# Acute anterior myocardial infarction in a young male patient homozygous for the factor V Leiden mutation

## Homozigot faktör V Leiden mutasyonu olan genç erkek hastada akut anteriyor miyokart enfarktüsü

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There are several reports on the association between the factor V Leiden mutation and acute myocardial infarction (AMI) in young patients, in particular young males. A 28-year-old male patient was admitted with severe chest pain of new onset. He was an active smoker. His father had a history of coronary artery disease and AMI after the age of 45 years. There were no other major coronary risk factors. His electrocardiogram showed ST-segment elevation in the precordial leads V1 to V5. His blood pressure, pulse rate, and other clinical parameters were stable. Emergency coronary angiography showed a significant narrowing in the mid-portion of the left anterior descending (LAD) artery with a moderate intracoronary thrombus, and no or minimal atherosclerosis. The other coronary arteries were normal. Direct stenting was performed for the culprit lesion, which resulted in relief of obstruction and significant improvement in the LAD artery. DNA samples isolated from the peripheral blood were analyzed by polymerase chain reaction and the patient was found to be homozygous for the factor V Leiden mutation. Transthoracic echocardiography before discharge showed only mild hypokinesis of the anterior and apical segments.

*Key words:* Activated protein C resistance; coronary angiography; coronary stenosis/genetics; factor V/genetics; homozygote; myocardial infarction/genetics; stents.

Genç hastalarda, özellikle erkek cinsiyette, faktör V Leiden mutasyonu ile akut miyokart enfarktüsü arasında ilişki olduğunu bildiren yayınlar vardır. Yirmi sekiz yaşında erkek hasta, yeni başlangıçlı şiddetli göğüs ağrısı yakınmasıyla başvurdu. Hastada, sigara içme ve babasında 45 yaşından sonra geçirilmiş koroner arter hastalığı ve akut miyokart enfarktüsü öyküsü dışında başka önemli risk faktörü yoktu. Elektrokardiyografide V1-5 prekordiyal derivasyonlarda ST-segment yükselmesi izlendi. Kan basıncı, nabız ve diğer klinik parametrelerde anormallik yoktu. Hastaya acil koroner anjiyografi yapıldı. Sol ön inen arterin orta bölümünde önemli daralma ve orta derecede trombüs görüldü; dikkat çekici ateroskleroza ise rastlanmadı. Diğer koroner arterler normal bulundu. Sorumlu lezyon için direkt stent yerleştirme sonrasında sol ön inen arterdeki tıkanıklık giderildi. Periferik kandan alınan DNA örneklerinin polimeraz zincir reaksiyonu yöntemiyle incelenmesi sonucunda hastada homozigot faktör V Leiden mutasyonu saptandı. Taburcu olmadan önce yapılan transtorasik ekokardiyografide anteriyor ve apikal segmentlerde hafif hipokinezi dışında bir sorun gözlenmedi.

*Anahtar sözcükler:* Aktive protein C direnci; koroner anjiyografi; koroner darlık/genetik; faktör V/genetik; homozigot; miyokart enfarktüsü/genetik; stent.

Acute myocardial infarction (AMI) occurring secondary to atherothrombotic coronary artery occlusion is one of the leading causes of mortality in our population. There are several reports on the association between the factor V Leiden mutation and AMI in young patients, in particular in young males.[1,2] Homozygous factor V Leiden mutation has been reported to be associated with AMI in two siblings from Turkey and in other young patients worldwide.[3-5] In this paper, we described a young male patient in whom we considered homozygous factor V Leiden mutation as a probable cause of AMI.

