Case report

Radial artery graft vasospasm

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Abstract

We report an unusual case of vasospasm of a grafted radial artery complicated with ventricular fibrillation during the postoperative course of coronary artery bypass graft surgery. To our knowledge this is the first documented case of a radial artery graft spasm leading to a severe arrhythmia. The arrhythmia resolved spontaneously. Radial artery graft spasm was demonstrated by angiography and was successfully resolved by intravenous nitroglycerin administration.

Keywords: Radial artery graft; Coronary artery bypass grafting; Vasospasm

1. Introduction

Radial artery is being applied with increasing frequency in coronary artery bypass surgery. The use of this artery, (to left circumflex and right coronary arteries territories) in association with left internal mammary arteries to the left anterior descending territory permits a total myocardial revascularization with excellent mid-term results [1].

2. Clinical case

A 48-year-old man was admitted to our institution with coronary artery disease in September, 1999. He had new onset angina pectoris. He began with dyspnea 1 month prior to admission. On admission his pulse was 90/min and blood pressure was 150/90 mmHg. Physical examination was unremarkable. He had positive exercise treadmill and stress thallium-201 scintigraphy tests. His coronary angiography showed severe stenosis of the major coronary epicardial arteries (left anterior descending, first diagonal branch, two left circumflex posterolateral branches and right coronary arteries). He underwent coronary artery bypass graft surgery. Bilateral internal mammary arteries ‘in situ’ grafts for the left anterior descending and right coronary arteries respectively, and a radial artery graft emerging in ‘T’ from the left internal mammary artery, as described by Tector [2], anastomosed end-to-side to the first diagonal and two left circumflex branches were performed. Intravenous Diltiazem (doses: 1 μg/kg per min) was started during surgery and maintained by continuous intravenous infusion during the first 24 h; he was not receiving other vasoactive medication. Within the first 24 h of the postoperative period, during sleep, he developed myocardial ischaemia with ST-segment elevation (Fig. 1A). A few minutes later the electrocardiogram showed a progressive widening of the QRS complex and ventricular fibrillation (Fig. 1B). The arrhythmia resolved spontaneously. MB creatine kinase, cardiac troponin I, potassium and oxygen blood levels were within normal ranges. An urgent coronary angiography was performed in order to determine graft patencies. Internal mammary artery grafts were patent and a radial artery graft spasm was demonstrated (Fig. 2) that was successfully resolved by intravenous nitroglycerin administration (Fig. 3). Nitroglycerin was continued by intravenous infusion for 48 h, thereafter Isosorbide 5-mononitrate (40 mg daily) were given orally until discharge of the patient. After this episode the evolution was uneventful and at discharge a normal dipyridamole-Thallium Scintigraphy radionuclide test was normal.

3. Discussion

In our institution the radial artery is used to increase the number of arterial grafts in order to achieve a total arterial
revascularization in patients undergoing multivessel coronary artery bypass graft surgery [3]. On account of the larger thickness of its muscular layer as compared with other arteries of similar size, the radial artery is prone to develop spasm in response to mechanical stimuli [4].

In order to avoid spasm, calcium-channel blockers, such as diltiazem, are routinely administered. They are given intraoperatively and continued postoperatively at a dose of 60 mg three times per day orally.

Because adverse effects (hypotension, bradycardia, heart failure) Diltiazem had to be discontinued in 20% of the patients [1]. In our previous series of 1023 patients with RA graft we have documented vasospasm of the implanted artery, either clinically or angiographically, in less than 5% of patients.

To our knowledge this is the first documented case of a radial artery graft spasm, leading to a severe arrhythmia, successfully resolved by intravenous nitroglycerin administration.

Diltiazem, a drug employed empirically to prevent radial artery vasospasm, had little effect on our patient. This result is supported by recent evidence claiming that Nitroglycerin is a superior vasodilator and is more effective in preventing graft spasm than Diltiazem [5]. In addition, recently, in a comparative study on the effect of calcium channel antagonists in the amelioration of radial artery vasospasm in isolated radial artery segments, it was shown that Diltiazem was not effective to reduce endothelin or epinephrine-developed spasm, as compared with other calcium channel blockers, such as amlodipine and nifedipine [6]. It can be

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**Fig. 1.** (A) Electrocardiogram (Telemetry) showing a progressive widening of the QRS complex with ST segment elevation. (B) A few minutes later the patient developed ventricular fibrillation (Telemetry).

**Fig. 2.** Cineangiography showing the radial artery graft vasospasm (arrows) emerging of the left internal mammary artery anastomosed to a lateral branch of the left circumflex artery.

**Fig. 3.** Cineangiography after intravenous nitroglycerin administration showing resolution of the artery graft vasospasm.
speculated that in the future the clinical application of gene therapy, such as transfer of endothelial nitric oxide synthase genes, may play an important role in prevention of radial artery vasospasm [7].

However, unresolved issues, such as the importance of pathological changes in the grafted artery and the efficient prevention of spasm, lurk in the background.

References


