

A rare case of iatrogenic retrograde coronary dissection spreading antegradely during coronary angiography: emergency revascularization

Elif Coşkun¹, Mustafa Büyükkateş¹, Ziyaeddin Aktop²

Received: July 25, 2015 Accepted: September 29, 2015 Published online: October 26, 2015

ABSTRACT

Herein, we report a 66-year-old male case with critical stenosis due to catheter-induced dissection during percutaneous coronary intervention. During the insertion of a stent to the critical stenosis in the circumflex branch, a retrograde dissection was detected in the circumflex branch proceeding to the left main coronary artery.

Keywords: Coronary dissection; emergency revascularization; percutaneous coronary intervention.

The incidence of iatrogenic aortocoronary dissection during percutaneous coronary intervention (PCI) has been reported approximately 0.1%.^[1] Although rare, it may have catastrophic consequences due to rapidly impaired antegrade coronary blood flow as a result of unpredictable nature of the dissection flap.^[2] Therefore, an urgent revascularization strategy should be considered as the appropriate approach in such cases. Herein, we report a case of cardiogenic shock caused by iatrogenic coronary dissection and treated by urgent revascularization. We present this case due to its rarity in the literature.

CASE REPORT

A 66-year-old man (70 kg, 165 cm, body surface area: 1.77 cm²) was admitted to our hospital's emergency department for sudden-onset chest pain and nausea. His medical history was specific for an appendectomy operation and bronchitis. He had several risk factors for coronary artery disease including smoking, untreated hypertension, and hyperlipidemia. On admission electrocardiography (ECG) demonstrated signs of acute inferior myocardial infarction (MI) changes and his troponin level was 0.14 ng/Lt. He was diagnosed with acute coronary syndrome and brought to angiography laboratory for coronary angiography using a 7F diagnostic catheter via transfemoral approach. The angiogram showed a normal left main coronary artery, a 30-40% stenosis at the ostium of the left anterior descending artery (LAD), a 60-70% stenosis in the first diagonal branch (D1) of LAD, a 50% LAD stenosis after D1, and diffuse luminal irregularities

in LAD, a 70% stenosis in obtuse marginal 2 (OM2) branch, complete occlusion of circumflex artery (Cx) after OM2 branch; and a 30-40% stenosis in the right coronary artery (RCA) after its right ventricular (RV) branch (Figure 1). During stent placement to the critical stenosis of the circumflex artery via transfemoral approach using a Judkins catheter (Launcher, Medtronic, Minneapolis, USA), a circumflex artery dissection occurred and progressed retrogradely to the left main coronary artery from where it extended antegradely to the mid-portions of the left anterior descending artery (Figure 2). The patient's chest pain was intensified and he rapidly developed cardiogenic shock. An urgent coronary artery bypass grafting (CABG) was performed via standard median sternotomy. Intraoperatively, the patient's heart was globally edematous with depressed ventricular functions. Following intravenous heparinization and rapid cannulation, cardiopulmonary bypass (CPB) was initiated to bypass OM artery, first diagonal artery (D1), second diagonal artery (D2), and LAD artery with a saphenous vein. The patient was only able to be removed from the CPB under dopamine, epinephrine, and intra-aortic balloon pump (IABP-intra-aortic balloon pump, Maquet, USA) support. Pump time and cross-clamp time were 159 and 69 min, respectively.

Departments of ¹Cardiovascular Surgery, ²Cardiology, Medical Faculty of Bülent Ecevit University, Zonguldak, Turkey

Corresponding author: Elif Coşkun, MD. Bülent Ecevit Üniversitesi Tıp Fakültesi Kalp ve Damar Cerrahisi Anabilim Dalı, 67600 Esenköy, Kozlu Zonguldak, Turkey.

