Case report - Coronary

Saphenous vein graft aneurysms; the true, false and ugly!

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Abstract

The reported incidence of minor dilation of reversed saphenous vein grafts used for coronary artery bypass grafting varies up to 14%, however significant aneurysmal dilation is unusual. We report on the findings and management of a series of four patients with reversed saphenous vein graft aneurysms (rSVG). These cases show some of the salient and very unusual features at presentation. rSVGs are usually asymptomatic (12–47%), however they may present with cough, unstable angina or sudden death. One of our cases presented with haemoptysis, which has only been described once previously in association with a rSVG. Diagnosis is usually done with a combination of chest X-ray, ECHO, coronary angiography and CT or MRA. Management options including coil embolisation, covered stenting and surgery are discussed. The histology of these cases exemplifies the varying pathogenesis for true and false aneurysms. Our recommendation remains that rSVGs should be treated surgically, if they show signs of enlargement, or they become symptomatic.

Keywords: Aneurysm; Coronary artery bypass conduits; Saphenous vein

1. Introduction

Reversed saphenous vein graft aneurysms (rSVG) post coronary artery bypass grafting (CABG) are uncommon, although minor dilations may occur in up to 14% of patients presenting for redo CABG [1]. They usually (12–47%) present as an asymptomatic incidental mass on chest X-ray, but they may present with new onset angina (13–24%), myocardial infarction (12–23%), cough or death [2].

2. Case 1

A 49-year-old man presented with haemoptysis with a history of CABG 10 years previously. He had two rSVGs to the right coronary (RCA) and obtuse marginal arteries (OM) and a left internal mammary artery (LIMA) to the left anterior descending artery (LAD). He subsequently developed a type I aortic dissection. This was repaired with an interposition Dacron tube graft to replace the ascending aorta and the two vein graft proximal ends were inserted with a single cuff of endogenous aortic wall as an island patch into the Dacron graft.

Initial investigation of the haemoptysis using bronchoscopy, CT-thorax and angiography were inconclusive. Subsequent MRI confirmed a communication between an aneurysmal rSVG and the right upper lobe (Fig. 1). During surgery dense adhesions were found around the ascending aorta and the RCA-rSVG origin with a macroscopic false-aneurysm leaking into the right upper lobe. The ascending aortic graft was excised and replaced, and the obtuse marginal vein graft was reconnected. The RCA graft was excised and not replaced as the graft was occluded distally and the target vessel was deemed none graftable. The patient had a good postoperative recovery and is doing well 3.5 years later with no reoccurrence of haemoptysis.

3. Case 2

A 67-year-old man was found to have a large shadow on a chest X-ray performed to investigate a cough. Thirteen years before he had CABG, with rSVG to RCA and OM, and LIMA to LAD. CT and MRI confirmed a 15 × 20 cm aneurysm along the course of the RCA vein graft, with flow into its lumen from the aorta (Fig. 2A and B). The graft distal to
the aneurysm was patent but run off was sluggish, with a diffusely diseased small RCA. As the graft was believed to contribute little to coronary blood flow, he underwent coil embolisation after which he developed progressive angina and enlargement of the aneurysm. He proceeded to surgery where a histologically confirmed atherosclerotic true-aneurysm was found densely adherent to the right atrium. New rSVGs were placed to the LAD and OM. The RCA was not regrafted, as the coronary was of very poor quality and diffusely diseased. He came off cardiopulmonary bypass with the aid of an intra-aortic balloon pump and inotropes, but subsequently developed progressive cardiac failure and died.

4. Case 3

A 64-year-old man with a history of CABG 9 years previously presented with a small mass on a routine CXR. Coronary angiography showed flow into an RCA-rSVG aneurysm with a distally occluded vein graft. A 4 cm aneurysm was confirmed on CT thorax. Histology confirmed a true-aneurysm that was removed through a right posterolateral thoracotomy and the vein graft was not replaced (Fig. 2C and D). He made an uneventful recovery and is doing well 3 years later.

