

## Inferior Vena Cava Resection and Reconstruction for Tumoral Recurrence after Right Nephrectomy

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### Rezumat

#### **Rezecție și reconstrucție de venă cavă inferioară pentru recidivă tumorală după nefrectomie dreaptă**

Prezentăm cazul unui pacient de 60 de ani care a fost internat pentru o recidivă tumorală după o nefrectomie dreaptă efectuată în urmăcu 2 ani (carcinom renal papilar cu zone de diferențiere sarcomatoidă - pT3a). Examenul CT a arătat o formațiune tumorală cu invazia venei cave inferioare. S-a practicat excizia completă a tumorii în bloc cu porțiunea infrarenală a venei cave inferioare și limfadenectomie. Reconstrucția vasculară s-a efectuat prin interpoziția unei proteze de Dacron de 20 mm. Evoluția postoperatorie a fost complicată de un episod de hemoragie digestivă superioară (ulcer duodenal) rezolvată prin tratament conservator (antisecretoare și hemostatice, inclusiv rFVIIa), dar în cele din urmă favorabilă. La controlul efectuat la 6 luni postoperator pacientul nu prezintă semne de recidivă tumorală iar proteza vasculară este funcțională. Cazul este interesant prin raritatea intervenției chirurgicale și indicația operatorie. Abordul chirurgical al tumorilor retroperitoneale cu invazie vasculară este posibil în centre cu dotare tehnică și expertiză umană corespunzătoare.

**Cuvinte cheie:** vena cavă inferioară, rezecție, reconstrucție, recidivă după nefrectomie

### Abstract

We report a 60 years old patient who was admitted for a local recurrence after a right nephrectomy performed 2 years ago (papillary renal carcinoma with areas of sarcomatoid differentiation - pT3a). CT scan showed a retroperitoneal mass with invasion of the inferior vena cava. We performed a complete en-bloque excision of the tumor with the infrarenal portion of the inferior vena cava and lymphadenectomy. The vascular reconstruction was performed by the interposition of a 20 mm diameter Dacron prosthesis. The postoperative course was complicated due to an episode of digestive bleeding (duodenal ulcer) which stopped after conservative treatment (antisecretory and hemostatics, including rFVIIa), but eventually favourable. At 6 months follow-up the patient presents no sign of tumoral relapse and a functional vascular prosthesis. The case is interesting due to the rarity of the surgical procedure and the indication. The surgical approach of the retroperitoneal tumors with vascular involvement is possible in centers with adequate technical endowment and human expertise.

**Key words:** inferior vena cava, resection, reconstruction, recurrence after nephrectomy

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### Introduction

Advanced malignant lesions require often multivisceral resections in order to achieve a complete removal (1-3). Retroperitoneal tumors with inferior vena cava (IVC)

invasion remain a challenge for modern surgery due to the complexity of the procedure and the need to preserve the venous flow from the inferior part of the body. Despite the lack of clear guidelines, several retrospective studies suggest that in selected cases and experienced centers the resection and reconstruction of the IVC is safe and provides a chance for long-time survival in several retroperitoneal malignancies (4-8).

