

OLGU SUNUMU

Did COVID-19 Pandemic Increase Mechanical Complications of ST-Elevation Myocardial Infarction? Two Ventricular Septal Rupture Cases After Myocardial Infarction During Covid-19 Pandemic

COVID-19 Pandemisi ST Eleve Miyokard İnfarktüsünün Mekanik Komplikasyonlarını Artırdı mı? COVID-19 Pandemisi Sırasında Miyokard İnfarktüsü Sonrası İki Ventriküler Septal Rüptür Olgusu

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Abstract: The coronavirus 19 pandemic causes heavy strain on the healthcare systems of countries worldwide. During the pandemic, fear of contracting the infection caused the patients with cardiovascular complaints to refrain from hospital admittance. This reaction resulted in severe mechanical complications of myocardial infarction. In our hospital, we had two ventricular septal ruptures (VSR) as a complication of late admitted inferior myocardial infarction. Having two VSR cases within three days was unusual for us due to the decreased incidence of VSR in the primary PCI era. However, two cases are not enough to conclude that mechanical complications of myocardial infarction increased during the pandemic, similar case reports from different countries and statements of senior interventional cardiologists support this assertion.

Keywords: Myocardial infarction, Ventricular septal rupture, Pandemics

Öz: Coronavirüs 19 pandemisi dünya çapında ülkelerin sağlık sistemlerinde ağır yüklerle sebep olmaktadır. Pandemi boyunca enfeksiyona yakalanma korkusu, kardiyovasküler şikayetleri olan hastaları hastane başvurdan alıkoymuştur. Bu durum miyokard infarktüsünün ciddi mekanik komplikasyonlarıyla sonuçlanmıştır. Hastanemizde, geç başvuran inferior miyokard infarktüsünün bir komplikasyonu olarak iki adet ventriküler septal rüptür mevcuttur. Primer PCI devrinde VSR insidansının azalması sebebiyle üç gün içinde iki VSR vakasının olması bizim için alışılmadık bir durumdur. Bununla birlikte iki vaka pandemi boyunca miyokard infarktüsünün mekanik komplikasyonlarının arttığı sonucuna varmak için tek başına yeterli değildir, fakat farklı ülkelerden benzer vaka raporları ve kıdemli invaziv kardiyologların açıklamaları bu iddiayı desteklemektedir.

Anahtar kelimeler: Miyokard infarktüsü, Ventriküler septal rüptür, Pandemi

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Etik Beyan/Ethical Declaration

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Informed consent was obtained from the participants and Helsinki Declaration rules were followed to conduct this study.

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1. INTRODUCTION

Ventricular septal rupture is a rare but highly lethal complication of both ST-elevation myocardial infarction and non-ST-elevation myocardial infarction. Although its incidence has decreased significantly with the use of primary percutaneous coronary intervention, the mortality of the mechanical complications is still high (1). During the coronavirus 19 pandemic, the concerns about late admission of acute coronary syndromes to hospital and elevated related complications are rising worldwide (2, 3).

2. CASE PRESENTATION

Case 1: A sixty-year-old male with a history of diabetes mellitus and smoking for 50 years admitted to our emergency department with chest pain lasting for three days and nausea and vomiting. In the initial assessment, the patient did not have a history of cardiovascular disease. The ECG revealed acute inferior posterior myocardial infarction, ST-segment elevation in inferior leads, and reciprocal ST-segment depression in lateral leads, and V2 rhythm was 2:1 AV block with a heart rate of 54 bpm. The patient was hemodynamically compromised; blood pressure was 70/40 mmHg, with clear lungs. After administering 300 mg acetylsalicylic acid, 180 mg ticagrelor, and weight-adjusted iv. unfractionated heparin and 1 mg atropine iv., the patient was taken to the catheter laboratory. His coronary angiography revealed acute total occlusion of dominant RCA before the origin of the right ventricle branch, and occlusion was successfully crossed with wire. RCA did not have any collateral circulation supplying the infarct zone. After balloon angioplasty, 2.75x24 mm DES was implanted, and TIMI 3 flow was restored without any complication. The door to needle time was 20 minutes. The circumflex artery was occluded after the first obtuse marginale, and the left anterior descending artery was critically narrowed at the first diagonal branch bifurcation at Medina 1.1.1. classification. Circumflex occlusion was considered chronic, and PCI was not performed. Despite successful PCI to the disturbed RCA and inotropic support, AV block and hemodynamic compromise persisted. On the physical examination, a 3/6 grade holo-systolic murmur was heard on the mesocardiac focus. The bed-side echocardiographic study revealed a left ventricular ejection fraction of 45% and ventricular septal rupture in the mid-portion of inferior septum 29 mm in diameter at its widest part (Figure 1). Right ventricular function and dimensions were normal. After a transvenous pacemaker and intra-aortic balloon pump implantation and dobutamine infusion, the patient was transferred to cardiovascular surgery for an emergency operation.

