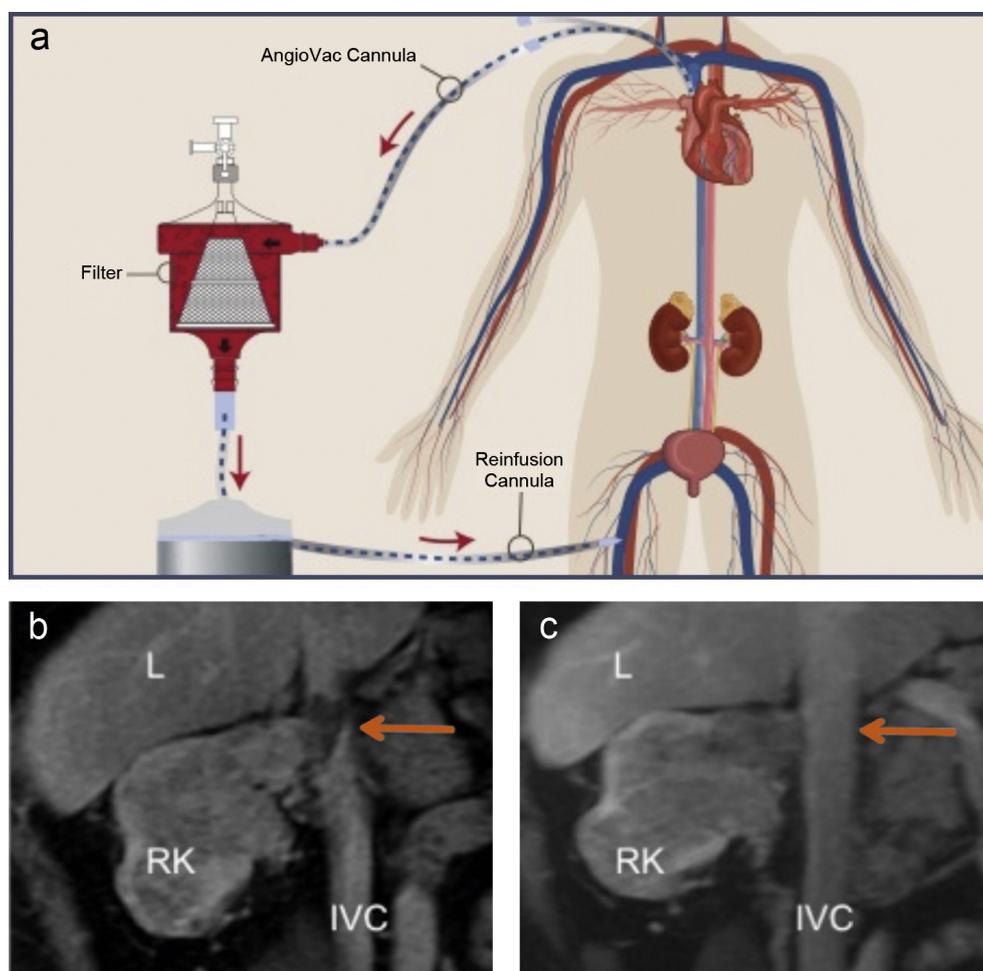


Fig. 1 – (a) Schematic of the AngioVac procedure. Venous access was obtained in the right internal jugular and right common femoral veins using 26-French DrySeal sheaths (Gore Medical, Flagstaff, AZ, USA). A 22-French AngioVac suction cannula was inserted into the right internal jugular vein sheath and positioned in the suprarenal inferior vena cava, above the tumor thrombus. An 18-French reinfusion cannula was inserted through the right common femoral vein sheath to complete a venovenous bypass circuit. A Terumo Bubble Trap (Terumo, Tokyo, Japan) was connected to the cardiopulmonary bypass pump head for filtration of the evacuated tumor thrombus. The AngioVac suction cannula was advanced to extract the inferior vena cava tumor thrombus (IVCT). The patient returned 1 wk later for a simplified minimally invasive cyto-reductive nephrectomy. **(b)** Pretreatment magnetic resonance imaging (MRI) with the arrow showing level 2 IVCT. **(c)** MRI after the AngioVac procedure confirmed removal of IVCT (arrow). IVC = inferior vena cava; L = liver; RK = right kidney.

minimally invasive approach for CN and IVC thrombectomy with early systemic therapy.

