OLGU SUNUMU CASE REPORT

DOI: 10.5336/cardiosci.2018-61069

The Role of "Catheter-Shaping" in Angiographic Success in Anomalous Coronary Events

Anomalili Koroner Olgularda Kateter Şekillendirmenin Anjiyografik Görüntüleme Başarısındaki Rolü

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Received: 13.04.2018
Received in revised form: 11.07.2018
Accepted: 12.07.2018
Available online: 28.09.2018

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ABSTRACT In this article, we present a case that suggesting some coronaries were not recognized in coronary angiography. On 2.6% of coronary angiograms anomalous origin of coronary arteries is encountered. In 0.58% of the cases left anterior descending artery (LAD) is arises from a separate ostium. Absence of LMCA can be discerned directly on coronary angiograms obtained using selective visualization of CX or LAD because in most of the cases of LAD and circumflex artery (CX) arise from separate ostia. A 54-year-old-female patient underwent coronary angiography through right radial route. In previous angiography performed at another center, The intermediate coronary (IM) artery was supposed to be the LAD and that was applied stent to the artery. We had watched the patient's previous angiography and we recorded various images considering that there may be another vessel in the new coronary angiography. Aortography was performed because the LAD area was empty in the left cranial view. When aortography is carefully examined, a weak image appears from a separate ostium, thought to belong to LAD. That could not be visualized using standard catheters. Using a 5F left Judkins catheter reshaped using a hot air gun LAD could be visualized selectively, and symptoms of the patient could be explained clinically. In patients who are undergoing coronary angiography where standard catheters can not be selectively engaged, in case of need, reshaping the catheter in the catheterization laboratory can be a practical, applicable method for the disclosure of occult coronaries.

Keywords: Coronary anomaly; catheter shaping; coronary atresia

ÖZET Bu yazıda koroner anjiyografilerde bazı koronerlerin hiç fark edilmediğini düşündüren bir olgu sunulmaktadır. Koroner anjiyografide çıkış anomalisine rastlanma oranı %2.6 dır. Sol ön inen arter (LAD)'in ayrı ostiumdan çıkması %0,58 oranında görülür. LAD ve circumflex arter (CX)'in ayrı ostiumlardan çıktığı vakaların çoğunda sol koroner anjiyografide sol ana koroner arter (LMCA) yokluğu CX veya LAD'nin selektif görüntülenmesiyle direkt fark edilebilmektedir. 54 yaşında tipik göğüs ağrısı olan kadın hastaya, başka bir merkezde yapılan önceki anjiyografisinde IM arter, LAD zannedilerek stentlenmiştir. Şikayetleri geçmeyince hasta bize müracaat etmiştir. Daha önceki anjiyografisi izlendi ve yapılan yeni koroner anjiyografide başka bir damarın daha tıkalı olabileceği düşünülerek çeşitli görüntüler alındı. Sol kranial görüntüde LAD sahasının boş olması sebebiyle ayrı bir LAD varlığından şüphelenilerek aortografi yapıldı. Aortografi dikkatlice incelendiğinde ayrı bir ostiumdan çıkan, LAD ye ait olduğu düşünülen zayıf bir görüntü izlendi. Bu arter standart kateterlerle görüntülenemedi. Isı tabancasıyla yeniden şekillendirilen kateterle LAD selektif görüntü- lenebildi. Standart kateterlerle selektif oturulamayan koroner anjiyografi olgularında laboratuarda kateter şekillendirme yapılması gizli kalan koronerleri göstermek için pratik uygulanabilir bir yöntemdir.

Anahtar Kelimeler: Koroner anomali; kateter şekillendirme; koroner atrezi

This article emphasizes a method and rare case in which the left anterior descending (LAD) artery can be visualized with a simple technique and that can be rescued the patient's life and the physician's reputation, which can easily be assumed to be absent (So that was thought be "the intermediate artery is LAD" at the first angiogram of our patient).

Apparent anomalous coronary artery, and anomalous origin of LAD have been encountered in 2.6, and 0.58 % of coronary angiograms.[1] Anomalous origin of left main coronary artery (LMCA) is seen in 0.04% of the population.[2] Anomalous origin of right coronary artery (RCA) is observed in 0.09% of the cases.[3] Anomalous origin of LAD localized at the right coronary ostium, at RCA itself, and pulmonary artery have been reported.[4,5] In these cases inability to selectively cannulate coronary arteries or even mistakenly deemed to be absent, may lead to catastrophic outcomes at the time of acute myocardial infarction.

This our patient with anomalous origin of LAD, whose intermediate coronary artery (IM) was stented mistaken for believed to be LAD, during an angiographic examination performed 6 years ago at another center.