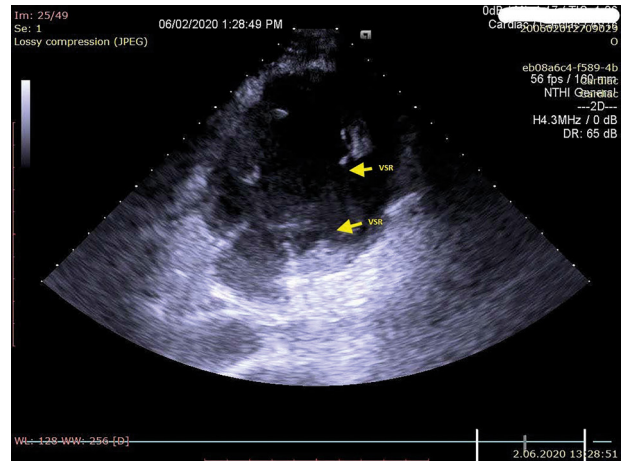


Figure 1. Modified apical four-chamber view of VSR of case 1.

Case 2: A 54-year-old male patient with a history of smoking (40 pack-years) and hypertension applied to the emergency room with a compressive chest pain lasting for two days. His medical history examination did not reveal a history of cardiovascular disease. In the ECG taken in the emergency room, ST elevation was present in leads D2-D3-aVF, and heart rate was 70bpm, the patient was diagnosed as acute inferior myocardial infarction. Blood pressure was 50/20 mmHg, hemodynamics was unstable. After 300 mg ASA, 180 mg Ticagrelor, and 5µg/kg/min dopamine infusion, the patient underwent emergent coronary angiography. Coronary angiography revealed total occlusion of the RCA artery after the conus branch, and other coronary arteries were free of significant disease. The total occlusion in the RCA was fixed by multiple balloon angioplasty dilation, and 3.0 * 38mm, and 3.5 * 15mm drug-eluting stents were deployed. TIMI 3 flow was restored in the IRA. There was not any collateral circulation to the IRA. Despite the successful PCI and inotropic support efforts, there were no signs of hemodynamic improvement, and the patient was taken to the coronary intensive care unit with a blood pressure of 70/50mmHg. In the physical examination, a harsh pan-systolic murmur was heard on the left parasternal border radiating to apex, no thrill was palpable, with clear lungs. Bed-side echocardiography showed a left ejection fraction of 40%, and the septum was hypokinetic with 20mmVSR in the inferior basal part. Right ventricular function was normal with minimally dilated dimensions and minimal tricuspid regurgitation (Figure 2). After the intra-aortic balloon pump implantation, the patient was taken to cardiovascular surgery.

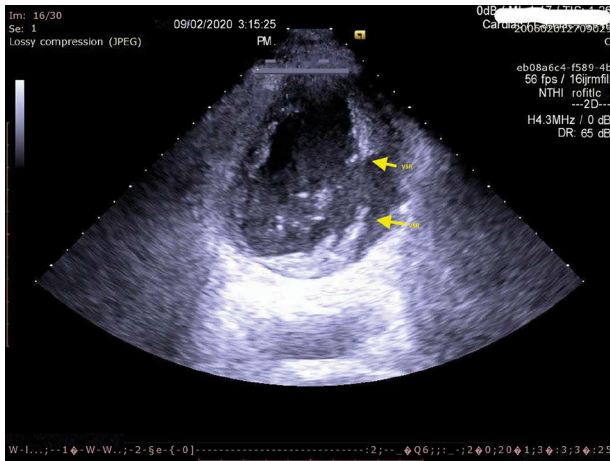


Figure 2. Modified apical four-chamber view of VSR of case 2.

