



VOJNOSANITETSKI PREGLED

VOJNOMEDICINSKA AKADEMIJA

Crnotravska 17, 11 000 Beograd, Srbija

Tel/faks: +381 11 2669689

vsp@vma.mod.gov.rs

ACCEPTED MANUSCRIPT

Accepted manuscripts are the articles in press that have been peer reviewed and accepted for publication by the Editorial Board of the *Vojnosanitetski Pregled*. They have not yet been copy edited and/or formatted in the publication house style, and the text could still be changed before final publication.

Although accepted manuscripts do not yet have all bibliographic details available, they can already be cited using the year of online publication and the DOI, as follows: article title, the author(s), publication (year), the DOI.

Please cite this article **Giant intrapericardial lipoma: clinical and forensic implications**

Veliki intraperikardni lipom: kliničke i forenzičke implikacije

Authors Milenko Bogdanović*, Snežana Pavlekić*, Maja Milošević†, Bojana Radnić*, Jovana Lakčević†, Stefan Veljković†, Đorđe Alempijević*, Miloš D. Babić†, Vojnosanitetski pregled (2022); Online First March, 2022.

UDC:

DOI: <https://doi.org/10.2298/VSP200922023B>

When the final article is assigned to volumes/issues of the Journal, the Article in Press version will be removed and the final version will appear in the associated published volumes/issues of the Journal. The date the article was made available online first will be carried over.

Giant intrapericardial lipoma: clinical and forensic implications

Veliki intraperikardni lipom: kliničke i forenzičke implikacije

Milenko Bogdanović*, Snežana Pavlekić*, Maja Milošević†, Bojana Radnić*, Jovana Lakčević†, Stefan Veljković†, Đorđe Alempijević*, Miloš D. Babić†

* University of Belgrade, Faculty of Medicine, Institute of Forensic Medicine “Milovan Milovanović”, Belgrade, Serbia

† Institute for Cardiovascular Diseases Dedinje, Department of Cardiology, Belgrade, Serbia

* Institute of Forensic Medicine “Milovan Milovanović”, University of Belgrade - Faculty of Medicine, Deligradska 31a, 11000 Belgrade, Serbia

† Institute for Cardiovascular Diseases Dedinje, , Department of Cardiology, Heroja Milana Tepića 1, 11000 Belgrade, Serbia

Correspondence to:

Miloš Babić, MD, MSc

Institute for Cardiovascular Diseases Dedinje

Heroja Milana Tepića 1, 11000 Belgrade, Serbia

e-mail: babicmisa@hotmail.com

Abstract

Introduction. Even though lipomas are the most common benign tumors, they are rarely found in the pericardial cavity. Although histopathological benign, they can cause life-threatening complications by rapid growth and, therefore, clinically may be considered as malignant. **Case report.** We present a case of an 80-year-old female who was injured during syncopial episode, when falling from standing height and later died in the hospital without an obvious cause of death. At the autopsy, a dilated and tense pericardium filling up a large part of the chest cavity was noted. A well-encapsulated soft tissue mass, 20x18x3cm in size and measuring 820 g, was visualized in the pericardial cavity. Histopathological examination revealed that the mass was lipoma and showed acute myocardial necrosis and, therefore, it was assumed that the cause of death was myocardial infarction, probably due to the compression of lipoma on coronary arteries. **Conclusion.** Even though intrapericardial lipomas are benign tumors, they can cause life-threatening complications and sudden cardiac death. There are numerous diagnostic methods capable of detecting intrapericardial lipomas, and with timely treatment patient can be cured.

Key words: intrapericardial lipoma, myocardial infarction, sudden death, syncope, autopsy

Apstrakt

Uvod. Lipomi su najčešći benigni tumori, ali su retko lokalizovani u perikardnoj šupljini. Iako su po patohistološkim karakteristikama benigni, usled ubrzanog rasta mogu dovesti do komplikacija koje ugrožavaju život pacijenta, stoga se klinički mogu smatrati malignim.

