Acta Marisiensis - Seria Medica 2025;71(4):365-368 DOI: 10.2478/amma-2025-0038

CASE REPORT

Laparoscopic right radical nephrectomy for locally advanced renal tumor: Case report

Rares Florin Vascul[1], Orsolya Martha[1,2*], Raul Gherasim[1], Tibor Reman[1], Oliver Vida[1,2], Daniel Porav-Hodade[1,2], Calin Chibelean[1,2], Veronica Maria Ghirca[1,2], Ciprian Todea-Moga[1,2]

1. Mureș County Clinical Hospital, Clinic of Urology, Târgu Mureș, Romania
2. Department of Urology, George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Targu Mures, Romania

Renal cell carcinoma (RCC) represents the most common solid malignancy of the kidney, comprising a broad spectrum of histopathological entities. Advances in diagnostic imaging, histopathological classification, and minimally invasive surgical techniques have improved early detection and treatment options. However, renal cell carcinoma with sarcomatoid dedifferentiation remains a challenge due to its aggressive nature and resistance to systemic therapies. We report the case management of a 69-year-old male with a history of significant comorbidities diagnosed with an advanced right renal cell carcinoma cT3aN1M0 who underwent a laparoscopic radical nephrectomy (LRN) and lymph node dissection with minimal blood loss in 110 minutes of surgery. The patient's postoperative recovery went well, with no significant complications. Histopathological results revealed a renal carcinoma with sarcomatoid and rhabdoid dedifferentiation staged as pT3aN1, with metastases identified in two out of four retrocaval lymph nodes. This case underscores the feasibility of minimally invasive surgery in advanced renal cancer and the prognostic implications of aggressive histological subtypes.

Keywords: laparoscopy, nephrectomy, large renal tumor

Received 26 July 2025 / Accepted 12 august 2025

Introduction

Renal cell carcinoma (RCC) represents the most common solid malignancy of the kidney, accounting for approximately 3% of all cancers worldwide, predominantly affecting older adults especially for females. The highest incidence rates are found in Western countries, influenced by increased imaging detection of small renal masses. Several risk factors have been identified, such as obesity, smoking, blood hypertension, diabetes, and genetic predispositions [1]. Clear cell renal cell carcinoma (ccRCC) is the most prevalent among its histological subtypes, comprising about 75% of cases. Variant subtypes include papillary, chromophobe, and others, with sarcomatoid and rhabdoid dedifferentiation representing distinct, aggressive features that may occur across these subtypes. While not classified as separate histologic subtypes, both sarcomatoid and rhabdoid dedifferentiation are associated with poor prognosis and are universally considered grade 4 under the WHO/ISUP tumor grading system due to their aggressive features. Sarcomatoid dedifferentiation is observed in approximately 5% of RCC cases, frequently within ccRCC, and involves spindle cells resembling sarcoma. Rhabdoid dedifferentiation, less well-studied, is characterized by cells resembling rhabdomyoblasts and is similarly associated with advanced disease and poor outcomes. The treatment landscape for RCC has been transformed by immune checkpoint therapy, with sarcomatoid RCC showing remarkable responses to combination regimes. However, less is understood about systemic therapies for rhabdoid dedifferentiation, and more investigations are needed in the future [2]. This study explores the clinical course, prognosis, and therapeutic outcomes in patients with RCC exhibiting sarcomatoid or rhabdoid features, focusing on the role of laparoscopic surgery as a management option for these aggressive tumors. Further investigation is essential to optimize treatment strategies for these aggressive and biologically distinct forms of RCC.

Case presentation

Patient information

The patient is a 69-year-old male with a history of type 2 diabetes mellitus who, despite being treated with oral hypoglycemic agents, developed a diabetic foot, which was recently surgically treated - amputation of the second and fifth right toes, arterial hypertension, mitral and tricuspid valve insufficiency maintaining appropriate blood pressures, without urological history. During a recent examination, Doppler ultrasound revealed a massive right renal mass with distorted renal parenchyma. The patient complained of slight flank pain without gross hematuria, and the physical examination revealed a palpable flank tumor mass. Enhanced CT confirmed the presence of a large right renal tumor of 108/108/142 mm (LL/AP/CC) and superior caliceal invasion with high suspicion of malignancy (Figure 1). Local adenopathy of 6-13mm was also described, and there was suspicion of renal vein thrombosis with no definitive evidence of distant metastasis. Magnetic resonance imaging provided additional information on venous involvement without inferior vena cava (IVC) occlusion on T2-weighted images. Serum creatinine level

