

Spontaneous coronary artery dissection as a cause of acute myocardial infarction in young people

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Abstract

Introduction. Spontaneous coronary artery dissection (SCAD) represents a dissection that occurred without atherosclerosis, trauma or has not developed iatrogenically. The true prevalence of SCAD is unknown, as they are often unrecognized. It most often occurs in young women, who do not have the classic risk factors for the development of cardiovascular diseases. In only 10% of cases, it occurs in men after physical exertion.

Case report. A 35-year-old man was admitted to the emergency department due to an acute myocardial infarction with ST elevation. Urgent coronarography was performed and the SCAD, type I of the first marginal branch (OM), was registered. During primary percutaneous coronary intervention drug-eluting stent was implanted in the OM branch, guided by optical coherence tomography (OCT). In the further time, the patient is without problems, hemodynamically and rhythmically stable. After a month, re-coronarography was performed, as well as OCT analysis of the first marginal branch, which registered a significant malaposition and insufficient expansion of the previously implanted stent in the distal segment OM. Dilatation with a non-compliant balloon was performed with optimal result. After OCT-guided balloon dilatation, excellent stent apposition and expansion, was registered. Optical medical treatment was indicated. In the follow-up period after three months, the patient is without problems.

Conclusion. Because the SCAD are often unrecognized, careful evaluation of the angiographic findings and the use of intravascular imaging in unclear cases is necessary. In the following period, randomized controlled studies are needed to define patients who require revascularization, as well as those who require dual antiplatelet therapy and the length of its use.

Key words

spontaneous coronary artery dissection; acute myocardial infarction; optical coherence tomography

Introduction

Spontaneous coronary artery dissection (SCA) is a dissection that is not associated with atherosclerosis, trauma or iatrogenic. The true prevalence of SCA is unknown, as they are often unrecognized. They are considered to be the cause of 1-4% of all acute coronary syndromes¹, 15-20% of women in the peripartum period², and up to 35% of acute coronary syndromes in women under 60 years of age^{3,4}. It occurs most often in young women, who do not have classic risk factors for the development of cardiovascular diseases. In only 10% of cases, it occurs in men after physical exertion. A number of conditions are associated with SCA, such as fibromuscular dysplasia, chronic inflammatory diseases, connective tissue disorders, and hypothyroidism⁴. Recently, several gene loci have been isolated that are associated with a higher risk of SCA¹. In addition, various factors that contribute to the development of SCA, consumption of various drugs, emotional stress, intense exercise, Valsalva maneuver and vomiting have been defined. Herewith, we shall present

the case of a 35-year-old man in whom the cause of an acute ST-elevation myocardial infarction was SCA.

Case presentation

A 35-year-old patient was admitted as an emergency due to an acute myocardial infarction with ST elevation in the lateral region. Intense chest pain occurred about 5 hours before admission and was repeated on several occasions. The evening before the reception, he consumed a large amount of alcohol, energy drinks and tobacco. Denies other diseases. He cites smoking experience as a risk factor. On admission, he was hemodynamically and rhythmically stable, cardiac compensated. Dual antiplatelet therapy (acetylsalicylic acid and ticagrelor) was prescribed. An urgent coronary angiography was performed, which found the first marginal branch narrowed in the medial segment by 50%, and then in the distal segment by 75%, caused by spontaneous dissection of the coronary artery, type 1 (Figure 1). Other coronary blood vessels are without significant narrowing. For the purpose of a more detailed evaluation, an optical coherence tomography