Prikaz bolesnika. Prikazujemo slučaj 80-godišnje žene, koja je nakon epizode sinkope, pri padu sa sopstvene visine, zadobila telesne povrede, zbog kojih je hospitalizovana, a u daljem toku kratkotrajnog bolničkog lečenja nastupio je smrtni ishod, a uzrok smrti označen je kao "nepoznat". Obdukcija je pokazala uvećan i napet perikard koji ispunjava značajan deo grudne duplje. Dobro inkapsulirana tkivna masa dimenzija 20x18x3cm, težine 820 g, uočena je intraperikardno. Mikroskopskim pregledom organa pokazano je da je uočena promena lipom, a na srčanom mišiću uočeni su znaci ishemije tj. infarkta

miokarda. Na osnovu ovakavog makroskopskog i mikroskopskog nalaza, uz usključivanje drugih uzroka smrti, pretpostavljeno je da je infarkt miokarda najverovatnije nastao kao posledica pritiska lipoma na koronarne arterije. **Zaključak.** Iako su intraperikardni lipomi benigni tumori, mogu dovesti do životno ugrožavajućih komplikacija i iznenadne srčane smrti. Postoje različite i široko dostupne dijagnostičke metode pomoću kojih je moguća detekcija intraperikardnih lipoma, te pravovremenom intervencijom pacijent može biti izlečen.

Ključne reči: intraperikardni lipom, infarkt miokarda, iznenadna smrt, sinkopa, autopsija

Introduction

Primary pericardial tumors are rare, with an estimated prevalence of 0.001-0.007%¹. These tumors can be benign (teratoma, fibroma, angioma, lipoma) or malignant (mesothelioma, sarcoma)². Lipomas are the most common benign tumors that are usually seen in the subcutaneous tissue, but may also be deep-seated. They are infrequently seen in the thoracic cavity, and even less frequently in the pericardial cavity^{3,4}. Cardiac lipomas can originate from the subendocardium, subpericardium, or myocardium⁵. Lipomas usually grow slowly, and patients may remain asymptomatic for many years. Therefore, most intrapericardial lipomas are detected as accidental finding during the autopsy⁶. Lipomas can be diagnosed using non-invasive imaging methods such as echocardiography, computed tomography, or magnetic resonance. If diagnosed, lipomas are usually in the advanced stage of development and present as extremely large masses that, if not asymptomatic, cause symptoms including effort angina, fatigue, atrial arrhythmias (by compressing the coronary arteries) and dyspnea (by tamponade)^{7,8}.

Herein, we shall present a rare case of cardiac death caused by compression of intrapericardial lipoma on coronary arteries.

Case report

We present a case of an 80-year-old female who was injured when falling from standing height after experiencing a syncopal episode. On admission to secondary care hospital, she presented with dizziness, breathlessness and chest pain. She had a history of hypertension. The main finding on physical examination was systolic ejection murmur grade III/VI, while rest of the examination was unremarkable. The electrocardiogram

(ECG) revealed sinus rhythm, 90 beats per minute and left ventricle hypertrophy with secondary repolarization abnormalities. Focus transthoracic echocardiogram (TTE) showed concentric left ventricle hypertrophy, non-severe aortic stenosis, and preserved ejection fraction (65%), with no revealed pericardial mass or effusion.

On the second day after admission she suddenly deteriorated. Initial ECG showed atrioventricular (AV) dissociation that progressed to cardiopulmonary arrest. Following unsuccessful resuscitation attempts, she was pronounced dead.

The patient was of average osteomuscular build, with body mass index (BMI) 24 kg/m². During the autopsy, external examination revealed multiple bruises, excoriations and superficial lacerations on the left side of the face. During the internal examination of the thorax, a dilated pericardium filling up a large part of the chest cavity was noted (Figure 1)



Fig. 1 – Dilated pericardium filling up a large part of the chest cavity

A well-encapsulated soft tissue mass, 20x18x3cm in size and measuring 820 g, was observed in the pericardial cavity (Figure 2).

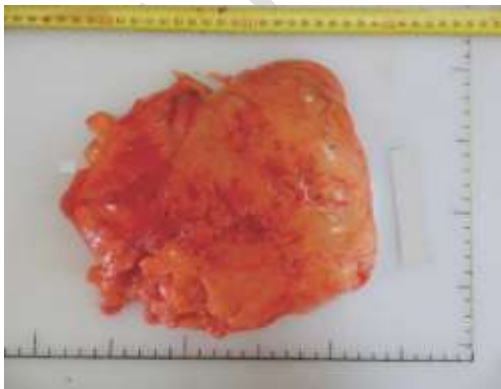


Fig. 2 – Well-encapsulated soft tissue mass in the pericardium

The mass was free in the pericardial sack, located behind the left auricle and connected with a vascular peduncle to the left atrium (Figure 3).



Fig. 3 – Free tumor in the pericardial sack, connected to the left atrium, just behind the auricula by a vascular peduncle

The heart itself weighted 460 g. The left ventricular wall was 16 mm thick, and the aortic valve was stenotic, with a ring circumference of 6 cm. An ischemic area, 2x2 cm in size, was noted in the interventricular septum (IVS), and it was observed that the anterolateral papillary muscle (ALPM) was pale, with hemorrhages. The three major coronary arteries had numerous atherosclerotic plaques that were calcified in some parts. The level of their stenosis was approximately 60%. Other macroscopic findings were unremarkable. Histopathological examination revealed that the tumor mass was lipoma, composed of mature fat cells (Figure 4).