## Case report

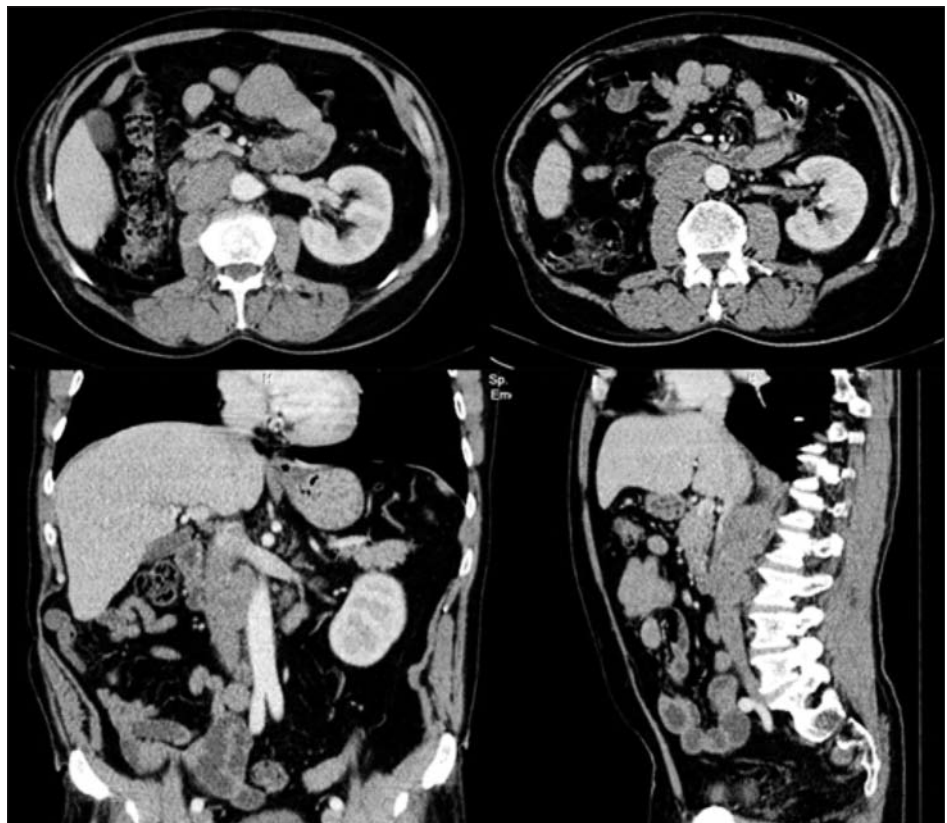
We report a 60 years old patient with a history of prostatectomy (benign hyperplasia) and right radical nephrectomy performed 2 years ago for a type 2 papillary renal carcinoma with areas of sarcomatoid differentiation (pT3a), which was not followed by any oncologic treatment. At two years after the nephrectomy the patient presented lumbar pain and nausea. CT scan showed a large retroperitoneal mass with invasion of the inferior vena cava (Fig. 1). After a multidisciplinary evaluation (general + vascular surgery, urology, oncology, anesthesia/intensive care) we decided to attempt a complete excision of the retroperitoneal mass.

The tumor was approached using an extended right sub-costal laparotomy. After mobilisation of the right colon and a Kocher manoeuvre a retroperitoneal mass surrounding the IVC was identified and exposed. After partial dissection of the tumor at the upper and lower poles we dissected and isolated the IVC above and below the tumor, as well as the left renal vein and the aorta (Fig. 2A); this manoeuvre was

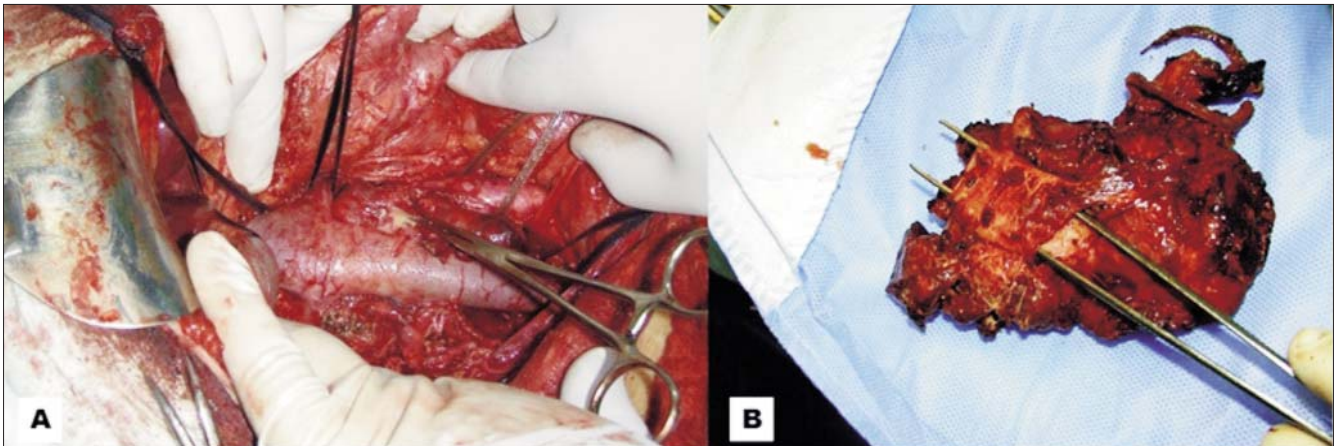
considered mandatory for a safe future dissection (quick hemostasis in the event of a vascular lesion). The right renal artery stump was dissected and excised with lateral suture of the aortic wall. Due to the invasion of the posterior wall of the IVC a circumferential excision of the infrarenal segment was necessary in order to achieve macroscopic negative margins (Fig. 2 B). The venous flow was reconstructed by the interposition of a 20 mm diameter Dacron prosthesis – 2 termino-terminal running suture anastomoses (Fig. 3). The total IVC clamping time was 39 minutes, which included the time required for the posterior mobilisation of the tumor which could be performed only after the sectioning of the IVC). Immediately after the clamping of the IVC the patient presented a drop of the blood pressure to 70 mmHg which was managed by volemic support. In order to reduce the risk of renal failure, the left renal vein was clamped only during the upper graft-to-IVC anastomosis.

