

Unnecessary PCI Attempt for Presumed CTO Which Was Revealed To Be Anomalous Coronary Arteries – Role of Coronary CT Angiography

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ABSTRACT

Herein, we present a brief case of anomalous coronary arteries mistaken to be chronic total occlusion. Since we first presumed the anomalous coronary arteries to be chronic total occlusion of the distal right coronary artery, percutaneous coronary intervention was attempted for the presumed lesion, but it failed. Before the second attempt of percutaneous coronary intervention, coronary computed tomography angiography revealed the coronary artery from the left anterior descending artery corresponding with the distal part of the right coronary artery without connection to the right coronary artery. Therefore, we recognized the patient had anomalous coronary arteries with no connection of the vascular wall between the main and distal segments of the right coronary artery.

This case may give insights to the importance of meticulous examination of coronary computed tomography angiography imaging before chronic total occlusion percutaneous coronary intervention to avoid the unnecessary procedure.

INTRODUCTION

Coronary computed tomography angiography (CCTA) to aid with pre-procedural planning before chronic total occlusion (CTO) percutaneous coronary intervention (PCI) is not only helpful with understanding the CTO anatomy, but it also is known to increase the success rate of the CTO PCI [Brilakis 2019; Yu 2017]. However, due to the economic cost and time-consuming issues with CCTA, a considerable number of CTO PCI still is being performed without CCTA guidance in real-world practice. Herein, we present a brief case about a failed PCI attempt for a presumed CTO lesion, which was revealed to be anomalous coronary artery on CCTA.

Received June 15, 2020; accepted July 17, 2020.

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CASE REPORT

A 50-year-old male patient presented with stable angina. The patient had hypertension as an underlying disease and a family history of coronary artery disease. Treadmill test showed horizontal ST-segment depression in the inferior and lateral leads on the electrocardiogram, during the exercise phase and down sloping ST-segment depression in the same leads during the recovery phase. An absence of coronary artery segment corresponding with the distal right coronary artery (RCA) was shown in angiography, and the left anterior descending (LAD) coronary artery was connected to

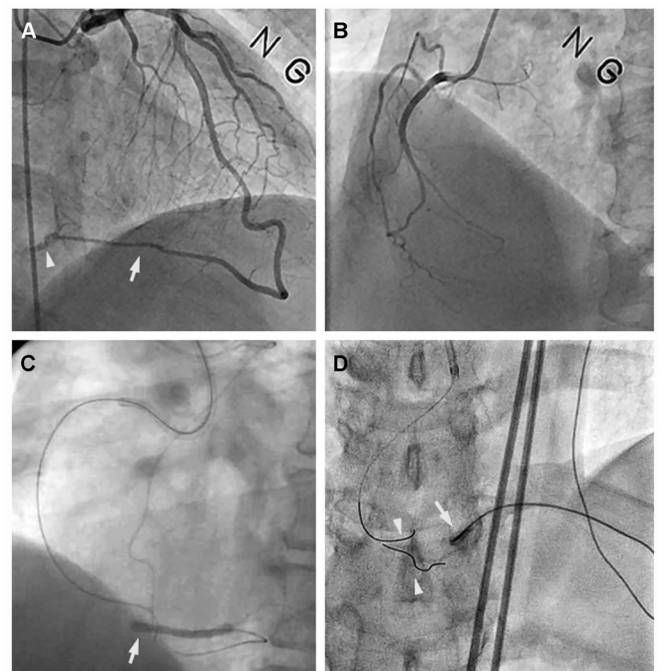


Figure 1. Coronary angiography and percutaneous coronary intervention. A) Coronary angiography showing left anterior descending coronary artery connected to posterior descending artery (arrow) and presumed distal RCA (arrowhead). B) Hypoplastic RCA. C) Percutaneous coronary intervention using retrograde approach. The presumed distal RCA and blockade of proximal segment (arrow) is visualized. D) Two intracoronary guidewires (arrowheads) and microcatheter (arrow). RCA: right coronary artery

