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Case report – Coronary

Minimal invasive direct coronary artery bypass in moyamoya disease

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Abstract

A 56-year-old woman with moyamoya disease presented with angina pectoris. Coronary artery stenosis of atherosclerosis origin was resistant to repeated transluminal angioplasty. Coronary artery bypass grafting was performed by minimal invasive direct coronary artery bypass (MIDCAB), avoiding cardiopulmonary bypass and intraoperative hypotension. Since coronary artery bypass grafting on cardiopulmonary bypass for patients with moyamoya disease has a potential risk of brain ischemia, MIDCAB may avoid perioperative cerebral ischemic complication.

Keywords: Coronary artery bypass grafting; Minimum invasive surgery; Moyamoya disease

1. Introduction

Moyamoya disease is a progressive cerebrovascular occlusive disease predominantly occurring in Japan and far eastern countries. It has been known for more than 30 years, but the etiology remains unclear. Angiographic characteristics include bilateral stenosis or occlusion of the terminal portions of the intracranial internal carotid arteries and bilateral development of fine collateral vessels at the base of the brain known as 'moyamoya vessels'. Transient or permanent ischemic events occur mainly in childhood while hemorrhagic events occur in adulthood [1,2]. Thus, moyamoya disease presents with different clinical pictures according to the patient's age.

Coronary artery disease among patients with moyamoya disease is rare [3]. Cardiac surgery for such patients has a potential risk of perioperative brain ischemia. Recent advances in minimal invasive direct coronary artery bypass (MIDCAB) include off-pump coronary artery bypass grafting (CABG) through the left anterior minithoracotomy. We report a moyamoya patient who presented with angina pectoris due to coronary artery stenosis and required CABG.

2. Case report

A 51-year-old woman developed cerebral infarction in the left parieto-occipital region. The patient had a history of hypertension and non-insulin dependent diabetes mellitus. Conventional cerebral angiography confirmed a diagnosis of moyamoya disease. For prevention of further brain ischemia, superficial temporal artery–middle cerebral artery (STA-MCA) anastomosis was performed bilaterally. The neurological status of the patient was stable thereafter.

At the age of 56 years, this patient developed angina pectoris. Coronary angiography performed in another hospital disclosed stenosis of the left anterior descending artery. The remaining coronary arteries were within normal limits. This coronary artery stenosis was treated by balloon angioplasty first. Three months later, restenosis was treated by angioplasty using a cutting balloon technique. Repeated restenosis was treated by direct coronary atherectomy and stenting, and direct coronary atherectomy, another 5 and 14 months later, respectively. A further 6 months later, exercise stress testing indicated cardiac ischemia. Coronary angiography at that time showed a near occlusion of the same portion of the left anterior descending artery and collaterals from the right coronary artery (Fig. 1A,B).

Due to a failure of the repeated transluminal angioplasty, this patient was referred to us for CABG. Magnetic resonance examination of the brain showed old left parieto-occipital infarction and occlusion of the right internal carotid artery and middle cerebral artery, and enlarged bilateral superficial temporal arteries (Fig. 2). In consideration of the patient's history of moyamoya disease, off-pump CABG was selected to avoid extracorporeal cardiopulmonary bypass (CPB) and possible intraoperative hypotension. This patient underwent uneventful off-pump CABG: left

