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Case report

Subclavian artery stenosis: An unusual cause of periprocedural myocardial infarction following the surgical myocardial revascularization

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ABSTRACT

The introduced case report explains the atypical periprocedural myocardial infarction following the surgical myocardial revascularization. 60-year-old man has undergone the coronary bypass surgery with arterial graft of left mammary artery (LIMA) to left anterior descending artery (LAD) and venous graft to posterior interventricular branch of right coronary artery. Early in the post-surgery period a perioperative myocardial infarction (PMI) developed, with laboratory correlation of cardio-specific enzymes elevation and ECG changes in terms of ischaemia in the diaphragmatic region. Echocardiography showed akinesia of the apex, apical septal and apical inferior segments accompanied by the decrease in ejection fraction (EF) of the left ventricle. Selective coronarography was performed showed the proper functionality of arterial as well as venous graft, however, examination also showed severe stenosis of the left subclavian artery (LSA) with limitation of flow through LIMA. Percutaneous angioplasty of the LSA and implantation of the stent was performed in the emergency regime with optimal results. In severe stenosis of the LSA, the progression of the so-called coronary-subclavial steal syndrome is developed, with retrograde flow into LIMA resulting in ischaemia of the supplied part of the myocardium. Nevertheless, steal phenomenon with reverse flow in LIMA is not an absolute requisite for development of the myocardial ischaemia. In some cases stenosis of the LSA manifests in similar fashion as the proximal stenosis of LIMA, which was the case of with the patient shown here.

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Introduction

Perioperative myocardial infarction (PMI) associated with the surgical revascularization (CABG) occurs in about 3–5% of patients. Myocardial necrosis and ischaemia after CABG are caused by direct cardiac trauma from manipulation, reperfusion injury, incomplete revascularization, hypotension, bleeding, ventricular arrhythmia, acute graft closure, inadequate perioperative myocardial protection and others [1].

Myocardial infarction associated with CABG (ESC type 5) is arbitrarily defined as an elevation of serum troponin T (cTnT) above 10 times the upper limit of normal (ULN) within the first 48 h following the CABG procedure, with the simultaneous occurrence of (a) new pathological Q waves or new LBBB; (b) angiographic documented new graft or new native coronary artery occlusion; (c) imaging evidence of new loss of viable myocardium or new regional wall motion abnormality [2].

The left internal mammary artery (LIMA) is the preferred graft for surgical revascularization of left anterior descending artery (LAD). Long-term observational studies have demonstrated better long-term patency, reduced incidence of late recurrent ischaemia and better long-term survival of patients with arterial graft compared with venous graft [3,4]. Increased use of LIMA and right internal mammary artery (RIMA) in coronary bypass surgery is associated with a higher incidence of the so-called coronary-subclavian steal syndrome (CSSS), significant stenosis or closure of subclavian artery with retrograde blood flow through the LIMA. A typical manifestation of this syndrome is recurrent ischaemia or angina in spite of the complete surgical myocardial revascularization.

The introduced case report explains the case of patient with perioperative myocardial infarction associated with CABG, which developed on the grounds of a significant stenosis of subclavian artery.

Case report

A 60-years-old male, ex-smoker, with history of arterial hypertension, coronary heart disease and hypercholesterolemia was admitted to our department. Patient underwent anterior wall myocardial infarction (03/2002) and coronary artery stent implantation was performed into the LAD (10/2002 and 12/2012). The patient was initially admitted to the Department of Cardiology, VÚSCH a.s. for unstable angina (UA). Selective coronary angiography (SCA) revealed three vessel coronary disease with 80% in-stent restenosis in proximal segment of LAD. Echocardiography showed preserved left ventricular systolic function (LVEF 60%), with no regional wall motion abnormalities, and no haemodynamically significant valvular disease. During the hospitalization patient was cardiopulmonary compensated, normotensive, with cardiospecific enzymes within the normal range. Due to the nature of coronary artery disease the patient was indicated for surgical revascularization (CABG). Preoperative haemoglobin level was 12.6 g/dL.

On 07-AUG-2015 coronary artery bypass graft surgery was performed (LIMA to LAD, saphenous venous graft to posterior interventricular branch of right coronary artery) under cardiopulmonary bypass (CPB). Due to inappropriate anatomical condition of the left circumflex artery (LCX), grafting of the LCX was not performed. During the weaning from CPB no complication nor significant ECG changes were noted. Within the first 24 h after the operation a significant elevation of cardiospecific enzymes was recorded. A subtle ST segment elevations (up to 1 mm) in leads II, III and aVF were present on the ECG in the early morning on the first postoperative day. Echocardiography examination was subsequently performed with the finding of left ventricle EF decreased to 45–50%, with new akinesia of apex, apical septal and apical inferior segments. The peak values of cardiospecific enzymes were registered on the first postoperative day (cTnT 4.0 μg/L, CK 11.34 μkat/L, CK-MB 1.49 μkat/L). Haemoglobin value on the first postoperative day was 9.0 g/dL. The patient was cardiopulmonary compensated, with no need for inotropic and vasopressor support, chest pain was not present. During the bed-side ECG monitoring, sinus rhythm at a frequency of 70–80 BPM was registered, no significant arrhythmias were detected. The follow-up ECG documented the development of Q wave in leads III and aVF. The condition was evaluated as perioperative myocardial infarction (ESC type 5).

Selective coronary angiography performed in emergency regime (within the 1 h after echocardiography examination) showed the proper functionality of arterial, as well as venous graft, however, an eccentric stenosis of the left subclavian artery (LSA) with limitation of flow of contrast medium through LIMA was noted during the examination. Immediately after the SCA examination, arteriography was performed by angiologist with the result of haemodynamically severe stenosis in the proximal segment of LSA (80–90% stenosis), with no reverse flow in LIMA (Fig. 1). Percutaneous angioplasty of the LSA and implantation of the stent (Isthmus 8 mm × 29 mm) was performed via a femoralis with optimal result (Fig. 2). Due to oligoanuria following the intervention, patient temporarily underwent continuous venovenous haemodialysis (CVVHD). The supposed reason for the decrease in renal function was combination of double administration of contrast agent (SCA and percutaneous angioplasty of LSA) and long-term history of arterial hypertension (suspected hypertensive nephrosclerosis). No signs of inadequate global oxygen delivery were noted (lactate values, as well as oxygen saturation levels were within the normal range). Control laboratory parameters showed decrease in cardiospecific enzymes and gradual decrease of renal parameters. Follow-up

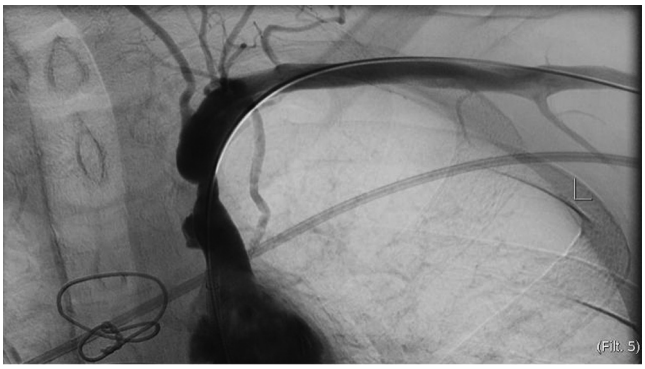

Fig. 1 – Haemodynamically significant stenosis of LSA.

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