CASE REPORTS
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A RARE CAUSE OF MYOCARDIAL INFARCTION − CORONARY ARTERY EMBOLIZATION BY MYXOMA FRAGMENTS

REDAK UZROK INFARKTA MIOKARDA – EMBOLIZACIJA KORONARNE ARTERIJE FRAGMENTIMA MIKSOMA

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Summary
Introduction. Myxoma is the most common intracardiac tumor accounting for about 50% of all heart tumors. The symptoms depend on the size of the tumor, its location and mobility. Embolic manifestations of coronary arteries are extremely rare, occurring in about 0.06% of cases, and they are caused by tumor fragments. **Case Report.** A 54-year-old female patient was admitted for an acute myocardial infarction with ST segment elevation in the inferior leads. Urgent coronary angiography was performed showing no coronary vessel stenosis. In the projection of the left atrium, a mobile mass with partial calcification was registered, which was stained to a lesser extent with a contrast agent. These were nutrient vessels with a typical "tumor blush" sign. An echocardiographic examination showed a round, inhomogeneous mass in the left atrium, which was fixed to the interatrial septum. The findings were presented to the cardiology team and urgent surgical extirpation was performed. During the follow-up period of two years, the patient was doing well and echocardiographic examination showed a normal finding, without recurrence of the tumor. **Conclusion.** Acute myocardial infarction in people without risk factors for ischemic heart disease is very rare. The most common cause of this type of acute coronary syndrome is spontaneous coronary artery dissection. Acute myocardial infarction caused by embolization of the coronary artery by myxoma fragments is a rare phenomenon. Echocardiographic examination is the method of choice in the diagnosis of myxoma. The most effective treatment for these patients is surgical resection of the tumor with low operative mortality.
Key words: Myocardial Infarction; Embolism; Coronary Vessels; Myxoma; MINOCA; Coronary Angiography

Sažetak
Uvod. Miksom predstavlja najčešći tumor srca i čini oko 50% svih srčanih tumora. Simptomi zavise od veličine tumora, pozicije i mobilnosti. Embolijske manifestacije koronarnih arterija su izuzetno retke, javljaju se u oko 0,06% slučajeva i uzrokovane su fragmentacijom tumorske mase. **Prikaz slučaja.** Bolesnica, 54 godine, primljena je zbog akutnog infarkta miokarda sa ST elevacijom donjeg zida. Urađena je urgentna koronarografija, kojom se registruje uredan luminogram koronarnih krvnih sudova. U projekciji leve pretkomore uočava se delimično kalcifikovana pokretna formacija, koja se u manjoj meri obojava i kontrastnim sredstvom − nutritivni krvni sudovi. Ehokardiografskim pregledom se u levoj pretkomori registruje okruglasta, nehomogena, eho formacija, koja je bazom fiksirana za interatrijalni septum. Dokumentacija je prikazana kardiološko-kardiohirurškom kozilijumu, koji je mišljenja da je indikovana hitna hirurška ekstirpacija tumorske mase, što je i učinjeno. U toku praćenja, u periodu od dve godine, bolesnica je subjektivno dobro i ehokardiografskim pregledom se registruje uredan nalaz, bez recidiva tumora. **Zaključak.** Akutni infarkt miokarda kod osoba bez faktora rizika za ishemijsku bolest srca je vrlo retka pojava. Najčešći uzrok takvog tipa akutnog koronarnog sindroma je spontana disekcija koronarne arterije. Još ređa pojava je akutni infarkt miokarda, kao posledica embolizacije fragmentima miksoma. Ehokardiografski pregled predstavlja metodu izbora u postavljanju dijagnoze miksoma. Najefikasniji tretman ovih pacijenata predstavlja hirurška resekcija tumora sa niskim operativnim mortalitetom.
Ključne reči: infarkt miokarda; embolizacija; koronarni krvni sudovi; miksom; infarkt miokarda bez opstrukcije koronarnih arterija; koronarna angiografija

Introduction

Myxoma is the most common intracardiac tumor accounting for about 50% of all heart tumors [1]. It occurs most often in women between the ages of thirty and sixty [2]. In asymptomatic patients, the diagnosis is made incidentally. Symptoms depend on the size of the tumor, its position and mobility. Myxoma is characterized by three groups of symptoms: intracardiac obstruction, embolization, and

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Abbreviations
ECG – electrocardiogram
MINOCA – myocardial infarction with non-obstructive coronary arteries

systemic manifestations (fever, anemia, arthralgia, dyspnea). Systemic embolization is not rare, since it manifests in about 30 - 40% of cases. Coronary artery embolism manifestations are extremely rare, and they account for about 0.06% of cases and they are caused by tumor fragments [3]. In the literature, several cases of acute myocardial infarction caused by embolization of coronary arteries with myxoma fragments (nonatherosclerotic coronary artery disease) have been described [1].

