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CASE REPORT

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Left atrial appendage occlusion device causing coronary obstruction: A word of caution

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Abstract

Closure of the left atrial appendage is a common procedure for patients with atrial fibrillation undergoing cardiac surgery. The technique of left atrial appendage occlusion (LAAO) by an extracardiac clip (AtriClip) is established as a reliable method. Acute coronary obstruction of the circumflex artery has already been described after minimally invasive LAAO. Here, we report a case of delayed circumflex artery obstruction after open-heart surgery. A patient who had mitral and tricuspid valve surgery in combination with AtriClip implantation suffered from myocardial infarction 24 h after clip implantation. Cardiac catheterization showed that the circumflex artery was obstructed on the level of the AtriClip device. The stenosis was treated by percutaneous coronary intervention with stent implantation. In conclusion, the surgeon should consider placing the AtriClip device slightly far away from the base of the left atrial appendage to avoid coronary obstruction.

KEYWORDS
cardiac complications, coronary artery stenosis, left atrial appendage occlusion, NSTEMI

1 | INTRODUCTION

In accordance to the local guidelines of the ethics commission, no ethical application is needed for this retrospective case report. Institutional Review Board approval, consent statement, and clinical trial registration were not required.

Left atrial appendage occlusion (LAAO) is recommended for patients with atrial fibrillation undergoing elective cardiac surgery.[1] Studies are reporting excellent outcomes for the AtriClip LAAO device without major device-related complications in several clinical trials.[2] Here, we report the first case of delayed severe coronary artery stenosis with NSTEMI after implantation of the AtriClip device during open-heart surgery with sternotomy.

2 | CASE REPORT

We report the case of a 79–year-old patient with severe eccentric mitral valve insufficiency with pseudo prolapse of the anterior mitral valve leaflet, moderate tricuspid valve insufficiency, and paroxysmal atrial fibrillation. He was admitted to the hospital due to progressive dyspnea NYHA III. The ejection fraction (EF) of the left ventricle was slightly reduced (50%) and the left atrial appendage was free of thrombi. A cardiac catheterization indicated a coronary heart disease without hemodynamic significant stenosis. In summary of the findings, the decision for mitral and tricuspid valve surgery with concomitant LAAO was made. Due to the increased age and frailty of the patient, we decided to use an AtriClip device instead of amputation and closure of the left atrial

FIGURE 1 (A) Preoperative coronary angiography without stenoses. (B) Postoperative coronary angiography. The arrow indicates the stenosis of the circumflex artery. (C) Stenosis from another angle compared to (B). CAU, Caudal; CX, circumflex artery; LAD, left anterior descendent artery; RAO, right anterior oblique; *, AtriClip device; +, mitral annuloplasty ring; #, tricuspid annuloplasty ring

appendage (LAA) with a running suture to minimize the risk of bleeding.

The operative course was uneventful. After full sternotomy, the base of the LAA was measured and an AtriClip device (AtriCure PROV50, 50 mm) was implanted. Annuloplasty of the mitral valve (LivaNova Memo 4D, 34 mm) and tricuspid valve (Edwards Physio tricuspid annuloplasty ring, 34 mm) were performed. Proper valve function without insufficiency was confirmed by transesophageal echocardiography. After weaning, the patient was awake and hemodynamically stable. An electrocardiogram showed a third-degree atrioventricular block, and blood levels of creatine kinase (CK) were within the normal range (CK: 2.22 µmol/s•L; CK-MB: < 0.4 µmol/s•L).

On the first postoperative day, an increase of serum CK to 13.5 µmol/s•L and CK-MB to 3.06 µmol/s•L (22.7%) indicated myocardial ischemia. In transthoracic echocardiography, the EF was reduced to 30%, and the patient was transferred to emergency cardiac catheterization. Here, stenosis of the left circumflex coronary artery (CX, 90%) was detected (Figure 1B,C) and the patient was referred to percutaneous coronary intervention (PCI).

A drug-eluting stent was implanted successfully into the affected coronary artery (Medtronic Synsiro, 4 × 15 mm; Figure 2). The further course on the ICU was uneventful.

The serum CK levels decreased 6 h after PCI and normalized after two more days. The patient was discharged for rehabilitation 14 days after operation. At demission, the EF increased slightly to 35%.

