

A Surgical Case of Concomitant Aneurysms of the Brachiocephalic and Coronary Arteries

Hideaki Mori, MD,¹ Yoshitaka Okamura, MD,¹ Yoshihiko Mochizuki, MD,²
Hiroshi Iida, MD,² Yasuyuki Yamada, MD,² Kunihiro Eda, MD,² Yuho Inoue, MD,²
and Shinichiro Miyoshi, MD²

Brachiocephalic artery aneurysm with concomitant coronary artery aneurysm is rare. We describe a case of a patient with a history of prosthetic graft placement following resection of an abdominal aortic aneurysm and was subsequently found to have a brachiocephalic artery aneurysm. After surgical correction of the brachiocephalic aneurysm, postoperative coronary arteriography demonstrated coronary artery aneurysms, and the patient subsequently underwent coronary artery bypass grafting (CABG). (Ann Thorac Cardiovasc Surg 2005; 11: 128–31)

Key words: brachiocephalic aneurysm, coronary artery aneurysm, coronary artery bypass grafting

Introduction

Brachiocephalic artery aneurysm comprises a small percentage of all peripheral aneurysms, and the presence of concomitant coronary artery aneurysms is extremely rare. Operative techniques for the correction of brachiocephalic artery aneurysm vary with aneurysm morphology, and involvement of the aortic arch necessitates use of cardiopulmonary bypass (CPB). Further, treatment of atherosclerotic coronary artery aneurysm remains controversial. We describe a case of staged operation employed for brachiocephalic artery aneurysm with concomitant coronary artery aneurysms.

Case Report

A 60 year-old Japanese man underwent prosthetic graft placement for correction of an abdominal aortic aneurysm in 1994. Other relevant medical history included

initiation of medical therapy for hyperlipidemia in 2000. On routine examination, the patient's standing height was 167 cm, body weight was 54 kg, blood pressure was 142/84 mmHg and heart rate was regular. The patient was asymptomatic, and the patient's electrocardiogram was normal, but chest roentgenogram revealed an abnormal opacity in the right lung apex.

Laboratory findings included: WBC, $4.70 \times 10^9/l$; RBC, $3.44 \times 10^{12}/l$; total cholesterol, 240 mg/dl; LDL-cholesterol, 161 mg/dl; and HDL-cholesterol, 29 mg/dl. The apolipoprotein subtyping was: A-1, 92 mg/dl; A-2, 18 mg/dl; B, 128 mg/dl; C-2, 1.7 mg/dl; C-3, 6.1 mg/dl; and E, 4.0 mg/dl. Lipoprotein subtyping was α (HDL), 21.5%; β (VLDL), 19.1%; and β (LDL), 59.1%. The Wassermann test and TPHA examination was negative.

Because the patient displayed no clinical signs of coronary artery disease, and there were no abnormalities on preoperative electrocardiography, conventional angiography and coronary angiography were not performed preoperatively. A diagnosis of brachiocephalic artery aneurysm was demonstrated by computed tomography (CT) and magnetic resonance (MR) angiogram (Fig. 1), and operative repair was achieved via resection of the aneurysm and placement of a prosthetic graft. However, postoperative graft and coronary angiography revealed multiple coronary artery aneurysms (Fig. 2). Off-pump coronary artery bypass grafting (OPCAB) was performed one month after the initial operation.

¹From Department of Thoracic and Cardiovascular Surgery, Wakayama Medical University, Wakayama, Japan, ²Department of Thoracic and Cardiovascular Surgery, Dokkyo University School of Medicine, Tochigi, Japan

Received February 2, 2004; accepted for publication November 12, 2004.

Address reprint requests to Hideaki Mori, MD: Department of Thoracic and Cardiovascular Surgery, Wakayama Medical University, 811-1 Kimiidera, Wakayama 641-8509, Japan.



Fig. 1. MR angiogram showing brachiocephalic artery aneurysm.

The maximum diameter of the brachiocephalic aneurysm was 5 cm, and the aneurysm involved portions of the brachiocephalic artery, right common carotid artery and right subclavian artery (Figs. 3A, 4A). Following systemic heparinization, temporary clamping of the right common carotid artery was performed. Common carotid artery stump pressure was subsequently measured (>60 mmHg), and a side bite clamp was placed on the ascend-

ing aorta. A proximal side anastomosis was performed using an 8 mm expanded polytetrafluoroethylene (ePTFE) graft. The right common carotid artery was clamped next, followed by an end-to-end anastomosis of the common carotid artery with a peripheral side of the ePTFE graft (Figs. 3B, 4B). Interposition of the brachiocephalic and subclavian arteries was performed with a 10 mm ePTFE graft. The ringed ePTFE graft was used to avoid bending of the two intersecting prosthetic grafts. Clamp time was 15 minutes, and preoperative oxygen saturation was 65-70% as determined by a percutaneous brain oximetry device (INVOS 3100A, Somanetics Corp. Troy, MI, USA).

