

Controversies

Aortic stents in renal artery stenosis

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Date accepted for publication 23 July 2003

Aortic stent placement and the effect on renal function is not well described in the literature. Although approximately 50 aortic stents have been placed in this hospital this is the first case referred to the nephrology unit because of co-existing renal artery stenosis.

The patient was a 78-year-old female described as 'extremely fit for her age'. The serum creatinine at presentation was 200 $\mu\text{mol/L}$. She had a 5.5 cm abdominal aortic aneurysm suitable for stenting on spiral CT. She also had a right ostial renal artery stenosis (RAS) and a left proximal renal artery occlusion. The blood pressure was '160/90' on bendrofluzide, atenolol and amlodipine. The surgeon wished to know if either of the renal artery lesions should be treated prior to aneurysm treatment.

In clinic she was a reasonably fit 78 year old, whose only symptom was occasional ankle oedema. She was a non-smoker who lived alone. There was no other relevant past medical history. Her blood pressure was 188/86 and urinalysis was normal. The serum creatinine was 184 $\mu\text{mol/L}$. It was suggested that a statin be added to her treatment regime. The case was then discussed with the radiologists and surgeon.

A review of the radiology showed bilateral renal artery stenosis (Fig. 1). It was felt that there would be an increased risk of acute renal failure or renal infarction with open surgery but probably not with endovascular aortic stenting. However, aortic stenting might make later renal artery intervention difficult. It was decided that the two best options were either not to intervene with the aneurysm or the renal arteries, or to attempt to stent at least one renal artery prior to aneurysm intervention. As the patient declared that she worried every night about her aneurysm rupturing, the latter course was taken. The patient was warned of a 1–2% immediate death rate after renal artery intervention.



Figure 1 Intraarterial digital subtraction angiogram showing bilateral renal artery stenosis and aortic aneurysm.

The left renal artery was stented. The procedure was technically difficult on the right and stenting could not be achieved at that session. Total contrast dose was 40 ml Iomeron and 40 ml Magnevist.

Prior to intervention the serum creatinine was 215 $\mu\text{mol/L}$. After intervention her blood pressure was 140/64 and the anti-hypertensive medications were reduced and IV fluid given. She experienced some abdominal pain, nausea and pleuritic lower left chest pain. The plasma creatinine peaked at 283 $\mu\text{mol/L}$ post intervention. Two weeks later her blood pressure was 121/68 so the anti-hypertensive medications were further reduced. The plasma creatinine was 290 $\mu\text{mol/L}$.

A renogram showed 62% function in the stented kidney. Four weeks after intervention the blood pressure was 125/72 and serum creatinine was 300 $\mu\text{mol/L}$. Three months after intervention her blood pressure was 136/71 and serum creatinine 243 $\mu\text{mol/L}$. The patient felt well for the first time since intervention.

The issues are what to do now about the right RAS and the abdominal aortic aneurysm; and whether an alternative strategy should have been pursued initially?

Expert 1

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Here we have a patient with a significant-sized abdominal aortic aneurysm (AAA) that is large enough to require repair^[1]. However, it is complicated by bilateral significant renal artery stenosis (RAS) with normal serum creatinine and no significant blood pressure problems. I presume the kidneys are of normal caliber.

Should the RAS be repaired?

There are two scenario's here:

1. If she undergoes endovascular repair with either a device fixed in the infra or supra-renal position, then there is no indication for preprocedural renal artery stenting. If the patient's creatinine had been abnormal and rising, then pre graft stenting would have been indicated and technically not a problem. However, there are several studies that suggest that this is unnecessary where renal function is normal^[2]. If the patient's renal function began to deteriorate post stent graft, then it would still not be technically difficult to cross and stent the RAS bilaterally even with supra-renal fixation.
2. The patient might undergo open repair. The rationale behind stenting or open renal artery reconstruction in this scenario is that hypotension might produce renal artery occlusion. This is the same argument used for asymptomatic carotid artery stenosis repair during coronary artery bypass graft (CABG). However, 3.8% of patients with a unilateral asymptomatic stenosis of >50% will suffer hemispheric stroke after CABG^[3]. With bilateral critical stenoses the hemispheric stroke rate is 8.3%^[3]. The rate of death and ipsilateral stroke for combined carotid endarterectomy (CEA) and CABG in a meta-analysis of 8979 patients was 3.8–7.4%^[4]. There is no randomised evidence and

this analysis suggests that there is no indication for CEA prior to, after or synchronous with CABG in asymptomatic patients. Similarly, there is no evidence for pre procedural renal artery repair prior to AAA repair in this case. If renal artery reconstruction is required during surgery because of recognised damage to the renal artery, this is said to have no adverse impact on outcome^[5]. If renal function does deteriorate post open repair then an endovascular approach to the renal arteries will still be possible.

