Case report - Coronary

A new form of coronary subclavian steal syndrome: ‘the spinning wheels’ syndrome

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Abstract

Coronary subclavian steal syndrome refers to decreased or reversed internal mammary artery flow, which causes angina related to severe subclavian steno-occlusive disease in patients with in situ internal mammary-to-coronary artery graft. We report a case, the first in the literature, of a right internal mammary artery-coronary-subclavian unidirectional steal syndrome. Clinical features, pathophysiology, and diagnostic and therapeutic strategies of this unusual adverse event are discussed.

Keywords: Subclavian steal syndrome

1. Introduction

The term ‘subclavian steal’ syndrome has been known since 1961 [1]. It includes arm claudication and neurological symptoms [2].

Use of the left internal thoracic artery as a conduit in coronary artery bypass surgery, in a patient who also has subclavian occlusive disease, can result in coronary ischemia due to flow reversal in the thoracic and anastomosed arteries [3].

2. Report

We report the case of a 73-year-old man, with diabetes and blood hypertension history, operated on, in 1994, for double coronary artery bypass of the left anterior descending artery (LAD) with a pediculated left internal mammary artery and of the right coronary artery with a saphenous vein graft. The outcome was favorable until January 2002 when this patient presented with typical angina pectoris at rest and exacerbated by selective exercise of the left upper limb. At physical examination, the left arm pulses and arterial pressure were weaker than the right ones. An electrocardiogram revealed myocardial ischemia of the anterior territory whilst cardiac enzymes were within normal limits.

Control coronary angiogram revealed patency of both grafts, and lastly the examination brought out a typical aspect of coronary subclavian steal syndrome (Video 1). A stress echography was performed revealing a clear antero-septal ischemia.

A brachiocephalic arteriography revealed a proximal subclavian artery thrombosis, with a left vertebral artery originating directly from the aortic arch. The patient underwent an unsuccessful radiological attempt of recanalization of the subclavian artery.

The patient being symptomatic, we addressed him to the vascular surgeon. The patient benefited from a carotid-subclavian graft with an 8 mm diameter Dacron prosthesis. Postoperative course was uneventful. This allowed recovery of the left radial pulse and complete disappearance of the pectoris angina pains.

Unfortunately, three months after this last vascular operation, the patient became once again symptomatic. A stress echography was performed revealing a clear antero-septal ischemia.

The supraaortic branches echo Doppler confirmed the prosthetic bypass alteration. An attempt to dilate this bypass was unfortunately unsuccessful.

We decided to perform a bypass onto the LAD artery. This was achieved on beating heart with the pediculated right internal mammary artery. Ligation of the left internal mammary artery was not systematically performed to avoid eventual myocardial damage. We therefore decided to evaluate the patient postoperatively and if necessary, an embolization of the left internal mammary artery could be performed.

Unfortunately, after initial improvement of clinical symptoms, the patient presented in 2006 recurrence of angina pectoris symptoms at rest and exacerbated when moving the left upper limb. Coronary artery angiogram control confirmed the patency of the right internal mammary artery.

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artery. Opacification of the proximal LAD and left internal mammary artery in a retrograde way revealed a subclavian steal syndrome aspect with an unusual circular circulation (Fig. 1a–d). In addition, echo-Doppler control of the right internal mammary artery showed its patency with a typical systolic-diastolic flow. It confirmed left internal mammary artery patency with persistence of a transient steal syndrome and a severe systole irrigation in the upper limb and a minimal diastole supplying the LAD/left internal mammary artery bypass. This diastole supplying was completely vanishing when maneuvering blood pressure cuff on the left upper limb.

Cardiac tomoscintigraphy with thallium and dipyridamol was performed since the patient was symptomatic. It corroborated the echo-Doppler results showing, in the early period, antero-septal left ventricular myocardium low uptake. Later, redistribution was partially abnormal, revealing an antero-septal ischemia aspect (Fig. 2a). Thus, we decided to embolize the left internal mammary artery. This operation was carried out successfully. Myocardial scintigraphy performed two weeks after embolization without any therapeutic treatment showed, at an early time, discreet heterogeneous distribution over the antero-septal wall of the left ventricular myocardium, of the 201 Thallium. Later, we observed a completely normal redistribution. It confirmed the disappearance of myocardial ischemia at rest with a clear improvement when compared to the pre-embolization procedure (Fig. 2b).

3. Discussion

Coronary-subclavian steal syndrome refers to decreased or reversed internal mammary artery flow, which causes angina related to severe subclavian steno-occlusive disease in patients with in situ internal mammary-to-coronary artery graft. Occlusion of the subclavian artery is often managed with percutaneous techniques rather than surgery. Revascularization in patients with subclavian disease is usually reserved for patients with exercise-limiting angina pectoris due to coronary-subclavian steal syndrome.

Surgery, with the use of either carotid-subclavian bypass or subclavian-carotid transposition, has a mortality rate of 1–2% [4–6]. Long-term patency rates are higher for transposition compared to bypass [5]. Indeed, we did take this point into account, but transposition requires clamping of the left subclavian artery as well as its branches with the surgical risk of injuring the left internal mammary artery, a myocardial ischemic risk by clamping the left subclavian artery and therefore of the left internal mammary artery. It is also worthwhile emphasizing that transposition is a more technically delicate procedure than grafting, especially in this stout patient.

This clinical observation is of great interest. It shows and describes for the first time a circling anatomical aspect of the right internal mammary artery-coronary-subclavian unidirectional steal syndrome. It could be called the ‘Spinning Wheels’ syndrome!

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References