Tel: +90 372 - 261 20 02 e-mail: drelfco@gmail.com

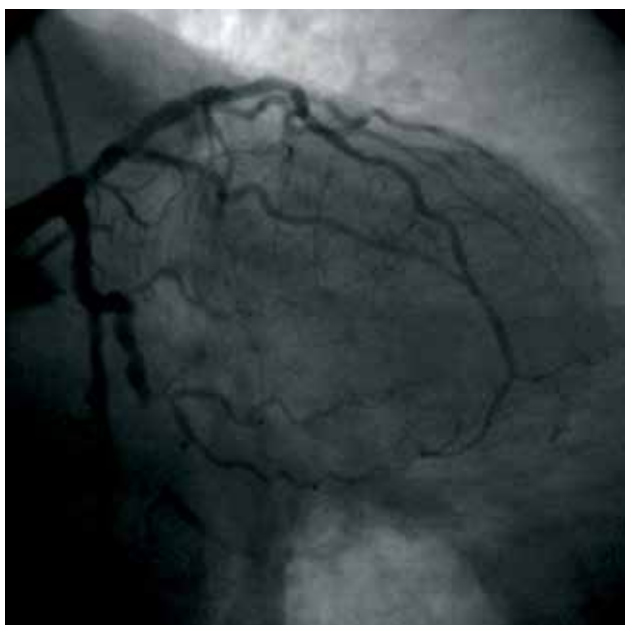


Figure 1. The angiographic view of the circumflex artery.

The patient was hemodynamically stable and was admitted to the surgical intensive care unit. He was extubated on postoperative second day and discharged on postoperative seventh day.

DISCUSSION

The incidence of iatrogenic aortocoronary dissection during percutaneous coronary intervention (PCI) has been reported close to 0.1%.^[1] According to the classification scheme developed by Eshtehardi et al.,^[3] type 1 dissection is defined as a localized dissection in left main coronary artery (LMCA) without involvement of the LAD and Cx; type 2 dissection refers to a dissection flap extending well into the LAD and Cx; and type 3 dissection is defined as the presence of a dissection involving the aortic root. In the same study, type 1 dissections were associated with excellent outcomes without hemodynamic instability or in-hospital mortality, while type 3 dissections had an in-hospital mortality rate of 100%.

Despite not fully understood, the etiology of iatrogenic LMCA dissection during PCI reportedly involves LMCA atherosclerosis (i.e., a type C, calcified stenosis), an unusual LMCA anatomy and location, operator experience, forceful manual injection of contrast agent, catheter selection (size and type differences; i.e., left Amplatz catheters are

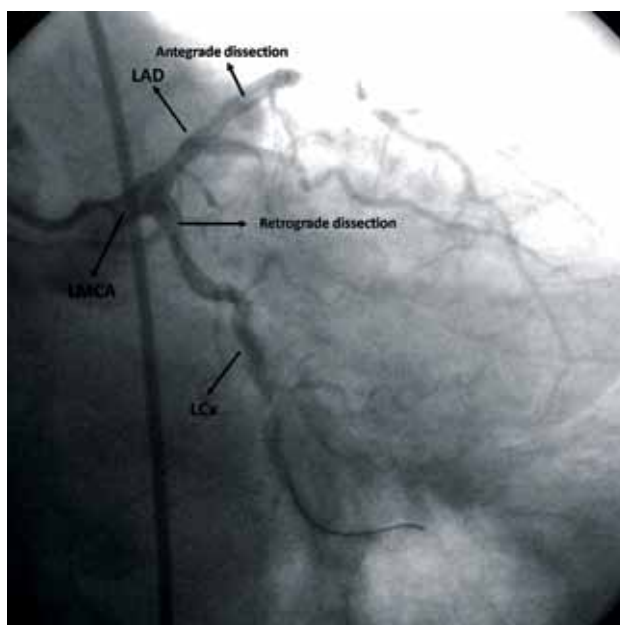


Figure 2. The view of the retrograde dissection of the circumflex artery during percutaneous coronary intervention of the artery, which from there extended to left main coronary artery and, then, antegradely to left anterior descending artery.

associated with a greater dissection risk), failure to align guidewire and guiding catheter co-axially with LMCA and subintimal canal (particularly with hard and less maneuverable guidewires), deep catheter intubation, and manipulations during seating the guiding catheter to coronary ostium, as well as all mechanical injuries to arterial wall during balloon dilatation and stenting.^[1,2,4-9]

It has also been reported that LMCA stenosis, hypertension, Marfan syndrome, congenital uni- or bicuspid aortic valve, and cystic medial necrosis may increase the risk.^[1] Fortunately, our case had no risk factor other than hypertension.