Coronary arteriography and graft angiography was performed postoperatively and revealed an aneurysmal lesion in the left main trunk and a stenotic lesion with diffuse expanding lesion in the right coronary artery. Triple-vessel coronary artery bypass was performed; the left internal thoracic artery (LITA) was anastomosed to the left anterior descending coronary artery, a saphenous vein graft (SVG) was anastomosed to the right posterior descending artery, and another SVG was anastomosed to the A-V nodal branch. Since the right coronary artery lesion was diffuse, manipulation of that aneurysm was not possible. The aneurysm of the left main trunk was corrected because of the relatively low risk of rupture, as determined by review of the literature.

The patient's postoperative course was uneventful.

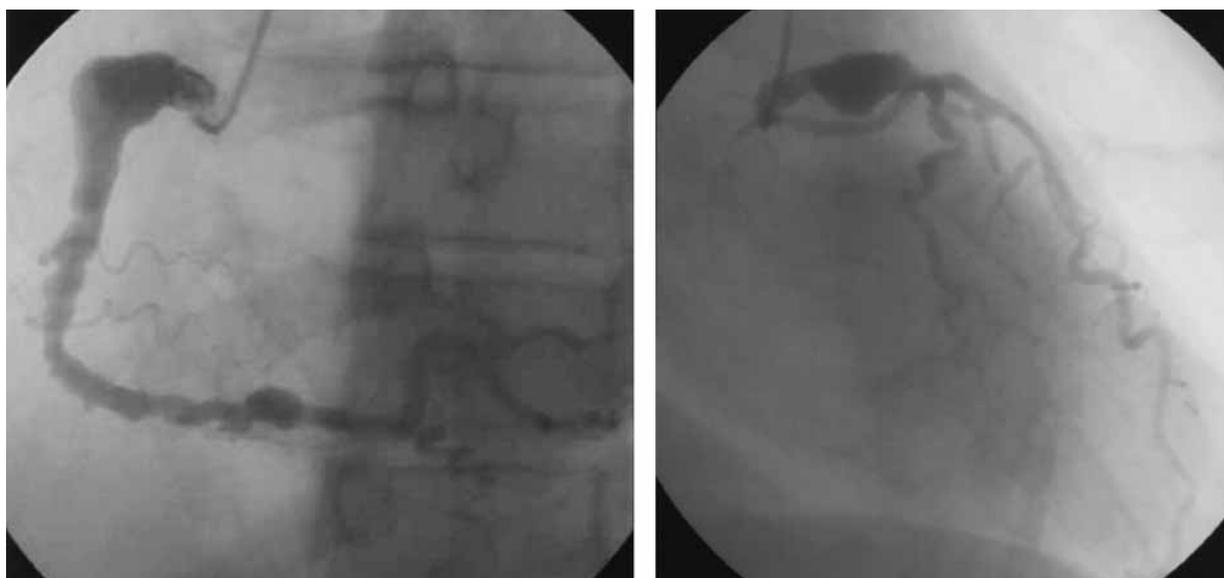


Fig. 2. Coronary angiograms.

- A: Diffuse dilatation and stenosis in the right coronary artery.
- B: Left main coronary aneurysm.