* Correspondence to: Orsolya Martha
E-mail: orsolya.martha@umfst.ro

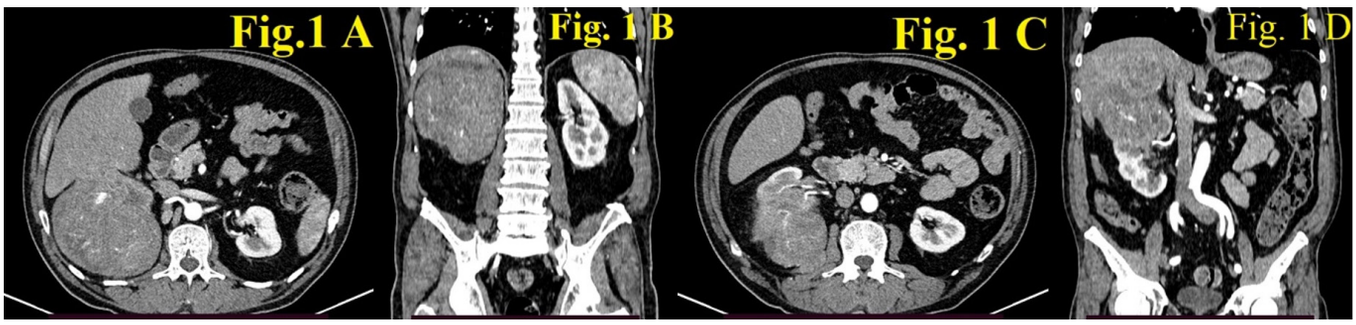

Fig. 1. CT of patient's right kidney tumor: A. Axial view; B. Coronal view; C. Axial view; D. Coronal view

was 1.18mg/dL and an eGFR of 62mL/min/1.73m². The final diagnosis was a right renal tumor clinically staged as cT3aN1M0.

Therapeutic interventions

The surgical treatment plan was discussed with the patient, and potential surgical complications were explained. The patient acknowledged understanding and agreed the surgical consent form. Following adequate anesthesia, a Foley catheter is inserted, and the patient is placed in the left lateral position. He is well secured and padded to the surgical table as tilting might be necessary during the procedure, and the surgical bed is modified to the "kidney position". The pneumoperitoneum was achieved through Hasson's open technique, which involved placing one 10mm trocar supraumbilical on the right paramedial line for the camera. Next, under visual control, two more incisions were made above the iliac crest at the mid-axillary line and in the mid-clavicular line below the ribs at Palmer's Point for two more trocars of 5mm and 10mm. The pneumoperitoneum was set up in the CO2 at a gas pressure of 12mmHg and a gas flow rate of 20L/min. We began to mobilize the colon by reflecting it medially with the vessel sealing system Ligasure® (Figure 2), and we placed another trocar of 5mm to retract the liver at Lee Huang Point. The right ureter was identified and dissected towards the lower pole of the kidney (Figure 3). The case was tough and challenging due to the large size of the kidney tumor and extensive adhesions. We reached the hilum and exposed it, dissecting and sealing it with Hem-o-lock clips and transecting each vascular structure separately (Figure 4), clinically observing the absence of renal vein thrombosis. Here we encoutered another difficult part of the surgery while trying to achieve an aggressive surgical resection also by dissecting the vascular pedicle with soft and high precision movements in a narrow laparoscopic operative field due to the large size of the kidney tumor. Before completing the kidney's dissection, we sealed and transected the ureter. We identified enlarged lymph nodes, predominantly located in a difficult area such as retrocaval position. We proceeded carefully with a lymph node dissection (Figure 5). Surgical specimens were then extracted through a right Rutherford-Morrison incision with an endo bag, and one drainage tube was placed. The patient's surgical treatment went according to plan, with an operating time of 110 minutes, blood loss of approximately 90ml. There were no complications following the procedure. On the first postoperative day, active mobilization began and he resumed the bowel movement. We removed the drainage system on the third postoperative day. The final pathological result was renal cell carcinoma with sarcomatoid and rhabdoid differentiation pT3aN1R0 (it infiltrated the perirenal adipose tissue and renal pelvis, producing micro emboli in vascular structures with muscular walls within the hi-

