

## Resolution of complete heart block after revascularization of acute marginal branch of the right coronary artery

### Sağ koroner arter akut marjinal dalın revaskülarizasyon sonrasında tam kalp blokunun düzelmesi

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**Summary**– A patient presented with typical angina and a non-ST elevation myocardial infarction. Electrocardiogram showed complete heart block, and she was found to have a 90% acute marginal artery stenosis. The block resolved after balloon angioplasty of this artery that does not supply the atrioventricular node. We propose that increased vagal tone due to inferior wall ischemia from acute marginal artery stenosis has elicited the Bezold-Jarisch reflex. This is a likely mechanism for this uncommon etiology of complete heart block.

**Özet**– Bir hasta tipik göğüs ağrısı ve ST-yükselmesi miyokart enfarktüsü ile başvurdu. Ekokardiyogramda tam kalp blokunun varlığını gösterdi ve %90 akut marjinal arter stenozu saptandı. Atriyoventriküler düğümü beslemeyen bu arterin balon anjiyoplastisi sonrası blok düzeldi. Akut marjinal arter stenozu nedeniyle inferiyör duvar iskemisine bağlı olarak artmış vagal tonusun Bezold-Jarisch refleksini ortaya çıkardığını ileri sürmekteyiz. Bu mekanizma olasılıkla tam kalp blokunun bu sık rastlanmayan etyolojisini oluşturmaktadır.

Right coronary artery (RCA) occlusion is a major cause of morbidity in patients who present with acute coronary syndrome. Most cases reporting complete heart block associated with RCA infarction describe the atrioventricular (AV) nodal artery as the culprit lesion.<sup>[1]</sup> Other vessels have also been described in the pathogenesis of these blocks, but the acute marginal branch of the RCA has not been implicated in this process.<sup>[2]</sup>

We describe a case and propose possible mechanisms of reversible complete heart block in a pa-

tient with an acute marginal branch stenosis and non-ST elevation myocardial infarction (NSTEMI) presenting with complete heart block. Angioplasty of the lesion led to complete resolution of the heart block.

#### CASE REPORT

The case we present here is about a 39-year-old female patient who admitted due to angina and dyspnea. In the emergency room, the initial electrocardiogram (EKG) revealed sinus bradycardia with an old left bundle-branch block; she progressed to complete AV block with a ventricular escape (Figure 1); with troponin elevation to 2.46 ng/ml (normal: <0.5 ng/ml).

A temporary pacemaker was inserted; coronary angiography revealed moderate atherosclerosis involving the left circumflex. There was 90% stenosis of the acute marginal branch of the RCA, which was considered the culprit lesion (Figure 2a). The other arteries had no significant lesions (Figure 3). Balloon angioplasty of the RCA lesion was performed with a

#### Abbreviations:

AV	Atrioventricular
CAD	Coronary artery disease
EKG	Electrocardiogram
MI	Myocardial infarction
NSTEMI	Non-ST elevation myocardial infarction
RCA	Right coronary artery

atient with an acute marginal branch stenosis and non-ST elevation myocardial infarction (NSTEMI) pre-

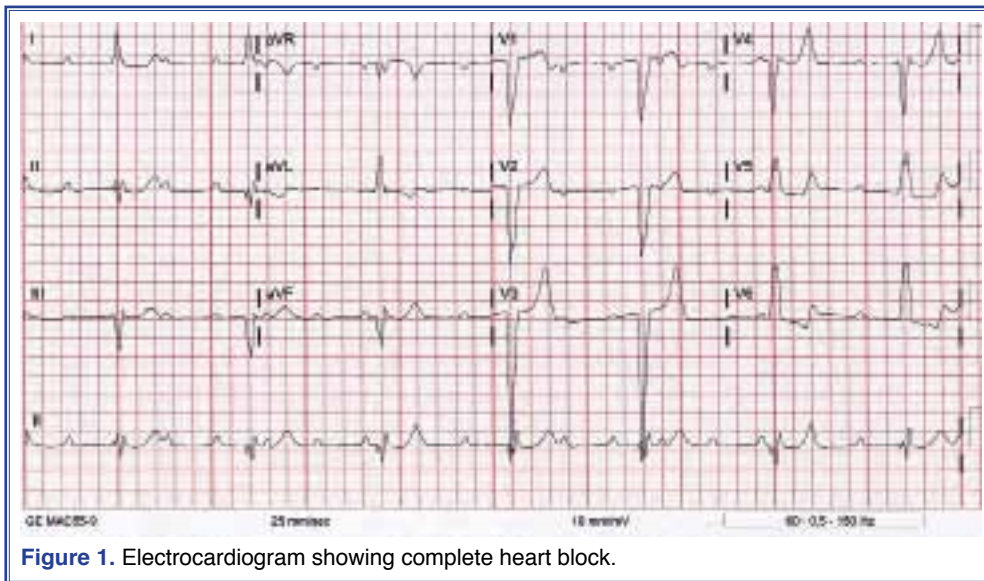
Received: May 22, 2014 Accepted: June 27, 2014

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much improved angiographic result and <20% residual stenosis (Figure 2a). The patient was placed on a telemetry monitor and was transferred to the intensive

care unit. Complete heart block was observed to have resolved within 1 h after the procedure, and she remained in normal sinus rhythm afterwards (Figure 4).