When anomalous origin of coronary arteries can not be visualized selectively with available catheters, catheter shaping may selectively display anomalous vessels and dramatically decrease procedural time, and amount of opaque substance used.[6-8]

CASE REPORT

A 54-year-old female patient consulted our clinic because of typical angina pectoris progressively increasing in severity for the last two months.

She had consulted a clinic with the same complaints 6 years ago, and undergone coronary angiography and stented at the same session

She had a history of hypertension, and coronary artery disease.

She was using olmesartan (20 mg/d), isosorbide mononitrate (50 mg/d), acetylsalicylic acid (100 mg/d).

Family history: Her father died of myocardial infarction. Her sibling had undergone coronary artery bypass surgery.

Her arterial blood pressure was 140/75 mmHg, and peak heart rate was rhytmic without any apparent abnormality. Breathing sounds were physiologic. Her physical examination was otherwise unremarkable. EKG; Sinus rhythm, evidence of ischemia at inferior, and lateral leads.

A mild degree of mitral regurgitation was observed. Left ventricular ejection fraction (EF) was 55 percent. Cardiac wall mobility was not impaired.

Laboratory values: Creatinine ; 0.8 mg/dl, LDL; 168 mg/dl, TG; 158 mg/dl, Hb; 14 g /L, Htc; 45%, PLT; 263K/uL, Troponin: 4.3 pg/ml (normal range: 0-26 pg/ml).

Barbeu, and Allen tests were performed on the right wrist to determine suitability of radial artery for cannulation. The region of interest was sterilized, and local anesthesia was performed using 4 cc Citanest, and, 1 mg Perlinganit. Radial artery was cannulized using Terumo 5 F radial sheath catheter. Then the catheter was irrigated with 5000 IU heparin, and 12.5 mg diltiazem diluted to 10 cc with serum physiologic. Subsequently, selective coronary angiography was performed using right, and left standard Judkins catheters.

From the right caudal and spider views well developed intermediate artery which simulated LMCA, and LAD was observed. From these projections we also mistakenly taken intermediate artery for LAD. When we obtained a left cranial view, we suspected of the presence of atresic LAD. Then the right coronary artery and the right coronary ostium are visualized (Figure 1). We obtained an aortographic image from the right caudal view with the aid of retrogradely implanted left Judkins catheter, and observed the silhouette of LAD. We could not selectively visualize LAD using standard right, and left Judkins catheters or even guiding catheters, and EBU catheter. We inserted a 0.38 F guidewire into the left 3.5 Judkins catheter. Then we held hot air gun at a distance of 10 cm away from the catheter for 5 secs, and under hot air flow we flexed the catheter at various angles so as to shape it to the desired angulation. We immersed the shaped part of the catheter in water, and irrigate it with pressurized water to cool it. Then we removed the guidewire. We advanced our handmade catheter tailored to our desired shape through left coronary sinus, and without any additional manoeuvre we could selectively visualize LAD within a fluoroscopy time of 15 secs, and using only 15 cc opaque substance (Figure 2, Figure 3).

