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Sudden cardiac arrest as a result of anterior and lateral myocardial infarction at 16 weeks of gestation - case report

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Abstract

Introduction: Sudden cardiac arrest (SCA) is defined as a significant impairment of the mechanical function of the heart muscle, characterized by the patient's lack of response to stimuli, no perceptible pulse and apnea or agonal breathing, most often caused by acute coronary syndrome (ACS). ACS during pregnancy is a rare phenomenon and its incidence increases with the age of giving birth. The most common cause of ACS in pregnancy are typical changes in the etiology of atherosclerosis or coronary artery thrombosis. Other factors increasing the risk of a heart attack are arterial hypertension, diabetes, obesity and lipid disorders.

Aim of study: To describe a rare clinical case and demonstrate the importance of maintaining cardiac vigilance in pregnant patients.

Clinical case report: A 32-year-old patient, at 16 weeks of gestation, hospitalized due to an anterior and lateral ST Elevation Myocardial Infarction (STEMI), complicated by SCA due to the mechanism of ventricular fibrillation. The patient was qualified for invasive reperfusion treatment which included left anterior descending (LAD) coronary artery surgery with drug eluting stent (DES) implantation and ballooning of the diagonal first coronary artery. Echocardiography done after treatment revealed apical hypokinesia and left ventricular ejection fraction of 70%. Subsequently the patient was kept under obstetrical and cardiological care. At 37 weeks of gestation, the pregnancy was finished by a successful caesarean section.

Conclusion: Pregnancy is a state of hypercoagulability and decreased activity of the fibrinolytic system. The clinical management in this case does not differ from the clinical procedure adopted for non-pregnant women. It is important to make a diagnosis quickly and implement a life-saving procedure as soon as possible.

Key words: acute coronary syndrome in pregnant women, sudden cardiac arrest in pregnant women, myocardial infarction in pregnant women

Introduction: Acute coronary syndrome (ACS) is a clinical condition caused by a significant restriction of blood flow through the coronary artery, in some patients leading to hypoxia and, consequently, to necrosis of the heart muscle tissue. This syndrome is very rare in pregnancy. It is important to quickly recognize it and implement a treatment in order to reduce mortality and further perinatal complications [1, 2]. It should be taken into account that OSW is a condition that can lead to sudden cardiac arrest (SCA) defined as a significant impairment of the mechanical function of the heart muscle, which is manifested by the patient's lack of response to stimuli, imperceptible pulse, and apnea or agonizing breath. Delayed diagnosis of SCA or postponement in the implementation of therapeutic management, including cardiopulmonary resuscitation (CPR) is associated with serious medical complications; the most dangerous of them is the sudden cardiac death. Based on changes in electrocardiography, we can diagnose ACS with ST-segment elevation (STEMI), which is mostly associated with the cessation or restriction of flow through the coronary artery. It is caused by a blood clot in the vessel lumen triggered by rupture or ulceration of the atherosclerotic plaque.

The most important symptoms of ACS with STEMI are severe burning, diffuse chest pain, often radiating to the left upper limb and jaw, shortness of breath usually accompanied by coughing and production of foamy sputum, weakness, dizziness, fainting, palpitations, anxiety, fear of death. Symptoms observed in this type of ACS include low-grade fever, pale skin, tachycardia, auscultation phenomena and symptoms of right ventricular failure.

In the second type of ACS, we do not observe ST segment elevation (NSTEMI). It is most often caused by a narrowing or spasm of the coronary artery, as well as thrombosis located on a ruptured or ulcerated atherosclerotic plaque. The most common symptoms reported by patients who have experienced NSTEMI include severe diffuse retrosternal pain, palpitations and anxiety.

Aim of study: To provide a description of a rare clinical case of ACS in pregnancy and demonstrate the importance of maintaining cardiac vigilance in pregnant patients.

Clinical case description: A 32-year-old patient, in the 16 week of pregnancy, treated in the Department of Cardiology in Zamość, hospitalized due to an anterior and lateral myocardial infarction STEMI, complicated by SCA due to the ventricular fibrillation mechanism. The diagnostics was performed. An increase in concentrations of the myocardial necrosis marker and D-dimers was observed. Changes were diagnosed in leads V1-V4 of an electrocardiogram (ECG). Based on the coronary angiography, the patient was qualified for invasive reperfusion treatment using percutaneous coronary intervention (PCI). Anterior interventricular artery coronary artery was performed with DES (antiproliferative stent) implantation and ballooning of the diagonal coronary artery. An echocardiography revealed the heart apex dyskinesia and left ventricular ejection fraction at the level of 70%. The patient remained under constant obstetric and cardiological care throughout her pregnancy. At 37 weeks, the pregnancy was finished by caesarean section using the Misgav-Ladach method. The healthy son with a birth weight of 2940 g was delivered. There were no post-operational complications.