3 | DISCUSSION

The use of the AtriClip has been described as a safe procedure for LAAO. Only two cases of LAAO and circumflex artery occlusion have been reported, but both were recorded after thoracoscopic LAAO, where the overview of the anatomical structures can be compromised.[3] As the CX is one of the LAA neighboring structures, occlusion is possible[4] and CX stenosis following LAAO with percutaneous devices has been reported previously.[5] Here, the occlusion occurred with a 24 h delay after open-heart surgery, where the visibility of the anatomical structures is excellent, and misplacement of the clip with following entrapment of the CX due to compromised overview seems unlikely. The true reasons for the delayed occlusion remain speculative. It seems unlikely that a ring suture has caused the problem because the ischemia occurred delayed and not immediately after surgery. Edema on the site of AtriClip implantation may explain the delayed CX occlusion. Local

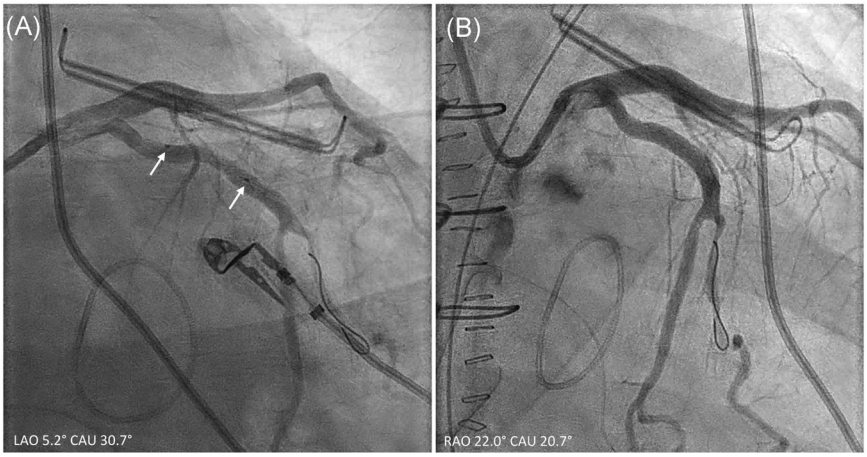

FIGURE 2 (A) Arrows indicating the proximal and distal radiopaque marker during stent implantation in the circumflex artery. (B) Result after stent placement without remaining stenosis

edema is known to occur after cardiac surgery, especially after valve surgery, and responsible for disorders of the conduction system. We suppose that the combination of both the rigid ring and the clip may have caused edema in the tissue between the mitral valve annulus and the LAA, leading to kinking of the CX and delayed coronary stenosis. In case of LAAO with a clipping device and concomitant mitral valve annuloplasty, the surgeon should consider placing the AtriClip slightly far away from the base of the LAA, without leaving a pouch. Additionally, cortisone pulse therapy could reduce local edema.

4 | CONCLUSION

AtriClip implantation in combination with mitral valve surgery can be followed by local edema with resulting stenosis of the circumflex artery. Therefore, the surgeon should consider placing the clip slightly far away from the base of the LAA.

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CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

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REFERENCES

1. Martin Gutierrez E, Castano M, Gualis J, et al. Beneficial effect of left atrial appendage closure during cardiac surgery: a meta-analysis of 280 585 patients. *Eur J Cardiothorac Surg*. 2020;57(2):252-262.
2. Toale C, Fitzmaurice GJ, Eaton D, Lyne J, Redmond KC. Outcomes of left atrial appendage occlusion using the AtriClip device: a systematic review. *Interact Cardiovasc Thorac Surg*. 2019;29(5):655-662.
3. Chaldoupi SM, Heuts S, Vainer J, Maesen B. Surgical options to tackle coronary artery kinking in thoracoscopic left atrial appendage clipping. *Ann Thorac Surg*. 2020;110(2):e119-e121.
4. Lindner S, Behnes M, Wenke A, et al. Relation of left atrial appendage closure devices to topographic neighboring structures using standardized imaging by cardiac computed tomography angiography. *Clin Cardiol*. 2019;42(2):264-269.
5. Katona A, Temesvari A, Szatmari A, Nemes A, Forster T, Fontos G. Left circumflex coronary artery occlusion due to a left atrial appendage closure device. *Postepy Kardiol Interwencyjnej*. 2015;11(1):69-70.

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