

# Surgical removal of stent from multiply stented vessel: problem with choice of place for anastomosis — one year follow-up

Chirurgiczne usunięcie stentu z wielokrotnie stentowanego naczynia: problem z wyborem miejsca zespolenia — 12-miesięczna obserwacja

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## Abstract

Since the advent of percutaneous coronary intervention there have been increasing numbers of patients with so-called ‘full metal jacket’ coronary arteries disease. This is creating a challenging problem for the cardiac surgeon. A 73 year-old woman after the implantation of two metal stents to the left anterior descending artery (LAD) and four to the right coronary artery (RCA), with ejection fraction of 28%, significant mitral and tricuspid insufficiency, and high systolic pulmonary pressure, was admitted to our department with unstable angina and with symptoms of pulmonary oedema. Coronary angiogram revealed restenosis in all stents. She agreed to a coronary artery bypass graft (CABG) with mitral and tricuspid valve reconstruction. The RCA was opened just above the postero-lateral branch. Due to lack of space, the metal stent was removed and saphenous bypass graft performed. Six months later, control angiography showed a properly working LITA–LAD graft; the stents in the RCA had been occluded above anastomosis and the venous graft to RCA had been stenosed. Percutaneous cardiac intervention was performed and the metal stent was implanted with good early effect. After a further six months, coronarography revealed in stent stenosis in the place of venous anastomosis. The patient was qualified for conservative treatment. Long term results after such procedures are hard to predict; we believe patients should be qualified earlier for CABG and that doctors should avoid implanting too many stents into one artery.

**Key words:** stent removed, stent restenosis, coronary artery bypass graft

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## INTRODUCTION

Since the advent of percutaneous coronary intervention (PCI), the number and frequency of these procedures have been rapidly increasing worldwide. Surgeons can expect to confront this problem with increasing frequency, with about 20% of patients with previous PCI requiring subsequent coronary artery bypass graft surgery (CABG). More importantly, an increasing number of patients with ‘full metal jacket’ diseased coronary arteries are being referred for CABG and are creating a challenging problem for the cardiac surgeon.

## CASE REPORT

A 73 year-old woman with a history of three acute coronary syndromes (ACS), insulin-dependent diabetes mellitus, sig-

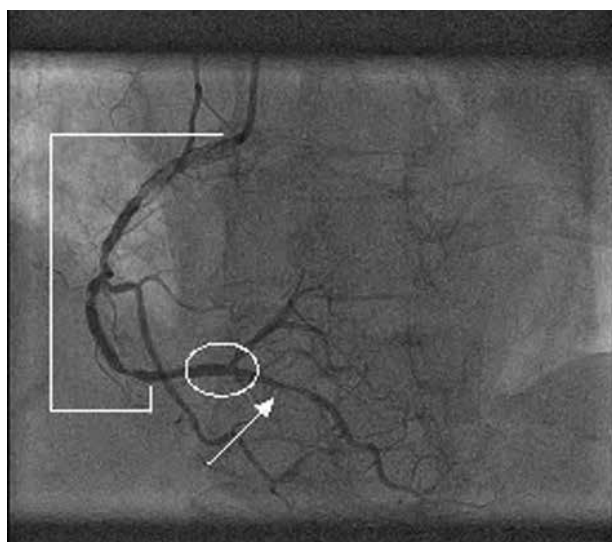
nificant left ventricular insufficiency with an ejection fraction (EF) of 28%, significant ischaemic mitral insufficiency (grade 4), concomitant tricuspid valve insufficiency (grade 4), and high systolic pulmonary pressure (98 mm Hg), was admitted to our department with unstable angina and with symptoms of pulmonary oedema. Four months previously she had ACS due to occlusion of the left anterior descending artery (LAD) and two metal stents were implanted. After three days, she developed pulmonary oedema and had coronarography with angioplasty of the right coronary artery (RCA) with implantation of four metal stents. Recessive circumflex artery had been occluded without the presence of collateral circulation. The patient did not agree to an operation. After another eight weeks she was admitted to the hospital again due to ACS and

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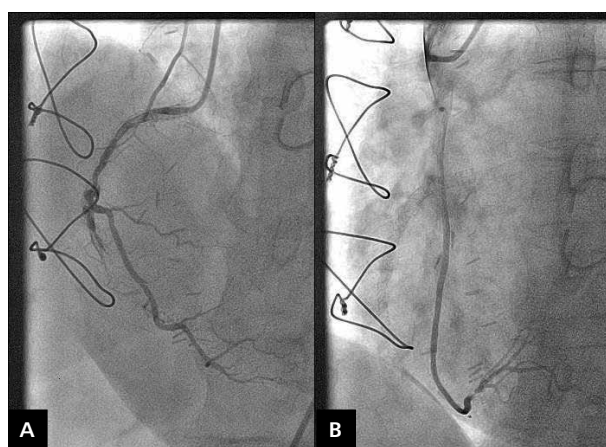
**Figure 1.** Right coronary artery before coronary artery bypass grafting; we have marked the place of anastomosis (circle) and the place where the stent had been removed (arrow) and the stented area (bracket)

