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Case Review

Approaches for the Treatment of Spontaneous Coronary Artery Dissection – a Case Review

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Abstract Spontaneous coronary artery dissection (SCAD) is a tear in the wall of the epicardial coronary artery that is not caused by trauma, coronary intervention, or atherosclerotic plaque rupture. Diagnosis is made by coronary angiography, computed tomography coronary angiography (CTCA), intravascular ultrasound (IVUS) and optical coherence tomography (OCT). SCAD has been shown to be a rare cause of acute coronary syndrome and sudden cardiac death. The usual clinical presentation is a picture of acute myocardial infarction. Young women represent about 70% of patients and 30% of such cases are related to the peripartum period, due to hormonal changes. Left anterior descending (LAD) is the most common site of dissection which represents 60% cases. Right coronary artery (RCA) is the second most common site (more common in men), followed by the left main coronary artery.

The treatment options for this event are conservative, interventional (PCI) or surgical (CABG). The conservative approach is suitable for low-risk stable patients, but in the presence of ongoing ischemia, cardiogenic shock or sustained ventricular tachycardia/fibrillation – an intervention should be performed.

In this current article we will present two cases of SCAD which took a completely different path in regards of the treatment approach that was chosen. The first case is a 48-years old female who was admitted in cardiology department due to the chest pain and dynamic ECG changes. The coronary angiography revealed a SCAD in LAD, but due to the stable state of the patient we decided to go with conservative treatment. However, after 12 hours, the patient reported another episode of chest pain with the ECG showing ST-elevations in precordial leads. Due to the high complexity of the intervention we decided to refer the patient for operation. CABG was performed (LIMA-LAD) and the patient was discharged five days post operation. Our second case as a 46-years-old man presenting with ECG changes for inferior AMI. The angiography revealed a SCAD in RCA. Due to ongoing chest pain we decided to go for an interventional treatment – PCI was successfully performed with implantation of four drug-eluting stents.

SCAD is a condition that can occur in everyday practice in patients with ACS and can be expected as the cause of ACS in young patients without significant risk factors. There is no universal principal regarding the treatment method, so rushing to perform an intervention (PCI or CABG) is not recommended, unless there is ongoing ischemia. In some of the cases, the dissection regenerates spontaneously, but in the acute phase, intervention or surgery is sometimes required.

Key words spontaneous coronary dissection, myocardial infarction, management

Introduction

Spontaneous coronary artery dissection (SCAD) is a tear in the wall of the epicardial coronary artery that is not caused by trauma, coronary intervention, or atherosclerotic plaque rupture. Diagnosis is made by coronary angiography, computed tomography coronary angiography (CTCA), intravascular ultrasound (IVUS) and optical coherence tomography (OCT). SCAD has been shown to be a rare cause of acute coronary syndrome and sudden cardiac death. The usual clinical presentation is a picture of acute myocardial infarction. Young women represent about 70% of patients and 30% of such cases are related to the peripartum period, due to hormonal changes [1, 2]. LAD is the most common site of dissection which represents 60% cases. RCA is the second most common site (more common in men), followed by the LM coronary artery.[3] The treatment options for this event are conservative, interventional (PCI) or sugical (CABG). The conservative approach is suitable for low-risk stable patients[4], but in the presence of ongoing ischemia, cardiogenic shock or sustained ventricular tachycardia/fibrillation – an intervention should be performed. Weather by percutaneous coronary intervention (PCI) or by a coronary artery bypass graft (CABG), it is up to the heart team to decide based on the complexity of the lesion and the patinet's condition.