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## CASE REPORT

A 28-year-old male patient was admitted to the emergency room with intensive chest pain of new onset. He was an active smoker (1 pack/day for 6 years) and had no history of illicit drug use. His father had a history of coronary artery disease and AMI after the age of 45 years. There were no other major coronary risk factors. His electrocardiogram showed ST-segment elevation of 1-2 mm in the precordial leads V1 to V5 (Fig. 1). His blood pressure (125/80 mmHg), pulse rate (78 beats/min), and other clinical parameters were stable. Emergency coronary angiography was performed, which showed a significant narrowing in the mid-portion of the left anterior descending (LAD) artery with a moderate intracoronary thrombus, and no or minimal atherosclerosis (Fig. 2a). The other coronary arteries were normal. Direct stenting was performed for the culprit lesion, which resulted in relief of obstruction and significant improvement in the LAD artery (Fig. 2b). Cardiac enzymes (CK-MB, troponin I) which increased up to three times normal after AMI returned to normal on the third day. Blood count and other biochemical tests were normal. DNA samples isolated from the peripheral blood were analyzed by polymerase chain reaction and the patient was found to be homozygous for the factor V Leiden mutation. There was no mutation at position 20210 of the prothrombin gene. Other laboratory findings were normal including levels of homocystein, anticardiolipin IgM and IgG, antithrombin III, protein C, and protein S. Genetic counseling for factor V Leiden mutation was recommended for the patient's first-degree relatives. Transthoracic echocardiogra-

