An unusual coronary pseudo-obstruction image due to competitive blood flow between critical stenosis in proximal LAD and collateral vessels from RCA

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Abstract: This case illustrates an unusual coronary pseudo-obstruction due to competitive coronary flows from critical proximal left anterior descending (LAD) coronary artery stenosis and collateral vessels from distal right coronary artery. The flow dynamics of both antegrade and retrograde flows counterbalanced each other at the second diagonal branch level of LAD causing a total pseudo-obstruction image.

Keywords: coronary artery, collateral vessel, competitive flow, myocardial infarction, stenosis

Case Presentation

A 47-year-old woman was admitted to our emergency department with an ongoing chest pain for 2 days. He was nondiabetic and nonhypertensive but a current smoker. Electrocardiography upon admission showed negative T waves on anterior derivations. Transthoracic echocardiography revealed normal left ventricular systolic function with a mild mitral regurgitation. Laboratory tests were normal except for elevated creatine kinase-myocardial band isoenzyme (88 ng/mL) and Troponin-I (1.9 ng/mL) levels. She was interned with the diagnosis of non-ST elevation acute myocardial infarction and given 300 mg acetylsalicylic acid, 600 mg loading dose clopidogrel, and 6000 IU enoxaparine sodium. Elective coronary angiography was performed and revealed a critical (95%) stenosis in proximal left anterior descending coronary artery (LAD) and total occlusion of coronary flow in the middle LAD after the second diagonal branch (*Fig. 1A,B, Supplementary Video 1** and *2*). There were only several atherosclerotic plaques in circumflex and right coronary arteries (RCA). A Rentrop grade 3 retrograde colateral vessel filling was detected from distal RCA to distal LAD *(Fig. 1C, Supplementary Video 3)*. Percutaneous coronary intervention was planned for middle and proximal LAD lesions. The proximal LAD lesion was crossed by a 0.014 guide wire which was easily advanced into the distal LAD through total occlusion in the middle LAD. The distal total lesion was predilated with a 2.0 × 12 mm balloon at 12 ATM for several times; however, no antegrade flow was achieved *(Fig. 2A, Supplementary Video 4)*. The balloon was also easily movable in the total occluded lesion. Subsequently, 4.0 × 16 mm bare metal stent was implanted at 16 ATM in the critical proximal LAD lesion. Control angiography showed successfully dilated proximal lesion and also complete recanalization of the middle total LAD occlusion with TIMI grade III flow *(Fig. 2B, Supplementary Video 5)*. There was also no thrombus image in the distal LAD. Then, right coronary angiography was repeated and showed that the retrograde collateral filling from distal

* Further details about the Electronic Supplementary Material (ESM) can be found at the end of the article.

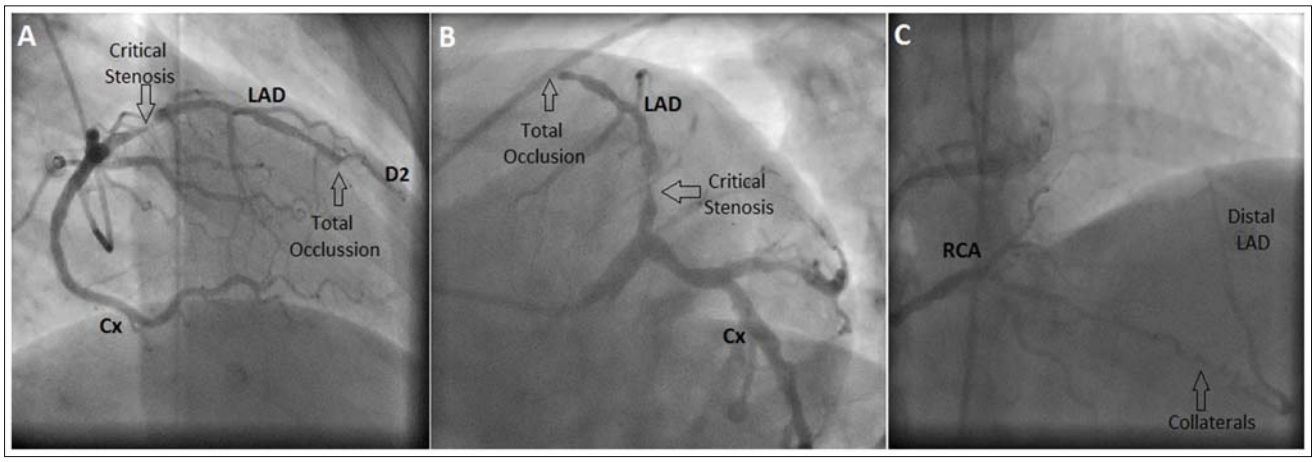

Fig. 1. Coronary angiography right oblique cranial (A) and left oblique caudal (B) views revealing a critical stenosis in proximal LAD and total occlusion of coronary flow in the middle LAD after the second diagonal branch. A Rentrop grade 3 retrograde colateral vessel filling was detected from distal RCA to distal LAD (C) (Cx: circumflex coronary artery, D2: second diagonal branch, LAD: left anterior descending coronary artery, RCA: right coronary artery)

