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Case report

Myocardial infarction as an anaphylactoid reaction to iodine contrast

Infarctus du myocarde en tant que réaction anaphylactoïde aux produits de contraste

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Abstract

The main characteristics of multislice computed tomography (MSCT) are those that make it a promising technique to replace invasive diagnostic coronary angiography. However, prior to use of MSCT coronarography, it is necessary to obtain a detailed history and thorough patient's cardiological check-up. The aim of this paper is to present a patient without previous known allergy to medications. During the course of MSCT coronarography, the patient showed symptoms of a rare allergy to iodine contrast medium (ICM). To the best of our knowledge, this is the first time that the case of myocardial infarction as anaphylactoid reaction to iodine contrast has been described. The reaction occurred during the course of MSCT coronarography performed in our hospital in Belgrade. Despite being rare, this case urges for detailed and careful reevaluation of both indications and contraindications for MSCT coronarography.

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Keywords: Anaphylactoid reaction; Iodine contrast; MSCT coronarography

Résumé

La caractéristique de la tomographie multispiralée est d'être le seul examen permettant d'envisager le remplacement d'un examen invasif comme l'angiographie coronaire à visée diagnostique. Néanmoins, avant la mise en application de la tomographie coronarienne, il est nécessaire d'analyser en détail les données de l'anamnèse associé à un examen cardiologique complet. L'objectif de ce travail est de présenter une observation d'un patient qui n'a pas antécédents connus d'allergie médicamenteuse et qui a développé des symptômes d'allergie aux produits de contraste iodé au décours d'une tomographie coronarienne. À notre connaissance, il s'agit du premier cas rapporté d'infarctus du myocarde en tant que réaction anaphylactoïde aux produits de contraste, survenu au décours d'une tomographie coronarienne à Belgrade. Bien que rare, cette observation conduit à analyser en détail les indications et contre-indications de la tomographie coronarienne.

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Mots clés : Tomographie coronarienne ; Réaction anaphylactoïde ; Produit de contraste iodé

1. Introduction

Invasive coronary angiography is currently the clinical “gold standard” for assessing coronary artery stenoses. The increasing body of evidence suggests that coronary blood vessels multislice computed tomography (MSCT) are becoming the adequate method for evaluation of atherosclerotic

coronary disease. Multislice CT is presently the best method for non-invasive imaging of the coronary arteries, with 64-slice scanners outperforming older 16-slice scanners. Sensitivity and specificity in identifying significant stenoses are higher compared to conventional angiography [1].

Being non-invasive diagnostic method covering broad spectrum of indications, characterized by scarce number of contraindications and small rate of artifacts, MSCT is currently becoming a diagnostic method of choice in cardiology. The first major document dealing with the clinical indications for MSCT in a range of clinical scenarios was recently published by the American College of Cardiology (ACC) [2] and American

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Heart Association (AHA) [3]. Contraindications to contrast-enhanced CT include: renal failure, inability to assume lying position, and allergy to contrast medium, while special caution should be taken in pregnant patients. The causes for excessive artifacts in cardiac scans include: irregular heart beat (atrial fibrillation, frequent ectopic beats), inability to hold breath, tachycardia, pacing wires, and metallic valves [4].

Prior to MSCT coronarography application, it is necessary to obtain a detailed history and to perform thorough patient's cardiological check-up. Frequent use of iodine contrast media (ICM) in everyday work imposes an inevitable need for knowing their adverse effects, and for being familiar with measures and procedures used for predicting the incidence and alleviating the degree of those adverse effects. It is also important to implement general treatment strategies and to be familiar with medications used to reduce adverse effects, as well as to estimate objective signs during adverse effects clinical follow-up. The aim of this paper is to present a patient without previous known allergy to medications who showed symptoms of rare allergy to ICM during the course of MSCT coronarography.

2. Case presentation

A 43-year-old patient was admitted to Clinic of Cardiology for the purpose of performing MSCT coronarography. He had arterial hypertension during the past two years with maximum arterial tension (AT) measuring 200/120 mmHg. He was allergic to dust and alcohol but was not aware of being allergic to any medications.

