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SHORT REPORT

Kidney Salvage after Urgent Repair of Large Ruptured Renal Artery Aneurysm—Case Report and Review of the Literature

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Introduction

Although renal artery aneurysms (RAA) are infrequent they are encountered often enough that the vascular surgeon needs to be acquainted with the diagnosis and surgical treatment, especially in urgent situations and when there are unexpected intraoperative findings. Autopsy studies reveal an incidence of renal artery aneurysms of 0.01 to 0.09% which is probably an underestimate because small or intrarenal aneurysms may not be seen at autopsy. With the introduction of visceral angiography the incidence has been revised upwards to 0.73–0.97%[6]. The most catastrophic complication of RAA is rupture (RRAA) which occurs in less than 3% of cases. Several types of treatment can be used for affected patients which usually involve nephrectomy, in situ or ex vivo repair. Nephrectomy is only an option of the contralateral renal function is normal. We present a very rare case of a large ruptured renal artery aneurysm which was not recognized preoperatively, repaired with successful kidney salvage.

Case Report

A 46-year-old woman was admitted to the urology department with a two day history of sudden lumbar pain on the left side; a clinical picture and history suggestive of renal calculi. The patient was hypotensive with a blood pressure of 90/60 mmHg and a heart rate of 120. Ultrasound investigation revealed a huge contained retroperitoneal hematoma on the left and a suspected 5 cm infrarenal abdominal aortic aneurysm (AAA). Initially the patient was stabilized with volume replacement and she received two units of blood. Following this she was transferred to the vascular unit.

On arrival in the intensive care unit (ICU) an urgent ultrasound investigation confirmed the previous finding of an infrarenal abdominal aortic aneurysm and the patient was trasnferred to theatre for an urgent laparotomy. The hemoglobin was 7.31 g/dl and the white count was 7.4×10^9/l. Blood chemistry showed a mildly elevated creatinine level of 150 mmol/l. The past medical history of the patient was unremarkable in relation to RAA.

The retroperitoneal space was dissected and the infrarenal aorta was exposed but it was apparently intact, there was no AAA. Control of the bleeding was achieved by applying a supracoeliac clamp. The origin of the left renal artery was exposed with som difficulty and a large perforated saccular non calcified thin-walled 5 cm aneurysm of the main stem of the left renal artery was found. An inlay repair using autologous vein was carried out with the assistance of a cell saver to mitigate the blood loss. The warm ischemia time was 45 minutes and the entire surgical procedure took 150 minutes. The postoperative period was uneventful and the serum creatinine had returned to normal three days after operation. Left renal function was unimpaired as confirmed on scientigraphy (50% of normal function). The patency of the repair was confirmed by color code duplex and contrast enhanced CT scans (Fig. 1). The upper pole of left kidney was affected by ischaemia (Fig. 2). CT scans of the brain and aortic arch were normal.

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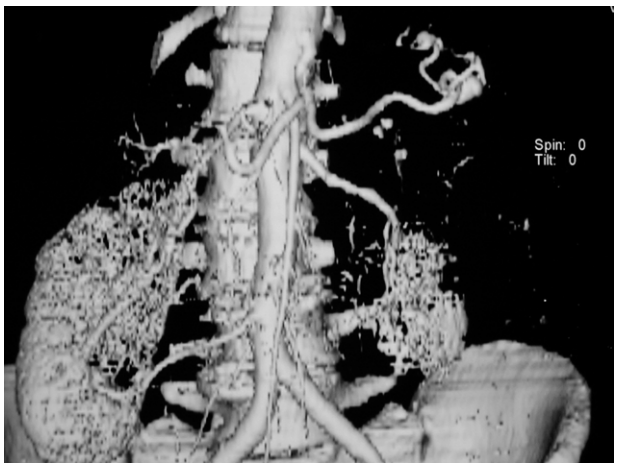

Fig. 1. Postoperative CT 3D reconstruction, which confirms left renal artery patency.