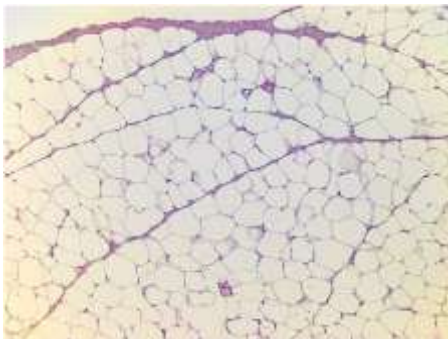


Fig. 4 – Histological appearance Intrapericardial lipoma: mature fat cells (Hematoxylin-eosin, $\times 40$)

The heart tissue showed acute ischemia. Therefore, we concluded that the cause of death was myocardial infarction, probably due to the compression of lipoma on coronary arteries.

Discussion

In our opinion, the most important autopsy findings were macroscopic and microscopic findings on the heart and pericardium. The examination of the pericardium showed a well-encapsulated lipoma, located behind the left auricle and connected with a vascular peduncle to the left atrium (Figure 2). Also, the aortic stenosis as well as the stenosis of coronary arteries were observed but, individually, they were not severe enough to cause death of the patient. Therefore, it was assumed that the cause of death was myocardial infarction, probably due to the compression of lipoma on coronary arteries. This hypothesis is encouraged by the fact that an ischemic area in the IVS, as well as ischemia of the ALPM were noted. It is well-known that the left anterior descending artery (LAD) through its branches provides blood supply for a major part of the left ventricular myocardium, as well as the anterior and mid thirds of the IVS⁹. Its first diagonal branch provides blood for ALPM¹⁰, while anterior part of the IVS obtains blood from the septal branches of the LAD⁹. Having in mind anatomic location of the mentioned blood vessels, in addition to the location of the lipoma, there is a strong possibility that the compression of these arteries caused by the tumor mass lead to the ischemia of the IVS and ALPM.

On the other hand, the question arises whether the pressure of the intrapericardial lipoma was enough to completely stop the blood flow through the coronary arteries and cause myocardial necrosis. We speculate that in this case aortic stenosis was significant contributing factor. As previously mentioned, aortic stenosis was probably not severe enough to individually cause myocardial ischemia. Nevertheless, patients with aortic stenosis are susceptible to myocardial ischemia due to increased metabolic demands of the hypertrophic myocardium, which, in case of decreased blood supply could have been contributing factor for myocardial ischemia^{11, 12}. Although ischemic zone was not extensive, we hypothesize that the alteration of metabolism in cardiac myocytes caused by the ischemia lead to malignant ventricular arrhythmia and sudden cardiac death.

Myocardial infarction with non-obstructive coronary arteries (MINOCA) is an uncommon but well documented phenomenon and one of the potential causes includes external compression on the coronary arteries. However, reports of extrinsic compression of epicardial coronary arteries are uncommon. Gue at al. presented a case of a 44-year old patient with MINOCA due to compression of coronary arteries caused by the enlarged mediastinal lymph nodes in Hodgkin lymphoma¹³. Aggarwala et al. showed the case of a

71-year-old female patient who presented with findings suggestive of an acute myocardial infarction due to extrinsic cardiac mass encasing the left circumflex and right coronary arteries (RCA), which caused compression and spasticity of the RCA ¹⁴. However, there is no reports in literature focusing on cases with similar clinical presentation in patients with intrapericardial lipoma.

Although being the first-choice method in identification of intrapericardial masses, the diagnostic value of echocardiography has its shortcomings. Transesophageal echocardiogram (TEE) can provide more accurate imaging than TTE, but either TTE or TEE are insufficient to distinguish pericardial adipose tissue from lipoma. Therefore, an additional Computed Tomography (CT) or Magnetic Resonance Imaging (MRI) are often needed, since they can give a more comprehensive view of the structure and its origin ^{15,16}. In this case, despite the fact that lipoma was very large it was neglected with TTE exam. The possible explanation for this might be the lack of time for detailed examination, since the TTE examination was performed in the emergency room, shortly after the syncopal episode. However, there are some case reports that describe successful diagnosing of cardiac lipoma by using TTE ¹⁷. Therefore, having in mind its low price and availability, TTE should be the first-line examination for suspect cardiac lipoma.

