"Pseudo" pseudoaneurysm following robotic assisted partial nephrectomy

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A 65-year-old female presented to clinic requesting follow up for a history of right robotic partial nephrectomy done at an outside institution 2 years prior. Initial pathology demonstrated a grade 2/4 3.4 cm clear cell renal cell carcinoma with negative margins. There was no tumor necrosis, sarcomatoid differentiation, or lymphovascular invasion. High quality follow up imaging initially revealed a pseudoaneurysm in the central portion of the right kidney. The patient was sent to interventional radiology for angioembolization. Angiography identified the abnormality to be a recurrent or residual mass in the renal hilum. MRI confirmed these findings, and the patient ultimately required a laparoscopic radical nephrectomy for definitive treatment. Final pathology showed grade 2/4 clear cell renal cell carcinoma with negative margins and no tumor necrosis or sarcomatoid differentiation. The tumor did involve sinus fat and sinus vessels, but not perinephric fat.

Key Words: arteriovenous fistula, kidney, renal cell carcinoma, pseudoaneurysm, laparoscopic surgery

Introduction

Nephron sparing surgery (NSS) is preferred for treatment of small renal masses assuming the size and location of the mass are amenable to this approach. Robotic-assisted partial nephrectomy (RAPN) is now the most common minimally invasive NSS approach and has been shown to have less blood transfusions, postoperative complications, and decreased length of stay when compared with open partial nephrectomy.[1] Renal artery pseudoaneurysms are a potential postoperative complication with both open and minimally invasive partial nephrectomy, occurring in 1% and 1.96 % of cases respectively.[2] A recent case report described multiple suspected renal arteriovenous fistulas after partial nephrectomy that turned out to be renal cell carcinoma recurrence.[3] Herein we present a case of suspected renal pseudoaneurysm following RAPN which turned out to be renal cell carcinoma. This case demonstrates the importance of accurate post-RAPN image interpretation.

Case report

A 65-year-old female presented to our clinic requesting ongoing follow up for renal cell carcinoma. Two years prior she had underwent a right RAPN for a solitary renal mass at an outside institution. At the time of surgery, final pathology revealed a grade 2/4

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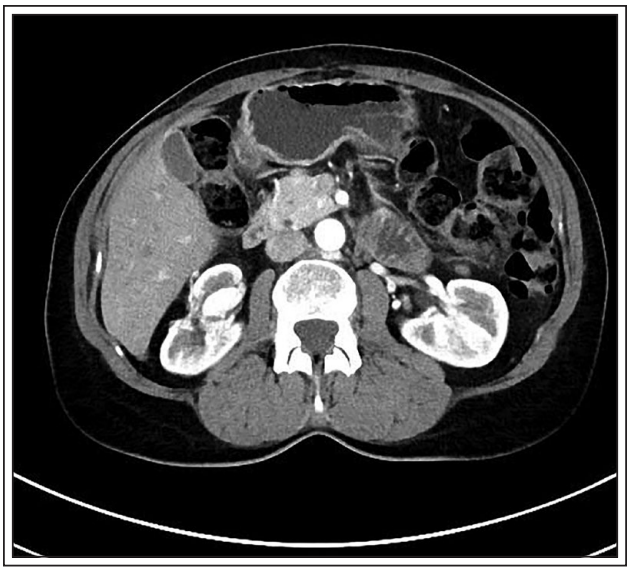

Figure 1. CT abdomen pelvis with and without IV contrast 2 years post right robotic partial nephrectomy.

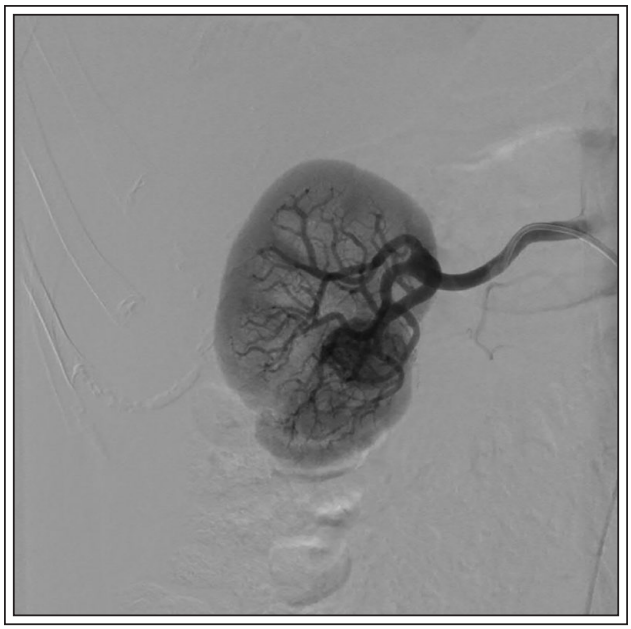

Figure 2. IR renal arteriography demostrated a focal 2.5 cm hyperdense lesion at the medial aspect of the mid pole kidney near the renal hilum which corresponded to the abnormal area evidenced on previous CT scan. No pseudoaneurysm was identified.

