

## Coronary rupture to the right ventricle during PTCA for myocardial bridge

*“Miyokardiyal Bridge” tedavisinde uygulanan PTKA sırasında koroner arterin sađ ventriküle rüptürü*

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### Introduction

Myocardial bridge (MB) is a congenital abnormality of the coronary arteries characterized by the decrease in the coronary blood flow during systole due to the compression of the myocardial fibrils surrounding the epicardial coronary artery in a certain segment. Although usually asymptomatic, medical therapy, percutaneous transluminal coronary angioplasty (PTCA), and rarely surgery may be necessary to relieve symptoms.

### Case Report

A 37 years old male patient was admitted to another hospital with the complaint of chest pain on exertion. Myocardial perfusion scintigraphy revealed anterior and anteroseptal ischemia. Coronary angiography proved presence of MB causing 70-80% stenosis in the middle segment of the left anterior descending coronary artery (LAD) during systole (Fig. 1). The existence of a MB was confirmed with intravascular ultrasonography (IVUS), which also revealed a plaque creating 80% stenosis just distal to the bridge (Fig. 2). A percutaneous transluminal coronary balloon angioplasty with concomitant implantation of a stent was the first intention for treatment by the cardiologist. During the inflation of the PTCA balloon; the vessel wall of the LAD ruptured accidentally to the right ventricle (Fig. 3), but was further successfully fixed with the implantation of a graft-stent (Jostent®, JoMed GmbH, Rangendingen, Sweden). Six weeks later, he was admitted to the same hospital with unstable angina. A new coronary angiography revealed a 90% stenosis, which was due to a thrombotic lesion within the stent, and 80% stenosing plaque was still observed in place distal to the stent (Fig. 4). The patient applied to our hospital and surgery was arranged since he had unstable angina and no more chance for another stenting. We performed a coronary bypass operation (CABG) with the left internal mammary artery (LIMA) to the LAD graft. The patient had an uneventful recovery and early postoperative stress tests demonstrated no evidence of ischemia.

### Discussion

In anatomical studies, the prevalence of myocardial bridge is reported to be varying between 5.4% and 85.7%, but in angiographic studies, the prevalence is 0.5% to 4.5% (1). In one study, coronary angiographies performed in 2547 Turkish patients revealed the presence of MB in 26 patients (1.02%) (2).

Usually located in the mid-LAD, myocardial bridges commonly are asymptomatic but may rarely present with angina pectoris (3), myocardial infarction (3), life-threatening arrhythmias or even sudden death (4).

Considering that the major myocardial perfusion occurs during diastole, the narrowing of the coronary lumen during systole should not normally cause ischemia, but Schwartz and colleagues, using intracoronary Doppler ultrasonography and angiography proved that systolic narrowing persists up to the mid-diastolic phase and this may be the reason of the perfusion failure and of ischemia (5).

Beta-blockers and calcium-channel antagonists are prescribed to relieve angina by decreasing the heart rate and the myocardial contractility, whereas nitrates are not suggested due to a possible augmentation of symptoms caused by the decrease of coronary vascular wall tension (3).

In a patient with symptomatic myocardial bridge, resistant to medical therapy and evidence of ischemia during stress tests IVUS should be performed. In case of pure systolic compression, with no atherosclerotic plaque, supracoronary myotomy could be enough to treat ischemia (6). In case of presence of an atherosclerotic plaque a CABG operation should be the first choice of treatment since the pressure applied to dilate the diseased coronary vessel during PTCA may easily rupture the thin vessel wall. Stenting is another successful mode of therapy in some cases (7), but due to the presence of a thinner vessel wall within the hyperdynamic segments, complications like perforation and acute thrombosis have been previously reported (8).

Jeremias and colleagues have reported a case where they could hardly prevent the systolic compression with the implantation of four consecutive stents in a patient with myocardial bridge, and an evolving dissection in the coronary artery after PTCA (9). Another case of a myocardial bridge with the formation of a thrombus within the coronary artery after stenting was reported by Ağırbaşı and colleagues (10).

In a case reported by Hering and colleagues, perforation of the coronary artery to the right ventricular outflow tract due to balloon oversizing occurred during balloon angioplasty of a myocardial bridge. The patient was referred for medical treatment and follow-up, and control angiography performed three months later showed spontaneous closure of the fistula (8).

In cases where the LAD is located intramyocardially, this segment of the artery is normally in direct relationship with the right ventricular cavity. In cardiac surgery this relationship is quite clear, that opening of the right ventricular cavity is the most common complication during dissection of an intramyocardial

LAD. It should be kept in mind that during PTCA procedure, due to high wall tension created by the balloon, the posterior wall of the LAD without myocardial support would be the segment most prone to trauma and may result in a rupture to the right ventricle easily. Especially in the presence of a plaque, risk of rupture of the LAD to the right ventricle is higher since more pressure is necessary in the balloon.