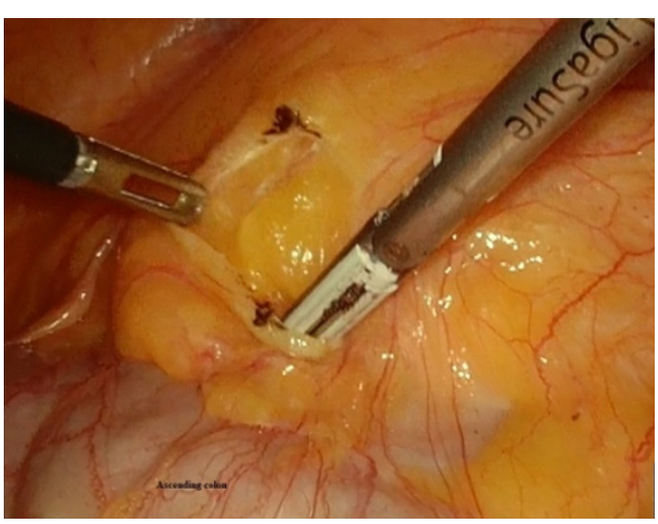

Fig. 2. Colon mobilisation

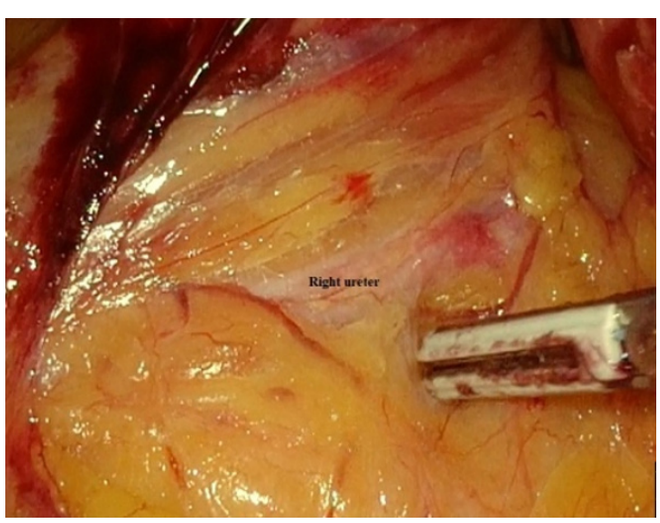

Fig. 3. Ureter identification

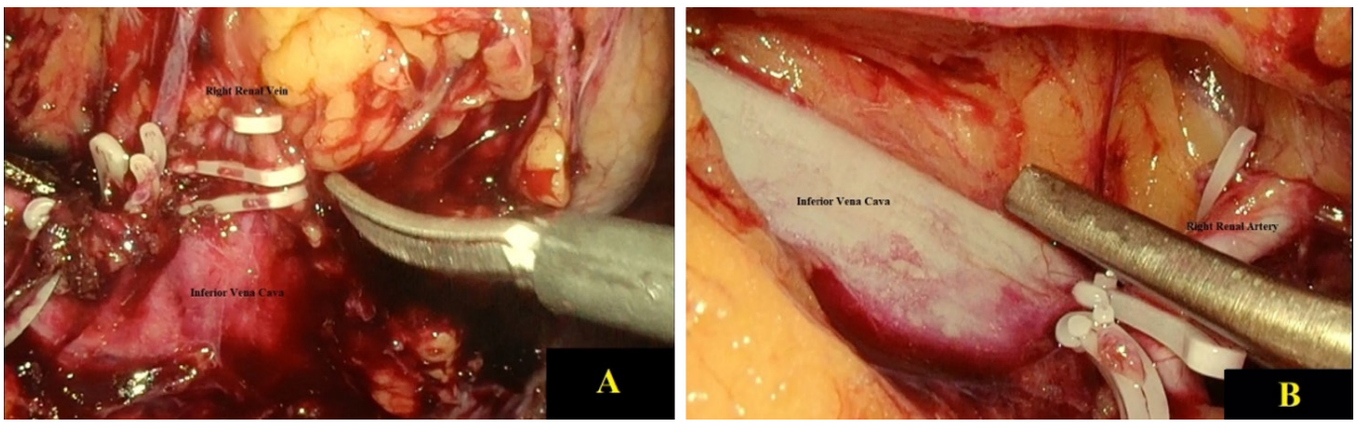

Fig. 4. A. Renal Vein sealling and transection; B. Renal Vein sealling and transection