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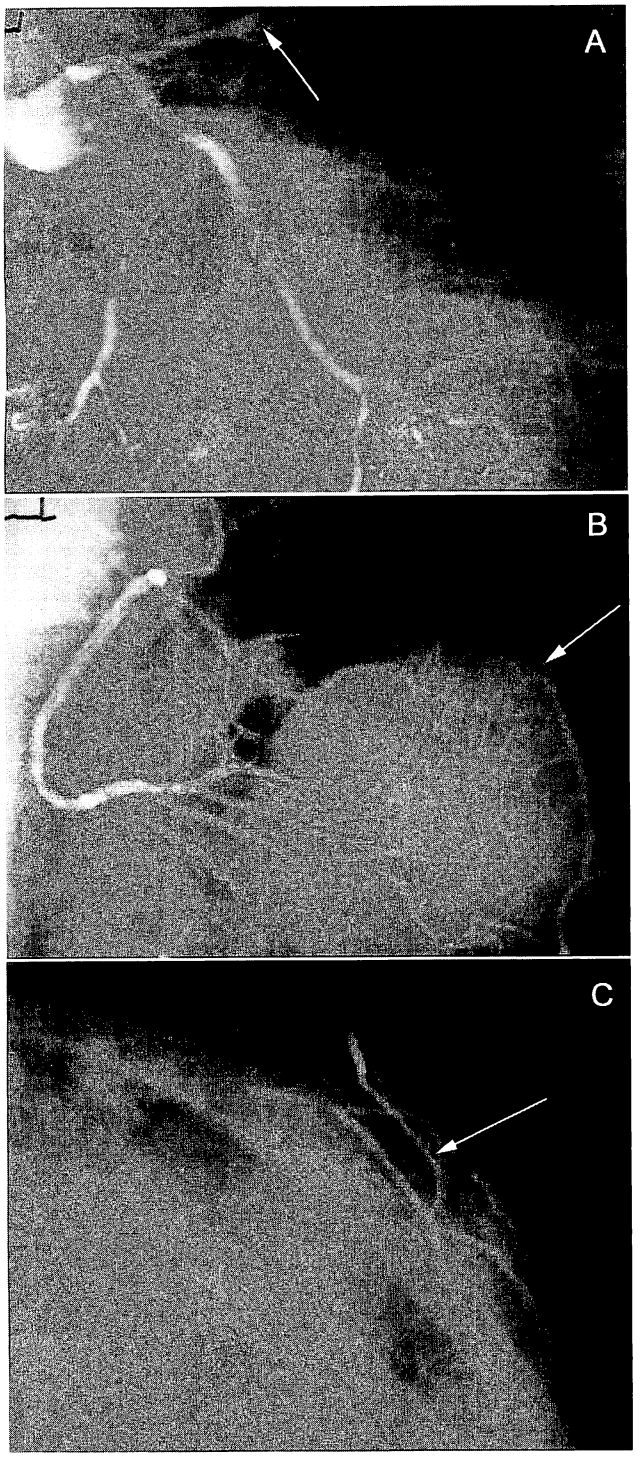

Fig. 1. Coronary angiography. (A) Preoperative left coronary angiography showing a near occlusion (99% stenosis and delayed flow) of the left anterior descending artery (arrow). (B) Preoperative right coronary angiography showing the well-developed collaterals to the distal left anterior descending artery (arrow). (C) Coronary angiography performed 10 days postoperatively showing a good collateral from the left internal thoracic artery (arrow) to the left anterior descending artery.

internal thoracic artery to left anterior descending artery bypass through left anterior minithoracotomy. Intraoperative observations indicated that stenosis of the left anterior descending artery was caused by atherosclerosis. During bypass surgery, systolic blood pressure was constantly kept above 100 mmHg. The time required for anastomosis was about 20 min while the total operation time was 3 h 35 min. There was no perioperative cerebral ischemic episode. Postoperative coronary angiography performed 10 days after bypass surgery showed the patent bypass (Fig. 1C). This patient did not develop either cerebral or cardiac ischemia in the follow-up period of 2 years.

3. Discussion

An association of coronary artery disease and moyamoya disease is rare. Twelve such cases have been reported in the literature [3]. In two such patients, there was no stenosis of coronary arteries. The remaining ten patients had coronary artery stenoses. CABG was performed in two patients with angina pectoris. A 37-year-old hypertensive Japanese man underwent CABG with CPB. Four years later, the patient developed intracerebral hemorrhage due to moyamoya disease [4]. A 38-year-old Indian man developed subarachnoid hemorrhage due to moyamoya disease, which was treated conservatively. Four years later, the patient underwent CABG, probably with CPB, for 95% stenosis of the left main coronary artery ostium and 90% stenosis of the ostium and proximal right coronary artery [5]. Re-attack of angina pectoris required repeated percutaneous angioplasty of the left main coronary artery. Another 9-year-old girl with moyamoya disease underwent repair of an atrial septal defect on CPB [6]. Moyamoya disease, diagnosed at the age of 4 years, was treated conservatively. She was asymptomatic for 3 years prior to the cardiac surgery. No cerebral bypass surgery was performed because of her minimal neurological symptoms at that time. The total CPB time was 17 min. Perfusion pressure was maintained within 10% of baseline with phenylephrine infusion. Pre- and post-CPB cerebral blood flows measured during surgery were 60 and 45 ml/100 g per min, respectively. No neurological deficits were observed postoperatively.