Discussion

The risk of rupture of renal artery aneurysms still remains uncertain. Stanley[6] refers to a risk of about 3%. In the series reported by Henke[3] rupture is most likely in a subset of patients without calcification. Most cases of rupture occur in pregnant women, especially in the third trimester. The maternal mortality rate is 50% and the fetal rate is 78%.[4] Hormonal changes, increased intrabdominal pressure, cardiac output and increased blood volume may play the key aetiological role. In non pregnant patients, rupture is likely to be associated with death in less than 10% of cases.[3] There is no information whatever in the literature about the kidney salvage rate even in papers from specialised vascular units. Prevention of rupture is the most common indication for elective repair but this remains controversial. Traditionally, elective repair is recommended for lesions with a diameter of more than 2 cm.[9] Chen[7] suggests that an aneurysm greater than 2 cm with no wall calcification and sac enlargement should be repaired. Many surgeons believe that there is not enough convincing data to support the belief that larger aneurysms are more likely to rupture than small ones[6,9] and the risk of rupture might instead be related to the etiology. Those associated with fibrodysplasia may carry a higher risk of rupture because of their tin-wall nature but firm data supporting this premise are lacking.[9] Even though data related to the risk of rupture are vague it seems prudent to recommend repair if the diameter is greater than 3 cm[1,10] in low-risk patients where nephrectomy will be unlikely to be necessary. Repair should be performed in all women of child bearing age. The attitude towards elective repair of RAA in some authors is more conservative and they recommend repair of aneurysms greater than 4.0 cm.[11]

Fig. 2. Postprocedural angioCT scan shows ischæmic damage to the upper pole of the left kidney and a small splenic artery aneurysm.

The clinical presentation of renal artery aneurysms is variable and includes hypertension, haematuria, flank pain and rupture. Hypertension is observed in 55–75% of patients due to stenosis, parenchymal compression and segmental ischemia.[5] Lumbar pain may occur without rupture in 50% of patients. Haematuria is the result of perforation of the aneurysmal sac into the collecting system or to an embolic renal event. A less common presentation involves arteriovenous fistula formation with the usual hemodynamic consequences.[3]

There are five types of renal aneurysms, namely saccular, fusiform, dissecting, intrarenal and false.[1] Atherosclerosis and congenital defects are the most common causes of aneurysm formation.[6] Fusiform aneurysms are in the majority of cases the result of post-stenotic dilatation distal to a hemodynamically significant atherosclerotic or fibromuscular stenosis. False aneurysms are result of blunt or iatrogenic injuries and should be repaired because of a high risk of rupture.[9] Some uncommon arteriopathies (Ehlers–Danlos syndrome, Marfan syndrome) associated with collagen abnormalities could also lead to aneurysm formation.[12]

The majority of saccular aneurysms (60%) are at the main renal bifurcation.[7] Our patient had an aneurysm of the main stem of the renal artery. It should be borne in mind that patients with multiple atherosclerotic aneurysms (aorta, femoral et popliteal) may also have a renal artery lesion. As shown in Figs. 1 and 2 our patient also had a small (< 1.6 cm) aneurysm of the splenic artery for which surgery is not yet indicated. Surgical treatment of renal artery aneurysms is well established and is justified in patients who present with renovascular hypertension or with symptoms of

pain and hematuria especially if pregnancy is likely.[5] Obviously, rupture requires urgent surgery. Preoperative CT scans could be justified in a stable patient when the diagnosis is uncertain. Ultrasound investigation is indicated in the urgent situation because it is quick and helps in the decision-making process but as shown in this case it is not necessarily quite as accurate.

There are several types of surgical treatment. Nephrectomy is indicated in hemodynamically unstable or elderly patients assumption that the contralateral kidney function is normal.[2] In situ repair includes bypass procedures or aneurysmorrhaphy especially when the sac does not involve the renal hilum. Ex vivo repair is used when the renal artery branches are affected and it is hardly ever possible in urgent situations because it is time consuming[8] and technically demanding. Useful alternatives include splenorenal bypass on the left or hepatorenal bypass on the right, but again mostly in elective cases.

Our experience suggests that the surgeon must always rely on his own clinical judgment and be experienced enough to solve unpredictable intraoperative situations. Maximum effort should be made to attemptr enal revascularization, especially on left side where it is technically more feasible, and in the shocked patient with prolonged renal ischemia. Nephrectomy is the last resort.

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