Laparoscopic Approach for Left Renal Tumour with Renal Vein Thrombus: Case Report and Review of Literature

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ABSTRACT

Introduction. Renal vein thrombus occurs in 4–10% of RCC cases and presents significant surgical challenges. While open radical nephrectomy with thrombectomy remains the traditional approach, it is associated with high morbidity. Minimally invasive techniques, such as laparoscopic radical nephrectomy (LRN), offer benefits like reduced blood loss, shorter recovery, and lower morbidity but are technically demanding. The aim of this study was to present a case of large renal tumour with renal vein thrombus managed through transperitoneal laparoscopic approach.

Materials and Methods. A 75-year-old male presented with left-sided lumbar pain and intermittent hematuria. Sectional imaging revealed a large left renal tumor (85 × 60 × 60 mm) with a level 0 thrombus in the renal vein (cT3aN0M0) and no metastasis. The patient underwent a laparoscopic transperitoneal radical nephrectomy with thrombectomy after adequate preoperative planning, including imaging review and anesthesia assessment.

Results. The procedure was completed in laparoscopic manner without complications. The operative time was 140 minutes, the blood losses were 200 mL. The postoperative evolution was uneventful. The lumbar drain and urinary catheter were removed in postoperative day 2. The patient was mobilized early, resumed a normal diet by day two, and was discharged on day four. Pathology confirmed clear cell RCC (pT3aL0V0G3) with negative surgical margins.

Conclusion. Laparoscopic approach in the surgery of the RCC with renal vein thrombus represents a promising alternative to traditional open surgery in our department, offering benefits such as reduced perioperative morbidity, shorter hospital stays, and faster recovery.

KEYWORDS: renal tumors, thrombus, radical nephrectomy, transperitoneal laparoscopy, renal cell carcinoma.

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INTRODUCTION AND OBJECTIVES

Renal tumours with thrombus extension into the renal vein present a significant clinical challenge, occurring in approximately 4–10% of renal cell carcinoma (RCC) cases [1,2].

To date, surgery remains the only potential curative option for locally advanced disease. Traditionally, the standard treatment for RCC with venous thrombus has been open radical nephrectomy with thrombectomy, which is associated with important perioperative morbidity [3].

The advancements and expertise in minimally invasive techniques have enabled laparoscopic and robotic-assisted approaches to gain popularity in complex cases. Laparoscopic radical nephrectomy (LRN) offers several advantages over open surgery, including reduced blood loss, shorter hospital stays, and faster recovery times. Despite these benefits, laparoscopic management of RCC with renal vein thrombus remains a challenging endeavor due to the complexity of vascular control and the risk of thrombus embolization. Recent studies have demonstrated the feasibility and safety of laparoscopic approaches in selected cases and in experienced hands, highlighting the importance of adequate surgical planning and techniques [4].

The objective of this study was to present a case of large renal tumour with renal vein thrombus managed through transperitoneal laparoscopic approach.

MATERIALS AND METHODS

We report the case of a 75-year-old male diagnosed in an outpatient setting with a large inhomogeneous, enhancing left renal tumour, located in the lower pole, measuring approximately 85/60/60 mm on native Computed Tomography (CT). The tumor was associated with a tumour venous thrombus extending in the left renal vein up to the level where it crosses the aorta, without evidence of lymph node or distant metastasis (cT3aN0M0). The Magnetic Resonance Imaging (MRI) of abdomen confirmed the level 0 of the tumour thrombus (Figure 1 A-D).
The patient initially presented to a urologist with left-sided lumbar pain and intermittent hematuria. Of the past medical history of the patient, we highlight grade 2 arterial hypertension, type 2 non-insulin-dependent diabetes mellitus, and asthma.

