

## Anomalous Separate Origin of Left Anterior Descending Coronary Artery: Presented as Acute Anterior Myocardial Infarction

Man Yong Hong, MD, Dae-Hee Shin, MD, Jang Hoon Kwon, MD, Woo-Sung Chang, MD, Kyu Un Choi, MD, Yun A Song, MD, Kwang Hoon Oh, MD, and Je Hoon Lee, MD

Department of Internal Medicine, Ulsan University College of Medicine, Gangneung Asan Hospital, Gangneung, Korea

Coronary artery anomalies are rare presentations in primary percutaneous coronary interventions of acute myocardial infarction. Herein, we report the case of a 59-year-old man with acute anterior myocardial infarction who had anomalous separate origin of left anterior descending artery (LAD) and left circumflex artery (LCX) from the left coronary aortic sinus. Coronary angiography showed a normal right coronary artery and LCX, but no visualization of the LAD. After several unsuccessful attempts to cannulate the LAD, we found the LAD ostium located by the side of the LCX ostium. There was total occlusion at proximal LAD. Coronary computed tomography angiography demonstrated the precise, separate origin of LAD and LCX from the left coronary aortic sinus. (**Korean Circ J 2013;43:408-410**)

**KEY WORDS:** Coronary vessel anomalies; Acute anterior wall myocardial infarction.

### Introduction

The presence of anomalous coronary arteries is observed in approximately 1% of patients undergoing coronary angiography (CAG).<sup>1)</sup> In these patients, the identification of the stenotic ostium and revascularization is difficult, particularly in the emergency setting of primary percutaneous coronary intervention (PCI).

Herein, we report a case of acute myocardial infarction with anomalous separate origin of the left anterior descending artery (LAD) and left circumflex artery (LCX) from the left coronary aortic sinus.

### Case

A 59-year-old man with hypertension and type 2 diabetes melli-

tus visited our emergency room with chest pain that had been started 2 hours prior to his visit. His electrocardiogram showed ST-segment elevation on lead V 1-4 (Fig. 1A). The initial serum Troponin was normal. Total creatine kinase (CK) was elevated to a peak of 4145 Units/L and the CK-MB fraction was 419 ng/mL. An emergency CAG was performed through the right radial artery using a Judkins left catheter. The CAG showed a normal right coronary artery (RCA) and a normal LCX, but no visualization of the LAD. Initially, we considered that the ostium of LAD was totally occluded, but a guide wire could not pass the site through to the LAD ostium (Fig. 2A). On repeated angiography from the coronary sinus, fortunately we found the separate LAD ostium directly from the left coronary aortic sinus beside the LCX ostium without the left main trunk (Fig. 2B and C). There was total occlusion at the proximal LAD. After balloon angioplasty, there was 60% stenosis at the middle LAD (Fig. 2D). We deployed a stent in the proximal LAD. For the demonstration of precise anatomical course and correlation of coronary arteries, coronary computed tomography (CT) angiography was performed with 64-row multidetector CT. It showed an absence of a left main trunk with an anomalous separate origin of LAD and LCX from left coronary aortic sinus (Fig. 3).

**Received:** July 20, 2012

**Revision Received:** September 13, 2012

**Accepted:** October 18, 2012

**Correspondence:** Dae-Hee Shin, MD, Department of Internal Medicine, Ulsan University College of Medicine, Gangneung Asan Hospital, 38 Bangdong-gil Sacheon-myon, Gangneung 210-711, Korea  
Tel: 82-33-610-3636, Fax: 82-33-641-4960  
E-mail: drshin@ulsan.ac.kr

• The authors have no financial conflicts of interest.

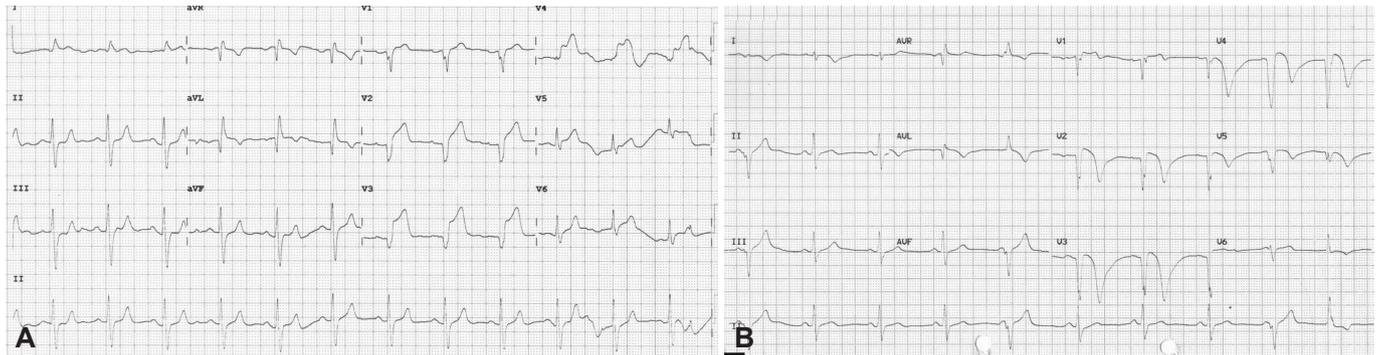
This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