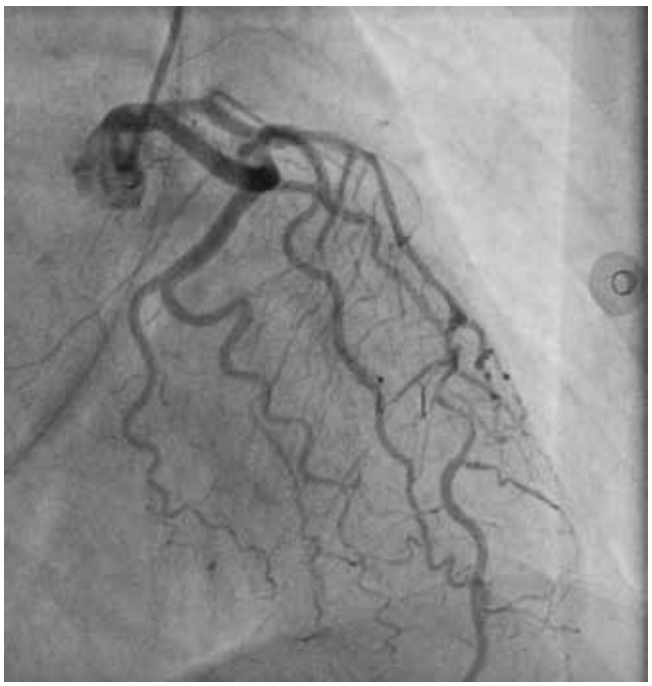

Fig. 1 LAD dissection

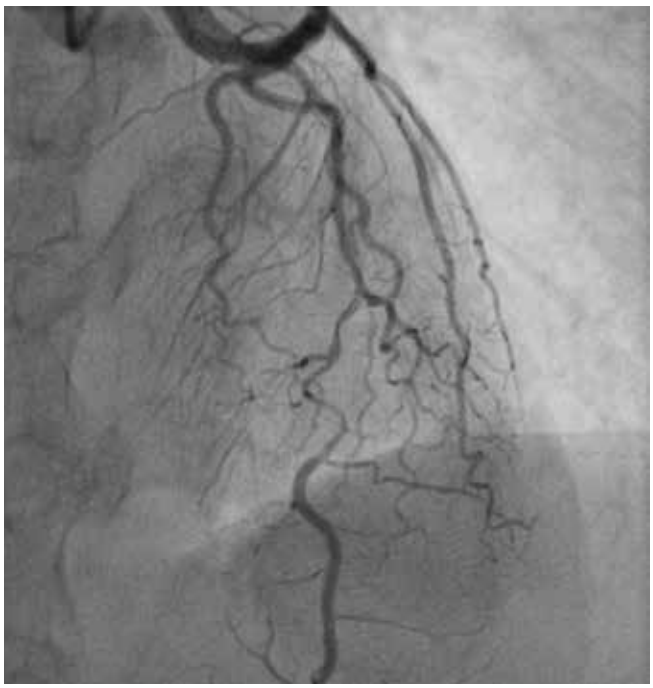

Fig. 2 LAD dissection

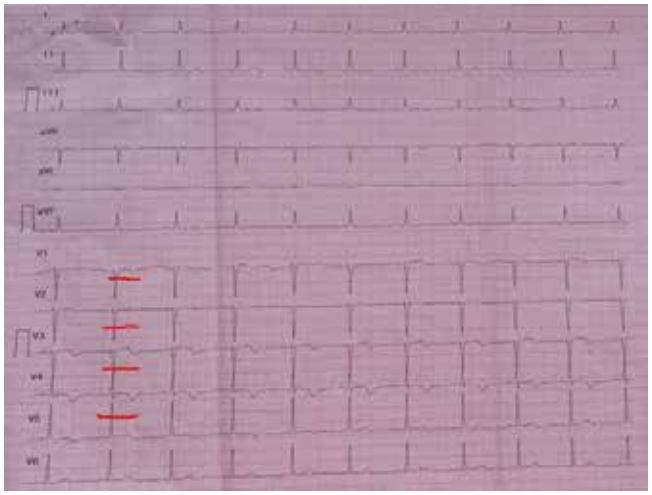

Fig. 3 ECG changes in anterior leads

In this current article we will present two cases of SCAD which took a completely different path in reguards of the treatment approach that was chosen.

Case presentations

Our first case is a 48-years old female, smoker that presents herself to our emergency department with chest pain with irradiation to the back and left arm, sweating and nausea. The ECG showed transient ST-T changes in the anterior leads – peaked T waves and ST-depression in V4-V6. The patient was transferred to our cardiology department for an urgent invasive assessment of the coronary circulation. At admission, patient had no ECG changes, but high levels of troponin were noted. From the echocardiography there was no valvular pathology, no findings of aortic dissection and a preserver ejection fraction. The patient was rushed to the cath lab and from the coronary angiography we observed a proximal prolonged stenosis in LAD, with up to 90% narrowing of the lumen in the mid segment but with TIMI 3 flow in

Fig. 4 LAD during the operation

LAD during the study (Figure 1 and 2). Lcx and RCA were with-out stenosis. Since the patient had no chest pain and was hemodynamically stable, we decided a to go with conservative treatment strategy.

However, after 12 hours, the patient reported another episode of chest pain. The ECG showed ST-elevations with biphasic T-waves in lead V2-V4 (Figure 3). Due to the complexity of the PCI procedure and the risk of iatrogenic damage, with an ongoing acute coronary syndrome with ST-elevation, we decided to change the strategy and proceed with surgical revascularization. LIMA-LAD coronary artery bypass grafting (CABG) was performed without any complications and the patient was discharged five days after the operation (Figure 4).