A | B

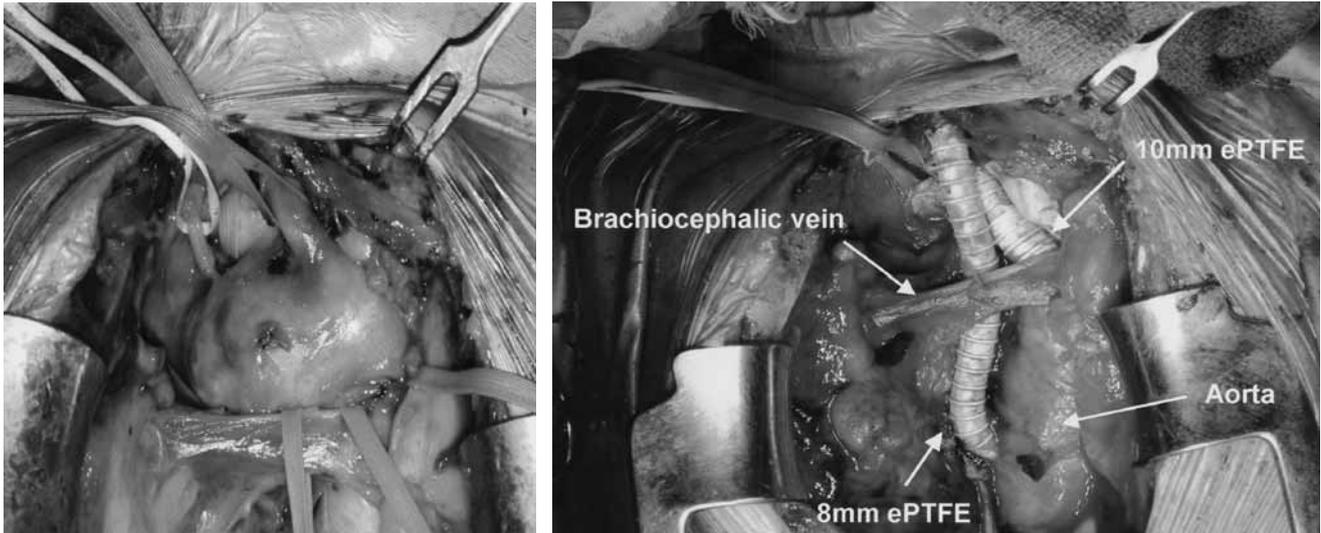


Fig. 3. Operative view.

A: The brachiocephalic artery aneurysm.

B: Brachiocephalic artery aneurysm was treated by resection and replacement with ePTFE grafts.

A | B

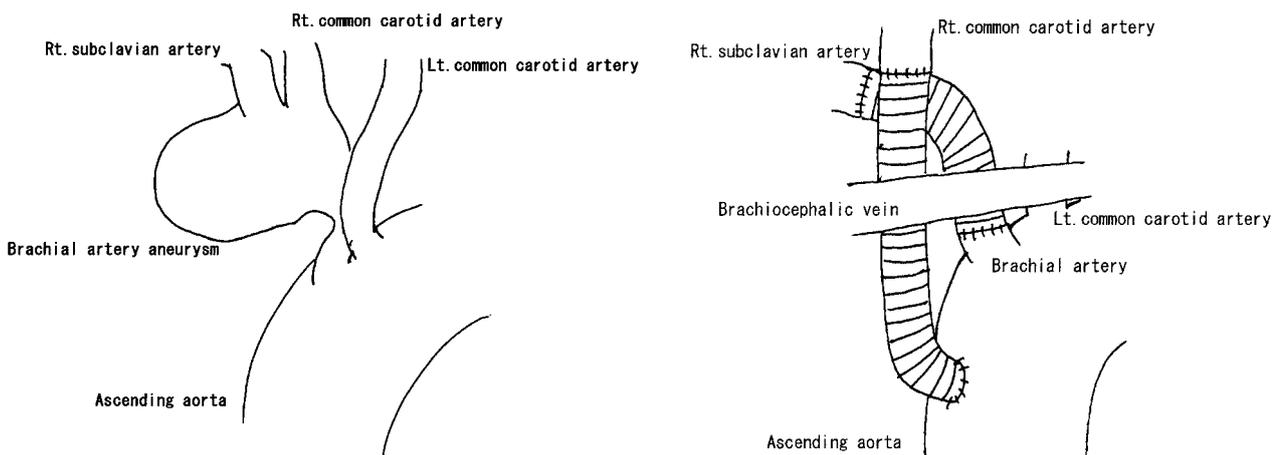


Fig. 4. Schematic findings of the operative findings.

A: The brachiocephalic artery aneurysm.

B: The brachiocephalic artery aneurysm was replaced with ePTFE grafts.

A | B

Postoperative coronary angiogram demonstrated patency of the coronary bypass grafts (Fig. 5) and no abnormalities in the prosthetic graft. Histopathological examination of the resected brachiocephalic artery demonstrated an atherosclerosis-related aneurysm. Histopathological examination of the resected brachiocephalic artery demonstrated an atherosclerosis-related aneurysm.

Discussion

Brachiocephalic artery aneurysm extension to the aortic

arch necessitates the use of CPB during surgical repair.¹⁾ In the present case, the proximal brachiocephalic artery had a normal diameter, and manipulation of the aortic arch was unnecessary. Surgical correction of the brachiocephalic artery aneurysm was performed via partial sternotomy. Exploration of the pericardium was not performed as there was no indication to do so (e.g. anginal symptoms, electrocardiogram abnormality). Thus, discovery of the coronary artery aneurysms during the initial procedure was not possible.