We present the case of a 54-year-old woman, who developed acute myocardial infarction, as a consequence of the embolization of the coronary artery by fragments of a thrombotic mass from the surface of the myxoma and spontaneous recanalization of the coronary artery.

Case Report

A 54-year-old woman was admitted to Intensive Care Unit due to an acute myocardial infarction with ST elevation in the inferior leads **(Figure 1)**. Chest pain radiating to the left arm occurred about 4 hours before admission. Dual antiplatelet therapy (acetylsalicylic acid and ticagrelor) and low molecular weight heparin were initiated. She denied other diseases and risk factors since previously she had no health problems. Upon admission, she was hemodynamically and rhythmically stable, cardiac compensated (blood pressure was 110/60 mmHg and heart rate 75 beats per minute). Physical examination was unremarkable, except for a soft grade 3/6 systolic murmur at the cardiac apex. Urgent coronarography was performed showing no coronary vessel stenosis **(Figure 2)**. In the projection of the left atrium, a mobile mass with partial calcification was registered, which was stained to a lesser extent with a contrast agent **(Figure 2)**. These were nutrient vessels with a typical "tumor blush" sign. The laboratory findings showed multiple elevated values of cardio specific enzymes

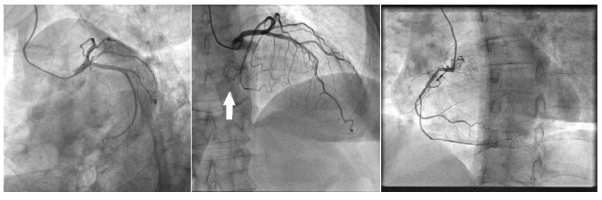

Figure 2. Coronarography shows coronary artery without stenosis. In the projection of the left atrium, a mobile mass with partial calcification stained to a lesser extent with a contrast agent, was found
Slika 2. *Na koronarografiji se ne registruju stenoze koronarnih krvnih sudova. U projekciji leve pretkomore uočava se delimično kalcifikovana pokretna formacija, koja se u manjoj meri obojava i kontrastnim sredstvom*

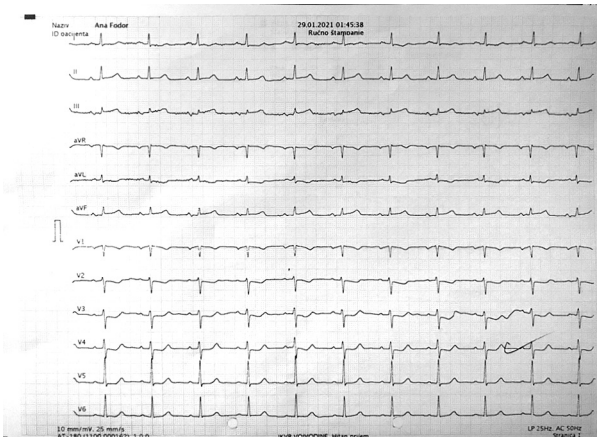

Figure 1. ECG shows ST segment elevation in the inferior leads
Slika 1. *Na elektrokardiografskom zapisu se registruje elevacija ST segmenta u inferiornim odvodima*

(high sensitive troponin 6,523 ng/l; reference values less than 34 ng/l). The resolution of ST elevation, identified upon admission, was registered on the electrocardiogram (ECG). According to current guidelines, this was a patient with myocardial infarction with non-obstructive coronary arteries (MINOCA). An echocardiographic examination showed a large (3.6 x 3.5 cm), round, inhomogeneous mass in the left atrium, fixed to the interatrial septum with a stalk **(Figure 3)**. The described mass prolapsed into the left ventricle during diastole and caused mechanical obstruction of the mitral valve **(Figure 3)**. Hypokinesis of the basal segment of the inferior wall was registered.