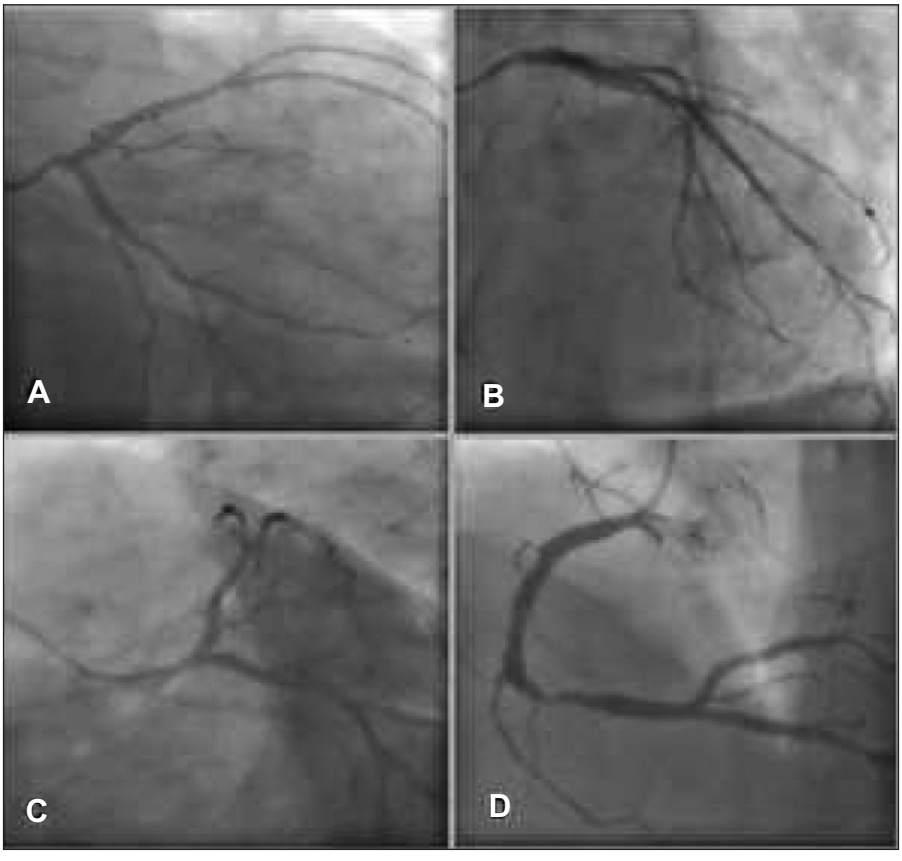

FIGURE 1: A) From right caudal view, stenosis of main coronary artery, and stented artery which was presumed to be LAD, and coursing into the region consistent with the origin of LAD are clearly observed. **B)** Left cranial view, LAD field is empty. **C)** From left caudal view we did not observe any vascular structure on the anterior wall, and so suspected of failed visualization of LAD. **D)** Image of RCA from the left lateral view.
LAD: Left anterior descending; RCA: Right coronary artery.

DISCUSSION

In coronary angiography, inability to selectively visualize anomalous coronary arteries is one of the major problems which a cardiologist encounters during angiography. For arteries which can not be selectively visualized, frequently the presence of anomalous origins are looked for, and if they can not displayed for the second time, diagnosis of single or atresic coronary arteries is made. In an earlier case, we did not found LAD in the aortic root. Instead of putting a "single coronary artery" diagnosis in haste, we insisted on continuing to look for LAD. Ultimately we found "native LAD" that arising from left internal mammary artery (LIMA). We published it as the first discovery (Balaban Syndrome) all over the world. This discovery; once again emphasizes the importance of cardiology physicians to continue to search for persistent doubts.[9-13] Frequently seen anomalous origins of coronary arteries are as follows: LAD and CX arising from separate ostia (0.048), RCA arising from a superoanterior position or left coronary sinus (0.65), CX arising from the right coronary ostium (0.20), and rarely LAD stems from the right coronary artery (0,04) or right coronary ostium (0.04). LAD arising from the pulmonary artery is a very rarely encountered anomaly (0.02 ALPACA Syndrome). In most of these cases during angiography standard catheters fail to selectively visualize coronary arteries (Table 1).[14-16]

In publications on anomalous origins, and their incidence rates, detection of anomaly has been made during autopsy or using computed tomography. In our literature screening based on Pub Med data, we haven't encountered a comprehen-