3.4 cm clear cell renal cell carcinoma with negative margins. There was no tumor necrosis, sarcomatoid differentiation, or lymphovascular invasion. Review of the outside operative note did not mention tumor spillage at the time of initial partial nephrectomy, and it was unclear if the entire surface of the kidney was examined prior to mass excision. Past medical and surgical history at the time of visit were otherwise unremarkable. She had no family history of cancers in the family. She was a nonsmoker and endorsed social alcohol use. All routine follow up imaging prior to her presentation at our clinic was negative.

Chest x-ray, and a computed tomography (CT) scan of the abdomen and pelvis with contrast were acquired for cancer surveillance. The patient's creatinine was 1.0 and the chest x-ray was negative. CT scan identified an arteriovenous fistula in the right renal hilum without any evidence of recurrent or residual tumor, Figure 1. She was sent for interventional radiology consultation and subsequently underwent right renal angiogram for planned angioembolization of the arteriovenous fistula. The arteriogram did not demonstrate evidence of aneurysm filling. A focal 2.5 cm hyperdense lesion was noted at the renal hilum that was highly suspicious for hypervascular tumor invasion into the renal vein, Figure 2. Dedicated renal mass protocol MRI was performed to further characterize the arteriogram findings. This identified a 1.3 cm x 1.9 cm x 1.4 cm enhancing nodule in the right kidney suspicious for renal cell carcinoma, Figure 3. Options were discussed with the patient as

Figure 3. Dedicated renal mass protocol MRI of abdomen with IV Gadavist. Arterial phase shows an enhancing nodule 1.3 cm x 1.9 cm x 1.4 cm in size.

well as interventional radiology. It was felt that the tumor was too hilar in location for a biopsy or repeat partial nephrectomy. The patient underwent uneventful laparoscopic radical nephrectomy for grade 2/4 clear cell renal cell carcinoma with negative margins. There was involvement of the sinus fat and vessels, but no sarcomatoid differentiation or tumor necrosis. There was no involvement of perinephric fat. Follow up imaging has shown absence of tumor recurrence.

Discussion

Renal artery pseudoaneurysm (RAP) is a known potential complication following partial nephrectomy. Recent data has demonstrated that this occurs twice as frequently with RAPN as compared to open partial nephrectomy, 1% versus 1.96% ($p \leq 0.001$).[2] The definitive cause for RAP after partial nephrectomy is unknown, but it has been previously hypothesized that renorraphy during partial nephrectomy may lacerate arterioles which may eventually become RAP's or that pneumoperitoneum obscures small arterial bleeds at the time of surgery.[4] Some suggest the parenchymal approximation is not as tight with laparoscopic partial nephrectomy.[5] Regardless, it is not uncommon to see pseudoaneurysms develop after partial nephrectomy. Patients present with gross hematuria 87.3% of the time and it is typically a mean of 14.9 days after surgery.[2] Our patient presented to clinic in a routine fashion for her annual follow up and was asymptomatic.

RAP can be diagnosed with CT of the abdomen and pelvis with intravenous contrast or by angiography. In our patient, CT scan identified an area very concerning for renal artery pseudoaneurysm. It was not until angiography was performed that revealed no rapid filling and washout of the area in question that tumor recurrence was suspected. Instead a vascular mass was evident in the location of interest. Only one other account is available in the literature in which a suspected pseudoaneurysm or arteriovenous malformation turned out to be renal cell carcinoma.[3] Review of the initial imaging prior to the partial nephrectomy on the outside did not identify a mass in this area, only the mass that was removed at the time of partial nephrectomy was identified.

Conclusion

This report highlights a unique case in which a suspected complication that occurs with robotic partial nephrectomy actually revealed a renal cell carcinoma 2 years after the initial partial nephrectomy. □

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