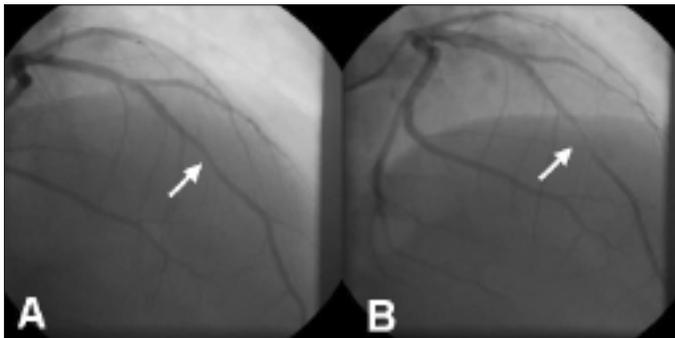


Figure 1. Coronary angiography showing the myocardial bridge in the mid-LAD. A- Normalization during diastole (arrow) B- Systolic compression of the epicardial artery (arrow)

LAD - left anterior descending artery

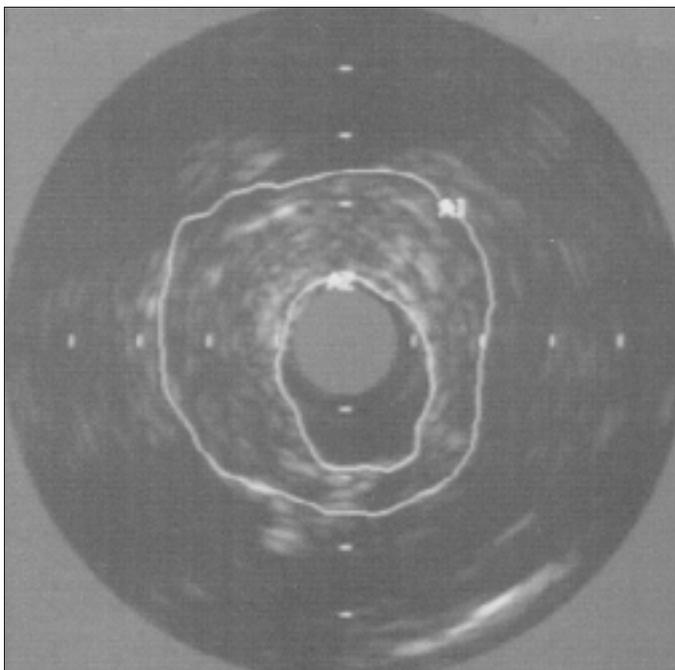


Figure 2. Intravascular ultrasonography demonstrating the bridge in systole and diastole

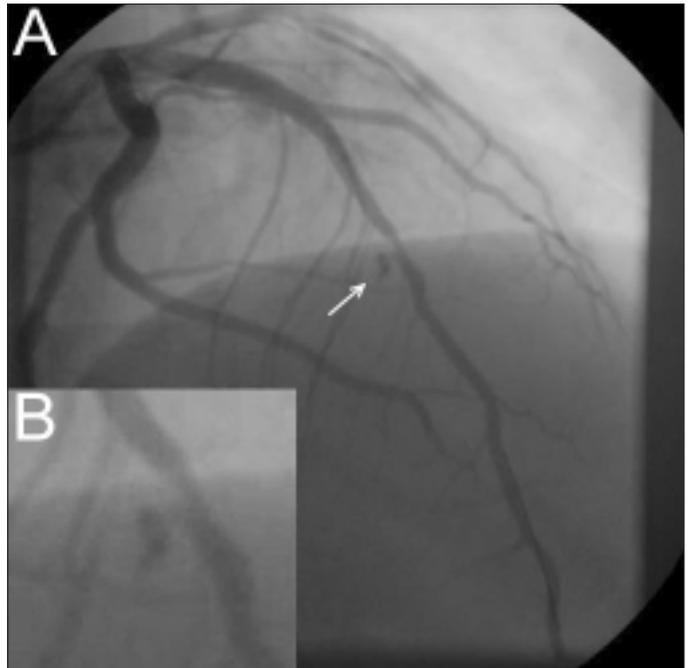


Figure 3. A- Coronary angiography showing extravasation of contrast medium to the right ventricle (arrow) as evidence of rupture of the LAD. B- Zoomed image of the extravasation



Figure 4. Control angiography 6 weeks after stenting showing subtotal stenosis within the stent (arrow) and an 80% stenosing plaque (dotted arrow) distal to it

## Conclusion

In cases where a myocardial bridge is detected angiographically, if angina pectoris persists despite medical treatment, and there is evidence of ischemia in stress tests, IVUS should be performed to detect any accompanying atherosclerotic disease. Despite reports of successful PTCA in the treatment of MB, especially in the presence of accompanying atherosclerosis, because of the extremely thin nature of such vessels, and a high risk of complication such as rupture to the right ventricle, surgical supraarterial myotomy should be the first choice of treatment.

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