### Discussion

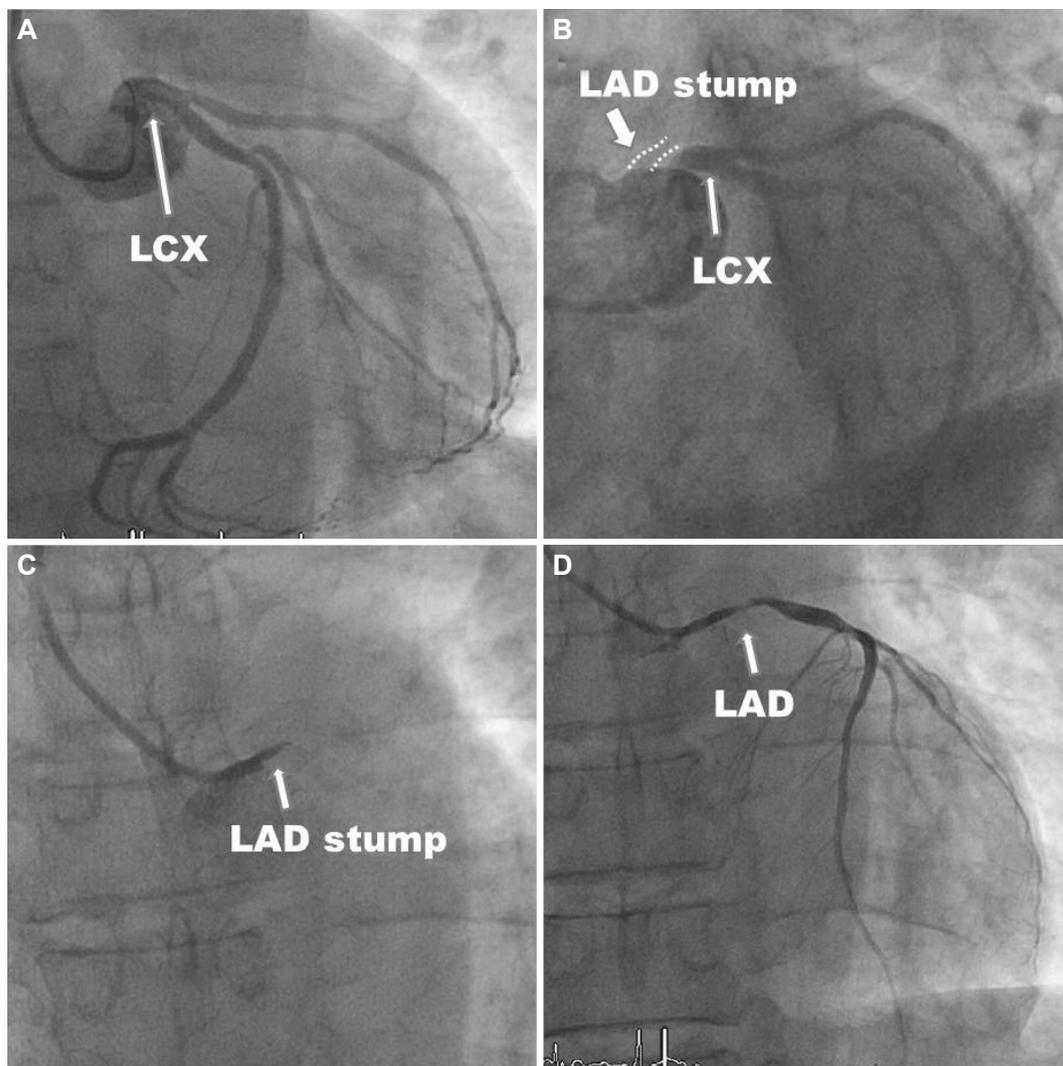
Coronary artery anomalies are the result of changes that occur during the third week of fetal development and have an overall pre-

valence from 0.3% to 1.3%. In particular, acute myocardial infarction is a rare clinical presentation in patients with coronary artery anomalies.<sup>2,3)</sup> Cademartiri et al.<sup>4)</sup> assessed the prevalence of coro-