Prior to intervention, the patient was cardiologically compensated; ECG demonstrated VES bigeminy and AT was 130/80 mmHg. Premedication were applied in accordance to protocol for MSCT coronarography: chloropyramine (Synopen[®]) 20 mg/2 ml, IV methylprednisolone (Lemod-solu[®]) 40 mg, as well as IV lidocaine (Xylocain[®]) 2 ml and IV labetalol hydrochloride (Presolol[®]) 2 mg. During the course of preparation, 100 ml of iohexol (Omnipaque[®]) contrast was applied. The patient described feeling the pain in his neck, a brief gripping pain in his chest lasting for few minutes, as well

as the same gripping pain in his hands, which was followed by sensation of “drowning”, but without losing consciousness. After being checked up, the patient felt weakness, lack of air and was shivering. His face was red and he profusely sweated, but he had no changes on his skin. Heartbeat was rhythmical, tones were lower, AT was 80/50 mmHg, frequency was 70/min, and O₂ saturation was 68%. ECG monitoring showed successively ST elevation in V1–V4 with ST depression in D2, D3, avF (Fig. 1).

MSCT coronarography showed no significant stenosis of LAD, RCA, Cx, and two OM branches were conspicuously gracile and tortoise (Fig. 2).

Auscultatory findings on lungs showed diffusely decreased breath sound accompanied with inspiratory crackles on both sides, more on the left. Abdomen and extremities appeared normal. Volume replacement was administered, as well as IV epinephrine 7 µg, corticosteroids (0.5 g of hydrocortisone), oxygen 3.0 l/min, with resulting O₂ saturation of 85%, AT was 110/70 mmHg, and the frequency was 75/min. The patient was transferred to Emergency Center Coronary Unit.

Upon admission, patient was conscious, alert, afebrile, acyanotic, dysphonic, pale, without pain in his chest or suffocation. He complained about “head fullness” and a dry irritating cough.

We performed patch tests on the volar forearm with iohexol (300 mg/ml water solution). After 20 min, the patch test was defined as 3+ positive reaction with a circle diameter of 14 mm (moderately sensitive) [5]. Commercially available ImmunoCAP Tryptase (Phadia[®]) was used as an in vitro test for the quantitative measurement of tryptase concentration in human serum. Two hours after onset, the tryptase serum level was elevated up to 55 µg/l, (1.9–13.5 µg/l). Urinary histamine was elevated to 206 ng (13–62 ng) for 24 h.

Laboratory tests showed sedimentation rate of 24, WBC count was 10.0, troponin was 4.77 µg/l (< 0.1 µg/l), CK was 218 U/l (< 200 U/l), LDH was 649 U/l (220–460 U/l) with normalization on the second day of hospital stay.

Chest X-ray showed multiple spot-like consolidations, more conspicuous on the left, as well as increased left chamber. On the follow-up X-ray on the third day of hospitalization, the

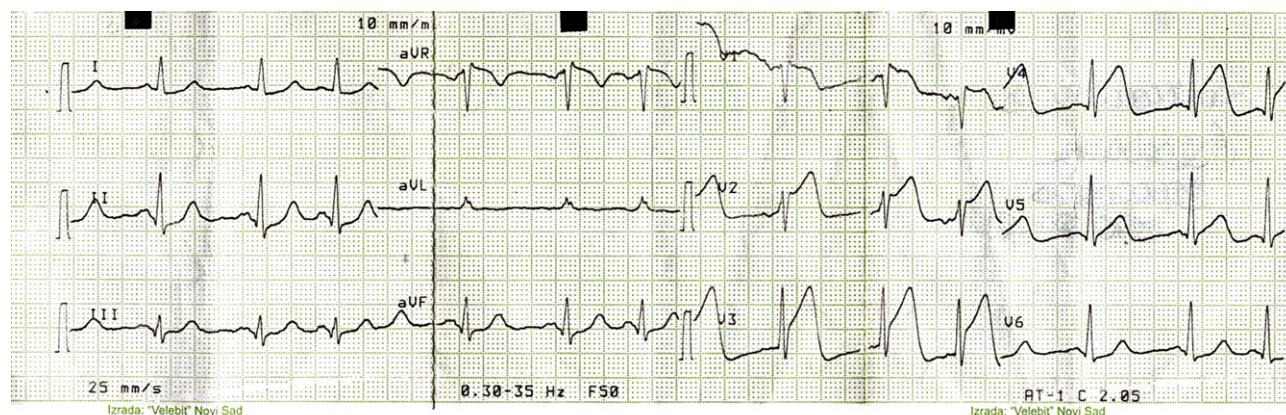


Fig. 1. Acute myocardial infarction.