had balloon angioplasty of LAD due to stent restenosis. During this time, EF had decreased from 42% to 28%. Heart ultrasound confirmed significant mitral valve regurgitation with dilated annulus and restrictive posterior leaflet and tricuspid insufficiency. Additionally there had been hypokinesia of the apico-septal and postero infero lateral segments. Following the last admission to hospital, she agreed to a CABG with mitral and tricuspid valve reconstruction. A coronary angiogram confirmed diffuse three-vessel disease with restenosis in all stents implanted in LAD and RCA (Fig. 1). The patient, in a stable condition and without any symptoms of either pulmonary oedema or changes in electrocardiogram, was taken to the operating theatre. Via median sternotomy, the left internal thoracic artery (LITA) was harvested in a skeletonised fashion. The saphenous vein was also harvested. Cardiopulmonary bypass was established using standard aortic and two venous cannulas. The patient was operated upon in mild hypothermia of 32°C. After aortic cross clamping and antegrade cold crystalloid cardioplegia infusion, cardiac arrest was obtained. LITA to LAD anastomosis was performed. RCA was opened just above the postero lateral branch. Due to lack of space, a metal stent was removed (Fig. 2).

Venous anastomosis was performed in the place of the removed stent. We performed mitral valve under sizing with 26 Carpentier Edwards classic ring, and tricuspid valve anuloplasty modo Revuelta. The patient was discharged from hospital nine days post surgery. Six months after the surgery, the patient did not present any stenocardial symptoms, with NYHA I/II. The patient was re-admitted to the hospital due to control RCA and the place of anastomosis. Angiography revealed a properly working LITA–LAD graft, the



**Figure 2.** Removed stent



**Figure 3.** **A.** Occlusion of the right coronary artery (RCA) in stented place; **B.** In-stent stenosis in the place of venous anastomosis and occlusion of posterior descending branch of RCA

stents in RCA had been occluded above anastomosis and the venous graft to RCA had been stenosed in the place of anastomosis. Percutaneous cardiac intervention was performed and a metal stent (2.5–12 mm) was implanted with good early effect. After six months, the patient was admitted to hospital once again. Coronarography revealed in-stent stenosis in the place of venous anastomosis and occlusion of the posterior descending branch of the RCA (Fig. 3). Heart ultrasound revealed good effect of both valves repair, with EF increasing to 44%. The patient was qualified for conservative treatment.

## DISCUSSION

Intracoronary stenting has been shown to provide a valuable nonsurgical approach to the management of acute complications of failed balloon angioplasty and to reduce the rate of restenosis compared to PCI. Coronary in-stent stenosis remains a challenge for both cardiologists and cardiac surgeons. The most commonly used technique for in-stent stenosis is still PCI, but the reoccurrence rate is very high and long-term efficacy is unsatisfactory. Stenting a diffusely diseased vessel because

of in-stent stenosis increases the stented segment length, and a 'full metal jacket' segment is an independent predictor of stenosis. The problem of excess neointimal proliferation associated with in-stent restenosis was quickly recognised as a major drawback responsible for the reoccurrence of angina and the need for CABG in many clinical trials [1, 2]. Drug-eluted stents were developed to address the need to inhibit excessive neointimal proliferation and stent failure [2]. But drug-eluted stents soon showed a typical mode of failure with even more serious consequences than a conventional metal stent because of acute thrombosis [3]. For this reason, it has been recommended to prolong antiplatelet treatment for at least one year, if not for life [3, 4]. It is clear that PCI is far from a panacea, especially in complex subsets such as patients with poor left ventricular function, diabetes, diffuse triple vessel disease, tortuous coronaries and left main disease [1, 5]. Patency rates of multiple in-series stents tend to be low because the risk of failure of each stent has to be considered along with that of the others.

In the presented case, due to the dynamic development of symptoms we did not perform a stress echo to check the viability of the myocardium and did not check intracoronary blood flow. We assume that implanting four stents to the RCA might have damaged small branches which decreased the blood flow and slowed down the flow of the contrast, which was visible on the coronarography. Damage to the endothelium after stent removal, narrow vessel and reduced blood flow caused stenosis in the place of venous anastomosis. Re-

implantation of the stent caused restenosis rapidly. Literature reveals a small group of patients who have experienced stent removal. The long term results after such procedures are hard to predict. For this reason, we believe that patients should be qualified earlier for CABG and doctors should avoid implanting so many stents into one artery [6, 7].

**Conflict of interest:** none declared

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