CASE REPORT

Incidentally detected bifid cardiac apex in a patient with acute myocardial infarction: A case presentation and brief literature review

Akut miyokart enfarktüsü geçiren hastada rastlantısal olarak fark edilmiş bifit kardiyak apeks: Bir olgu sunumu ve kısa bir literatür taraması

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Summary– A bifid cardiac apex is a rare congenital cardiac anomaly in humans and is usually associated with other congenital heart diseases. Presently described is a case of an incidentally detected bifid cardiac apex in a patient presenting with inferior ST-segment elevation myocardial infarction, which was subsequently confirmed with selective ventriculography. This anomaly, because it is rare, can be a source of confusion to clinicians, especially when acute coronary syndrome is present. The possible presence of this anomaly should, therefore, be kept in mind in daily practice.

Özet– Bifit kardiyak apeks seyrek görülen bir doğuştan anomali olup genellikle başka doğumsal kalp hastalıklarıyla ilişkilidir. Daha sonra gerçekleştirilen selektif ventrikülografiyle doğrulandığı gibi inferiyor ST-segment yükselmeli miyokart enfarktüsüyle gelen bir hastada tesadüfen bifit kardiyak apeks saptandı. Seyrek görülmesine rağmen bu anomali klinisyenler için özellikle akut koroner sendrom varlığında kafa karışıklığı kaynağı olabilir. O halde günlük pratikte bu anomalinin varlığı akılda tutulmalıdır.

A bifid cardiac apex is a rare congenital cardiac anomaly first reported in humans by Teja and Sturgill in 1986,[1] although it has long been known to occur in sea mammals.[2] The persistence of the embryonic cardiac notch has been suggested as a possible main pathology,[1] probably due to defective signaling for cardiomyocyte migration.[3] Although usually accompanied by other congenital abnormalities,[1,4–8] this anomaly may in some cases present in isolation.[9–11] There is little information on this anomaly in the literature, and the majority of the presented cases were diagnosed at autopsy.[1,8,9] The functional or clinical importance of this abnormality has thus far eluded the scientific community, which partly explains the sense of bafflement some clinicians feel when confronted with this anomaly.

Abbreviations:

CAD	*Coronary artery disease*
ECG	*Electrocardiography*
TTE	*Transthoracic echocardiography*

Described herein is the case of an incidentally detected bifid cardiac apex in a patient presenting with inferior ST-segment-elevation myocardial infarction.

CASE REPORT

A 53-year-old woman with a family history of coronary artery disease (CAD) and hyperlipidemia presented at the emergency department with severe, acute, typical chest pain. Electrocardiography (ECG) showed ST-segment elevation in the inferior leads (II, III, and aVF). The patient was transferred to the cath lab for primary percutanous coronary intervention. Selective coronary angiography demonstrated 100% stenosis in the right coronary artery at the proximal part. Thereafter, she underwent direct stenting, with successful results. The other coronary arteries had insignificant stenosis. On the third day of admission, while there was no report of hemodynamic instability or appearance of new symptoms, transthoracic

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echocardiography (TTE) revealed hypokinesia in the inferior wall with mild left ventricular systolic dysfunction (left ventricular ejection fraction: 45%). Additionally, there was a dividing bundle in the left ventricular apex, constituting a chamber between the left and right ventricles (Fig. 1a). No congenital cardiac abnormality was detected. There were no optimal echocardiography views; the echocardiography images obtained were confounded with near-field artifacts. Due to the patient's history of acute myocardial infarction, the poor echocardiography images, and a suspicion of a pseudoaneurysm in the left ventricular apex or post-myocardial infarction ventricular septal defect, left ventriculography was planned. The imaging confirmed a bifid cardiac apex (Fig. 1b) without suspected mechanical complications of myocardial infarction.

DISCUSSION

In the course of cardiac development in the embryonic period, a prominent notch appears in the external surface of the heart between weeks 5 and 8 (indicating the place of interventricular septum development) and then disappears in the 11th week. If this notch persists into the postnatal period, it results into a bifid cardiac apex.[1] In the nonhuman heart, a type of GTPase (Ras 1) plays a role in the septation of the heart, and defects in this GTPase can lead to a bifid cardiac apex.[2]

The existing literature contains only 11 cases of a bifid cardiac apex in humans, and most of these abnormalities were in males (n=8, 73%) accompanied by other cardiac congenital anomalies (n=8, 73%). In these reports, an atrial septal defect, tetralogy of Fallot, and persistent left superior vena cava were the most common accompanying congenital cardiac anomalies. Nonetheless, there have also been reports of isolated bifid cardiac apices.[9–11] A large number of these cases of a bifid cardiac apex were diagnosed in postmortem evaluations (n=5) or on the surgical table (n=3), and not with imaging modalities.[1,4–6,8,9]

It is not surprising that echocardiography was the first imaging modality to enable the suspicion of the presence of this anomaly in more recent reports.[7,10,11] The growing body of evidence regarding this rare congenital cardiac anomaly may be due to increased awareness among cardiologists in recent years. What should be taken into consideration is that the presence of a bifid cardiac apex in adults may be missed or neglected.