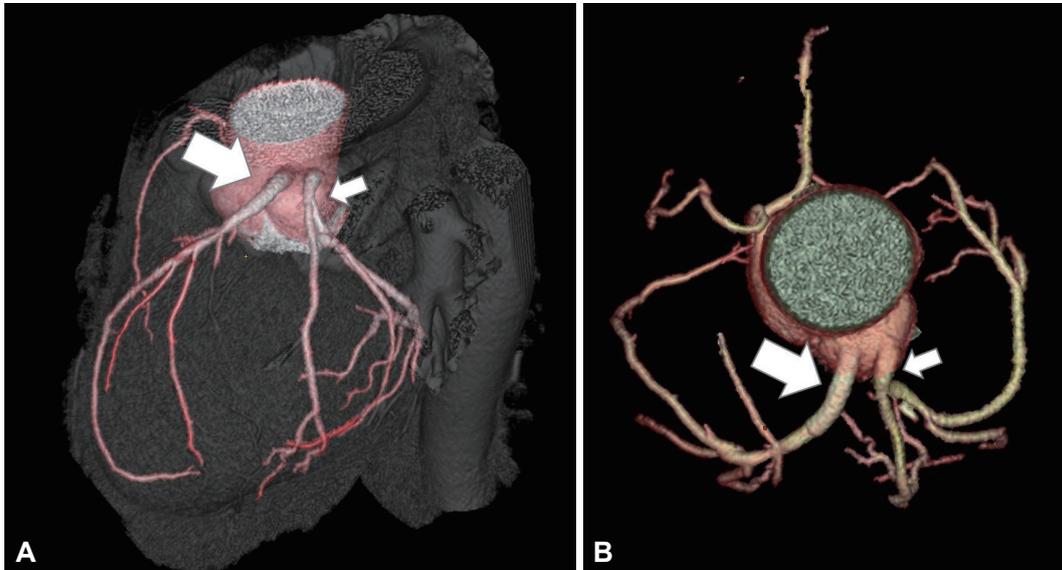
nary artery anomalies in patients using coronary CT angiography. In their study, the coronary artery anomaly incidence rates were 86.6% for an RCA anomaly, 9.2% for the left coronary anomaly, and 4.2%



**Fig. 1.** Initial and follow-up electrocardiograms. A: the initial electrocardiogram showing ST-segment elevation on lead V 1-4. B: the electrocardiogram after primary percutaneous coronary intervention showing pathologic Q-wave and T-wave inversion on lead V 1-5.



**Fig. 2.** Coronary angiography and primary percutaneous coronary intervention. A: AP cranial projectioon 30 degree angle showing that the guidewire would not advance into the LAD ostium. B: LAO caudal protection marking the site of LAD stump (arrow). C: AP caudal view showing the separate LAD ostium directly originating from the left coronary aortic sinus. D: another AP caudal view showing residual 60% stenosis at proximal LAD after balloon angioplasty. AP: anterioposterior, LAD: left anterior descending artery, LAO: left anterior oblique, LCX: left circumflex artery.



**Fig. 3.** Coronary CT angiography showing anomalous separate origin of LAD (large arrow) and LCX (small arrow) from the left coronary aortic sinus. A: LAO cranial view of a three-dimensional volume rendered image. B: top view of a volume-rendered coronary tree image. LAD: left anterior descending artery, LAO: left anterior oblique, LCX: left circumflex artery.

for a balanced case. Anomalies of the left coronary are of much lower incidence than those of the right coronary.

In general, the presence of such anomalies does not result in symptoms. Occasionally, more potentially serious anomalies may lead to myocardial ischemia, myocardial infarction, and even sudden cardiac death.<sup>5)</sup>

Angiographic recognition of unsuspected coronary anomalies is considered important for making an appropriate diagnosis and managing acute myocardial infarction in primary PCI. Repeated failures to identify the anomalous origin of coronary arteries can lead to inadequate diagnosis and prolonged procedures, which can result in serious complications.<sup>6)</sup> Although their incidence is low, clinicians should always take into consideration coronary artery anomalies.

Coronary CT angiography is particularly useful to clarify the relationship between coronary arteries and great vessels and the correct position of coronary arteries ostia. Currently, the ideal imaging tool for the diagnosis and delineation of coronary artery anomalies is coronary CT angiography.<sup>7)</sup> In this case, it was very difficult to find the ostium of the obstructed anomalous LAD during primary PCI. Coronary CT angiography precisely demonstrated a separate origin of LAD and LCX from the left coronary aortic sinus after PCI.

## References

1. Papadopoulos DP, Dalianis N, Benos I, Votteas V, Anagnostopoulou S. Anomalous origin of circumflex artery from right sinus of Valsalva: a rare cause of non-ST elevation syndrome. *Int J Cardiol* 2007;114:e105-6.
2. Kim JH, Ha GJ, Seong MJ, et al. Anomalous origin of the left circumflex coronary artery from the first diagonal branch presented as acute myocardial infarction. *Korean Circ J* 2011;41:612-4.
3. Rohit M, Bagga S, Talwar KK. Double right coronary artery with acute inferior wall myocardial infarction. *J Invasive Cardiol* 2008;20:E37-40.
4. Cademartiri F, La Grutta L, Malagò R, et al. Prevalence of anatomical variants and coronary anomalies in 543 consecutive patients studied with 64-slice CT coronary angiography. *Eur Radiol* 2008;18:781-91.
5. Taylor AJ, Rogan KM, Virmani R. Sudden cardiac death associated with isolated congenital coronary artery anomalies. *J Am Coll Cardiol* 1992;20:640-7.
6. Serota H, Barth CW 3rd, Seuc CA, Vandormael M, Aguirre F, Kern MJ. Rapid identification of the course of anomalous coronary arteries in adults: the "dot and eye" method. *Am J Cardiol* 1990;65:891-8.
7. Malagò R, D'Onofrio M, Brunelli S, et al. Anatomical variants and anomalies of the coronary tree studied with MDCT coronary angiography. *Radiol Med* 2010;115:679-92.