Conclusion

The available evidence suggests that the AAA should be repaired. The patient should be randomized within the endovascular aortic aneurysm repair (EVAR) trial^[6]. The renal artery stenoses do not require preoperative intervention. Renal function should be carefully monitored post procedure and if renal failure is detected, endovascular intervention is indicated as urgent.

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Expert 2

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In summary, the case is a 78-year-old woman with a 5.5 cm abdominal aortic aneurysm (AAA). She has stable hypertension controlled with 'triple' therapy and stented left renal artery stenosis (RAS), and residual 'tight' right RAS following failed stenting. She has moderate chronic, but apparently stable, renal failure (post stent serum creatinine 243–300 $\mu\text{mol/l}$.)

Current problems

What to do about the AAA?

Level 1 evidence clearly demonstrates that an asymptomatic AAA of <5.5 cm in diameter should be managed expectantly with surveillance^[1,2]. The risk of rupture is proportional to diameter and the annual rupture rate of a 5.5 cm AAA would be in the order of 5–10%^[3]. Elective AAA repair is associated with a perioperative mortality of approximately 3–10%^[4]. This specific patient would appear to be very anxious regarding her AAA and ‘keen on intervention’. On balance, therefore, the AAA should be repaired. She would require preoperative anaesthetic and cardiac assessment.

Endovascular or open AAA repair?

Endovascular aortic aneurysm repair (EVAR) is a topic for debate. Technical success rates are high once the initial learning curve is conquered. Total hospital stay is reduced, pain and early quality of life scores are improved when compared to open surgical repair. However, reintervention rates following EVAR are approximately 20% in the first 12 months and 10% per annum thereafter^[5,6]. Lifelong graft surveillance (which may cause further anxiety) is necessary following EVAR, and the long-term durability of these devices is unproven. Open repair, however, is a durable procedure with excellent long-term results^[3]. A multicentre randomised trial comparing EVAR and open AAA repair has been recruiting patients since September 1999^[8]. If this patient consented to EVAR she could be entered into this study. If the patient declined EVAR, open repair would be justified.

What to do about the right RAS?

This patient now has essentially unilateral RAS following successful stenting of the left RAS. It is not particularly clear in the case report whether stenting of the right renal artery was actually attempted.

Preoperative management. A potentially relative indication for further intervention on the right renal artery is the preservation and prevention of renal function deterioration. This, however, is not supported by current best medical evidence; therefore, preoperative revascularisation of the right renal artery is not indicated^[7].

Peroperative management. The other concern is that during AAA repair the renal artery or arteries may occlude. Thus, given the failed original right renal stent, it would need to be ascertained prior to AAA repair whether endovascular revascularisation of the right renal artery is feasible. If not feasible, this could be considered to be a relative contraindication to endovascular AAA repair.

At open repair, the aortic cross clamp could be placed

above the renal arteries, below the superior mesenteric artery, thus the renal orifices could be identified and the kidneys perfused with cooled renal preservation solution while the superior anastomosis was performed just below the renal artery ostia. The other option would be to place the aortic cross clamp just below the renal arteries and monitor renal blood flow with intraoperative continuous wave Doppler or duplex scanning. If infrarenal clamping resulted in renal artery occlusion/low flow or distal emboli were detected, a supra renal clamp could then be placed. If surgical revascularisation was indicated (e.g. renal artery damage) the operation of choice on the right would be a saphenous vein interposition graft between the side of the hepatic artery and the distal end of the transected right renal artery. On the left, a splenorenal bypass, during which the transected splenic artery is anastomosed end-to-end to the transected left renal artery, is probably the preferred option.

Postoperative management. Treatment of the right RAS (endovascular if possible) would only be indicated if this lady develops an appropriate indication (e.g. flash pulmonary oedema or deteriorating renal function).

Conclusion

The AAA should be repaired. If endovascular repair is requested then the patient should be entered into the EVAR I study; if not, then open repair should be used.

Management of the right RAS should be as follows:

1. Preoperative: no indication for intervention.
2. Preoperative: (a) open repair—suprarenal clamp to prevent renal artery occlusion or infrarenal clamp with interoperative monitoring. If renal artery occlusion/damage did occur, surgical revascularisation is indicated. (b) EVAR—should renal artery occlusion occur, endovascular revascularisation may still be possible.
3. Postoperative: revascularisation (endovascular if possible) only recommended if appropriate indications develop.

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