

Renal Artery Pseudoaneurysm Following Partial Nephrectomy: Report of a Case and Review of the Literature

Chin-Ta Lin¹, Tai-Lung Cha², Dah-Shyong Yu², and Sheng-Tang Wu^{2*}

¹Department of Surgery; ²Division of Urology, Department of Surgery,
Tri-Service General Hospital, National Defense Medical Center, Taipei,
Taiwan, Republic of China

Delayed hemorrhage related to partial nephrectomy may be a life-threatening condition because of the diagnostic difficulties. Although hemorrhage is a well-recognized complication of partial nephrectomy, hemorrhage caused by a renal artery pseudoaneurysm after open partial nephrectomy is rare. We report a case of retroperitoneal hematoma associated with a renal artery pseudoaneurysm occurring in a 48-year-old male three days after he underwent right partial nephrectomy for renal cell carcinoma. With early suspicion, the pseudoaneurysmal branch was successfully identified and selectively embolized using percutaneous renal arterial angiography.

Key words: renal artery pseudoaneurysm; partial nephrectomy; coil embolization

INTRODUCTION

Hemorrhage is a well-recognized complication of partial nephrectomy, but is rare after partial nephrectomy with renal artery pseudoaneurysm. Renal artery pseudoaneurysms are a potentially life-threatening complication that is clinically difficult to identify and manage. Partial nephrectomy has recently become the procedure of choice to treat localized renal tumors in patients with tumors less than 4cm in the long axis. We present a rare case of a renal artery pseudoaneurysm in a patient following partial nephrectomy for renal cell carcinoma.

CASE REPORT

A 48-year-old man presented to our hospital with a 3-week history of intermittent gross hematuria. He also complained of bowel habit changes and weight loss of about 5kg in the last month. His vital signs revealed temperature of 36.6 °C, pulse of 92 /min and blood pressure of 116/68 mmHg. Physical examination showed no re-



Fig. 1 Contrast computed tomography (CT) of the abdomen revealed an enhancing renal mass of the right kidney about 3×2.8×2.5-cm³ in size consistent with renal cell carcinoma.

markable findings for the abdomen. Blood tests, including complete blood count, liver and renal function tests were all normal with an initial hemoglobin level of 12.7 g/dL. Ultrasonography (US) revealed an echoic, oval cystic mass located in the right kidney region. Contrast computed tomography (CT) of the abdomen revealed an enhanced renal mass of the right kidney about 3×2.8×2.5-cm³ in size, consistent with renal cell carcinoma (Fig.1). Using an extraperitoneal approach with a flank incision, staged nephron-sparing surgery was performed. The lesion was removed intact after cross-clamping the renal hilum. After clamp removal, the kidney was metic-

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*Corresponding author: Sheng-Tang Wu, Division of Urology, Department of Surgery, Tri-Service General Hospital, National Defense Medical Center, No. 325, Sec. 2, Cheng-gong Road, Taipei 114, Taiwan, Republic of China. Tel: +886-2-87927170; Fax: +886-2-87927172; Email: aarondakimo@yahoo.com.tw



Fig. 2 CT scan shows extravasation from the right collecting system with retroperitoneal fluid collection.

ulously inspected and found to be hemostatically stable. Pathologic analysis revealed a T1N0M0, clear cell renal cell carcinoma. The postoperative course was uneventful. However, 6 days later, the patient noted right flank discomfort and bleeding from the Penrose drain. His hemoglobin dropped from 12.7 to 9.7 mg/dL within three days. Initially, he was treated conservatively with bedrest, blood transfusion, and serial hemoglobin determinations. Intermittent bleeding at the Penrose site persisted, and he soon developed gross painless hematuria. Uncontrast CT revealed a large hematoma arising from the posterior inferior pole of the right kidney with retroperitoneal fluid collection (Fig.2). Using selective renal angiogram, the renal artery pseudoaneurysm and its branches were localized (Fig.3a). Control angiography showed total occlusion of the main renal artery stump. There was no filling in the pseudoaneurysm after coil embolization (Fig.3b). Following the procedure, the patient's hemoglobin remained stable, and he had no additional gross hematuria. The patient recovered well and was discharged after 7 days.