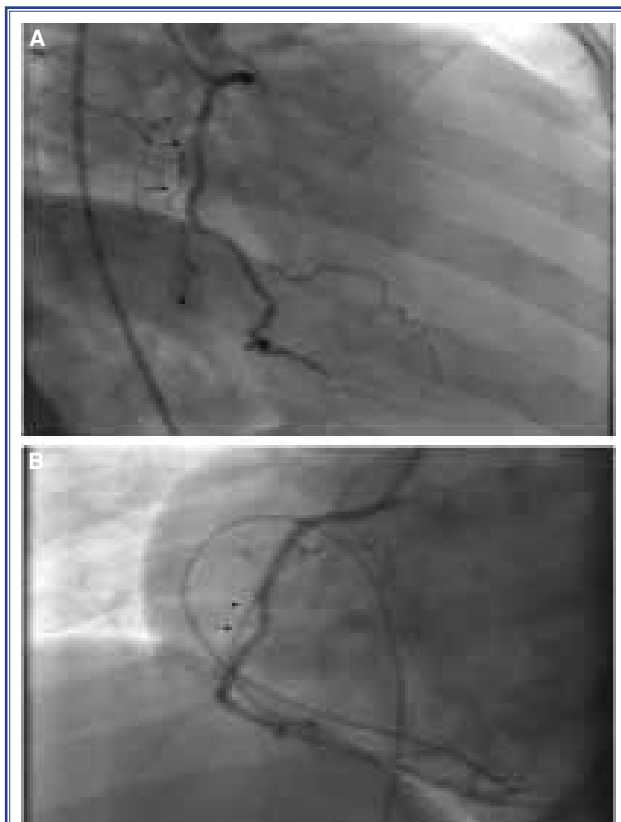
The temporary pacemaker remained in place and was discontinued about 6 h later after heart rate was consistently greater than the backup rate. The patient did not have any further problems and was discharged home in stable condition.

## DISCUSSION

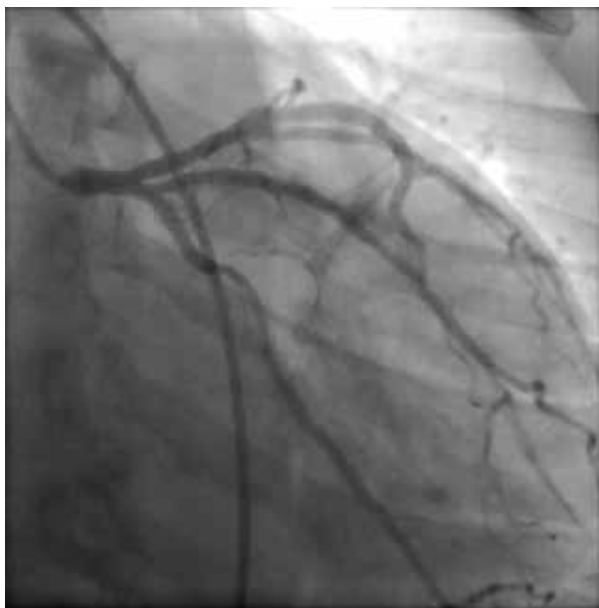
Resolution of complete heart block after RCA angioplasty has been described, but to the best of the authors' knowledge this is the first case of acute marginal artery stenosis leading to complete heart block with prompt resolution after angioplasty.

Complete heart block after acute inferior wall MI usually occurs from damage to the RCA (85% of cases) and is usually proximal to its AV nodal branch.<sup>[3]</sup> In this case, we did not find any significant obstructive disease in the proximal RCA or in the left circumflex system. Surprisingly, the culprit lesion was a 90% stenosis in a medium sized acute marginal artery. We researched possible mechanisms for this uncommon etiology of complete heart block.

Abuin et al. described the AV nodal artery, first septal perforator, Kugel's artery and the superior descending artery as the arteries implicated in AV block with inferior MI<sup>[2]</sup> this suggests that AV nodal ischemia may not be a mechanism for complete heart block in our patient. AV block after MI is usually as-



**Figure 2.** (A) Coronary angiography showing severe ostial/proximal stenosis of the acute marginal artery, (B) and restoration of flow with decreased stenosis after balloon angioplasty.