5. Case 4

A 69-year-old man with a history of CABG 12 years previously, presented with new onset anginal chest pain and a 3-year history of cough. CT thorax and angiography revealed a tubular (3 cm diameter, 6 cm long) aneurysm along the course of an OM-rSVG. At surgery he was found to have a histological true-aneurysm involving the OM1-rSVG, which was excised and replaced. He made an uneventful recovery and is doing well 2 years later.

6. Discussion

These rSVG aneurysm cases exemplify some of the salient features of this condition and lead us to review the diagnostic and management options. The first case had a very unusual presentation of haemoptysis, only once reported previously [3]. MRA made it possible to confirm the aorto-coronary-pulmonary fistula. Unlike the previously reported case, lobectomy was not necessary in our case.

Although frequently identifiable on chest X-ray or ECHO, coronary angiography is required to evaluate patency of coronary arteries and bypass grafts. Confirmation of size of the aneurysm and the relationship to surrounding structures is best achieved with CT angiography or MRA. Other unusual presentations such as rSVG aneurysm...
fistulisation into the right atrium with resultant left–right shunt or into the right ventricle with resultant coronary steal and myocardial infarction have been documented and are summarized by Kalimi et al. [2]. As has rupture of the aneurysm into the pericardium, pleural cavity or through a sternotomy wound. The actual incidence of rSVG aneurysms is however likely to remain unknown, as many (12% of pseudoaneurysms and 47% of true aneurysms) are asymptomatic even when they are very large as exemplified by the second case [2]. These are the only four cases of rSVG aneurysms treated surgically and identified from the operation log books of three cardiothoracic hospitals that combined did approximately 15,000 CABG cases over the last 10 years (1993–2003).

True aneurysms appear to be athromatous in origin and tend to occur late (more than 1 year after CABG surgery), as exemplified by the histology of cases 2–4 [1,2,4]. The atheromatous process is potentiated by hyperlipidaemia and smoking [1,2]. True aneurysms may occur at areas of weakness of the graft wall, near valves or areas of trauma to the vein graft. Non-reversal of the rSVG has been proposed as a mechanism of multiple true aneurysms, but this is not supported by the extensive literature looking at patency of reversed versus non-reversed/in situ vein grafts for infrainguinal bypass surgery [2,5]. Pseudoaneurysm formation occurs mainly at suture lines whether due to breakage of a suture, dehiscence of a suture line or infection [6]. Weakness of a branch site with subsequent rupture may produce a pseudoaneurysm in the mid portion of a graft. Rigidity of prosthetic grafts, graft placement under tension or poor graft orientation may also be significant factors. This may explain the predominance of right-sided vein graft aneurysms in our series.

The diagnosis of a vein graft aneurysm must be considered in patients presenting with new cardiac symptoms or a mediastinal mass post CABG. Investigation and confirmation of the diagnosis with coronary angiography, CT or MRA allows identification of the nature, relationships and patency of the aneurysm and aids planning of the treatment strategy. Coronary angiography identifies distal runoff and coronary vessels that might require revascularisation during aneurysmorrhaphy. In the case of small (<2 cm diameter or a diameter less than twice of the non-aneurysmal vein) asymptomatic patent vein graft aneurysms, conservative management or stenting with a covered stent may be reasonable [7–9]. We believe that stenting was not an option in any of the presented cases. Patients treated conservatively or with a covered stent should be followed closely by CT or MRA, for signs of enlargement or complications.

Coil embolisation may be useful in selected cases, where the aneurysmal vein graft is not patent distal to the aneurysm or were the graft contributes nothing to coronary blood flow or when the above conditions are met and the risk of surgery is deemed to be excessive [10]. In cases where the rSVG is patent distally, coil embolisation may precipitate unstable angina or cause a myocardial infarction as occurred in the second case.

7. Conclusion

Due to the risk of rupture, erosion, fistulisation, thrombosis or embolisation rSVG aneurysms should be treated aggressively. Although coil embolisation or covered stenting may be useful in selected cases, surgical excision of a large or symptomatic rSVG and re-grafting remains our treatment of choice.

References