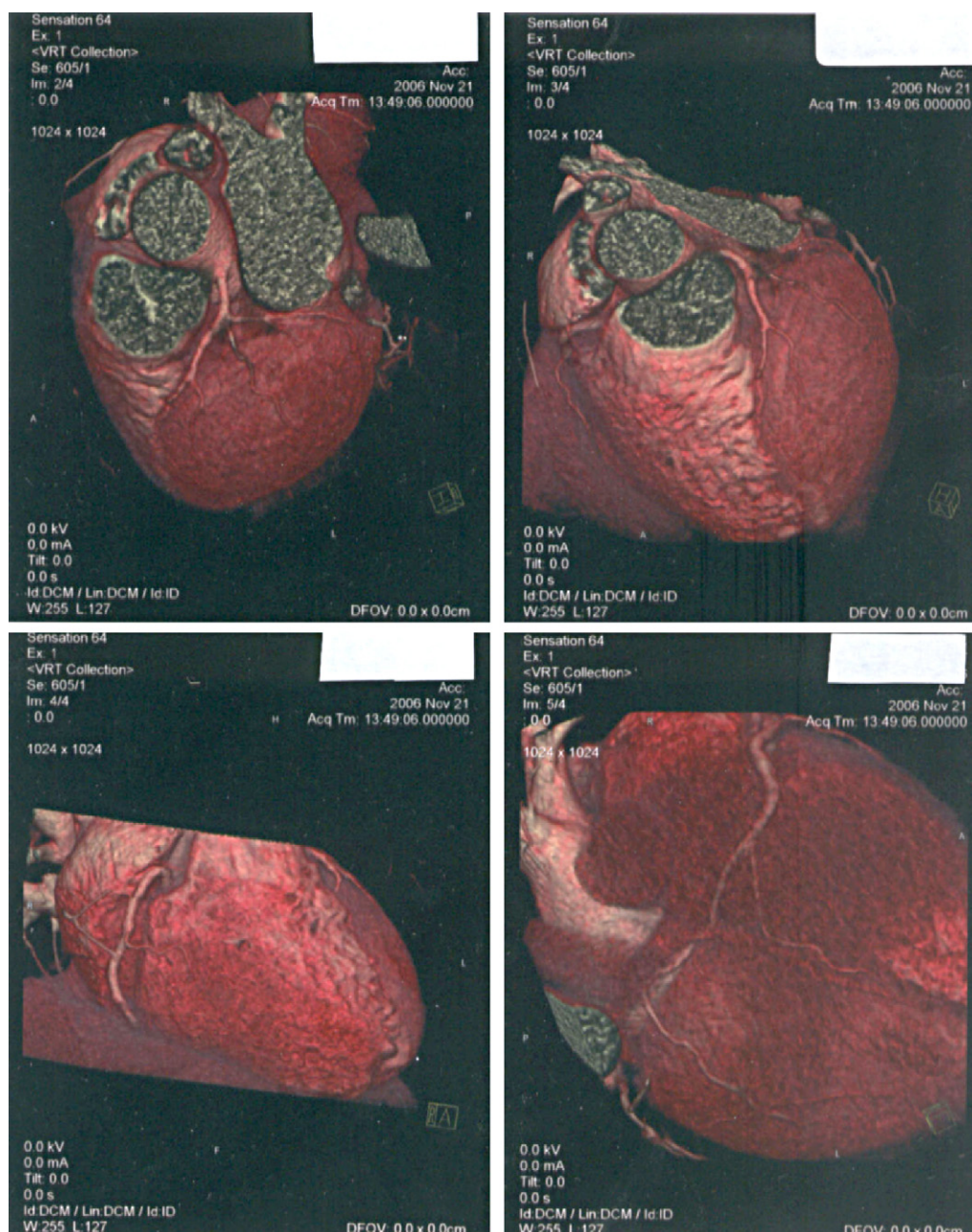


Fig. 2. MSCT coronarography.

findings were fully improved without active pathological changes in the lungs and normal size of the heart.

Heart US showed small tricuspid regurgitation 1+ and EF was 65%. The allergologist was consulted and his opinion was in favor of an anaphylactic reaction to iodine contrast – Omnipaque®.

During the course of hospitalization patient received oxygen, corticosteroids, H1 and H2 blockers, salicylates, beta-blockers, antihypertensives, and nitrates, all of which resulted in alleviation of discomfort. During the whole period, the patient was free of pain and no registered or newly developed ECG changes were observed. After a 7-day hospitalization, the patient was discharged. Discharge ECG revealed sinus rhythm, with without any changes in ST segment and T wave.

