CASE REPORT
Urooncology

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Open Approaches to Radical Nephrectomies: A Case Report of Bilateral T3b Renal Cell Carcinoma

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Abstract

A case report describing the surgical challenges of an open approach bilateral T3b renal cell carcinoma with bilateral renal vein involvement. This is the second reported case of bilateral renal cell carcinoma with extension into bilateral renal veins and inferior vena cava. This case highlights how good outcomes can be achieved with open surgical approach.

Keywords: Nephrectomy, renal cell carcinoma, renal vein thrombus

Introduction

A 67-year-old male presented to the emergency department with a two-day history of hematuria and dysuria. Both kidneys were ballotable on examination. His past medical history included hypertension, and he was an ex-smoker. The patient's older brother had prior treatment for bilateral renal cell carcinoma (RCC).

Investigations revealed a mildly elevated white cell count of $11.1*10^9$ cells/L, C-reactive protein of 22 mg/L, and decreased renal function with a serum creatinine of 138 mg/dL. Computed tomography (CT) of the chest, abdomen, and pelvis demonstrated a 53 mm right-sided interpolar mass and a 121 mm left-sided multilobulated mass replacing most of the renal parenchyma (Figure 1). Additionally, CT showed enhancing tumor thrombus extending into both the left and right renal veins, extending into the inferior vena cava to the level of hepatic vein insertion (Figure 2). No evidence of metastatic disease was identified on CT.

CT - guided left renal biopsy confirmed clear cell RCC. Multidisciplinary consensus was to proceed with bilateral radical nephrectomy (RN), and the patient was prepared for postoperative dialysis via a central venous catheter.

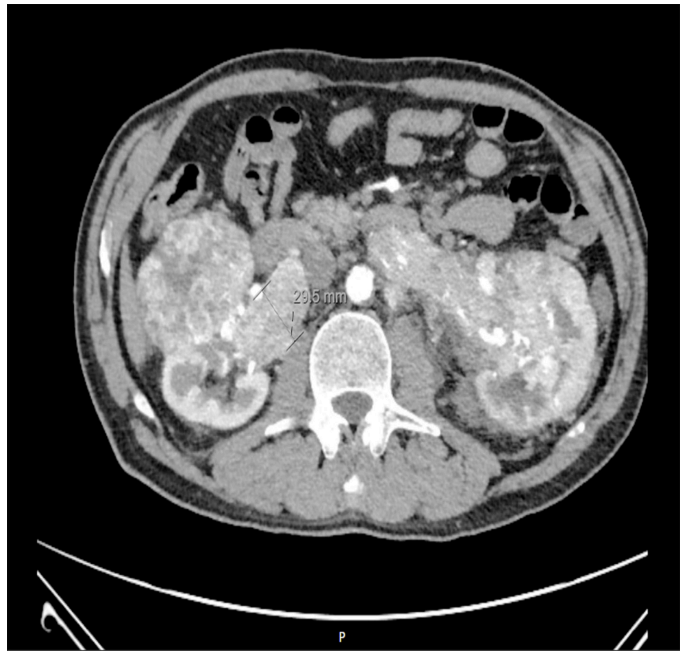

Figure 1. Axial cross-section from CT imaging demonstrated large bilateral renal masses and renal vein tumour thrombus extending from right renal mass

CT: Computed tomography

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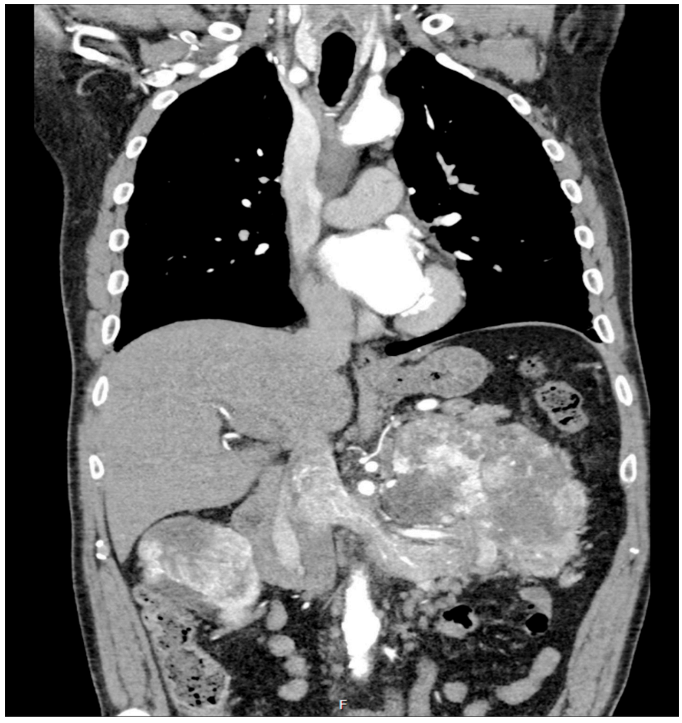