Neoplasms, either primary cardiac tumors such as pericardial lipoma, or metastatic disease, are a rare cause of extrinsic compression of coronary arteries and, therefore, there is paucity of papers focusing on their clinical effects ¹⁴. That is the reason they are often being neglected by the clinicians. However, as we have shown, they can lead to a fatal outcome and, thus, considering pericardial tumor in patient presenting with chest pain and no sign of coronary artery disease is important for establishing the diagnosis and initiating appropriate treatment.

Conclusion

Even though intrapericardial tumors are often histopathologically benign, they can cause life-threatening complications and sudden cardiac death. However, these tumors are seldom considered and often overlooked and mistreated. There are numerous diagnostic methods capable of revealing them and, therefore, careful examination of patient is always required, because with adequate diagnosis and timely treatment majority of these patients can be cured.

References

1. Barroso AS, Leite S, Friões F, Vasconcelos M, Azevedo D, Baldaia H, et al. Pericardial mesothelioma presenting as a suspected ST-elevation myocardial infarction. *Rev Port Cardiol.* 2017 Apr;36(4):307.e1-307.e5.
2. Sakurai H, Kaji M, Yamazaki K, Suemasu K. Intrathoracic lipomas: their clinicopathological behaviors are not as straightforward as expected. *Ann Thorac Surg.* 2008;86(1):261-5.
3. Steger CM. Intrapericardial giant lipoma displacing the heart. *ISRN Cardiol.* 2011; 2011:243637.
4. Mehta H V, Samaan H, Norman JC, Cooley DA. Intrapericardial lipoma: case report. *Cardiovasc. Dis.* 1976;3(1):96–101.
5. Zhu H, Wang M, Feng D, Feng Y, Ren Y, Chen J, et al. Ultrasonography, X-ray and CT imaging findings of a giant pericardial lipoma: Imaging diagnosis and review of the literature. *Oncol. Lett.* 2014;7(1):195–8.
6. Doshi S, Halim M, Singh H, Patel R. Massive intrapericardial lipoma, a rare cause of breathlessness. Investigations and management. *Int J Cardiol.* 1998;66(2):211-5.
7. Fletcher CDM, Unni KK, Mertens F, eds. World Health Organization Classification of Tumours. Pathology and genetics of tumours of soft tissue and bone. Lyon, France: International Agency for Research on Cancer (IARC) Press;2002.
8. Bardakci H, Altintas G, Unal U, Kervan U, Arda K, Birincioglu L. Giant cardiac lipoma: report of a case. *J Card Surg.* 2008;23(3):254-6.
9. Rehman I, Kerndt C, Rehman A. Anatomy, Thorax, Heart Left Anterior Descending (LAD) Artery. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020 Jan. 2020 Jul 27.
10. Jayawardena S, Renteria AS, Burzyantseva O, Lokesh G, Thelusmond L. Anterolateral papillary muscle rupture caused by myocardial infarction: A case report. *Cases J.* 2008;1(1):172.
11. Smucker ML, Tedesco CL, Manning SB, Owen RM, Feldman MD. Demonstration of an imbalance between coronary perfusion and excessive load

- as a mechanism of ischemia during stress in patients with aortic stenosis. *Circulation*. 1988;78(3):573-82.
12. Buckberg G, Eber L, Herman M, Gorlin R. Ischemia in aortic stenosis: hemodynamic prediction. *Am J Cardiol*. 1975;35(6):778-84.
 13. Gue YX, Anwar M, Gorog DA. A rare cause of myocardial infarction with non-obstructive coronary arteries-case report of ST-segment elevation myocardial infarction caused by a mediastinal mass. *Eur Heart J Case Rep*. 2018;5;2(1):yty008.
 14. Aggarwala G, Iyengar G, Horwitz P. Cardiac mass presenting as ST-elevation myocardial infarction: case report and review of the literature. *J Invasive Cardiol*. 2008;20(11):628-30.
 15. Lestuzzi Ch, Nicolosi GL, Mimo R, Pavan D, Zanuttini D. Usefulness of transesophageal echocardiography on evaluation of paracardiac neoplastic masses. *Am J Cardiol*. 1992 Jul 15;70(2):247-51.
 16. Geibel A, Kasper W, Keck A, Hofmann T, Konstantinides S, Just H. Diagnosis, localization and evaluation of malignancy of heart and mediastinal tumours by conventional and transesophageal echocardiography. *Acta Cardiol* 1996; 51(5):395 – 408.
 17. Liu L, Zuo Y, Huang Y, Cao L. Echocardiographical findings of giant cardiac lipoma: A case report. *Medicine (Baltimore)*. 2019; 98(8):e14456.

Received on September 22, 2020.

Accepted March 3, 2022.

Online First March, 2022.