Surg Today (2002) 32:753–755

SURGERY TODAY

Rupture of a Saccular Renal Artery Aneurysm: Report of a Case

TELMO PEDRO BONAMIGO, NILON ERLING JR., and FELIPE PURICELLI FACCINI

Vascular Surgery Department, Fundação Faculdade Federal de Ciências Médicas de Porto Alegre (FFFCMPA), Irmandade Santa Casa de Misericórdia de Porto Alegre (ISCMPA), Rua Coronel Bordini 675/303, CEP: 90440-001, Porto Alegre, RS, Brazil

Abstract
This paper reports a patient who was successfully treated for a ruptured renal artery aneurysm. A 64-year-old man presented with sudden onset of strong abdominal and lumbar pain, and a 2-week history of abdominal discomfort. Abdominal computed tomography and visceral arteriography revealed a retroperitoneal hematoma and a 7.5-cm saccular renal aneurysm with active bleeding. A laparotomy was indicated, and a nephrectomy was performed due to the persistent bleeding and refractory hypotension presented during surgery. The postoperative course was uneventful, and the patient was discharged with a normal renal function on the tenth day. This paper presents the successful management of a ruptured renal aneurysm with a review of the literature, and the management possibilities of such patients is also discussed.

Key words Aneurysm · Renal artery · Rupture · Nephrectomy

Introduction

Ruptured renal artery aneurysms in nonpregnant patients are extremely rare but such cases do demonstrate a high mortality. Several treatments have been used for these patients, who usually present with hemodynamic instability and a retroperitoneal hematoma. The most commonly used treatments are a nephrectomy, in situ repair, and ex vivo repair of the lesions. The former may be indicated in patients with a normal contralateral kidney and an adverse clinical situation. The others may be used in stable patients and are extremely important for the treatment of those without a normal contralateral renal function. This paper presents the case of a ruptured renal aneurysm in a man with a normal contralateral kidney function in which a nephrectomy was necessary. We also discuss the pros and cons of the possible surgical options.

Case Report

A 64-year-old white man presented with a sudden onset of strong abdominal and lumbar pain. He presented at a local hospital 2 weeks earlier for abdominal discomfort, and received nonsteroidal anti-inflammatory drugs (diagnosis of nephrolithiasis) and a blood transfusion for marked normocytic anemia. No trauma or previous diseases had been reported; he had smoked 20 cigarettes a day for the past 50 years. On physical examination the patient was afebrile and pale, with a high heart rate and hypotension. He presented with diffuse pain on abdominal palpation without signs of peritoneal irritation and hematoma in the scrotum, right lumbar region, and flank. Laboratory tests revealed hemoglobin 9 g% and creatinine 1.5 mg/dl, and all other blood and urine examinations were inconspicuous. Ultrasonography suggested a 14.2-cm lesion in the medial portion of the right kidney, possibly indicating the presence of renal carcinoma. An abdominal computed tomography scan (Fig. 1) and visceral arteriography (Fig. 2) revealed a 7.5-cm saccular renal artery aneurysm with retroperitoneal bleeding and hematoma.

The patient was already hemodynamically unstable and rapidly worsening by the end of arteriography, and therefore a laparotomy was indicated instead of catheter embolization. After accessing the abdominal cavity, a large hematoma was seen in the right retroperitoneum. The bleeding was partially controlled with supraceliac clamping of the abdominal aorta and the aneurysm was approached through the right

Reprint requests to: T.P. Bonamigo
Received: August 7, 2001 / Accepted: January 8, 2002

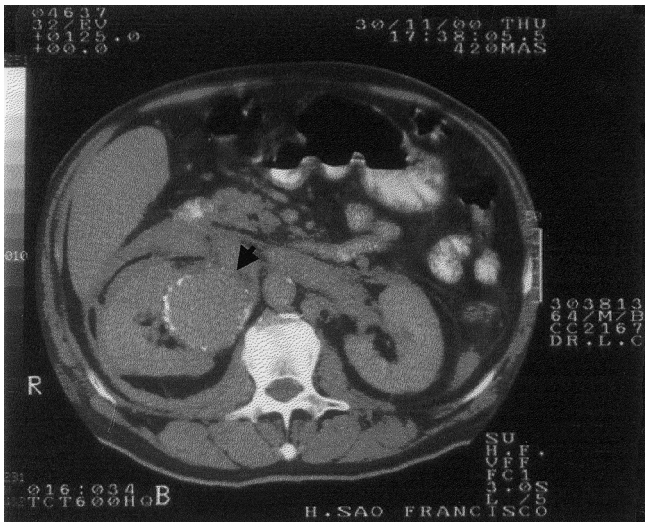

Fig. 1. Computed tomography scan showing a renal aneurysm with partial wall calcification (*arrow*) and retroperitoneal hematoma