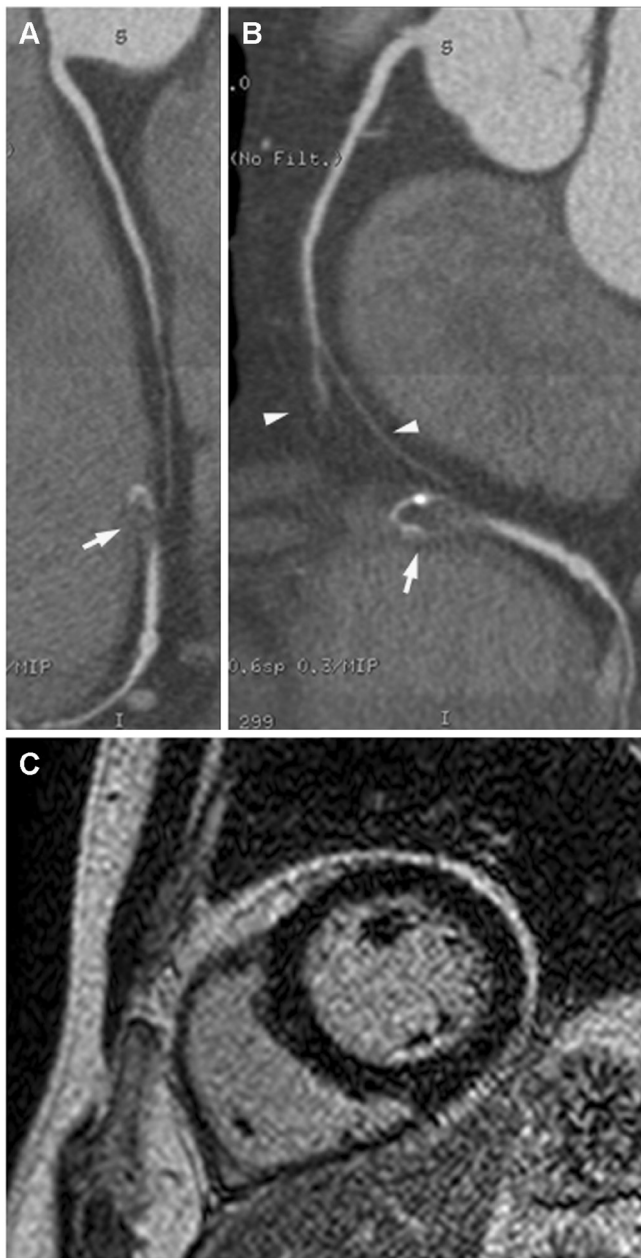


Figure 2. Coronary computed tomography angiography and cardiac magnetic resonance imaging. A, B) The end of coronary artery continuous from left anterior descending coronary artery was surrounded by calcified wall and distal cap (arrows). Notice two arrowheads indicating small branches of hypoplastic right coronary. C) No late gadolinium enhancement in left ventricular myocardium by cardiac magnetic resonance imaging.

the posterior descending artery and posterolateral branches (Figures 1A and 1B). The posterior descending artery and posterolateral branches connected with the LAD seemed to compete with the distal flow of the RCA, through which we assumed there would be CTO of the distal RCA. Another reason to suspect the CTO of the distal RCA was that the

distal end of the posterior descending artery and posterolateral branches connecting to the LAD seemed to be abruptly disconnected. PCI for the presumed CTO was attempted with retrograde approach, but it failed (Figures 1C and 1D). No wire could cross the presumed occluded segment. CCTA before the second PCI attempt revealed coronary artery corresponding to the distal RCA without connection to the RCA. The end of the coronary artery continuous from the LAD coronary artery was surrounded by calcified wall and a distal cap. There was no connection of the vascular wall between the right coronary artery and presumed posterior descending artery in CCTA images [Choi 2011] (Figures 2A and 2B). Cardiac magnetic resonance imaging showed a normal regional wall motion and no late gadolinium enhancement in the left ventricular myocardium. There is digital content that demonstrates cardiac magnetic resonance two-chamber view cine movie with no regional wall motional abnormality [Choi 2013] (Figure 2C). Therefore, we recognized the patient had anomalous coronary arteries with no connection of the vascular wall between the main and distal segments of the RCA.

After coronary anomaly was confirmed by CCTA and cardiac magnetic resonance imaging showed normal regional wall motion without late left ventricular gadolinium enhancement, we estimated that the cause of ischemia in the patient was microvascular angina or ischemia induced by the coronary artery anomaly itself. The symptoms improved after medical therapy consisting of nicorandil, trimetazidine, and statin.

DISCUSSION

With the development of dedicated devices and new techniques, CTO PCI has made significant progress in recent years [Rathore 2009]. Among them, CCTA and imaging reconstruction technology has markedly contributed to the understanding of CTO lesion anatomy. On the other hand, if CCTA routinely is implemented before the CTO PCI, there is a risk that patients will be exposed to more contrast agents and radiation. The additional economic burden and time required for coronary artery imaging reconstruction also are not negligible. Also, clinical presentation of an angina patient can be an important factor with deciding whether to implement CCTA before PCI. For these reasons, a considerable number of CTO PCIs still are being performed without pre-procedural CCTA evaluation in real-world practice. However, when evaluating a CTO lesion using only coronary angiography, it may be difficult to distinguish between CTO and subtotal occlusion, and rarely, it may not be possible to distinguish it from anomalous coronary arteries that resemble CTO as introduced in this case report [Choi 2015]. The estimated prevalence of coronary artery anomalies varies, ranging from 0.21% to 6% based on angiography, CCTA, and autopsy databanks [Perez-Pomares 2016; Aydinlar 2005]. An anomalous origin of posterior descending artery and posterolateral branches from LAD, one of the anomalies of intrinsic coronary artery anatomy, is a very rare coronary artery anomaly (prevalence of 0 to 0.028%) and some of this anomaly

might be only confirmed with CCTA [Yildiz 2010; Cheng 2010]. Despite the remarkable development of CTO PCI, the success rate still is lower, and the incidence of complications is higher than that of conventional PCI [Hannan 2016; Brilakis 2015]. Therefore, the benefits of pre-procedural meticulous CCTA image analysis to avoid unnecessary PCI procedures may outweigh its drawbacks.

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