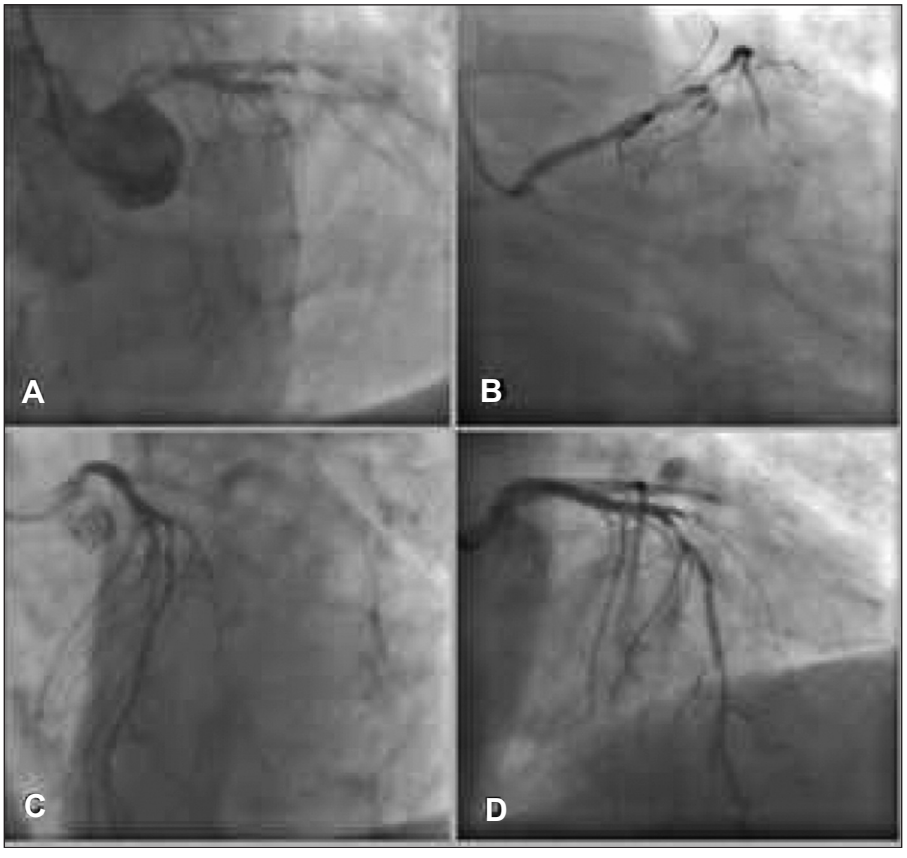

FIGURE 2: A) Aortography image of the left coronary sinus taken from the right caudal view which displays the silhouette of LAD. **B)** Selective image of LAD we obtained from the right caudal view with the aid of our handmade catheter. **C)** Selective image of LAD we obtained from left cranial view with the aid of our handmade catheter. **D)** Selective image of LAD we obtained from mid-cranial view with the aid of our handmade catheter.
LAD: Left anterior descending.

sive and detailed publication related to angiographically defined coronary arteries of anomalous origin or their incidence. In patients with anomalous coronary arteries, by shaping catheter, angiographic visualization of anomalous coronary arteries may be enabled within a short time, and using lesser amount of opaque material. Indeed, in our case, LAD stemmed from an ectopic ostium. Without any need for tomographic imaging, with the aid of our handmade catheter we could selectively visualize LAD within a short time, and using small amount of opaque material.

In cases with anomalous origin of coronary arteries, inability to visualize the coronary artery or as was the case with our patient, if the physician does not suspect of the presence of another coronary artery, this negligence may lead to catastrophic consequences during a potential attack of myocardial infarction.

In nearly 97.4% of the patient population selective visualization of coronary arteries can be achieved with the aid of catheters available in most of the catheterization laboratories. However in the remaining 2.6% of the cases these catheters can't aid in visualization. Otherwise, if a coronary artery which could not be selectively detected is responsible for MI, then this condition may lead to fatal consequences for the patient.[1,15]

In these circumstances a physician who is both an explorer and in cases of myocardial infarction crisis an inventor may save the life of his/her patient.

In cases with coronary arteries with anomalous origin which are difficult or even impossible to visualize in catheterization laboratory, after de-

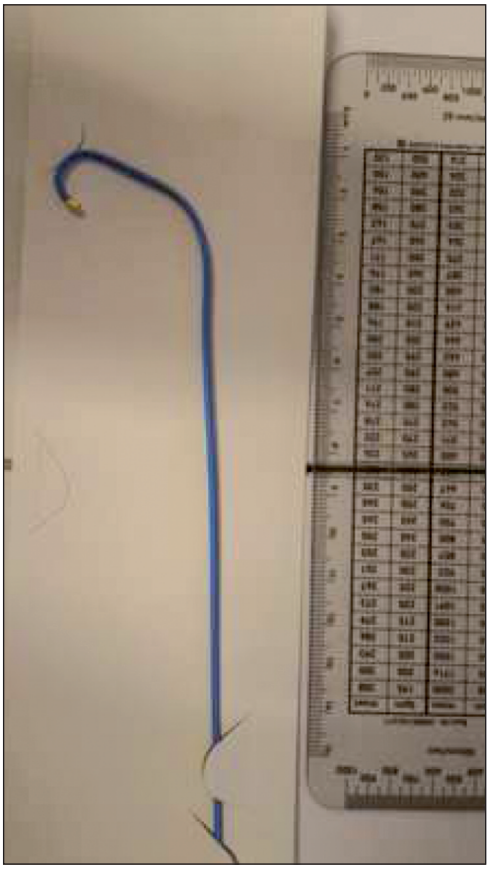

FIGURE 3: Our handmade catheter.

termination of approximate origin and angle of exit the coronary artery it is possible to design a catheter which can negotiate anomalous origin and angle of exit. Shaping catheter may be an effective, reliable, and in cases with acute MI, that is life-saving procedure in the achievement of visualization, and decreasing the duration of the procedure, radiation dose, and opaque material used.

TABLE 1: I Incidence rates of coronary arteries of anomalous origin.[13,15]

Anomalous origin	Incidence %
LAD, and CX stemming from separate ostia	0.48
LAD originating from pulmonary artery	0.02
LAD arising from RCA	0.04
LAD arising from right coronary sinus	0.02
Single coronary artery RCA	0.11
Single coronary artery LMCA	0.02
High take off RCA	0.65
CX arising from right coronary sinus	0.2

Coronary arteries of anomalous origin, and their incidence rates. **LAD:** Left Anterior Descending Arter; **CX:** Circumflex Artery; **RCA:** Right Coronary Artery; **LMCA:** Left Main Coronary Artery.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

This study is entirely author's own work and no other author contribution.

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