The findings were presented to the cardiology team and urgent surgical extirpation of the tumor mass was performed. Histopathological findings were consistent with a left atrial myxoma **(Figure 4)**. A grayish nodule, gelatinous on cross-section, supplied with blood and calcified, was confirmed. It was composed of spindle and stellate-shaped cells with an oval hyperchromatic nucleus, scanty cyto-

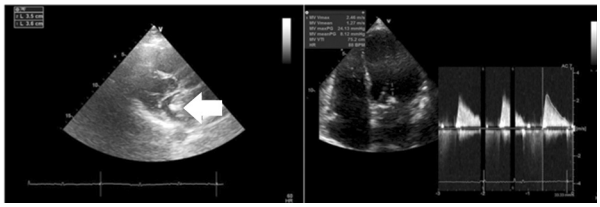

Figure 3. Echocardiographic examination showed a large (3.6 x 3.5 cm) round, inhomogeneous mass in the left atrium, fixed to the interatrial septum with a stalk. The described mass prolapsed into the left ventricle during diastole and caused mechanical obstruction of the mitral valve
Slika 3. *Ehokardiografskim pregledom se registruje velika (3,6x3,5cm), okruglasta, nehomogena, eho formacija, koja je bazom fiksirana za interatrijalni septum. Opisana masa prolabira u levu komoru tokom dijastole i uzrokuje mehaničku opstrukciju mitralne valvule*

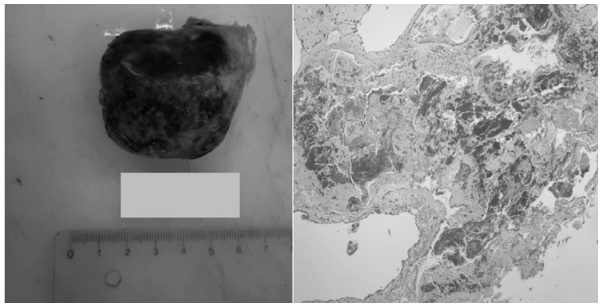

Figure 4. Histopathological findings are consistent with a left atrial myxoma
Slika 4. *Patohistološki nalaz ukazuje na miksom leve pretkomore*

plasm, immersed in an abundant myxoid stroma **(Figure 4)**.

The patient was without symptoms, hemodynamically and rhythmically stable, with cardiac compensation. An echocardiographic examination registered a normal finding, without segmental kinetics disorder. The patient was discharged on the seventh day of hospitalization. Since it was a myocardial infarction caused by thromboembolism from a tumor mass, with spontaneous recanalization and without angiographically registered atherosclerotic disease, the patient was discharged with one antiplatelet drug (acetylsalicylic acid).

On follow-up, two years later, the patient was doing well and the echocardiographic examination showed a normal finding, without recurrence of the tumor. A written consent to publish this report was obtained from the patient.

Discussion

Acute myocardial infarction in people without risk factors for ischemic heart disease is very rare. The most common cause of this type of acute coronary syndrome is spontaneous coronary artery dissection. Acute myocardial infarction caused by embolization of the coronary artery by myxoma fragments is a rare phenomenon. Embolic complications of coronary arteries are extremely rare, in contrast to embolic complications of targeted vessels, such as cerebral arteries, mesenteric arteries and other peripheral arteries**.** According to current guidelines, our patient presented with MINOCA. Coronary embolism is included in microvascular causes of MINOCA, as it usually involves microcirculation, although angiographically visible embolization of the epicardial coronary artery branches may occur [4]. In our patient, coronarography showed no visible embolization. The cause of very rare embolization of the coronary arteries can be explained by the perpendicular position of the ostia of the coronary arteries, protection of the ostia by aortic valve cusps in systole, and the small diameter of the coronary arteries [5]. Embolization of the right coronary artery is more common than of the left coronary artery. This can be understood as a consequence of the smaller angle at which the right coronary artery is placed. Panos et al. reported that the right coronary artery is most often affected (in 50% of cases), the left coronary artery is affected in 20% of cases, and the circumflex artery in about 10% of cases [6].