The postoperative course was complicated due to an episode of digestive bleeding from a duodenal ulcer which stopped after conservative treatment (antisecretory and hemostatics, including rFVIIa), but eventually favourable. The patient was discharged at two weeks after surgery.

The pathological examination of the specimen confirmed the local recurrence – papillary renal carcinoma with areas of sarcomatoid differentiation. The patient received post-operative treatment with sunitinib malate (sunitinib). At 6 months follow-up the patient presents no signs of tumoral relapse and a functional vascular prosthesis (Fig. 4).



**Figure 1.** Preoperative CT scan (see text for details)



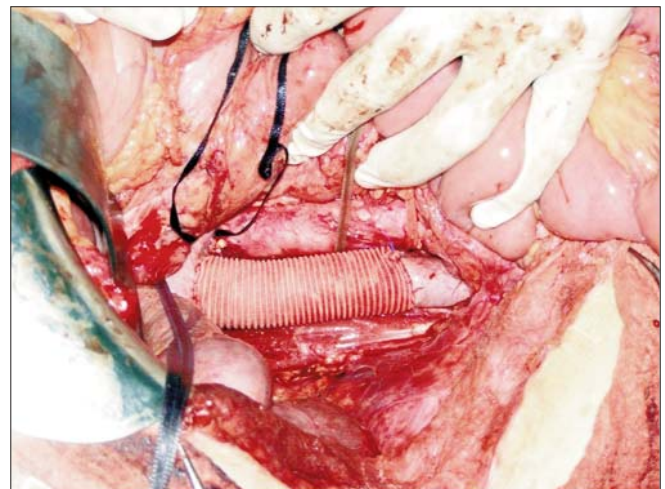
**Figure 2.** (A) – intraoperative image after partial mobilisation of the tumor and dissection of the IVC, left renal vein and aorta. (B) – operative specimen showing the tumor and the resected IVC segment.