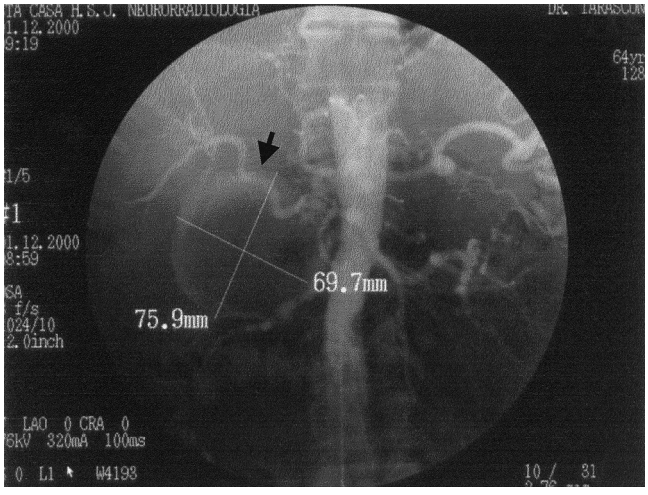

Fig. 2. Arteriography showing the aneurysm in the renal artery (*arrow*), with a ring of contrast around the inner portion of the aneurysm (thrombus) and the leakage of contrast media to the retroperitoneum

retroperitoneum using the Cattell maneuver. The right renal vein was divided and ligated to access the aneurysm. The dissection of the aneurysm and proximal renal artery was difficult to perform due to persistent bleeding and the proximity of the aneurysm neck to the aorta. The proximal control of the renal artery was obtained an the supraceliac clamping of the aorta interrupted after 30 min. The aneurysm was partially thrombosed and back-bleeding from the kidney persisted thorough-out until a resection was performed. The dissection and assessment of the aneurysm was carried out posterior to the right border of the inferior vena cava; however, the procedure was extremely difficult to perform and caused massive bleeding (5000 ml) associated with a worsening of the patient status. At this point, the patient was in hypovolemic shock and a right nephrectomy was performed. We decided not to perform autotransplantation due to the poor patient status, and in order to avoid further surgical time and burden. The postoperative course was uneventful except for a transient increase in the serum creatinine to 2 mg/dl. The patient was discharged on the tenth day after surgery with a normal renal function.

The pathologic report showed medullar necrosis in a portion of the upper pole of the kidney and confirmed the operative finding of a 7.2-cm aneurysm with a partially calcified wall. We considered the medullar necrosis to be due to the fact that the polar renal artery had become dilated and thrombosed, based on observations during a pathologic examination.

Discussion

A rupture of renal artery aneurysms was first reported by Mathé in 1932. Renal artery aneurysms represent 1% of all aneurysms encountered in postmortem examinations[1] and are estimated to represent 22% of all visceral aneurysms.[2] Hageman et al. estimated the prevalence of these aneurysms to be approximately 0.3% in patients undergoing aortography.[3] These aneurysms are usually single and unilateral (20% are bilateral and 30% are multiple).[4] The incidence of a rupture is relatively low and varies in the literature. Ippolito et al. found 24 ruptures out of 169 patients with noncalcified aneurysms[5] and Cerny et al. described a rupture incidence of 30% for intrarenal aneurysms.[6] Glass et al. reported 1 rupture in 20 aneurysms diagnosed over an 11-year period.[7] Yet, Tham et al. published a prospective study in which 60 patients with renal artery aneurysms were followed with no rupture in a 10-year period. The mortality of the subset of patients presenting aneurysm rupture is high, reaching 80% in most studies.[8]

The clinical picture is variable including hypertension, hematuria, flank pain, and spontaneous rupture.[5,9] Hypertension is observed in 55%–75% from such patients and may be due to stenosis, parenchymal compression, and segmental ischemia. Flank and back pain may occur without a rupture being presented by half of the patients. Hematuria is also common (22%–45%) and may be due to a perforation into the collecting system or embolic renal infarct. A bruit can be heard in 10%–25% of the patients.[4,10] Another possible presentation is arteriovenous fistula, which has been rarely reported and can cause important hemodynamic effects.[11]

There are five major types of renal aneurysms, namely, saccular, fusiform, dissecting, intrarenal, and pseudoaneurysm.[4] The majority are saccular at the main renal bifurcation (60%–100%).[4,10] Fusiform aneurysms are not common, arise distal to stenotic arterial lesions, and are associated with fibrous dysplasia.[4] On the other hand, the real etiology of saccular renal aneurysms is not certain. This disease is often associated with atherosclerosis, and atheromas are found in most of these lesions on microscopic examinations. These aneurysms have also been found in patients without atherosclerosis (even in young children). In addition, patients with multiple atherosclerotic aneurysms in other arteries (aorta, femoral, and popliteal) frequently have the renal arteries spared. Most aneurysms present at bifurcation, where congenital abnormalities are most common and the plaques found by microscopy may be reactional to flow disturbances. Furthermore, the association of aneurysm enlargement and rupture with pregnancy suggests that hormonal alterations in the arterial wall may also play a role in this disease.[12] These facts suggest that saccular renal aneurysms may have a different origin in spite of their association with atherosclerosis.[3]