Cerebral ischemia time was 15 minutes, and prosthetic

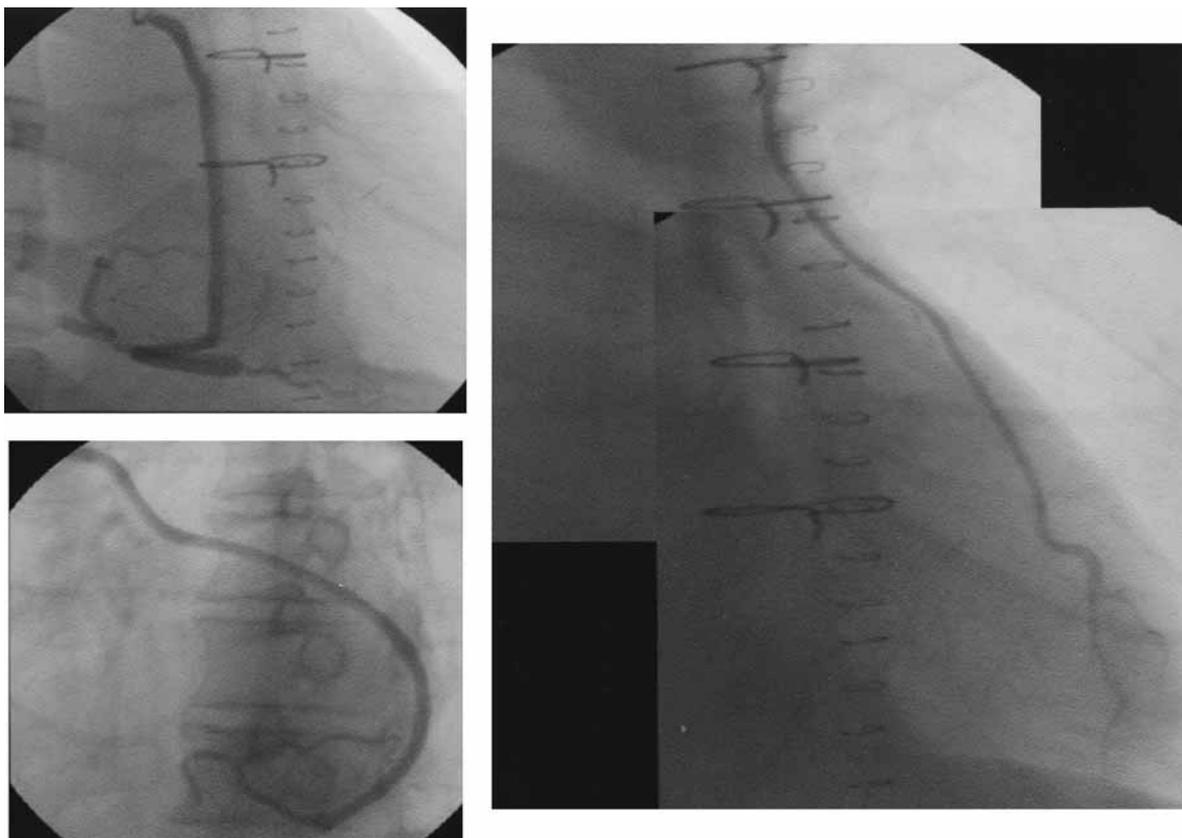


Fig. 5. Postoperative bypass angiograms.

A: SVG → 4PD.

B: SVG → 4AV.

C: LITA → LAD. SVG, saphenous vein graft; PDA, posterior descending artery; AV, A-V nodal branch; LITA, left internal thoracic artery.

A	C
B	

graft replacement was performed using a simple clamp. Cerebral ischemia time of shorter durations may be achieved via the use of separate prosthetic grafts for revascularization of the common carotid and subclavian arteries.

Coronary artery aneurysm can result from congenital malformation or occur in the context of arteriosclerosis, Kawasaki disease, Behçet's disease, infection (mycotic aneurysm) or vascular injury secondary to percutaneous coronary angioplasty.²⁾ Arteriosclerosis-related coronary artery aneurysms yield a comparatively low incidence of rupture but a high incidence of myocardial infarction.^{3,4)} In contrast, giant coronary artery aneurysms carry a high risk of rupture, and aneurysmectomy or aneurysmorrhaphy is required.⁵⁾ These procedures were not performed in the present case. Therefore, long term follow-up will be required with periodic reevaluation.

References

1. Kurihara H, Tsuchiya K, Ohsawa H, et al. Coronary revascularization in a patient with bilateral internal carotid artery stenosis and aneurysm of brachiocephalic artery: a case report. *Kyobu Geka* 2000; **53**: 225–8. (in Japanese)
2. Syed M and Lesch M. Coronary artery aneurysm: a review. *Prog Cardiovasc Dis* 1997; **40**: 77–84.
3. Swaye PS, Fisher LD, Litwin P, Vignola PA, Judkins MP, Kemp HG, Mudd JG, and Gosselin AJ. Aneurysmal coronary artery disease. *Circulation* 1983; **67**: 134–8.
4. Higashi S, Enoki C, Matsubara T. Saccular aneurysm in the left main coronary artery. *Jpn J Thorac Cardiovasc Surg*; 2001; **49**: 79–81
5. Al Attar N, Sablayrolles JL, Nataf P. Giant atherosclerotic aneurysm of the left anterior descending artery. *J Thorac Cardiovasc Surg* 2003; **126**: 888–90.