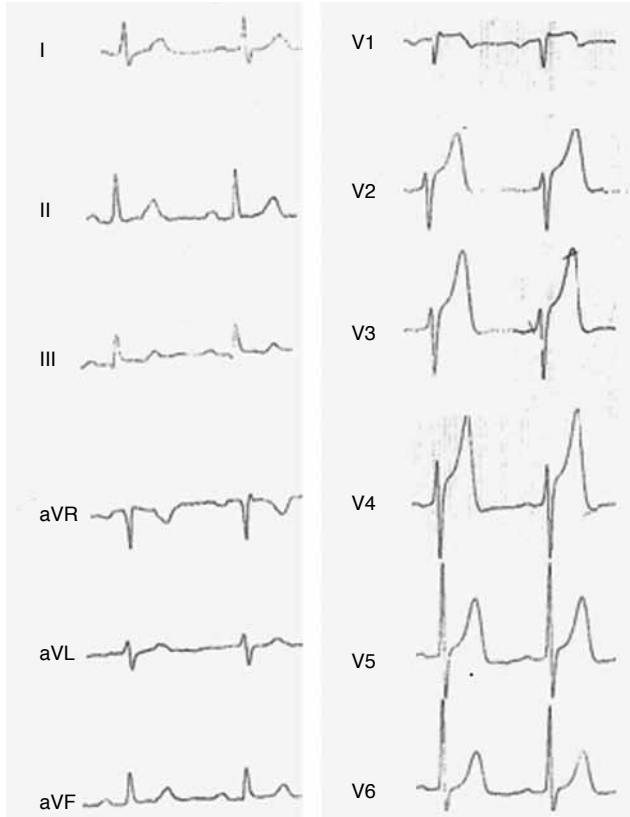


**Figure 1.** The electrocardiogram showing significant ST-segment elevation in the precordial leads V1 to V5.

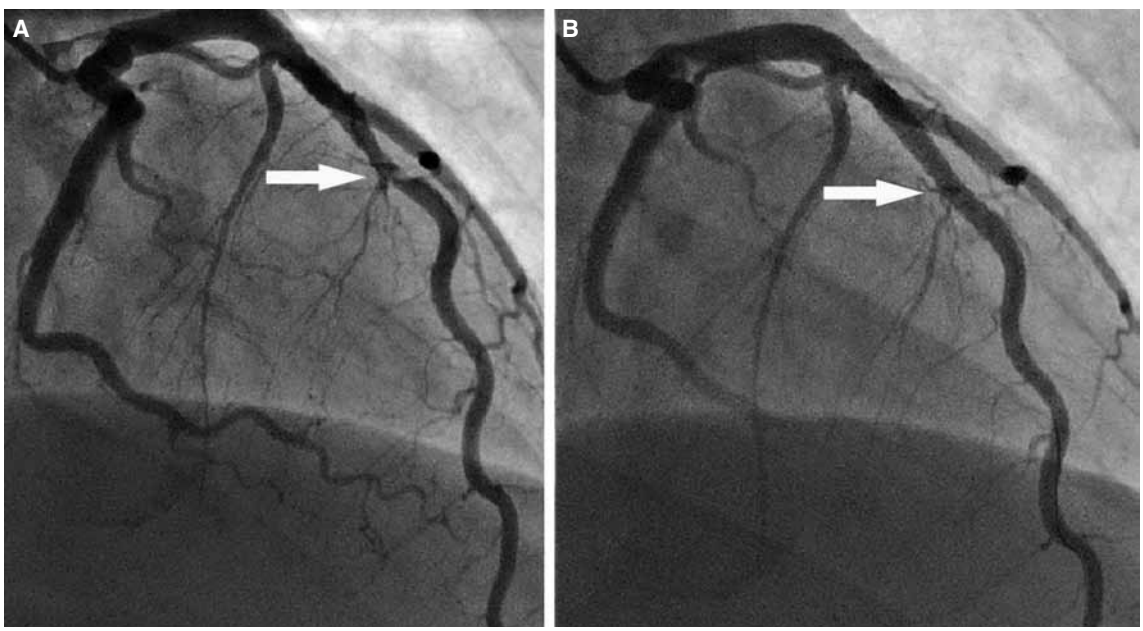


**Figure 2. (A)** Critical narrowing due to an intracoronary thrombus inside the mid-portion of the left anterior descending artery, which was observed as a filling defect, shadow, and slow coronary blood flow (arrow). **(B)** The appearance of the same segment after direct coronary stenting (arrow), showing improved coronary blood flow.

phy was performed before the patient was discharged from the hospital. Ejection fraction was estimated as 60% and there was only mild hypokinesis of the anterior and apical segments. Two anti-platelet drugs were prescribed together with a beta-blocker and an angiotensin-converting enzyme inhibitor for long-term treatment.

## DISCUSSION

Factor V is the co-factor for the activation of factor X in the normal human coagulation system. Activated factor X is necessary for thrombin generation and thrombus formation. Activated protein C is a natural anticoagulant which prevents excessive clot formation in the venous or arterial system. In the presence of factor V Leiden mutation, there is a resistance to the antithrombotic effect of activated protein C, predisposing the patients to the risk for venous or arterial thrombosis. Genetic disorders of coagulation proteins, in general, have important effects on thrombus formation, thrombolysis, or both. The most commonly encountered gene polymorphisms involving factor II, V, and VII may increase the risk for ischemic heart disease.[6] Low protein C and antithrombin III levels, even when within the normal range, seem to be associated with an elevated risk for recurrent cardiovascular events and shorter event-free time in acute coronary syndromes.[7] The role of thrombophilia-hypofibrinolysis in atherothrombotic cardiovascular disorders in patients younger than 45 years has also been investigated. Thrombophilia (mutations of factor V, factor VIII, and factor XI; deficiencies of protein C and S, lupus anticoagulant) has been found to play an important role in premature atherothrombosis, especially in young and normolipidemic patients.[8] Antiphospholipid syndrome is another coagulopathy that increases the risk for AMI and ischemic cerebrovascular stroke in otherwise low-risk patients.[9] In particular, a significant association between the factor V Leiden mutation and coronary artery disease has been demonstrated in the northeast region of our country.[10]

We believe that the presence of a coagulopathy should be investigated especially in very young patients or young adults with few short-term major coronary risk factors for AMI.[11,12] Homozygous factor V Leiden mutation was detected as a probable cause of anterior AMI in our case. The main mechanism of AMI was excessive intracoronary thrombus formation rather than atherosclerotic stenosis in the LAD artery. Major coronary risk factors usually require long-term interaction for the development and progression of coronary atherosclerosis. Despite smoking and family history as well-known coronary risk factors, coronary angiography showed no or minimal atherosclerosis in our patient. A family history of AMI may also imply the inheritance of the coagulopathy in these patients.

In the emergency treatment of coronary thrombosis, tirofiban, direct stenting, and catheter aspiration of the coronary thrombus may be considered. Arterial thrombosis in our case was successfully managed with direct stenting, followed by antiplatelet treatment with aspirin and clopidogrel, which are known to reduce short-and long-term stent restenosis.

In conclusion, homozygous factor V Leiden mutation may contribute to AMI in young patients with few short-term traditional risk factors for atherosclerosis.

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