Fig. 5 LAD has healed one month after the operation

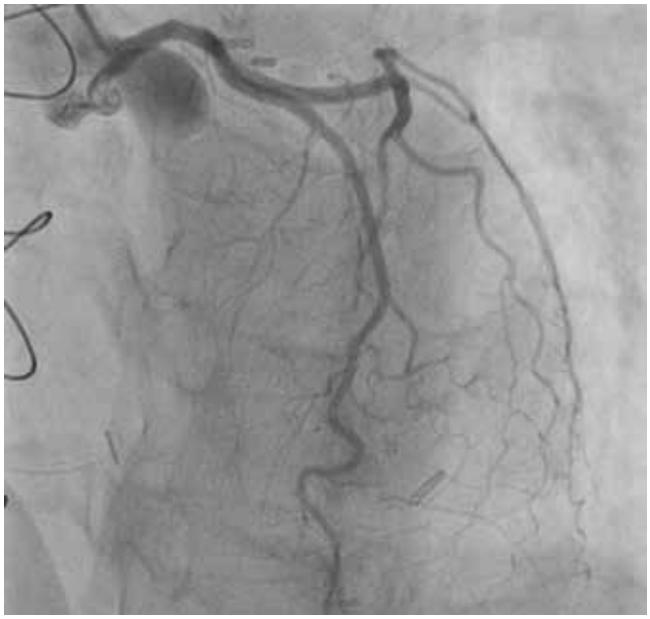

Fig. 7 Normal flow in LAD 1 year after operation

One month after discharge we re-hospitalized the patient in order to assess the coronary status after the surgical revascularization. We found a patent coronary artery bypass graft and normal flow in the LAD (Figure 5 and 6).

One year later, the patient was referred to our department again due to chest pain. We performed a coronary angiography and we found normal blood flow in the LAD but the LIMA-LAD bypass was occluded, since it has served its purpose (Figure 7 and 8).

Our second case is a 46-year-old man, with risk factors for ischemic heart disease – sex, age, arterial hypertension and smoking, who was transported to our hospital with an acute myocardial infarction of the inferior wall of the left ventricle. The complaints have been for about 5 hours prior, and experienced two syncope. The ECG that was presented from the paramedics team was with marked ST-elevations in leads II, III, aVF. In our

Fig. 6 Patent LIMA-LAD graft one month after the operation

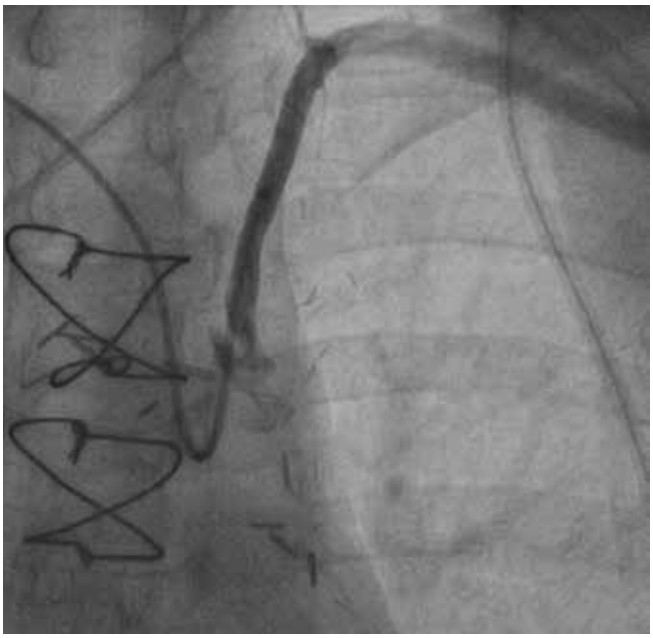

Fig. 8 LIMA-LAD graft is occluded one year after operation, since it has already served its purpose

ECG, however, there was only a slight ST-elevation up to 0.5mm in lead III. We performed an immediate coronary angiography, from which we noted that the left coronary arteries had no stenosis, but the RCA was at first with an unclear finding – reduced diameter of the vessel in the proximal and middle third, preserved distal blood flow and a probable filling defect in the middle segment (Figure 9). In order to clarify, we decided to use a guiding catheter for a more precise image. The selective cannulation revealed a double-lumen dissection starting ostial and propagating to the midsegment (Figure 10). We consider this to be a spontaneous dissection and since the patient started to experience