Discussion: A 12-lead ECG accompanying an acute STEMI coronary syndrome shows high, pointed T-waves, convex or horizontal ST-segment elevation, as well as left or right bundle branch block. An increase in concentrations of the markers of myocardial necrosis including troponin T and I or, checked rarely, creatine-kinase MB isoenzyme (CK-MB) is observed in laboratory tests [3]. In the diagnosis of ACS, an assessment of the serum level of heart-fatty acid binding protein (H-FABP) can be also used. According to the present state of knowledge, it is believed that the combined determination of H-FABP and troponin levels has the greatest predictive value [4]. However, it should be emphasized that an increase in the serum concentration of troponin may also be observed in the case of hypertension and pre-eclampsia, but the elevated level has never been observed in physiological pregnancy [5, 6]. Other helpful laboratory tests include: Biernacki's test, C-reactive protein (CRP) and fibrinogen levels, and peripheral blood smear. Resting echocardiography allows to visualize the disturbances in the mobility of the heart walls and complications such as rupture of the heart wall, ventricular septum or cardiac tamponade. It is also extremely important to be able to show the features of other diseases that cause angina.

Computed tomography (CT) coronary angiography is a diagnostic method with several limitations, including the need to reduce the heart rate and a lower resolution in the smaller branches of the coronary arteries [7].

Coronary angiography makes it possible to locate the stenosis or occlusion of the arterial lumen and is the basis for diagnosis and planning further therapeutic procedures [8].

When invasive diagnostic tests are used, the benefit-risk ratio should be carefully analyzed, taking into account the potential complications associated with the possibility of causing iatrogenic or aggravating the existing artery wall dissection. Many studies that diagnose ACS use radiation, and its effect on the fetus depends on the dose used and the gestational age. If possible, medical procedures using radiation should be delayed until organogenesis is complete, which is at 12 weeks of gestation. Nowadays it is commonly accepted that there is no risk of congenital malformations, intellectual disability or loss of pregnancy at a radiation dose of up to 50 mGy, where one X-ray provides an estimated 0.01 mGy. Doses above 100 mGy are definitely harmful [9].

The basic element of care for a pregnant woman suffering from ACS is frequent monitoring of the patient and the fetus, including assessment of the patient's awareness, measurements of vital signs (including blood pressure), assessment of the fetal movements, ECG, cardiotocography (CTG) and ultrasound examinations (USG) of pregnancy, determination of the cardiac and respiratory system capacity. If saturation below 90% is found, oxygen therapy and ongoing monitoring of oxygen saturation in peripheral blood haemoglobin is indispensable. Medical management for pregnant women does not differ significantly from that for the rest of patients and includes administration of acetylsalicylic acid, β -adrenoceptor antagonists and anticoagulants [3]. Low-dose acetylsalicylic acid, clopidogrel and prasugrel are examples of antiplatelet drugs that can be used during pregnancy and the puerperium, in contrast to ticagrelor, which is contraindicated for pregnant women. It should be remembered that pharmacotherapy during pregnancy should be selected individually after considering the benefits in relation to the risks taken.

PCI is the most frequently chosen method of invasive reperfusion and, according to the literature, it is more effective than thrombolysis. On the other hand, this method can be complicated by iatrogenic dissection of the arteries in about 6% of procedures performed in pregnant women [6, 10]. PCI is particularly recommended for the treatment of high-risk STEMI and NSTEMI [8]. The maximum possible radiological protection for the fetus should be ensured during the procedure. Thrombolytic therapy carries the risk of an unfavorable prognosis for the pregnant woman and the fetus, therefore, when deciding whether to use it, the well-being of the mother and her child should be closely checked [3]. Among the complications related to thrombolysis, spontaneous preterm labor, maternal haemorrhage, intrauterine death, and placental insufficiency were observed [11]. Coronary bypass grafting (CABG) should be considered in complications with PCI or the absence of its success.

The choice of the type of delivery is a key element in the management in complicated pregnancies. Vaginal deliveries are recommended due to the lower risk of blood loss and infection [12]. However, caesarean section is the preferred method in the presence of severe heart disease or pulmonary hypertension [13, 14]. The gestational age for delivery should be considered individually on the basis of the maternal clinical condition as well as the fetal well-being and lung maturity [3].

Mechanical methods for cervical ripening are preferred, e.g. the use of pre-induction of labor with a Foley catheter. Cardiovascular changes in the puerperium are dramatic. The blood volume shift at the time of delivery and replacement during involution of the uterus as well as hormonal vascular effects result in significant alterations in every cardiac function parameter, i.e. in mean arterial pressure, cardiac output, stroke volume, and systemic vascular resistance. This makes delivery and the few days following it extremely risky for patients with pre-existing cardiac conditions that limit adaptability to the rapid changes taking place. Most of the hemodynamic recovery occurs in the first 2 weeks postpartum. [15, 16].