3. Discussion

Developed in 1991, the Elscint CT Twin was the first multislice (MSCT) scanner, which had two parallel banks of X-ray detectors to acquire two slices for each gantry evolution. Quickly, the technology developed into four-slice scanners followed by 16 slices, while current scanners have up to 64 slices with prototype of 256-slice detector being under development [6].

Patients do require some preparation before their non-invasive coronary angiography. First, there are a number of contraindications, which are applicable to any contrast enhanced CT exam. In addition, there are several circumstances when cardiac CT may not be appropriate.

MSCT imaging was performed with a Sensation 64-MSCT scanner (Siemens Medical Solutions). During the course of preparations for MSCT coronarography in accordance with the established protocol [6] the patient underwent intravenous cannulation. To slow the heart rate in order to improve image quality a beta-blocker (5–15 mg metoprolol, IV) was given 1 h before the scan. It is common to aim at a heart rate < 65 bpm. The patient was placed on the CT scanner table and attached to an ECG monitor. Many centers also advocate the use of sublingual nitrate before scanning as this can improve coronary artery visualization [7].

A contrast agent (iohexol – Omnipaque® 100 ml) was injected in IV bolus dose into the left antecubital vein. During its application, some side effects might occur. Risk factors for sensitivity reaction to iodine contrasts include: history of atopy, significant accompanying cardiovascular disease, history of hypersensitivity to radioactive elements, as well as history of allergy to other medications. A wide range of clinical investigations showed that the incidence of anaphylactoid reactions to radioactive contrast media might be decreased by approximately five- to 10-fold by application of corticosteroids and antihistamines during premedication [8]. Premedication is recommended in patients under high risk, especially in cases of unambiguous atopy and in those with severe cardiovascular disease [3]. It is to be pointed out that this kind of premedication cannot completely prevent IgE-mediated anaphylaxis. There are few different schemes of premedication. Our patient with a familiar allergy to dust and alcohol was administered a therapy with H1 antihistamine (Synopen®) and corticosteroid (Lemod-solu®) as a premedication, while due to his VES bigeminy he was given antiarrhythmic (Xylocain®).

For classification and accompanying forms, as well as adverse reactions to parenteral iodine contrast medium in our patient we used the European Society of Urogenital Radiology guidelines on contrast media application [8]. In accordance with hereinabove mentioned guidelines, it was alleged that idiosyncratic (anaphylactoid) reaction was initiated. Idiosyncratic or anaphylactoid reactions to contrasting medium can be divided into mild, medium-severe and severe. They do not depend on iodine concentration, chemical characteristics or volume of initiating contrasting media [9]. According to available reference data, the incidence of mild reactions to contrasting media is up to 10%, it ranges from 1:900 to 1:3000 for severe reactions, while mortality rates are between 1:50,000 and 1:100,000 [5].

Pathogenesis of these reactions is not thoroughly understood, but is considered not to be the consequence of antigen–antibody reaction [10]. The recent literature demonstrates that histamine is released in vivo, with a peak concentration standing in the correlation with severity of the reaction. Mast cells participate in severe reactions, as shown by several authors [5], through the release of tryptase (in this case, 55 µg/l). Our patient with severe reaction underwent intradermal testing with immediate reading appearing positive to the culprit ICM, confirming an immune mechanism.

In our patient, idiosyncratic reaction was observed, from medium-severe (unconsciousness, facial redness, and hypoten-

sion) to severe characterized by chest X-ray resembling ARDS, myocardial infarction (ST elevation suggesting anteroseptal involvement with positive troponin), arrhythmias (VT), and decrease in O₂ saturation to 85%. The development of clinical picture of acute myocardial infarction and ECG consequences were presumably the result of histamine liberation as well as sympathicomimetic prevailing. Lungs X-ray, which resembled ARDS, might have been the consequence of anaphylactoid bronchospasm.

Since severe reactions were obvious and conspicuous, and demanded treatment within the intensive care unit, our patient was hospitalized. During the hospitalization, corticosteroids were applied, as well as H1 and H2 blockers, salicylates, beta-blockers, and nitrates, which lead to normalization of troponin levels at 0.89 µg/l, and resolution of X-ray and ECG findings.

4. Conclusion

The features of MSCT are the factors that make it a promising technique that may replace invasive coronary angiography diagnostics. This otherwise comfortable and painless diagnostics method can sometimes become a trigger for severe adverse reactions to iodine contrasting media that are used. This case urges for inevitable, detailed, and careful reevaluation of both indications and contraindications for application of MSCT coronarography.

Conflict of interest statement

The authors have not declared any conflict of interest.

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