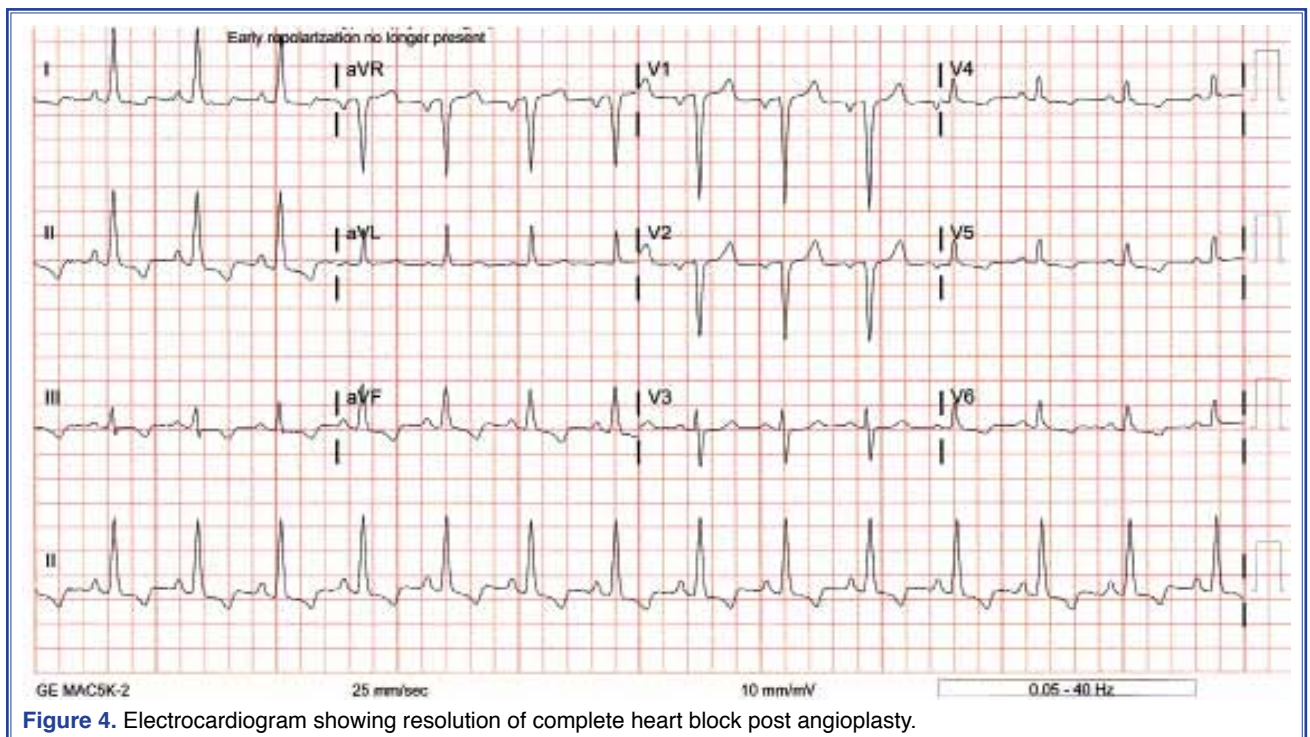
**Figure 3.** Coronary angiography showing angiographically normal left anterior descending and left circumflex arteries.

sociated with a normal conduction system and is due to reversible factors rather than structural damage to the conduction system, which will be expected from ischemia with resultant infarction.<sup>[4]</sup> Other possible mechanisms proposed for heart block after MI in-

clude high vagal tone in inferior wall MI and the release of inflammatory mediators, including adenosine and potassium.<sup>[3]</sup>

This mechanism appears to be more likely in our patient. The inferior aspect of the heart is known to have rich innervation with vagal nerve terminals.<sup>[5]</sup> The inferior wall ischemia from acute marginal artery stenosis could have stimulated the vagus nerve thus eliciting the Bezold-Jarisch reflex.<sup>[5]</sup> The Bezold-Jarisch reflex results from the stimulation of cardiac mechanoreceptors associated with unmyelinated vagal afferent nerve fibers.<sup>[5]</sup> This increased vagal tone could have led to the initial sinus bradycardia progressing to complete heart block seen in our patient. Resolution of the inferior wall ischemia after angioplasty would have cut off this trigger for the vagal nerve stimulation thus leading to resolution of the complete AV block.

This patient presented with angina and was found to have a left bundle block on EKG. This was initially concerning for an STEMI equivalent, but a cursory examination of her previous records at our hospital revealed that she had the bundle branch block on old EKGs. Her risk factors for coronary artery disease (CAD) in this relatively young age included obesity and a strong family history of premature CAD, diabe-



**Figure 4.** Electrocardiogram showing resolution of complete heart block post angioplasty.

tes mellitus and hypertension.

In summary, this is a nice illustration of a case of complete heart block in a patient with an inferior MI, which resolved after angioplasty of the acute marginal artery. This case lends support to the mechanism of complete heart block in patients with NSTEMI and a culprit artery not known to supply the AV node.

**Conflict-of-interest issues regarding the authorship or article: None declared.**

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**Key words:** Angioplasty; atrioventricular block; stenoses, coronary.

**Anahtar sözcükler:** Anjiyoplasti; atriyoventriküler blok; darlık, koroner.