Khanji et al.[10] described a 68-year-old man who had chest pain and ST-segment depression in the inferior and lateral ECG leads with significant stenosis in the left circumflex artery and the right coronary artery. The authors incidentally detected a bifid cardiac apex on TTE, which was subsequently confirmed with other imaging modalities, rather than selective ventriculography. Masoura et al.[11] described a 73-year-old woman with complaints of palpitation and dizziness. The investigators incidentally detected a bifid cardiac apex on TTE and ventricular tachycardia on

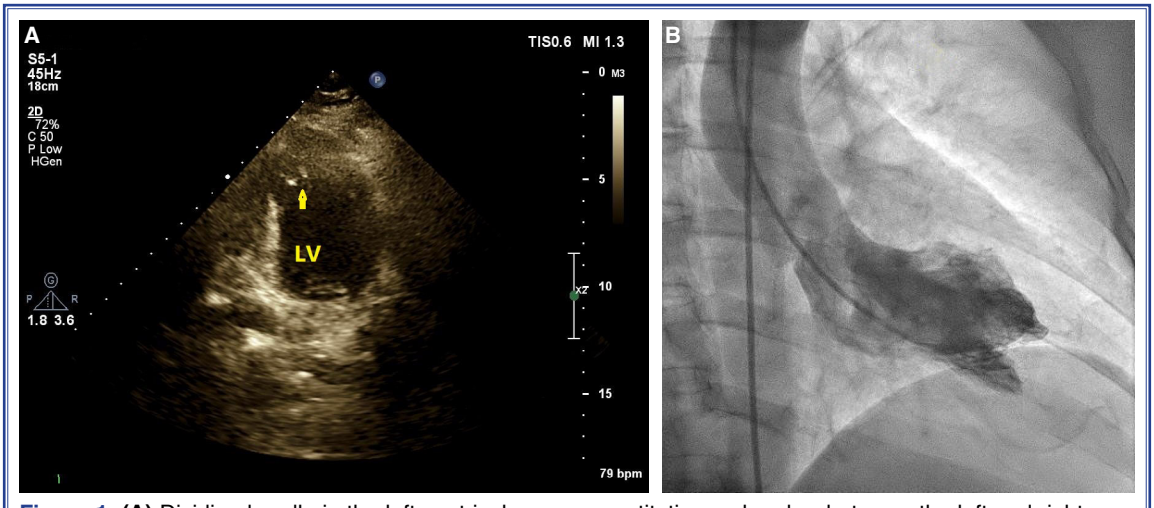

Figure 1. **(A)** Dividing bundle in the left ventricular apex constituting a chamber between the left and right ventricles and resulting in a bifid cardiac apex as observed on transthoracic echocardiography. **(B)** Left ventriculography confirming the bifid cardiac apex.

ambulatory ECG Holter monitoring. In our case, we encountered a patient with inferior ST-segment elevation myocardial infarction treated with primary percutaneous intervention and a small cavity between the left and right ventricles on TTE confounded by near-field artifacts. Selective ventriculography allowed us to confirm the presence of the bifid cardiac apex.

A cardiac bifid apex is a challenging diagnosis, especially in the presence of CAD, wherein the mechanical complications of myocardial infarction should be considered in the differential diagnosis of this anomaly. These diagnostic challenges can include post-myocardial infarction ventricular septal defect, pseudoaneurysm, and myocardial dissection. What would direct clinicians to differentiate a bifid cardiac apex from other possible diagnosis may be previous cardiac images and videos, time between infarction and detection of pathology, coronary artery territories, and signs and symptoms of myocardial infarction.

It can be suggested that the presence of such a cardiac anomaly should be kept in mind during echocardiographic assessment of patients with CAD when echocardiographic data are not compatible with other possible causes.

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*Supplementary video files associated with this article can be found in the online version of the journal.

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Anahtar sözcükler: Bifid kardiyak apeks; miyokart enfarktüsü; ventrikülografi.