

Atypical presentation of renal cell carcinoma: a case report

Gunalan Palari **Arumugam**¹, Anand **Sachithanandan**², Mohamad Isa **Bikin**¹, Bala Sundaram **Mariappan**³, **Khoo** Li Ser⁴, Haritharan **Thamutaram**⁵, **Choy** Chun Ngok⁶, Mohd Haris Fadzillah bin **Abdul Rahman**⁷, **Tan** Kia Lean⁸, Pathmanathan **Rajadurai**⁹, Yogendren **Letchumanasamy**¹⁰, Mastura binti **Md Yusof**¹¹

¹Department of Anaesthesiology and Critical Care; ²Cardiothoracic Surgery, Department of Surgery; ³Department of Urology; ⁴Department of Radiology; ⁵Hepatobiliary Surgery, Department of Surgery; ⁶Department of Cardiology; ⁷Haematology, Department of Internal Medicine; ⁸Vascular Surgery, Department of Surgery; ⁹Department of Pathology; ¹⁰Department of Nuclear Medicine; ¹¹Department of Oncology, Subang Jaya, Medical Centre, Subang, Malaysia

Abstract

Our patient was a 61-year-old male who first presented with a diagnosis of renal cell carcinoma and low oxygen saturation at rest. An urgent computed tomography of the thorax revealed a filling defect in the distal left pulmonary artery. We describe our perioperative management of this patient and highlight some challenges in his postoperative care.

Keywords: renal cell carcinoma, tumour thrombus

Introduction

Patients with renal carcinoma require extensive pre-, peri-, and postoperative management. An approach to the anaesthetic technique will involve discussions with the surgical teams involved so that potential challenges to conduct anaesthesia in this high-risk patient group can be anticipated and tackled appropriately. We

Correspondence: Dr Gunalan Palari Arumugam, M.Med (Anaesthesiology), Consultant Anaesthesiologist, Subang Jaya Medical Centre (SJMC), Jalan SS12/1A, 47500 Subang Jaya, Selangor, Malaysia.

E-mail: gunalan73@yahoo.com

present a case in which there was a presentation of both abdominal pain and low oxygen saturation, a rare presentation at the time of diagnosis. The surgical team involved comprised of one urologist, one vascular surgeon, one hepatobiliary surgeon, and two cardiothoracic surgeons. Postoperatively, the haematologist, oncologist, and nuclear medicine physicians were instrumental in co-managing the patient together with the surgical teams as well as the anaesthesiologists.

Case presentation

A 61-year-old Indian male presented with sudden onset left-sided loin pain of 1-day duration. He reported no history of haematuria, fever, chest pain, or shortness of breath and there was no history of kidney stone disease. He had a past medical history of hypertension on telmisartan/amlodipine and well controlled diabetes mellitus on metformin/vildagliptin.

On examination, the abdomen was non-tender. The haemodynamic vital signs were stable; however, his baseline O₂ saturation was 88% on room air. An urgent computed tomography (CT) scan of the thorax and abdomen was performed revealing a left renal tumour with renal vein/inferior vena cava (IVC) thrombus. There was also a filling defect suggesting possible thrombus in the left pulmonary artery (PA).

He was admitted to the High Dependency Unit (HDU) for observation and supplemental nasal prong O₂ 2 L/min. In HDU, he was in sinus rhythm with a pulse rate of 85–95/min with oxygen saturation of 95% on O₂ 2 L/min. The respiratory rate was 15–20/min. The patient was also started on subcutaneous enoxaparin 60 mg daily preoperatively instead of a higher therapeutic dose as he already had thrombocytopenia and was also planned for emergency surgery; as such, the need to balance the risk of bleeding perioperatively. Haematological and coagulation parameters were all normal aside from a mild thrombocytopenia with platelet count of 128.

Our clinical impression was a pulmonary embolism secondary to a venous or tumour thrombus in the main distal left PA and possibly right atrium from the left renal cell carcinoma. An electrocardiogram-gated CT of the PA was performed next to precisely delineate the location and extent of the thrombus/tumour. The CT (Fig. 1) confirmed a large tumour/thrombus obstructing the distal main left PA and IVC thrombus that extended proximally, just distal to the hepatic vein. There was no evidence of clot in the right atrium or right ventricle.