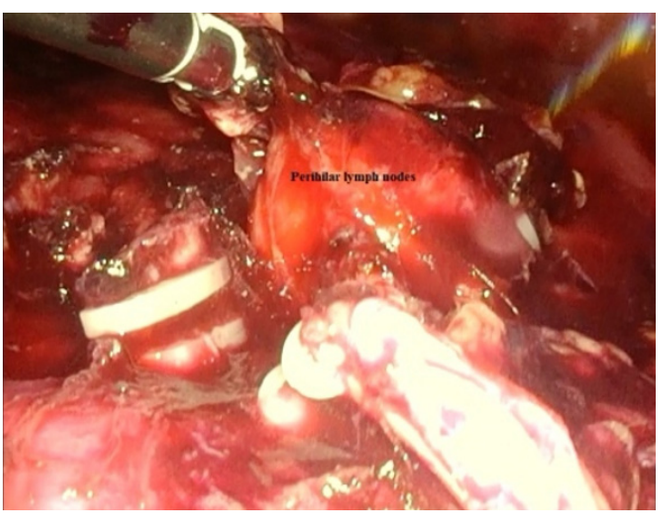

Fig. 5. Lymph node dissection

lum and renal vein) and tumor metastases identified in two out of four dissected retrocaval lymph nodes. According to the International Society of Urological Pathology (ISUP) grading system, the tumor was classified as Grade 4. The multidisciplinary committee, comprising urologists, oncologists, and pathologists, decided to refer the patient for further evaluation and specialized treatment (immunotherapy was considered in light of the aggressive tumor histology).

Ethical statement

The patient was fully informed about the nature and the purpose of this case report and voluntarily provided both written and oral consent for the anonymized use and presentation of his clinical information.

Discussions

Our case highlights the challenges associated with the surgical management of large renal tumors, particularly those with aggressive histological features and complex anatomical features. Several key aspects of our case should be brought to light, including renal tumor diagnosis, the role of cytoreductive nephrectomy, the feasibility and safety of LRN for large tumors, and oncological outcomes.

Diagnosis and Staging Considerations

Accurate preoperative evaluation is crucial in determining the optimal therapeutic approach for renal tumors. According to Pierre Bigot et al. [3] contrast-enhanced thoraco-abdominal CT remains the gold standard for staging kidney cancer, while PET scans are not routinely recommended. Additionally, percutaneous biopsy is advised when its results would significantly influence management decisions. Although with large tumors biopsy, you encounter some challenges such as sampling issues due to heterogeneity in large tumors, a biopsy may miss key areas like sarcomatoid features due to necrosis, hemorrhage, risking false negatives. Also, understaging tumor results may occur requiring precise, often multiple samples [4]. In our case, while the biopsy was considered, the imaging characteristics strongly suggested the tumor stage, and we decided that a histopathological examination of the entire surgical specimen would ensure tumor staging.

Role of Cytoreductive Nephrectomy in Advanced and Aggressive Tumors

For patients with metastatic renal cell carcinoma (mRCC), particularly those with sarcomatoid or rhabdoid dedifferentiation, the role of cytoreductive nephrectomy (CN) remains controversial. Pierre Bigot et al. [3] emphasized that while immunotherapy (ICT) has improved outcomes in these aggressive subtypes, CN did not significantly enhance survival or prolong the duration of systemic therapy. However, some patients may still benefit, highlighting the need for better stratification tools. Lymph node dissection (LND) is not routinely performed during RN [5]. According to Aakbar N. Ashrafi et al. [5], there is potential oncologic benefit in selected high-risk patients with radiologic or intraoperative nodal enlargement (cN1M0), bulky tumors (>10cm in size), advanced pathological stage or sarcomatoid features. Additionally, LND brings potential benefits in accurate staging and prognosis. Minimally invasive approaches allow LND with low morbidity rates. In our case, the tumor exhibited locally advanced features. Still, nephrectomy was pursued, given the potential symptomatic relief, aiming

for specific tumor staging and the possibility of systemic therapy following surgery.

Feasibility and Challenges of LRN for Large Tumors

As the literature describes, minimally invasive approaches, including LRN, have been increasingly adopted for managing renal tumors. Xinwen Nian et al. [6] showed that LRN could be a safe procedure with less blood loss than open radical nephrectomy for renal tumors greater than 10cm with comparable surgical and oncological outcomes while being performed by experienced surgeons. Grégory Verhoest et al. [7] demonstrated that LRN is a safe and viable option, even for tumors >10 cm, if the surgeon has adequate expertise. However, large tumor size is associated with technical challenges, including limited working space, difficult pedicle dissection, and an increased risk of hemorrhage due to neovascularization. In our case, the tumor's size and extensive adhesions complicated the dissection, requiring meticulous surgical techniques to reach the renal hilum. Despite these difficulties, the literature supports LRN as a feasible approach with comparable outcomes to open surgery.