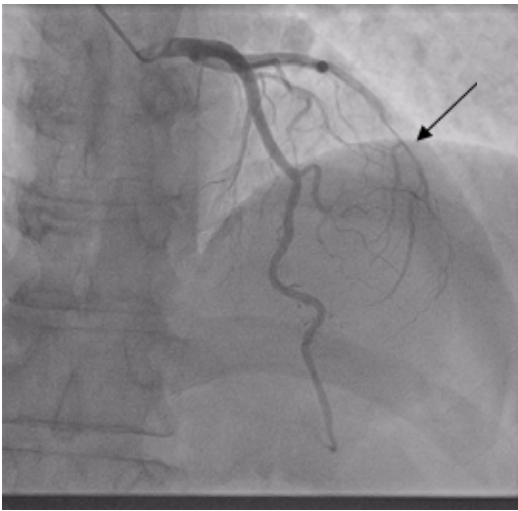


Figure 1. Angiography presenting spontaneous coronary dissection type 1 of circumflex coronary artery (arrow)

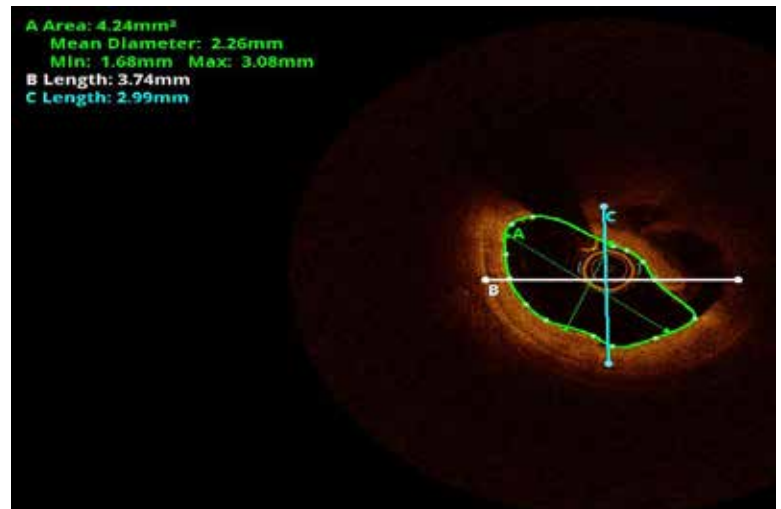


Figure 2. Optical coherence tomography showing dissection flap with 180 degrees angle and 3mm in length

(OCT) was performed, which registered a dissection flap with an angle of about 180 degrees and a length of up to 3 mm, MLA 1.62 mm², stenosis 75% in the distal segment (Figure 2). An intramural hematoma is registered in a length of about 60 mm. An OCT-guided primary percutaneous coronary intervention was performed with the implantation of a drug-coated stent 28x2.5 mm (Xience PRO, Abbott, USA) with an optimal result of the intervention (Figure 3). An OCT analysis was performed after stent implantation and satisfactory expansion and apposition of the stent was registered, without signs of "edge dissection". An intramural hematoma was registered proximal and distal to the implanted stent. Echocardiographic examination shows a left ventricle of normal dimensions, without clear disturbances of segmental kinetics, preserved systolic function and without signs of diastolic dysfunction. After seven days, the patient was discharged to home treatment, without subjective complaints, hemodynamically and rhythmically stable, cardiac compensated. He was discharged with aspirin, ticagrelor, bisoprolol, ramipril, rosuvastatin and a proton pump inhibitor. After one month, recoronarography and OCT analysis of

the first marginal branch was performed, which registered significant malposition and insufficient expansion of the previously implanted stent in the distal segment. Dilation was performed with a 12x3.5mm non-compliant balloon (Apollo, BrosMed, China). After OCT-guided balloon dilatation, satisfactory expansion and apposition of the stent was registered (Figure 4). The described malposition of the stent was understood as a consequence of the reabsorption of the intramural hematoma. Further medical treatment is indicated. A doppler of the carotid arteries and a doppler of the renal arteries were performed, which registered a normal finding. At the follow-up examination after three months, the patient has no subjective complaints.