Ethical Declaration

Informed consent was obtained from the participants and Helsinki Declaration rules were followed to conduct this study.

3. DISCUSSION

Ventricular septal rupture is a rare but lethal complication of ST-elevation acute myocardial infarction. Before the thrombolytic era, its incidence was about 1 to 3%, and the prognosis was grim with a mortality rate of 45% for surgically treated patients and 90% for medically treated. In the thrombolytic era, the incidence has dropped to 0.2 to 0.4%, and with primary percutaneous coronary intervention, a similar rate of 0.2 to 0.5% was reported in contemporary series (4, 5). However, the incidence of VSR has decreased with the advent of revascularization techniques; its mortality remains high (41-80%) compared with AMI patients without VSR (1, 6).

Ventricular septal rupture incidence shows a bimodal characteristic with a peak in the first 24 hours (median 16 hours) and a second peak between 3 to 5 days after AMI. There are several risk factors for VSR development during AMI; older age, female sex, anterior location, total occlusion of the infarct-related artery (IRA), absence of collateral circulation to the infarct zone, prolonged time from the onset of symptoms to the treatment administration, cigarette smoking, lack of prior angina, history of hypertension and heart failure at admission (4, 7).

Symptoms and signs of VSR are; severe tearing chest pain, shortness of breath, signs of low cardiac output, and shock. Physical examination signs of left to right ventricular shunt can be found, a loud, harsh holo-systolic murmur along the left sternal border, radiating towards

the base, apex, and right parasternal edge, in half of the patients a palpable parasternal thrill can be identified. Right and left ventricular S3 gallops are common due to the volume overload of the ventricles. P2 is accentuated by pulmonary hypertension induced by the left to right ventricular shunt. Tricuspid regurgitation murmur may also be present. The diagnosis can easily be made by physical examination and echocardiography in almost 100% of the patients (7, 8).

Early surgery is associated with a high mortality rate, reported as 20–40%, and a high risk of recurrent ventricular rupture (8). However, cardiovascular surgeons assert that delayed surgery allows more natural septal repair in scarring tissue (9); this approach carries the risk of rupture extension and death while waiting for surgery (8). The patients operated in the early period were more likely to be unstable and therefore carry high mortality and morbidity risk compared to stable patients who can wait for a delayed procedure (1). In other words, selection bias probably accounts for the observed high mortality rate of early surgery. Based on this information, the latest ESC guideline on the ST-elevation MI recommends early surgery in all patients with severe heart failure that does not respond rapidly to aggressive therapy but delayed elective surgical repair may be considered in patients who respond well to aggressive heart failure therapy (10). Percutaneous closure of the defect with appropriately designed devices may soon become an alternative to surgery (11). Our patients were hemodynamically unstable, and septal defects were too large to be successfully closed by percutaneous techniques. The most apparent contributing factor to VSR development in both of our cases is that patients apply to the hospital long after the onset of symptoms.

In recent times, there is accumulating evidence that the principal reason for the decreasing STEMI cases is patients' avoiding hospitals out of fear of catching Covid-19 infection. Besides, there are publications and statements that the incidence of mechanical complications of myocardial infarction such as aneurysms, papillary muscle rupture, ventricular septal rupture, thrombus formation, and acute onset heart failure are increasing. Some authors, like Lorenzo Azzalini, describe the last few months as a trip back in time and state that mechanical complications that were supposed to be quite rare could be seen more frequently in the preceding months. Likewise, Dr. Cindy Grines states that doctors see these complications after not seeing them after a decade, and patients were much sicker than before (2, 3).

4. CONCLUSION

However, hospitals in Turkey were not overwhelmed by numerous Covid-19 patients and remained fully operative in healthcare, public fear of catching a highly contagious Covid-19 infection from hospitals lead to decreasing applications to the emergency department with cardiovascular complaints.

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