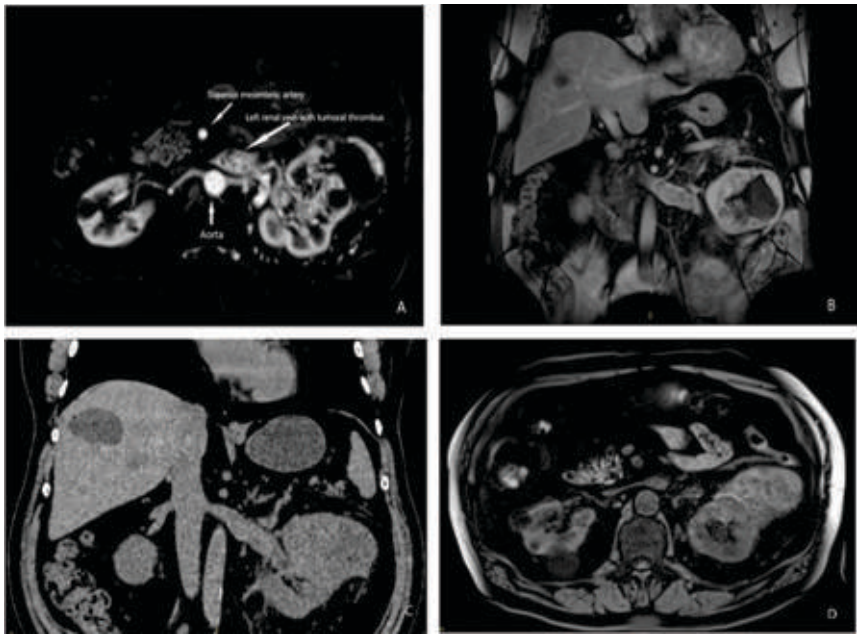


Figure 1. A - Axial MRI sequence (T1 FS AX DYN). B – Coronal MRI sequence showing the renal tumour and the level 0 of the thrombus (T1 FS COR). C – Coronal native CT reconstruction. D – Axial MRI sequence without contrast

After a detailed anesthesia consultation, imaging reevaluation, and obtaining informed consent, we decided to perform left radical nephrectomy with thrombectomy by laparoscopic transperitoneal approach). Mechanical prophylaxis of the venous thromboembolism and adequate antibioprophylaxis were applied. After orotracheal intubation, the patient was positioned in right lateral decubitus position with the operative table slightly flexed above iliac crest to increase the area between the ribs and iliac crest. All the pressure points were adequately padded.

Surgical Procedure

The Hasson technique was used to insert a camera trocar at the lateral border of the rectus, two fingerbreadths cranial to the level of umbilicus. Carbon dioxide was insufflated to create a pneumoperitoneum, and working trocars were inserted under direct visual control the trocar for the left-hand instrument (10 mm) on the perpendicular line from the umbilicus to the costal margin, 2 cm below the costal margin and the trocar for the right-hand instrument on the line between the umbilicus and the right antero-superior iliac spine. Additional trocar was placed in the left flank for assistant to provide suction and adequate tension on the renal pedicle.

The descending colon was medially reflected, by incising the peritoneum along the line of Toldt. Then, the left ureter and left spermatic vein were identified at the level of the lower pole of the kidney. The dissection proceeded proximally along these elements up to the dilated left renal vein, revealing the tumor thrombus extending up to the medial border of the aorta. Extensive medial isolation of renal pedicle elements was needed. The dissection was extended cranial to the renal pedicle. The adrenal vein and gonadal vein were isolated and clipped. After identification and isolation of renal artery, a Hem-o-lock clip was applied, which induced a slightly retraction of the thrombus into the renal vein. This allowed us to supplementary milk the thrombus and put Hem-o-lock clips on left renal vein near its confluence with the inferior vena cava. After transection of left renal vein, additional clips were placed on the renal artery to allow its safe sectioning. The left ureter was clipped, and transected. The kidney was carefully dissected off the surrounding structures, allowing for specimen extraction in an organ retrieval bag by extending the right-hand port incision toward the axillary line. Final steps included thorough inspection of the renal bed and pedicle, meticulous hemostasis, insertion of a drain in the renal bed.

RESULTS

The procedure was completed in laparoscopic manner without complications. The operative time was 140 minutes, the blood losses were 200 mL. The postoperative evolution was uneventful. Low molecular weight heparin (enoxaparin) was administered for venous thromboembolism prophylaxis, alongside symptomatic medications as needed and a three-day antibiotic regimen. Early mobilization and liquid diet began on the first postoperative day. The intestinal activity and full diet resumed in postoperative day two. The urinary catheter and lumbar drain were removed in the postoperative day 2. The patient was discharged in the postoperative day 4. The values of the hemoglobin and serum creatinine were stable.

Discharge medications included prophylactic low molecular weight heparin for additional 14 days, and mild analgesics (taken when needed). Serum creatinine levels presented a mild increasing, while the hemoglobin values were stable.

The pathological result revealed clear cell renal cell carcinoma, perirenal fat extension, and tumor thrombus in the left renal vein, classified as pT3aL0V0 G3. The surgical margins were negative.

DISCUSSIONS

This case report aimed to contribute to the growing body of evidence on the feasibility, safety, and outcomes of laparoscopic radical nephrectomy with level 0 thrombectomy. By presenting the detailed procedure of laparoscopic resection of large renal tumour with tumour thrombus in renal vein, we highlighted the technical considerations, potential advantages, and limitations of this

approach. Additionally, a narrative review of the literature is provided to contextualize our findings and assess the evolving role of minimally invasive surgery in the management of locally-advanced renal malignancies.

