Anterior ST-elevation myocardial infarction after Excimer laser extraction of defibrillator leads

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Summary
We describe a case of a so far unknown complication after failed extraction of defibrillator leads. Perforation of the LIMA bypass caused by Excimer laser created an arterio-venous fistula from the proximal bypass to the superior subclavian vein and occlusion of the distal LIMA bypass with consecutive anterior ST-elevation myocardial infarction.

Key words: Excimer laser extraction; defibrillator leads; myocardial infarction; arterio-venous fistula; aortocoronary bypass

Case report
A 60-year-old woman was admitted to our hospital for replacement of broken defibrillator leads. The patient was known to have ischemic heart disease since a medically treated inferior myocardial infarction in 1985. In early 1996, coronary bypass surgery was performed with implantation of a LIMA to LAD and RIMA to RCA graft. A single chamber defibrillator was implanted at the left pectoral region in late 1996 for non-sustained ventricular tachycardia and persistent low left ventricular ejection fraction. In 1998, an isolation defect of the defibrillator leads was diagnosed and new leads were implanted. The original lead could not be removed and was left in place. In 2007, a coronary angiogram documented open LIMA to LAD and RIMA to RCA grafts. Native LAD and RCA were both chronically proximally occluded.

After repeated inadequate shock deliveries occurred in late 2010 because of electrical artefacts produced by the patient’s arm movement, defibrillator lead malfunction was diagnosed and the patient was sent for lead replacement. The Excimer laser extraction technique was attempted on both right ventricular leads, but the cleaning guide wire could not be advanced more than 20 cm and both leads could not be removed. Finally, a third ventricular lead and a new single chamber ICD were implanted through the right subclavian vein. During the procedure, a short fall in blood pressure was noticed and successfully treated with a single bolus of 250 ml of pure saline. After extubation, the patient instantaneously complained about severe chest pain and ECG showed new ST segment elevation of the anterior wall. An immediately performed angiogram showed arterio-venous fistula between the proximal LIMA bypass and the superior subclavian vein and occlusion of the distal LIMA bypass (fig. 1). Due to the anatomical proximity, the laser had probably perforated the vein, “cutted” the LIMA-graft and created a connection between LIMA and the left subclavian vein. Several attempts to reopen the distal LIMA bypass percutaneously were unsuccessful. Finally, the arterio-venous fistula was coiled with a 4×6 mm Amplatzer® vascular plug to prevent persistent left to right shunt and consecutive volume overload (fig. 2). An intra-aortic balloon pump was placed and used for 24 hours after the procedure. Thereafter the patient remained haemodynamically stable. Repetitive blood samples showed a relevant CK peak of 2993 U/l on day two after the LIMA occlusion and a decline of left ventricular ejection fraction measured in echocardiography from 38% pre-operatively to 22% short after the infarction. After an uneventful observation period, the patient was sent to ambulatory cardiac rehabilitation seven days later with only mild symptoms of heart failure.

Discussion
Extraction of defibrillator leads is a frequently done procedure in patients with infected or broken pacemaker leads. Recent publications point out that 40% of lead extractions are for non-infective reasons [1, 10]. Lead removal of non-infected leads that do not interfere with the operation of implanted cardiac devices is
a Class II indication according to a recent statement by the American Heart Association [11]. For successful and safe lead extraction, several factors are needed: patients have to be selected carefully, procedures should be performed by experienced operators and a stage-to-stage approach with respect to the technical complexity is recommended (starting with manual traction, using specialised tools, up to laser extraction). Using Laser assistance, extraction of defibrillator leads may nowadays be performed in >95% of the cases [1–8]. Although Excimer laser lead extraction is considered to be safe and mortality remains low (<1%), major complications such as ventricular perforation, tricuspid valve insufficiency or severe pleural bleeding after rupture of the subclavian vein occur in 1–3% of the procedures [1–8].

We describe the first case of an arterio-venous fistula between LIMA and the superior subclavian vein with subsequent closure of the distal LIMA bypass and anterior ST-elevation infarction. Our case demonstrates that life-threatening complications do occur and non-infected leads should not be removed on a regular base [9]. We believe that indication for lead extraction should be set very conservatively, especially in patients with anatomically close arterial bypasses.

Figure 1
Arterio-venous fistula (orange arrow) from proximal LIMA (green arrows) to the superior subclavian vein (red arrows). Occlusion of the distal LIMA to LAD bypass (blue arrows).

Figure 2
Proximal occlusion of the LIMA with an Amplatzer vascular plug (green arrow).

References
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