Discussion

A significant increase in scientific interest in SCA arose after defining the angiographic classification of SDKA in 2014 according to Saw and the consensus document of the European Association of Cardiologists^{5,6}. Namely, type 1 represents a dissection that is angiographically

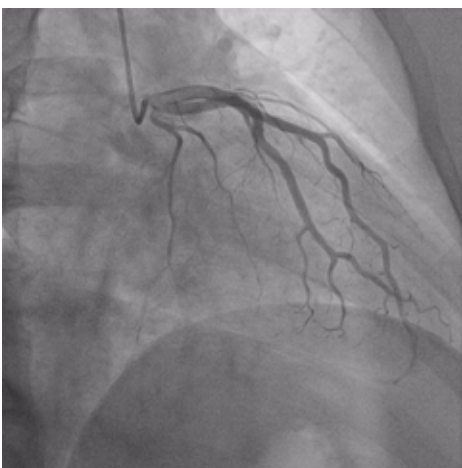
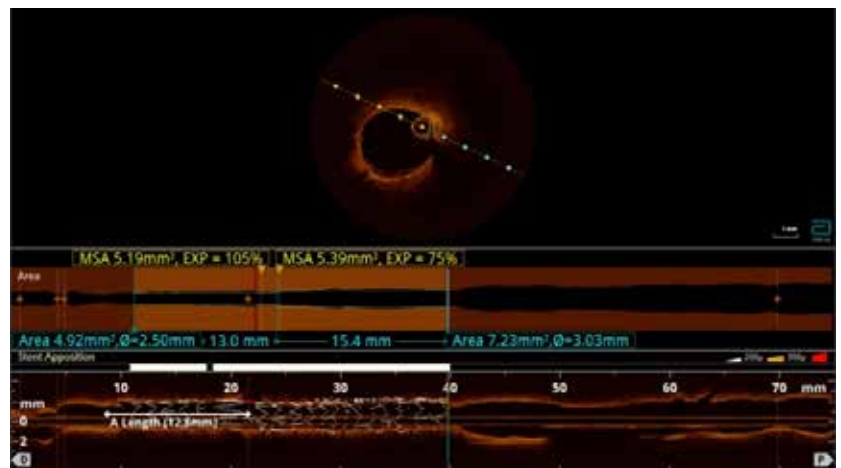


Figure 3. Angiography after stent implantation in OM branch



Slika 4. Optical coherence tomography following stent implantation with good expansion, apposition, without tissue prolapse and significant edge dissections

registered as contrast retention in the blood vessel wall and multiple radiolucent lumens. Type 2 is characterized by a long, diffuse (more than 20mm) stenosis with varying degrees of narrowing of the lumen, while type 3 mimic atherosclerotic stenoses and are defined as focal or tubular stenoses (less than 20mm in length)⁷. The cause of acute myocardial infarction in our patient is SCA type 1. Type 3 is the rarest type of dissection that occurs in about 3.4% of patients, while the most common is type 2 that occurs in about 67.5% of patients⁷. SCA were previously considered rare as they are often unrecognized on angiography. However, with the increasing use of intravascular imaging, they are not uncommon. Optical coherence tomography is a useful tool, since intramural hematoma and dissection membrane can be visualized due to its high resolution. On the other hand, one should be careful because of the possibility of extension of the dissection when applying contrast and manipulating the catheter. The literature describes cases in which SCA was initially unrecognized, while SCA was clearly registered after intravascular imaging⁸.

The clinical presentation of SCA is different, but they are most often manifested by acute coronary syndrome. The most common complaint is typical chest pain (96% of cases). ST segment elevation is registered on the electrocardiographic record in 30 to 49% of patients, while 47 to 70% of patients present with acute myocardial infarction without ST elevation^{9,10}. A very small number of patients present with ventricular tachycardia, cardiac arrest or cardiogenic shock.