In our case, chest pain and electrocardiographic ST segment elevation in the inferior leads are most likely the result of embolization of the coronary artery by small thrombotic fragments from the surface of the tumor mass.

The patient received dual antiplatelet therapy and low molecular weight heparin. This therapy contributed to a recanalization of the coronary artery. Coronarography did not show a thrombus or a narrowing of the blood vessel. The patient was without any symptoms and the ECG registered resolution of ST segment elevation. El Zaharani et al. reported that coronary blood vessel without stenosis occurs in 55% of patients with myocardial infarction and myxoma, found in 17 cases between 2003 and 2014. They showed that the coronary blood vessel without stenosis was the result of spontaneous recanalization of the coronary artery [7].

A common finding on angiography in these patients is late or delayed contrast opacification of the tumor mass in vascularized tumors. This is described in the literature as "tumor blush" which represents the neovascularization of the tumor mass [8]. This feature helps to differentiate myxoma from atrial thrombus [9]. In our patient, the "tumor blush" was registered on coronarography.

Echocardiographic examination is the most frequently used method in establishing the diagnosis. This is a non-invasive method that provides sensitivity between 95 and 100%. A "tumor plop" sound can be heard during auscultation of these patients. A case study including 112 patients with myxoma shows that 65% of patients had auscultatory abnormalities, but only 15% of patients had a tumor plop [10]. Our patient had a systolic murmur, but not a "tumor plop".

In the current recommendations, there are no clear guidelines for dual antiplatelet therapy in such patients. According to the literature, administration of dual antiplatelet therapy is associated with a significant intraoperative bleeding in patients who undergo surgical tumor extirpation. Since myocardial infarction was caused by thromboembolism from a tumor mass, with spontaneous recanalization and without angiographically registered atherosclerotic disease, the patient was discharged with one antiplatelet drug (acetylsalicylic acid). The most effective treatment for these patients is surgical resection of the tumor with low operative mortality.

The recurrence rate after surgical excision is relatively low (5%), but long-term follow-up with echocardiographic imaging is recommended [11].

Conclusion

Acute myocardial infarction in people without risk factors for ischemic heart disease is a very rare. The

most common cause of this type of acute coronary syndrome is spontaneous coronary artery dissection. Acute myocardial infarction caused by embolization of the coronary artery by myxoma fragments is a rare phenomenon. Echocardiographic examination is a method of choice in the diagnosis of myxoma. The most effective treatment for these patients is surgical resection of the tumor with low operative mortality.

References

1. Lalla S, Kawall J, Seecheran R, Ramadhin D, Seecheran V, Persad S, et al. Atrial myxoma presenting as a non-ST-segment elevation myocardial infarction. Int Med Case Rep J. 2019;12:179-83.

2. Reynen K. Frequency of primary tumors of the heart. Am J Cardiol. 1996;77(1):107.

3. Lehrman KL, Prozan GB, Ullyot D. Atrial myxoma presenting as acute myocardial infarction. Am Heart J. 1985;110(6): 1293-5.

4. Scalone G, Niccoli G, Crea F. Editor's choice - pathophysiology, diagnosis and management of MINOCA: an update. Eur Heart J Acute Cardiovasc Care. 2019;8(1):54-62.

5. Attar MN, Moore RK, Khan S. Left atrial myxoma presenting with ventricular fibrillation. J Cardiovasc Med (Hagerstown). 2008;9(3):282-4.

6. Panos A, Kalangos A, Sztajzel J. Left atrial myxoma presenting with myocardial infarction. Case report and review of the literature. Int J Cardiol. 1997;62(1):73-5.

7. Al Zahrani IM, Alraqtan A, Rezk A, Almasswary A, Bella A. Atrial myxoma related myocardial infarction: case report and review of the literature. J Saudi Heart Assoc. 2014;26(3):166-9.

8. Kim YK, Yong HS, Kang EY, Woo OH. Left atrial myxoma with neovascularization: detected on cardiac computed tomography angiography. Int J Cardiovasc Imaging. 2009;25 Suppl 1:95-8.

9. Tang W, Chen J. Myocardial infarction and "dye brushes'' sign from an atrial myxoma. Int J Cardiovasc Imaging. 2020; 36(1):1-2.

10. Reynen K. Cardiac myxomas. N Engl J Med. 1995;333-(24):1610-7.

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