Figure 2. Coronal cross-section from arterial phase CT demonstrating renal vein and inferior vena cava tumour thrombus from left renal mass

CT: Computed tomography

Case Presentation

Due to extensive tumor burden, an open surgical approach was undertaken with upper midline laparotomy. Intraoperatively, a large left upper pole tumor with profound neovascularisation and adherence to the splenic capsule was identified and concurrent splenectomy was performed. Level 2 caval thrombus was identified with the bilateral renal vein involvement. Proximal and distal control of the inferior vena cava (IVC) was obtained, and the proximal tumor thrombus was identified and milked inferiorly, followed by cavotomy and extraction of the tumor thrombus. A small portion of the caval wall was resected to ensure the complete removal of the tumor thrombus. The vascular surgical team then performed caval reconstruction using bovine pericardium graft. A limited retroperitoneal lymph node dissection of the paracaval, interaortocaval, and paraaortic chains was performed at the level of the renal hilum. Postoperatively, he was instituted on hemodialysis, made an uneventful recovery, and was discharged home on day nine. He has been referred to the familial cancer unit because of his family history of bilateral clear cell RCC.

Pathological examination of the left and right renal tumors demonstrated International Society of Urological Pathology grade 3 and grade 2 clear cell RCC, respectively, with no involved lymph nodes and clear surgical margins (American Joint Committee on Cancer 8th edition staging pT3bpN0 bilateral clear cell RCC).

Discussion

Here we present a unique case of bilateral RCC with bilateral renal vein and inferior vena cava tumor thrombus (1). Renal cancer accounts for 2.9% of all new cancer diagnoses in Australia, making it the 7th most diagnosed cancer in 2021 (2). Bilateral RCC occurs in less than 5% of all RCC cases, with most cases having a genetic etiology such as Von-Hippel Lindau syndrome (3).

Although genetic etiology accounts for 3-5% of RCC presentations and is associated with a higher degree of locally advanced disease, there is no statistical analysis of incidence of venous involvement in genetic syndromes (4). However, the rate of IVC thrombus involvement in RCC cases is estimated to be between 5-20% of RCC diagnosed each year (5).

To our knowledge, there has been only one other reported case of bilateral RCC with extension into bilateral renal veins and the IVC (5). It was postulated that the reported case was a nongenetic instance of bilateral RCC, in contrast to our case (5). Nephron-sparing surgery is often preferred in genetic RCC syndromes because the tumors are often bilateral, multifocal, and recurrent (6). While there is some evidence that in stage 3 tumours, nephron-sparing surgery can have similar outcomes to RN (6), in our case, multidisciplinary consensus deemed this inappropriate as remaining renal function was estimated not to be sufficient to avoid haemodialysis. Nephron-sparing surgery may also decrease the five-year life expectancy of patients due to a risk of incomplete tumour resection in previous cases of T3a tumours (7).

As robotic and laparoscopic approaches continue to become more commonplace in RN (8), this case demonstrates the role of open RN techniques when complete oncological clearance is required in cases of extensive RCC. Although there may be perioperative advantages with minimally invasive techniques, such as reduced blood loss, shorter convalescence, and a shorter hospital length of stay (8), there is yet to be definitive evidence of improvements in oncological outcomes (8). Additionally, due to the higher hospital cost combined with limited access to robotic techniques in many healthcare systems, an open approach still remains a relevant and viable option in a case such as that presented with extensive bilateral and locally advanced disease.

A number of studies have found less surgical time and blood loss in thrombectomy-first compared to thrombectomy-last approaches to patients with IVC thrombus in RCC (9).

However, a thrombectomy-last approach was required in this case as access to IVC was most optimal after bilateral RN. This case demonstrates that good outcomes can be achieved with thrombectomy-last approaches (10).

Conclusion

This is the second reported case of bilateral renal cell carcinoma with extension into bilateral renal veins and IVC and the first to report a history suggestive of a hereditary familial syndrome. Additionally, this case highlights the surgical approach taken and challenges faced due to incredible size and infiltration into local vasculature and tissues, emphasizing the continued relevance of an open surgical approach in obtaining an optimal oncological outcome, despite the increasing popularity and experience with minimally invasive techniques for complex renal surgery.

Ethics

Informed Consent: Informed consent was obtained from the patient.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: P.J.H.K., J.L.K., A.R.S., M.W.W., A.D., Concept: J.L.K., M.W.W., Design: J.L.K., Data Collection or Processing: A.D., Literature Search: P.J.H.K., Writing: P.J.H.K., J.L.K., A.R.S., M.W.W., A.D.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declare that they have no relevant financial.

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