The decision to proceed with surgery was finalised and informed consent obtained. We divided the procedures into three stages, namely, laparotomy with

radical left nephrectomy by the urologist, infra-diaphragmatic IVC thrombectomy by the hepatobiliary and vascular surgeons, and finally concluded with sternotomy and pulmonary thromboemblectomy on cardiopulmonary bypass (CPB) with systemic heparinisation by the cardiothoracic team. As the patient was relatively stable at this point from an oxygenation point of view, it was decided that the laparotomy would start first so that any bleeding issues resulting from the nephrectomy and the IVC thrombectomy could be tackled first so that the effects of heparinization that would occur during CPB later could be minimised. If problems in oxygenation were encountered during the laparotomy, the cardiothoracic team were on standby for immediate cannulation and commencement of CPB.



Fig. 1. Computed tomography of the thorax (coronal view) showing filling defects at the distal left main pulmonary artery.

Among the issues anticipated were significant blood loss, reduced venous return due to IVC clamping that may require volume loading and inotrope support, need for systemic anticoagulation with heparin during CPB, postoperative coagulopathy, and acute ischaemia-reperfusion lung injury in addition to difficulties in weaning from CPB.

On the operative day, the patient was put on standard electrocardiogram (ECG), blood pressure, and pulse oximetry monitoring. A 16G intravenous peripheral cannula and a 20G right radial arterial cannula were inserted under local anaesthesia. He was induced with intravenous (IV) palonosetron 75 µg, fentanyl 100 µg, IV propofol 100 mg, and IV rocuronium 60 mg, and intubated smoothly. Another 16G peripheral IV cannula and a right internal jugular vein triple lumen catheter were inserted uneventfully. A transoesophageal (TOE) probe was then inserted. Intraoperative TOE by our cardiologist revealed a normal-sized right atrium and ventricle with an intact atrial septum and no intracardiac clot. The volume status of the patient was assessed using both central venous pressure monitoring and TOE.

The urology team performed the laparotomy first via a midline and transverse incision. The kidney was mobilised and radical nephrectomy was performed. Subsequently, the hepatobiliary and vascular surgeons approached the IVC and were able to remove the tumour thrombus with relative ease. Clamping time was approximately 30 minutes. The teams were very careful in removing the tumour thrombus during the surgical manipulation and, where necessary, vascular clamps



Fig. 2. Tumour thrombus in the left main pulmonary artery removed en bloc.

and suture ties were used to minimise the risk of embolisation. Upon resection of the left renal cell tumour and concomitant IVC tumour thrombectomy, the cardiothoracic team took over.

The chest was accessed via a median sternotomy and CPB was instituted with routine cannulation (aortic 20F and 2-stage venous 32F) once adequate systemic heparinisation was achieved (activated clotting time > 450 sec) and normothermia maintained at 36°C. Given the absence of intracardiac clot, the heart was not arrested, and the pulmonary tumour embolus was approached via a 4-cm longitudinal incision in the distal main PA extended in a curvilinear fashion into the left PA. A large, organised tumour thrombus (Fig. 2) was removed en bloc under direct vision with a pair of gallstone forceps and good back bleeding was achieved. A 6F balloon embolectomy catheter was then carefully passed down distally several times, but no further clot was retrieved. The PA was lavaged with heparinised saline and closed primarily with a running 5-0 prolene monofilament non-absorbable suture. The patient was weaned from CPB with ease, decannulated, and the chest wired closed after insertion of mediastinal chest drains.

Four pints of whole blood and four units of platelets were transfused to achieve satisfactory haemostasis. A disseminated intravascular coagulation (DICC) screen was ordered and an additional DICC regime of six cryoprecipitate, four units of fresh frozen plasma, and two units of platelets was given. Postoperatively, he was sent to the Intensive Care Unit (ICU) and kept ventilated overnight.

There were two main issues that were of concern postoperatively, mainly of the respiratory and haematology systems. The patient was slowly weaned off the ventilator on postoperative day 1 and extubated on day 2. The chest X-ray and the first few arterial blood gases after extubation showed hypoxemia suggestive of acute lung injury (ALI) as per the American-European Consensus Conference definition. This was potentially attributed to either transfusion-related or post-CPB changes. He was put on non-invasive ventilation therapy to support his oxygenation, and this was weaned off after 3 days to room air. He also received nebulised bronchodilator therapy and routine chest physiotherapy.