The treatment of renal aneurysms in elective cases is well established and is indicated in patients presenting with: (1) renovascular hypertension, (2) symptoms–pain, (3) hematuria, and (4) a possibility of pregnancy.[10,13] Electively operated aneurysms rarely require a nephrectomy, since the surgical reconstruction of blood flow is feasible, the renal function can be preserved, and hypertension is cured in 88% of such patients.[10] Another surgical indication is the risk of rupture, although this is not thoroughly depicted and is still not uniformly accepted. Some authors suggest that aneurysms with more than 2 cm, lack of calcification, and enlargement should be regarded as indications for surgery.[4] The best treatment for patients presenting with a rupture of such aneurysms has yet to be completely established, since such patients may be operated on with an extensive retroperitoneal hematoma and also tend to be unstable hemodynamically, thus making the reconstruction less safe.

Our patient was unstable and had a normal contralateral kidney, therefore the intraoperative decision was to perform a nephrectomy. In our opinion this is the safest way to deal with patients who present with a poor operative status due to massive bleeding, assuming they have normal function in the other kidney. In patients operated on while stable and without contralateral kidney function, the reconstruction of the renal flow is imperative. This can be either performed with an in situ repair or an ex vivo repair with autotransplantation.[10,12]

Both the nature of the rupture and the surgeon's experience are pivotal. It is difficult to dissect the right renal artery and to perform its reconstruction, thus leading to an increase in the operative time, blood loss, and risk to the patient. Lesions on the left side are more easily operated on, due to its simpler anatomical position, thus making its reconstruction more feasible even in an emergency operation.

In conclusion, a renal artery aneurysm rupture is a rare condition (unless it is associated with pregnancy) and can be related to atherosclerosis, congenital lesions, or a hormonal degeneration of the arterial wall. The treatment basically depends on the hemodynamic status of the patient during surgery, the side of the rupture, and the experience of the surgeon performing the laparotomy. A nephrectomy in an unstable patient with a normal contralateral kidney may thus be a wiser choice than a complicated reconstruction in unstable patients who present with a rupture of renal aneurysms.

References

1. Hogbin BM, Scorer CG. Spontaneous rupture of an aneurysm of the renal artery with survival. Br J Urol 1969;41:218–21.
2. Von Ronnen JR. The roentgen diagnosis of calcified aneurysm of the splenic and renal arteries. Acta Radiol 1953;39:385.
3. Hageman JH, Smith RF, Szilagyi E, Elliott JP. Aneurysms of the renal artery: Problems of prognosis and surgical management. Surgery 1978;84:563.
4. Chen R, Novick AC. Retroperitoneal hemorrhage from a ruptured renal aneurysm with spontaneous resolution. J Urol 1994;151:139–41.
5. Ippolito JJ, Leveen HH. Treatment of renal artery aneurysms. J Urol 1960;83:10–6.
6. Cerny JC, Chang CY, Fry WJ. Renal artery aneurysms. Arch Surg 1968;96:653–63.
7. Glass PM, Uson AC. Aneurysms of the renal artery: a study of 20 cases. J Urol 1967;98:285–92.
8. Tham G, Ekelund L, Herrlin K, Lindstedt EL, Olin T, Bergentz SE. Renal artery aneurysms: natural history and prognosis. Ann Surg 1983;197:348–52.
9. Peh WCG, Yip KH, Tam PC. Spontaneous renal pseudoaneurysm rupture presenting as acute intra-abdominal haemorrhage. Br J Radiol 1997;70:1188–90.
10. Seki T, Koyanagi T, Togashi M, Chikaraishi T, Tanda K, Kanagawa K. Experience with revascularizing renal artery aneurysms: is it feasible, safe and worth attempting? J Urol 1997;158:357–62.
11. Nawa S, Ikeda E, Naito M, Kondo K, Yuasa I, Watanabe K, et al. Idiopathic renal arteriovenous fistula demonstrating a huge aneurysm with a high risk of rupture: report of a case. Surg Today 1998;28:1300–3.
12. Dayton B, Helgernos RB, Sollinger HW, Acher CW. Ruptured renal artery aneurysm in a pregnant uninephric patient: successful ex-vivo repair and autotransplantation. Surgery 1990;107:708–11.
13. McCarron JP, Marshall VF, Whitsell JC. Indications for surgery on renal artery aneurysms. J Urol 1975;114:177–80.