The feasibility of performing radical nephrectomy with thrombectomy via a laparoscopic approach was supported by favorable factors, including the anatomy of the renal pedicle, the tumor's location, the absence of significant comorbidities, and no history of prior abdominal surgeries. The decision to use a transperitoneal technique was guided by the surgeon's expertise and familiarity with this method. Proper preoperative preparation played a crucial role, encompassing the selection of the most appropriate surgical approach, the arrangement of blood units, and ensuring the availability of open and vascular surgery instruments to mitigate the inherent risk of hemorrhage during the procedure.

Recent literature highlights a significant increase in the use of minimally invasive techniques for managing renal cell carcinoma (RCC) with tumour thrombus levels 0, I, II, and occasionally III. Traditionally, the elective approach for such cases was open surgery. However, advancements in surgical techniques and technology have expanded the role of minimally invasive options [4,5,6].

A study conducted by Hospital Italiano de Buenos Aires demonstrated the adoption of a pure laparoscopic approach for RCC with thrombus involvement. Their data revealed that laparoscopic surgery was performed in 40% of cases with thrombus level 0, 23% with level I, 5% with level II, 26% with level III, and 0% for level IV.[5]
All these procedures were carried out using a transperitoneal approach, ensuring adequate access and visualization. Importantly, a rigorous preoperative evaluation was a prerequisite to determine the feasibility and safety of using minimally invasive techniques, emphasizing patient selection as a critical factor for success. [5,7]

This trend reflects a shift in surgical practice, driven by the potential benefits of laparoscopy, such as reduced postoperative pain, shorter recovery times, and improved cosmetic outcomes, compared to traditional open surgery. [5,7]

The thorough evaluation of imaging, confirmation of the diagnosis of a level 0 tumor thrombus (limited to the renal vein), absence of a history of abdominal surgeries, and the surgeon's expertise in transperitoneal laparoscopy made the laparoscopic approach a feasible first-line option for surgical treatment in our case.

We used several maneuvers cited in literature to be helpful in reducing the level of thrombus. First, early control of the renal artery ensures kidney emptying and prevents further thrombus propagation. Second, the additional lateral port, introduced to aid in lateral kidney traction, also facilitate thrombus retraction. Then, the thrombus was milked towards kidney and the renal vein was clipped with XL size Hem-o-Lok clips close to its junction with IVC [8,9].

Minimally invasive surgery in localized RCC is well known to be associated with improved perioperative outcomes while preserving oncologic results. There is increasing evidence that in appropriately selected cases of locally advanced RCC, this type of approach can offer comparable outcomes to open surgery, with the added benefit of reduced morbidity and a shorter recovery period [10,11,12].

The use of elastic stockings and prophylactic administration of low-molecular-weight heparin during hospitalization and at home effectively prevented thromboembolic complications. No thromboembolic events were observed following the laparoscopic radical nephrectomy, either during hospitalization or subsequent follow-ups. Renal cell carcinoma with tumor thrombus has been documented to be associated with venous thromboembolism development. However, the use of anticoagulation in these patients remains controversial in clinical practice. It is unclear whether anticoagulation improves survival outcomes. Additionally, if anticoagulation is initiated, there is limited evidence to determine whether direct oral anticoagulants, heparin, or warfarin is the most beneficial option. [13]

Our experience in laparoscopic surgery of the renal tumours

The first choice in the treatment for most of the renal tumours in our department moved towards laparoscopic approach. Between October 2022 and December 2024, 248 patients underwent radical or cytoreductive nephrectomy, 134 of them by laparoscopic approach and 114 open nephrectomies. Forty-four patients underwent partial nephrectomy, 33 laparoscopic and 10 open procedures. The three cases with level 0 tumour thrombus underwent laparoscopic radical nephrectomy, while those with level I-IV (four cases) were approached in open manner.

Open approach was considered in renal tumours staged as T3b-T4 and/or N1, or when the patient was not sufficiently fit to tolerate a prolonged laparoscopic procedure (severe uncorrected cardiopulmonary and metabolic comorbidities).

CONCLUSIONS

Laparoscopic approach in the surgery of the RCC with renal vein thrombus represents a promising alternative to traditional open surgery in our department, offering benefits such as reduced perioperative morbidity, shorter hospital stays, and faster recovery. Our case report, along with the review of existing literature, underscores the feasibility and safety of this approach in carefully selected patients, without compromising the oncological outcomes.

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