Coronary artery disease in association with moyamoya disease can be caused by coronary artery stenosis, vasospas-

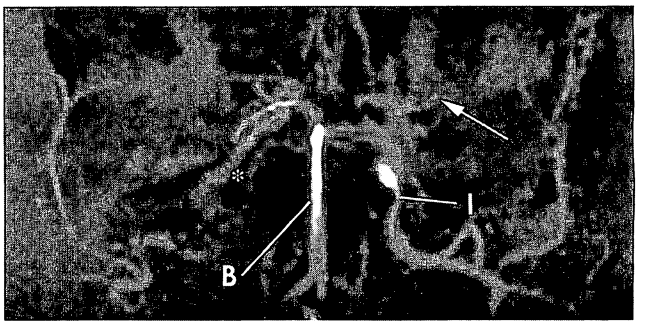

Fig. 2. Magnetic resonance angiography (frontal view) showing the absence of the right internal carotid artery (asterisk) and occlusion of the left middle cerebral artery (arrow). B, basilar artery; I, left internal carotid artery.

tic angina and a microvascular coronary perfusion disorder [3]. Coronary artery stenosis in moyamoya disease may be attributable to either fibrous intimal thickening of the coronary artery similar to the histopathological changes of the intracranial internal carotid arteries or atherosclerosis. Percutaneous angioplasty could be applied to the atherosclerotic vessels, but not to the vessels with a fibrous intimal thickening observed in moyamoya disease because an external diameter of the vessels is usually so small that angioplasty could cause fatal vessel rupture [7].

It is necessary to avoid hypotension during any type of intervention including cardiovascular surgery for patients with moyamoya disease because of inherent hypoperfusion of the brain. CPB is a high-risk procedure for patients with renal failure, severe aortic atherosclerosis, calcified aorta, previous cerebrovascular disease, hematological disease, immunosuppressive state, and peripheral vascular disease. CPB for patients with moyamoya disease is a high-risk procedure because of decreased cerebral perfusion pressure and non-pulsatile flow during CPB. Off-pump surgery is less invasive and provides a more stable cardiovascular status than on-pump surgery. In moyamoya disease, hypotension and hypocarbia may cause a serious reduction of the cerebral blood flow. Extracorporeal CPB may compromise brain circulation by intraoperative hypotension even if the patients have undergone STA-MCA anastomoses. Off-pump CABG can avoid possible complications of the CPB.

In conclusion, for patients with moyamoya disease, MIDCAB (off-pump CABG) is less invasive and avoids possible hypotensive complications of the extracorporeal CPB.

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Negative results – Cardiac general

Use of Cough Lok can predispose to axillary artery thrombosis after a Robicsek procedure

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Abstract

Objective: To present a rare complication of the use of Cough Lok following coronary artery surgery. **Methods**: Case report. **Results**: Report of axillary artery thrombosis following use of Cough Lok. **Conclusions**: Axillary artery thrombosis as a complication related to the use of the Cough Lok belt has not been previously reported. This rare complication was treated with endovascular thrombolysis. Staff awareness is the most important factor for its prevention.

Keywords: Cough Lok; Axillary artery; Robicsek

1. Introduction

Thrombosis of the axillary artery is a rare complication following coronary artery bypass grafting. It has been described most commonly secondary to trauma (fracture of the clavicle or the head of the humerus, penetrating injuries), other orthopaedic injuries (throwing injuries in athletes, isometric exercise), use of armpit crutches or from electric injury [1–6]. We report a case of axillary artery thrombosis related to the use of a Cough Lok belt following sternal rewiring.

2. Case report

An overweight 65-year-old man was admitted to our hospital with unstable angina and left lower lobe pneumonia. Six days later with his chest optimized, he underwent coronary artery bypass grafting (LIMA, left radial, and SVG ×4) which was performed with the use of cardiopulmonary bypass.

One week later he developed sternal dehiscence from persistent coughing which was debrided and closed with a modified Robicsek procedure and irrigated with dilute betadine for 48 h. The chest was then supported externally by using the Cough Lok belt (Fig. 1) (Hawksley Technology, Sussex, UK).

Three days later he developed an acutely ischaemic forearm. Colour duplex and angiography (Fig. 2) showed occlusion at the left axillo-subclavian artery junction. Echocardiographic studies did not identify a cardiac source of emboli and repeated electrocardiogram confirmed sinus rhythm. In addition his coagulation screen revealed no hypercoagulability and there was no low cardiac output syndrome or dehydration at any time.

Following advice from the vascular surgeons he received local intra-arterial thrombolytic therapy via the angiographic catheter for 24 h with rTPA and anticoagulation with an intravenous heparin infusion. Repeat angiogram the next day confirmed lysis of the thrombus with good flow in the brachial artery. It also revealed an underlying 40% stenosis in the third part of the subclavian that was not amenable to angioplasty. Clinically the forearm and hand had recovered fully and the patient was started on long-term oral anticoagulation treatment.

3. Results

Axillary artery thrombosis as a complication related to the use of the Cough Lok belt has not been previously reported.

4. Discussion

It is generally accepted that in order to provide maximum support to the chest the Cough Lok needs to be worn across

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