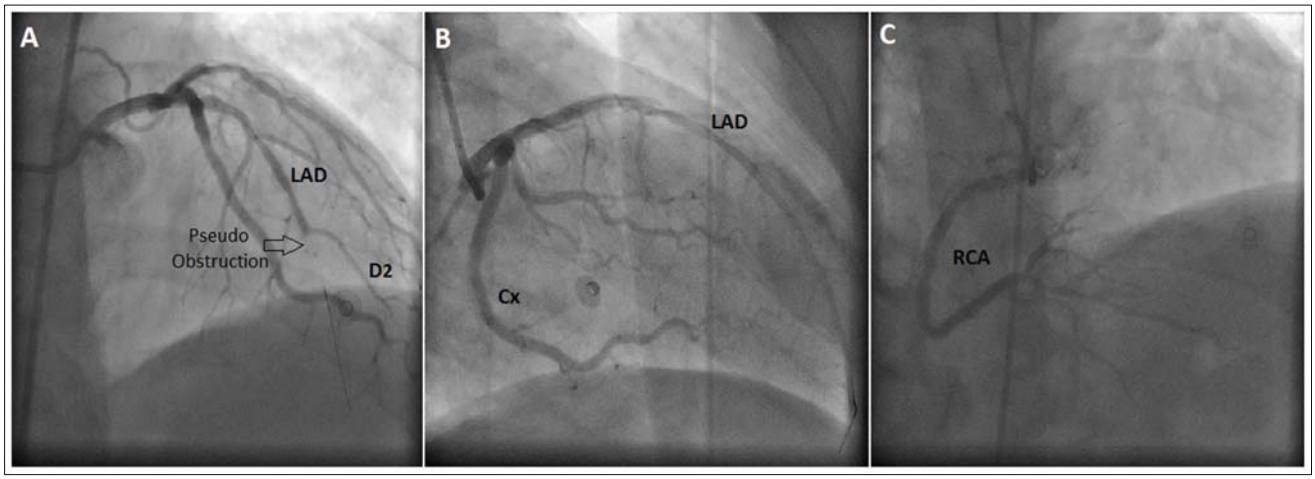

Fig. 2. The distal total lesion was predilated with a 2.0 × 12 mm balloon at 12 ATM for several times; however, no antegrade flow was achieved (A). Control angiography showed successfully dilated proximal lesion after the implantation of a bare metal stent and also complete recanalization of the middle total LAD occlusion with TIMI grade III flow (B). Repeated right coronary angiography showed that the retrograde collateral filling from distal RCA was weaned due to normal antegrade flow in the LAD (C) (Cx: circumflex coronary artery, D2: second diagonal branch, LAD: left anterior descending coronary artery, RCA: right coronary artery)

RCA was weaned due to normal antegrade flow in the LAD *(Fig. 2C, Supplementary Video 6)*.

This interesting case illustrates an unusual coronary pseudo-obstruction due to competitive coronary flows from critical proximal LAD stenosis and collateral vessels from distal RCA. The flow dynamics of both antegrade and retrograde flows counterbalanced each other at the second diagonal branch level of LAD causing a total pseudo-obstruction image. The contrast media coming from antegrade flow was washed out by the second diagonal and the retrograde collateral flow supplied the distal LAD up to the second diagonal bifurcation. The antegrade flow overwhelmed the retrograde flow when the proximal stenosis was dilated, so the pseudo-obstruction image was disappeared. The required triad for this entity includes a weak antegrade flow through critical proximal stenosis, a good retrograde flow from collaterals, and a side branch that can wash out the antegrade flow. To the best of our knowledge, this is the first report of such a coronary pseudo-obstruction in the current literature and provides important take-home messages for interventional cardiologists.

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Conflict of interest: All of the authors have no conflict of interest.

Electronic Supplementary Material (ESM)

Electronic Supplementary Material (ESM) associated with this article can be found at the website of IMAS at www.akademiai.com/loi/1646

Supplementary Video 1. Coronary angiography right oblique cranial view revealing a critical stenosis in proximal LAD and slow flow with a total occlusion of coronary flow in the middle LAD after the second diagonal branch

Supplementary Video 2. Coronary angiography left oblique caudal view revealing a critical stenosis in proximal LAD and slow flow with a total occlusion of coronary flow in the middle LAD after the second diagonal branch

Supplementary Video 3. Right coronary angiography revealing a Rentrop grade 3 retrograde colateral vessel filling from distal RCA to distal LAD

Supplementary Video 4. There was no antegrade distal flow in LAD although the distal total lesion was predilated with a 2.0 × 12 mm balloon at 12 ATM for several times

Supplementary Video 5. Control angiography showed successfully dilated proximal lesion after the implantation of a bare metal stent and also complete recanalization of the middle total LAD occlusion with a TIMI grade III flow

Supplementary Video 6. Repeated right coronary angiography showed that the retrograde collateral filling from distal RCA was weaned due to normal antegrade flow in the LAD

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