Conclusions: If ACS is suspected in a pregnant woman, the clinical condition of the patient and the fetus should be determined and monitored. Diagnostic and therapeutic procedures should be implemented as soon as possible. The use of invasive strategies should be individually analyzed and their validity assessed. Making an appropriate diagnosis in a short time is difficult in the case of pregnant women, because the clinical picture of ACS may mimic symptoms related to pregnancy, for example digestive pain suggesting gastro-oesophageal reflux [15]. In the case of an unstable patient condition, PCI is the life- and health-saving treatment of choice. With a stable course, a conservative posture is recommended. After a cardiac episode, the further course of pregnancy should be closely monitored. If an ischemic episode reoccurs, an invasive treatment should be considered, including PCI or CABG. The choice of the delivery route is also important and should be determined by the obstetrician-gynecologist in consultation with specialists in cardiology and anesthesiology. The consequences of ACS during pregnancy are very serious. The mortality rate in this group is estimated at 0-4%.

Bibliography

1. Edupuganti MM. Acute myocardial infarction in pregnancy: Current diagnosis and management approaches. *Indian Heart Journal*. 2019;71 (5):367-374.
2. Kennedal BB, Baird S. Acute Myocardial Infarction in Pregnancy: An Update. *The Journal of Perinatal & Neonatal Nursing*. 2016;30 (1): 13-24.
3. Regitz-Zagrosek V. ESC Guidelines on the management of cardiovascular diseases during pregnancy. *European Heart Journal*. 2011;32 (24): 3147-3197.
4. Havakuk O, Goland S, Mehra A, Elkayam U. Pregnancy and the Risk of Spontaneous Coronary Artery Dissection: An Analysis of 120 Contemporary Cases. *Circulation: Cardiovascular Interventions*. 2017, 10 (3):412-420
5. Wang J, Tan GJ, Han LN, Bai YY, Miao He, Liu HB. Novel biomarkers for cardiovascular risk prediction. *Journal of Geriatric Cardiology*. 2017, 14(2): 135-150.
6. Ravichandran J, Woon SY, Quek YS, et al. High-sensitivity cardiac troponin I level in normal and hypertensive pregnancy. *The American Journal of Medicine*. 2019;132 (3): 362-366.
7. Elkayam U, Jalanapurkal S, Barakkat M.N, Khatri N. Pregnancy-associated acute myocardial infarction: a review of contemporary experience in 150 cases between 2006-2011. *Circulation: Cardiovascular Interventions*. 2014; 129 (16): 1695-1702.
8. Prejbisz A, Dobrowolski P, Kosiński P. Postępowanie w nadciśnieniu tętniczym u kobiet w ciąży. Zapobieganie, diagnostyka, leczenie i odległe rokowanie. *Ginekologia i Perinatologia Praktyczna*. 2019; 4(2): 43–111.
9. Bush N, Nelson-Piercy C, Spark P, Kurinczuk JJ, Brocklehurst P, Knight M; UKOSS. Myocardial infarction in pregnancy and postpartum in the UK. *Eur J Prev Cardiol* 2013;20(1):12–20.
10. Leonhardt G, Gaul C, Nietsch HH, Buerke M, Schleussner E. Thrombolytic therapy in pregnancy. *Journal of thrombosis and thrombolysis*. 2015;21 (3): 271-176.
11. Tawfik MM, Taman ME, Motawea AA, Abdel-Hady E. Thrombolysis for the management of Massive pulmonary embolism in pregnancy. *International Journal of Obstetric Anesthesia*. 2017; 22 (2): 149-152.
12. Higgins GL, Borofsky JS, Irish CB, et al. Spontaneous peripartum coronary artery dissection presentation outcome. *The Journal of American Board of Family Medicine*. 2013; 26(1): 82–89.
13. Martin S. Cardiac disease in pregnancy. In: Foley MR, Strong TH, Garite TJ, eds. *Obstetric Intensive Care Manual*. 3rd ed. New York, NY: McGraw-Hill; 2010:91–110.
14. Chang SH, Kuo CF, Chou IJ, et al. Outcomes associated with paroxysmal supraventricular tachycardia during pregnancy. *Circulation: Cardiovascular Interventions*. 2017; 135(6): 616-618.
15. Lipman S, Cohen S, Einav S, et al. The Society for Obstetric Anesthesia and Perinatology Consensus Statement on the management of cardiac arrest in pregnancy. *Anesth Analg*. 2014;118:1003–1016.
16. Lyon DS. (2009). *Postpartum Care*. Glob. libr. women's med. 2009, doi:10.3843/GLOWM.10143. ISSN 1756-2228.