Surgical Repair of a Giant Renal Artery Aneurysm: A Case Report

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Abstract  A case of a giant renal artery aneurysm and multiple small branch aneurysms in a 48-year-old man is presented. The largest aneurysm was repaired successfully with kidney preservation. Small branch aneurysms were left alone. Subsequent CT scans 6, 12 and 20 months after the operation revealed the same aneurysms without any increase in size and shape.

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Introduction
Renal artery aneurysms (RAAs) whose diameters exceed 5 cm are referred to as giant RAAs. Fewer than 27 giant RAAs have been reported in the English literature. We present a patient who underwent surgical repair of his 12-cm left RAA.

Case Report
A 48-year-old man presenting with persistent back pain was referred to our clinic after abdominal ultrasonography revealed a cystic mass in the left upper quadrant. His medical history was unremarkable. The mass was diagnosed by 3-dimensional CT as a 12-cm saccular aneurysm, occurring in the main stem of the left renal artery (Fig. 1). Distal renal artery displacement was associated with stenosis and a small aneurysm just before kidney parenchyma.

At surgery, two renal artery ostia were observed at the bottom and lateral walls of the aneurysm in addition to the proximal renal artery ostium. A 9F Pruitt irrigation occlusion catheter (LeMaitre Vascular, Burlington, MA) was placed in the distal ostia and 1.5 L cold perfusion was performed during arterial reconstruction as previously described. An 8-mm PTFE graft was placed from the proximal renal artery to the lateral ostium and a similar graft placed between the middle of the first graft and the other ostium. Total kidney ischaemia time was 30 minutes. The post-operative course was uneventful.

One month after surgery, a follow-up CT angiogram showed patent grafts within the aneurysmal sac and small aneurysms in branch arteries distal to the anastomoses (Fig. 2A). The lower aneurysm had been diagnosed

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pre-operatively but the upper one was missed during the pre and peri-operative period. Subsequent CT scans 6, 12 and 20 months after surgery revealed the same aneurysms without any increase in size (Fig. 2B).

Discussion

RAAs can be managed by arterial reconstruction, nephrectomy, or ligation of the renal artery. In recent reports of giant RAAs, open surgery with nephrectomy mostly has been the preferred treatment. However, surgical indications for this entity are rapidly diminishing as endovascular stent grafting, transarterial embolization, or ablation techniques are developed. We preferred open surgery in this case for two main reasons: first the patient had relatively low risk for conventional surgery. Second the repair of RAAs of such proportion sometimes requires branch reconstructions which incur the risk of damage to other branch or pole vessels when performed as an endovascular procedure. English et al.\(^3\) reported that 78% of repaired RAAs involved branch renal artery reconstructions.

One of the branch aneurysms distal to the anastomoses was missed both preoperatively and perioperatively, most probably being masked by the 12-cm aneurysm.

Although non-invasive, scintigraphy as a diagnostic tool has difficulties distinguishing between RAAs and tumours. CT angiography with 3-dimensional reconstruction provides greater anatomic detail and is of better help when planning treatment. Pfeiffer et al.\(^4\) reported that 12% of patients with RAAs had two or more unilateral RAAs and suggested that preoperative angiography should be obligatory. A preoperative angiogram might not have missed them. However, awareness of the branch aneurysms preoperatively

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**Figure 1**  Left side: 12-cm renal artery aneurysm displacing the left kidney downwards. Right side: Stenotic renal artery (Arrow) and small aneurysm (Arrowhead).

**Figure 2**  A: CT scan at one month following surgery showing a 14 mm aneurysm (at bottom) and another 9 mm aneurysm (at top), both of which are of the branch renal arteries distal to anastomoses. B: CT scan at twenty months post-surgery showing aneurysms without a change in size.
would not have changed our surgical strategy. When post-operative scans revealed these aneurysms, we did not attempt to repair them. These branch artery aneurysms can be repaired surgically. However in selected cases, distal RAAs, intraparenchymal and branch renal aneurysms, can be treated endovascularly with equally good results. The potential complications associated with endovascular repair are distal embolization and loss of pole vessels with subsequent infarction. In our case, these aneurysms were located just at the branch bifurcation suggesting that embolization or stent grafting could potentially lead to loss of one these branches. There is not enough information about the fate of such aneurysms. Twenty months after surgery, these aneurysms have not changed in size and shape. We will continue follow up, in case these aneurysms become large or complicated.

In summary, giant RAAs can be repaired surgically. In the presence of multiple aneurysms, some small aneurysms may be missed preoperatively. Meticulous pre-operative imaging may help recognize renal vascular anatomy to facilitate planning treatment.

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