There was evidence of coagulopathy post-surgery with some bleeding noted from the drains. There was preoperative thrombocytopenia, raised prothrombin

time, normal partial thromboplastin time, and fibrinogen. The bleeding settled after correction of all haematological indices, and he was put on anticoagulation; initially subcutaneous enoxaparin (therapeutic dose) until discharge and thereafter on oral rivaroxaban for 3 months.

The pathologist reported that the morphology of the tumour cells in the pulmonary embolus were similar to those of the main tumour, thus favouring metastases and not direct thrombus extension (from the IVC), as there was no clot or tumour from the right atrium or ventricle.

Discussion

Renal cell carcinoma has a tendency to invade vascular structures, extending into the IVC as well as the right-sided chambers of the heart. In some patients, the need to perform surgery on CPB and deep hypothermic circulatory arrest may be necessary.

Shriner *et al.* have stated that microscopic pulmonary tumour embolism is difficult to diagnose; often, the initial clinical symptom is subacute progressive dyspnoea, and the initial laboratory evaluation typically shows hypoxemia in a patient with clear lung fields on a chest X-ray. They also noted that pulmonary angiography may not disclose evidence of emboli. As such, clinicians should maintain a high degree of clinical suspicion when encountering a patient with a renal tumour presenting with shortness of breath or lower than expected oxygen saturation. This clinical suspicion must be followed through with the relevant radiological imaging to ensure that the exact structural lesions and their spread is determined preoperatively. In our patient, an ECG-gated CT angiogram was helpful to precisely delineate the extent of the tumour and intrathoracic involvement. Often, this technique is requisite to obtain accurate high-quality scans void of pulsation artefact.

Intraoperative TOE is important to delineate the cardiac and pulmonary arterial structures and extent of tumour vascular invasion. The absence of clot or tumour in the right heart (on TOE) allowed us to perform the surgery without inducing cardioplegic arrest. The pulmonary thromboemblectomy was done safely on a beating heart with CPB support. The latter, effectively “rests” the heart sufficiently and provided adequate visualisation to facilitate the thrombo-emblectomy.

Any CPB-induced ALI may be further exacerbated by possible lung reperfusion injury following the pulmonary thromboemblectomy. Studies have shown that the incidences of ALI vary from 0.4% to 20%. ALI remains an important postoperative complication that needs to be recognised early. The patient remained stable during the surgery as well as in the ICU and only required a short period of mechanical

ventilation before being weaned to a non-invasive mode of ventilation (high-flow nasal cannula). He was monitored with constant meticulous appraisal of his breathing effort and ventilatory parameters (ABG, CXR, oxygen requirements, etc).

Conclusion

Successful outcome of a complex case is best achieved with multidisciplinary planning. Once issues have been identified in the preoperative period, complications can be anticipated and tackled appropriately.

Declarations

Informed consent for publication

The patient provided signed informed consent for the publication of the clinical data and images contained in this case report.

Competing interests

None to declare.

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References

1. Flavin K, Vasdev N, Ashead J, et al. Perioperative Considerations in Metastatic Renal Cell Carcinoma. *Rev Urol*. 2016;18(3):133–142. <https://doi.org/10.3909/riu0697>
2. Bernard GR, Artigas A, Brigham KL, et al. The American-European Consensus conference on ARDS. *Am J Respir Crit Care Med*. 1994;149(3 Part 1):818-24.
3. Morita Y, Ayabe K, Nurok M, Young J. Perioperative anaesthetic management for renal cell carcinoma with vena cava thrombus extending into the right atrium: case series. *J Clin Anesth*. 2017;36:39-46. <https://doi.org/10.1016/j.jclinane.2016.09.030>
4. Schrinier RW, Ryu JH, Edwards WD. Microscopic pulmonary tumor embolism causing subacute cor pulmonale: a difficult antemortem diagnosis. *Mayo Clin Proc*. 1991;66:143-148. [https://doi.org/10.1016/s0025-6196\(12\)60485-6](https://doi.org/10.1016/s0025-6196(12)60485-6)
5. Murphy A. Cardiac gating (CT). Reference article, Radiopaedia.org. (Accessed on 23 Jan 2022) <https://doi.org/10.53347/rfd-88788>