We suggest that in our patient a Cx dissection occurred due to the mechanical injury of arterial wall during stenting (Integrity, Medtronic; Medtronic, Inc., Santa Rosa, CA, USA) or intimal tear during predilatation procedure, which retrogradely progressed to LMCA due possibly to forceful dye injection or medial degeneration.

Furthermore, LMCA dissection is a rare, albeit fatal complication of coronary interventional procedures. To date, several strategies have been proposed for the management of LMCA dissection. A rapid, successful

management requires a full cooperation between cardiologists and cardiovascular surgeons. Emergent stent implantation, emergent CABG or conservative therapy are the available treatment options for an iatrogenic LMCA dissection.

The presence of hemodynamic instability constitutes the major incentive for coronary intervention. Currently, percutaneous stenting of the entry point of coronary dissection is the primary treatment of choice in patients with limited aortic involvement.^[10] Surgical therapy is recommended, when a dissection involves beyond coronary ostium or 40 mm into ascending aorta.^[10] In patients with a distal 'Thrombolysis In Myocardial Infarction: TIMI' III flow and hemodynamic stability, conservative therapy of iatrogenic non-occluding LMCA dissection has been shown to be associated with quite favorable long-term outcomes.^[4]

In a large observational study including 38 patients with iatrogenic LMCA dissection,^[3] 17 patients were treated with CABG and 14 patients were treated with bailout stenting. The authors reported no in-hospital mortality and the number of stable patients with multivessel disease was higher in the CABG group.

In conclusion, hemodynamic status, technical feasibility, availability of therapy, and surgical expertise are the major factors to be considered in the management for LMCA and coronary artery dissections. Based on our experiences, we suggest that emergency aortocoronary bypass surgery before hemodynamical status becomes worse is a life-saving procedure in patients with coronary arterial dissection.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

REFERENCES

1. Awadalla H, Sabet S, El Sebaie A, Rosales O, Smalling R. Catheter-induced left main dissection incidence, predisposition and therapeutic strategies experience from two sides of the hemisphere. *J Invasive Cardiol* 2005;17:233-6.
2. Onsea K, Kayaert P, Desmet W, Dubois CL. Iatrogenic left main coronary artery dissection. *Neth Heart J* 2011;19:192-5.
3. Eshtehardi P, Adorjan P, Togni M, Tevaearai H, Vogel R, Seiler C, et al. Iatrogenic left main coronary artery dissection: incidence, classification, management, and long-term follow-up. *Am Heart J* 2010;159:1147-53.
4. Kovac JD, de Bono DP. Cardiac catheter complications related to left main stem disease. *Heart* 1996;76:76-8.
5. Slack JD, Pinkerton CA, VanTassel JW, Orr CM. Left main coronary artery dissection during percutaneous transluminal coronary angioplasty. *Cathet Cardiovasc Diagn* 1986;12:255-60.
6. Tomassini F, Gagnor A, Varbella F. Perforation of the sinus of Valsalva by guiding catheter during the percutaneous coronary intervention via the right transradial approach: a very unusual complication. *Catheter Cardiovasc Interv* 2011;78:888-91.
7. Lee JH, Kim EM, Ahn KT, Kim MS, Kim KS, Jung IS, et al. Significant left main coronary artery disease from iatrogenic dissection during coronary angiography. *Int J Cardiol* 2010;138:e35-7.
8. Cheng CI, Wu CJ, Hsieh YK, Chen YH, Chen CJ, Chen SM, et al. Percutaneous coronary intervention for iatrogenic left main coronary artery dissection. *Int J Cardiol* 2008;126:177-82.
9. Zidi M, Nallet O, Esteve JB, Michaud P, Cattani S. Extensive iatrogenic coronary dissection during coronary angioplasty: a series of 19 consecutive patients. *Ann Cardiol Angeiol (Paris)* 2010;59:306-10. [Abstract]
10. Al-Saif SM, Liu MW, Al-Mubarak N, Agrawal S, Dean LS. Percutaneous treatment of catheter-induced dissection of the left main coronary artery and adjacent aortic wall: a case report. *Catheter Cardiovasc Interv* 2000;49:86-9.