Considering the small number of patients, treatment recommendations for these patients are primarily based on the opinion of experts and the results of observational studies. Conservative treatment is recommended in stable patients without signs of ongoing ischemia, given the high percentage of failure of percutaneous coronary intervention (PCI). In a retrospective study that included 189 patients with SCA, a procedural complication was noted in 53% of patients treated with PCI (11). The reasons for failure were the passage of the wire through the false lumen, loss of flow under the implanted stent, and remaining residual stenosis. PCI is associated with a significantly higher percentage of patients undergoing urgent surgical revascularization (12%) compared to those treated conservatively (2%). Surgical myocardial revascularization is reserved for patients with CAD involving the main trunk, those with ongoing ischemia, life-threatening arrhythmias, and hemodynamically unstable patients.

In terms of medication, in patients who have been treated with PCI, it is recommended to use dual antiplatelet therapy for up to 12 months, as in the case of acute coronary syndrome of another etiology. In a cohort of 64 patients with CAD, 59 (92%) received dual antiplatelet therapy (Aspirin plus one antiplatelet drug: Clopidogrel, Prasugrel, or Ticagrelor)¹². Out of 40 patients who underwent recoronarography, healing of the dissection was noted in all but one. In patients who have not been

treated with a PCI, the addition of another antiplatelet drug is controversial.

Long-term follow-up of these patients aims to perform screening for early detection of fibromuscular dysplasia, prevent recurrent events, and perform cardiac rehabilitation.

Fibromuscular dysplasia is an idiopathic arteriopathy that is often associated with CAD, with a prevalence of 25% to 86%¹³. Renal, carotid and vertebral arteries are most often affected. In our patient, the renal and carotid arteries doppler showed a normal finding.

A retrospective study in which 189 patients were included is reported in the literature and recurrent SDKA was registered in 27% of patients. During the follow-up period of three months, our patient has no subjective complaints.

In the following period, randomized controlled studies are necessary to define patients who need revascularization, as well as those who need dual antiplatelet therapy and the duration of its administration.

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Sažetak

Spontana disekcija koronarne arterije, uzročnik akutnog infarkta miokarda kod mladih osoba

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Uvod. Spontana disekcija koronarne arterije (SDKA) predstavlja disekciju koja nije povezana sa aterosklerozom, traumom niti je nastala jatrogeno. Prava prevalenca SDKA je nepoznata, obzirom da su često neprepoznate. Najčešće se javlja kod mladih žena, koje nemaju klasične faktore rizika za razvoj kardiovaskularnih bolesti. U samo 10% slučajeva se javlja kod muškaraca nakon fizičkog napora.

Prikaz slučaja. Muškarac dobi 35 godina je primljen kao hitan zbog akutnog infarkta miokarda sa ST elevacijom. Urađena je urgentna koronarografija kojom se nađe SDKA, tip I prve marginalne grane (OM). Urađena je primarna perkutana koronarna intervencija sa implanitacijom lekom obloženog stenta u OM granu vođena optičkom koherentnom tomografijom (OCT). U daljem toku bolesnik je bez tegoba, hemodinamski i ritmički stabilan. Nakon mesec dana je urađena rekoronarografija, i OCT analiza kojom prve marginalne grane kojom se registruje signifikantna malapozicija i nedovoljna ekspanzija ranije implantiranog stenta u distalnom segmentu. Urađena je dilatacija nekomplijantnim balonom, sa optimalnim rezultatom. Nakon OCT-om vođene balon dilatacije registruje se zadovoljavajuća ekspanzija i apozicija stenta. Indikovano je dalji medikamentni tretman. U periodu praćenja nakon tri meseca bolesnik je bez tegoba.

Zaključak. Imajući u vidu da su SDKA često neprepoznate, neophodna je pažljiva evaluacija angiografskog nalaza i upotreba intravaskularnog imidžinga u nejasnim slučajevima. U narednom periodu su neophodne randomizovane kontrolisane studije za definisanje pacijenata kod kojih je neophodna revaskularizacija, kao i onih kojima je neophodna dvojna antiagregaciona terapija i kao i dužina primene iste.

Ključne reči: spontana disekcija koronarne arterije, akutni infarct miokarda, optička koherentna tomografija