## Discussions

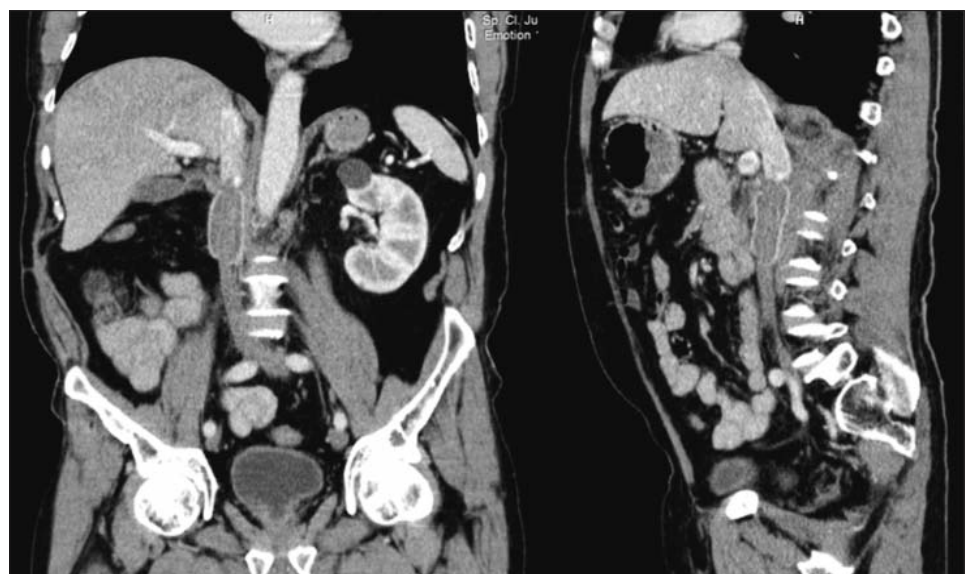
Resection and reconstruction of the IVC is a difficult procedure which is performed rarely and in a small number of centers. In the absence of large series of patients there is no consensus concerning the indications and contraindications, surgical technique and the best material for vascular reconstruction (4, 5, 7, 9).

The main indication is represented by renal cancers with direct invasion or a tumoral thrombus extending in the venous lumen; the need to perform IVC resection may be usually anticipated with the use of modern imaging (10). In selected tumors with a stage T3b or greater achieving an R0 resection may often require an associated IVC resection, which is now considered to have an acceptable peri-operative morbidity and a reasonable oncologic outcome (11, 12).

Liver malignancies are another indication for IVC



**Figure 3.** Reconstruction of the IVC by the interposition of a 20 mm diameter Dacron prosthesis.



**Figure 4.** Postoperative CT scan at 6 months after surgery showing no signs of tumoral recurrence and a functional vascular graft.

resection and reconstruction (associated with liver resection) but are usually much more difficult to perform and require frequently veno-venous by-pass techniques. Acceptable results were reported in small series from high-volume liver surgery units (13-15).

Primary tumors of the IVC are also a rare indication for IVC resection. The most frequent malignant lesion is leiomyosarcoma – a neoplasm arising from the smooth muscle cells of the media; this tumor has an aggressive behaviour with only very few patients being eligible for surgery (16). Complete tumoral excision including IVC resection associated with radio- and/or chemotherapy offers a significant chance for cure (17, 18).

Resection of the IVC has also been reported in case-reports or small series for other retroperitoneal malignancies such as adrenocortical cancers (6), para-aorto-caval nodal involvement in testicular (19, 20) and endometrial cancers (21) or pancreatic head and biliary tract cancers (associated with pancreatico-duodenectomy) (22, 23).

Local recurrence after nephrectomy is a very rare indication for IVC resection (24, 25). In our case, the decision to perform this procedure was a multidisciplinary one and was based on the good biological status of the patient and the very poor prognosis in the absence of an R0 resection.

Reconstruction of the IVC is recommended if there is no complete preoperative obstruction leading to the development of collateral circulation (26). Most authors prefer the use of synthetic grafts (5, 7), although good results were also achieved with biological materials (27). We have used a Dacron prosthesis due to its availability in our hospital.

The surgical approach should be adapted to the particular anatomic conditions of every patient. In our case, we were able to achieve a partial mobilisation from the IVC which allowed the preservation of the left renal vein, thus simplifying the technique by avoiding a supplementary vascular anastomosis. On the other hand, the complete posterior mobilisation of the tumor was possible only after the sectioning of the IVC, which has prolonged the total clamping time.

The long time prognostic after IVC resection and reconstruction for malignancies is a matter of debate in the absence of large series. The available literature shows good patency rates (over 80%) and significant survival rates at 3 and 5 years with a real chance for cure if a complete resection is achieved, while perioperative morbidity and mortality are acceptable in experienced centers (4-7).

## Conclusions

The case is interesting due to the rarity of the surgical procedure and the indication. IVC resection and reconstruction is a feasible procedure which should be taken into consideration in selected patients with retroperitoneal malignancies in order to achieve an R0 resection. In selected cases, it may be safely performed with standard vascular surgery instruments with no need for extracorporeal circulatory support.

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