Fig. 9 LAD has healed one month after the operation

Fig. 10 Patent LIMA-LAD graft one month after the operation

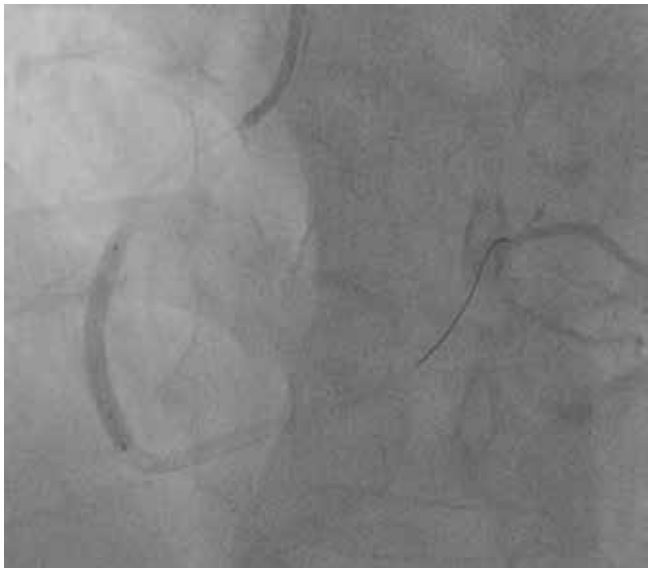

Fig. 11 First of four stents

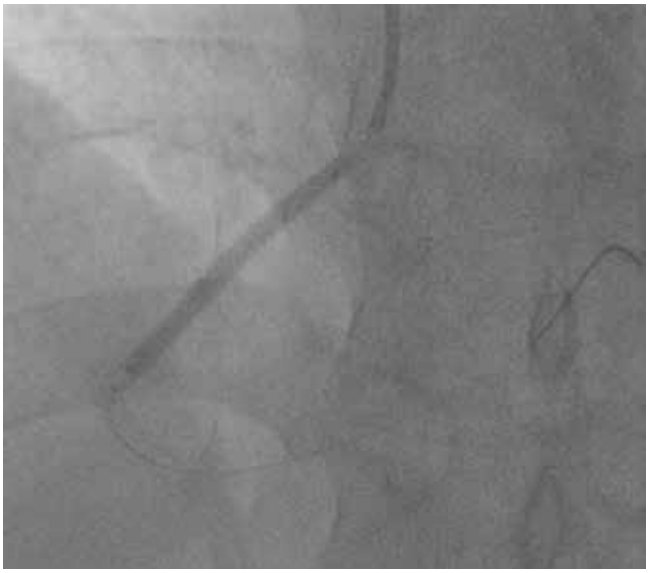

Fig. 12 Second stent

chest pain, we decided to proceed to an interventional treatment. We performed PCI, starting with a stent 3.5/36 from distal to proximal, with the idea to prevent "squeezing" the hematoma and to avoid it's propagation towards the distal segment. Next we implanted a second stent – 3.5/40 from mid to proximal segment. Unfortunately, there indeed occurred a minor propagation of the thrombus in the false lumen, so we had to cover it up as well using a 3.5/16 stent. We finished with a 4.0/16 DES in ostial segment and a post-dilatation with a noncompliant balloon 3.5/18. The final result was good and the patient was discharged on the third day after the procedure (Figure 11, 12 and 13). Follow-up was done by phone after six months and the patient denied having any sort of complains ever since.

Discussion

Spontaneous coronary artery dissection (SCAD) is an infrequent cause of ACS in general but accounts for a significant proportion of ACS cases in young/middle-aged women[5]. The mechanism underlying SCAD is different to that of Type 1 myocardial infarction and therefore – has a different way of management and different outcomes. Compared to the approach in ACS due to atherosclerotic plaque rupture, in SCAD the focus should be less on restoration of normal coronary architecture but rather on the minimal measures necessary to restore TIMI 3 flow. The treatment methods are conservative, interventional (PCI) and surgical (CABG).

Conservative medical management, as opposed to PCI, is generally recommended for patients with SCAD. Until evidence from ongoing trials becomes available, these patients should receive the same pharmacological therapy as other ACS patients.

PCI is recommended for SCAD with associated symptoms and signs of ongoing myocardial ischemia, a large area of myocardium in jeopardy, recurring ventricular arrhythmias and reduced antegrade flow. However,

Fig. 13 Final result

the rate of complications during PCI is high (up to 40%) with the most common being hematoma extension and iatrogenic dissection[6].

The third treatment option is CABG and is recommended when dissection affects the LM or two proximal vessels, or if PCI is not feasible, unsuccessful, or very complex.