One week prior to CN, the patient underwent removal of the IVCT using the AngioVac system (Angiodynamics, Latham, NY, USA), which is a percutaneous endovascular suction thrombectomy device that operates via an extracorporeal venous bypass circuit with filtration of the blood prior to its return to the body (Fig. 1a). The patient was heparinized, and the AngioVac suction cannula was advanced to extract the IVCT. Clearance of IVCT was confirmed with magnetic resonance imaging (Fig. 1b and 1c). The patient had an uneventful recovery and was discharged the following day. Pathologic assessment of the removed IVCT fragments confirmed RCC. The following week, the patient underwent a minimally invasive CN [1]. Operating time was 239 min, estimated blood loss was 260 ml, and the patient had an uneventful discharge on day 2. Final pathology confirmed Fuhrman grade IV clear cell RCC.

Surgery for IVCT has traditionally been via an open approach, but some patients with mRCC and IVCT may not tolerate the morbidity of an open procedure followed by systemic therapy. Approximately 40% of patients presenting with mRCC are managed nonoperatively [2]. Minimally invasive surgery for IVCT has been reported by experienced surgeons [3,4], but the need for IVC reconstruction increases surgical complexity.

Westesson et al reported on 76 patients with mRCC and IVCT who underwent open CN over a 22-yr period at a high-volume tertiary care center [5]. Postoperative complications occurred in 37% of patients; six patients (7.9%) had major postoperative complications that were fatal for five (6.6%). Four patients required emergent pulmonary artery embolectomy, of which one patient died intraoperatively and two patients died of disease progression before receiving systemic therapy.

Our patient presented with RCC plus IVCT and high-volume metastases. Use of the AngioVac facilitated a minimally invasive CN by avoiding the need for resection of the IVCT and IVC reconstruction. Clinical implications of our technique include the potential to offer a simplified minimally invasive CN for patients with mRCC and IVCT who might not otherwise be candidates for surgery.

Limitations of an endovascular approach for IVCT removal include potential for liberation of tumor cells

into systemic circulation and inability of the current AngioVac device to extract larger tumor thrombi. Technical modifications to overcome these limitations would be needed to extend indications for this technique to patients with nonmetastatic disease or more extensive IVCT. Although our technique is applicable to only a small subset of patients with RCC, we feel that it provides a proof of principle of feasibility and a platform for further development.

Conflicts of interest: The authors have nothing to disclose.

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Exceptional Response to Pazopanib in a Patient with Urothelial Carcinoma Harboring *FGFR3* Activating Mutation and Amplification

We report the case of a 67-yr-old woman who presented with intermittent gross hematuria. Cystoscopy showed a sessile bladder tumor, and biopsy demonstrated high-grade papillary urothelial carcinoma. Computed tomography (CT) imaging of the chest, abdomen, and pelvis revealed a 7-cm bladder mass and multiple pulmonary nodules ranging from 0.4 to 2.1 cm. The patient received four cycles of methotrex-

ate, vinblastine, doxorubicin, and cisplatin (MVAC regimen) chemotherapy. Her course was complicated by neutropenic fever, and subsequent imaging showed Response Evaluation Criteria in Solid Tumor–defined progression, with multiple new pulmonary nodules emerging. The patient then received a combination of doxorubicin and ifosfamide, complicated by both neutropenic fever and renal impairment with no documented response. This was followed by sequential therapy with paclitaxel followed by methotrexate, gemcitabine, and cyclophosphamide. Treatment was interrupted to allow the patient to undergo a palliative cystectomy.