DISCUSSION

Partial nephrectomy is more complex than traditional radical nephrectomy and more frequently results in complications. The possible complications of partial nephrectomy chiefly affect the vascular and collection systems.¹⁻³ Renal artery pseudoaneurysms are relatively less common lesions and usually occur after invasive procedures, such as percutaneous nephrostomy or renal artery angioplasty, renal biopsy, blunt or penetrating trauma, and surgery.^{4,5} Two mechanisms are proposed which may

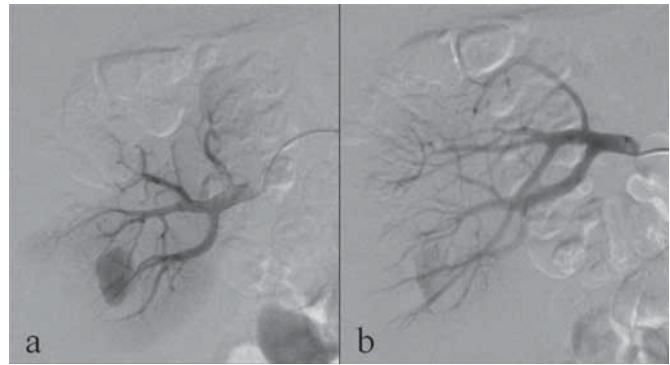


Fig. 3 (A) Selective renal angiogram demonstrates large pseudoaneurysm. (B) Control angiography shows total occlusion of the main renal artery stump. There is no filling in the pseudoaneurysm after coil embolization.

form these pseudoaneurysms. An artery that is partially transected during resection could subsequently bleed into a contained space, particularly near the wedge resection apex. The other mechanism could be a puncture hole made into a vessel during nephrectomy closure in which the initial needle placement is removed.⁶ The incidence of bleeding following open partial nephrectomy varies between 1.1% and 4.3%.⁷

Gross haematuria and flank pain at the site of prior surgery are very suggestive of such a process, as seen in the present patient and reported in nearly all cases in the literature. We suggest pseudoaneurysm should consider differential diagnosis of loculated fluids at the nephrectomy site. This complication usually presents in the first 2 or 3 weeks after surgery. It is therefore important to keep pseudoaneurysm in mind as a potential delayed complication in hypovolemic patients following partial nephrectomy.

Angiography has been shown to be the reference standard for the diagnosis of renal artery pseudoaneurysm.² However, if the patient is stable, non-invasive tests such as contrast medium-enhanced CT, or color Doppler sonography should be performed. Endovascular transcatheter embolization prevents risks of surgery, and an operation can often be avoided entirely. Moreover, Eastham et al.⁸ achieved hemostasis with embolization alone in 88% of patients with bleeding caused by penetrating renal trauma. Besides, Kessaris et al.⁹ reported an embolization success rate of 90% in patients with renal vascular injuries following various percutaneous procedures.

In conclusion, our case illustrates the successful use of endovascular treatment with coil embolization to selectively eliminate a pseudoaneurysm resulting from partial

nephrectomy. The diagnosis of a renal artery pseudoaneurysm requires a high index of suspicion, as most patients initially present with non-specific symptoms. Although pseudoaneurysms in the renal arteries are potentially fatal lesions and are difficult to diagnose, they may occur clinically as massive bleeding secondary to their delayed rupture. To our knowledge, this suggests angiographic localization and embolization are efficacious modalities for managing renal vascular complications after open surgery.

REFERENCES

1. Israel GM, Hecht E, Bosniak MA. CT and MR imaging of complications of partial nephrectomy. *RadioGraphics*. 2006;26:1419-1429.
2. Fergany AF, Saad IR, Woo L, Novick AC. Open partial nephrectomy for tumor in a solitary kidney: experience with 400 cases. *J Urol*. 2006;175:1630-1633.
3. Permpongkosol S, Link RE, Su LM, Romero FR, Bagga HS, Pavlovich CP, Jarrett TW, Kavoussi LR. Complications of 2,775 urological laparoscopic procedures: 1993 to 2005. *J Urol*. 2007;177:580-585.
4. Kang KP, Kwak HS, Han YM, Yoon IY, Lee S, Kim W, Park SK. A delayed case of renal artery pseudoaneurysm presented with gross hematuria and azotemia in solitary kidney following percutaneous nephrostomy: treated by transcatheter coil embolization. *Int Urol Nephrol*. 2008;40:811-813.
5. Matos A, Moreira A, Mendonça M. Renal arteriovenous fistula after nephrectomy. *Ann Vasc Surg*. 1992;6:378-380.
6. Singh D, Gill I. Renal artery pseudoaneurysm following laparoscopic partial nephrectomy. *J Urol*. 2005;174:2256-2259.
7. Polascik TJ, Pound CR, Meng MV, Partin AW, Marshall FF. Partial nephrectomy: technique, complications and pathological findings. *J Urol*. 1995;154:1312-1318.
8. Eastham JA, Wilson TG, Larsen DW, Ahlering TE. Angiographic embolization of renal stab wounds. *J Urol*. 1992;148:268-270.
9. Kessaris DN, Bellman GC, Pardalidis NP, Smith AG. Management of hemorrhage after percutaneous renal surgery. *J Urol*. 1995;153:604-608.