Oncological Outcomes and Follow-Up Considerations

The oncological safety of LRN for large tumors remains a topic of interest. Grégory Verhoest et al. [7] reported that LRN recurrence rates and progression-free survival are comparable to those seen in open radical nephrectomy. Importantly, positive surgical margins did not significantly increase the recurrence risk, reinforcing the laparoscopic approach's oncological efficacy. However, high-grade tumors, lymph node involvement, and metastatic disease at presentation remain significant risk factors for disease progression. Laparoscopic cytoreductive nephrectomy (CN) in selected patients with sarcomatoid renal cell carcinoma (sRCC) may enhance the efficacy of subsequent systemic therapy, achieving durable clinical responses and prolonged overall survival exceeding expectations for this aggressive tumor subtype [8]. However, this multimodal strategy has some key challenges, such as careful patient selection, immunotherapy timing, surgical considerations, biomarker limitations, and lack of prospective data due to the rarity of this histologic subtype; collaborative multi-institutional research is crucial to clarify the effectiveness [8] further. In our case, postoperative, the patient was referred for further systemic treatment such as immune checkpoint inhibitor therapy with Programmed Cell Death Protein 1 (PD 1) inhibitors in line with the recommendations from the multidisciplinary tumor board.

Conclusions

Our case underscores the complexities of managing large renal tumors, particularly those with aggressive histological features. While LRN is a viable and safe approach, meticulous surgical planning and expertise are essential due to the increased technical difficulties. The role of cytoreductive nephrectomy in advanced disease remains debated, but certain patients may benefit from a multimodal treatment approach. Continued research and improved patient stratification methods are needed to optimize outcomes for these challenging cases.

Authors' contribution

VRF (Conceptualization; Project administration; Resources; Visualization; Writing-original draft)
MO (Conceptualization; Methodology; Project administration; Resources)
GR (Data curation; Resources; Software)
TR (Data curation; Resources; Visualization)
VO (Investigation; Validation; Visualization)
PHD (Formal analysis; Resources; Software; Supervision)
CC (Formal analysis; Supervision; Visualization)
GMV (Data curation; Investigation; Resources; Supervision)
TMC (Conceptualization; Data curation; Methodology; Project administration; Resources; Writing-review & editing)

Conflict of interest

None to declare.

Funding

No external funding was received.

References

1. Renal Cell Carcinoma EAU Guidelines. Edn. presented at the EAU Congress, Madrid 2025, ISBN 978-94-92671-29-5 EAU Guidelines Office, Arnhem, The Netherlands, 8-16.
2. Andrew W. H, Justin L, Giannicola G et. al. The significance of sarcomatoid and rhabdoid dedifferentiation in renal cell carcinoma, Cancer Treat Res, 2022; 33:1-5.
3. Pierre B, Romain B, Zine-Eddine K et. al. French AFU Cancer Committee Guidelines – Update 2024–2026: Management of kidney cancer, The French Journal of Urology, 2024; 34:2-5.
4. Eduard R, Umberto C, Alexander K et. al. Novel Imaging Methods for Renal Mass Characterization: A Collaborative Review, Eur Urol, 2022; 81(5):476-488.
5. Ashrafi AN, Gill IS. Minimally invasive radical nephrectomy: a contemporary review. Transl Androl Urol 2020;9(6):3112-3122.
6. Nian X, Ye H, Zhang W et. al. Propensity-matched pair analysis of safety and efficacy between laparoscopic and open radical nephrectomy for the treatment of large renal masses (>10 cm): a retrospective cohort study. Transl Androl Urol 2022;11(8):1148-1156.
7. Grégory V, Jean-Philippe C, Emmanuel O et. al. Safety and Feasibility of Laparoscopic Nephrectomy for Big Tumors (≥ 10 cm): A Retrospective Multicentric Study, Clinical Genitourinary Cancer, 2014;14(4):e335-e340
8. Studentova, H, Rusarova, N, Ondruskova, A et. al. The Role of Cytoreductive Nephrectomy in Renal Cell Carcinoma with Sarcomatoid Histology: A Case Series and Review of the Literature, Curr Oncol, 2022; 29:5475-5488.