If the performing physician is uncertain weather it indeed is a case of SCAD, intracoronary imaging (OCT or IVUS) may come in handy, however it is not generally advised to use those methods routinely, since they could potentially worsen the dissection.[7]

Conclusions

SCAD is a condition that can occur in everyday practice in patients with ACS and can be expected as the cause of ACS in young patients without significant risk factors. There is no universal principal regarding the treatment method, so rushing to perform an intervention (PCI or CABG) is not recommended, unless there is ongoing ischemia. In some of the cases, the dissection regenerates spontaneously, but in the acute phase, intervention or surgery is sometimes required.

References

1. Tweet MS, Olin JW, Bonikowske AR et al. Physical activity and exercise in patients with spontaneous coronary artery dissection and fibromuscular dysplasia. Eur Heart J 2021;42(37): 3825-3828.
2. Adlam D, Alfonso F, Maas A, Vrints C. Writing Committee, European Society of Cardiology, Acute Cardiovascular Care Association, SCAD study group: a position paper on spontaneous coronary artery dissection. Eur Heart J2018;39(36):3353-3368.
3. Mokhberi V, Bagheri B, Navidi S, Amini SM. Spontaneous coronary artery dissection: A case report. J Tehran Heart Cent 2015;10(3):159-62.
4. Regragui H, Boussaadani BE, Sasbou L, et al. Conservative management of spontaneous coronary artery dissection: a case report. Pan Afr Med J 2020;36:334.
5. Byrne RA, Rossello X, Coughlan J, et al. 2023 ESC Guidelines for the management of acute coronary syndromes: Developed by the task force on the management of acute coronary syndromes of the European Society of Cardiology (ESC). https://academic.oup.com/eurheartj/article/44/38/3720/7243210?login=false
6. Kotecha R, Garcia Guimaraes D, Pramawardhana S,. et al. Risks and benefits of percutaneous coronary intervention in spontaneous coronary artery dissection. https://heart.bmj.com/content/107/17/1398
7. Barbieri L, D'Errico A, Avallone C, et al. Optical coherence tomography and coronary dissection: Precious tool or useless surplus? Front Cardiovasc Med 2022;9:822998.

Sažetak

Pristupi rešavanju spontane disekcije koronarne arterije – prikaz slučajeva

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Spontana disekcija koronarne arterije (SCAD) je disekcija u zidu epikardijalne koronarne arterije koja nije uzrokovana traumom, koronarnom intervencijom ili rupturom aterosklerotskog plaka. Dijagnoza se postavlja pomoću koronarne angiografije, kompjuterizovane tomografije koronarografije (CTCA), intravaskularnog ultrazvuka (IVUS) i optičke koherentne tomografije (OCT). Pokazalo se da je SCAD redak uzrok akutnog koronarnog sindroma i iznenadne srčane smrti. Uobičajna klinička slika je slika akutnog infarkta miokarda. Mlade žene predstavljaju oko 70% pacijenata, a 30% takvih slučajeva se odnosi na peripartalni period, zbog hormonalnih promena. Prednja silazna grana (LAD) je najčešće mesto disekcije koje predstavlja 60% slučajeva. Desna koronarn arterija (RCA) je drugo najčešće mesto (češće kod muškaraca), a zatim sledi glavno stable leve koronarna arterija.

Opcije lečenja za ovo stanje su konzervativne, interventne (PCI) ili hirurške (CABG). Konzervativni pristup je pogodan za niskorizične stabilne pacijente, ali u prisustvu ishemije koja je u toku, kardiogenog šoka ili produžene ventrikularne tahikardije/fibrilacije – potrebno je izvršiti intervenciju.

Ovde predstavljamo dva slučaja SCAD-a koji su lečeni potpuno drugačijim načinom. Prvi slučaj je žena od 48 godina koja je primljena na kardiološko odeljenje zbog bolova u grudima i dinamičkih promena EKG-a. Koronarografija je otkrila SCAD u LAD, ali zbog stabilnog stanja pacijenta odlučili smo se za konzervativno lečenje. Međutim, nakon 12 sati, pacijentkinja je prijavila još jednu epizodu bola u grudima sa EKG-om koji pokazuje ST-elevaciju u prekordijalnim odvodima. Zbog velike složenosti intervencije odlučili smo da uputimo pacijenta na operaciju. Urađen je CABG (LIMA-LAD) i pacijent je otpušten pet dana nakon operacije. Naš drugi slučaj je bio 46-godišnji muškarac koji je imao EKG promene zbog inferiornog infarkta miokarda. Angiografija je otkrila SCAD u RCA. Zbog stalnog bola u grudima odlučili smo da idemo na interventno lečenje – PCI je uspešno urađena sa implantacijom četiri stenta sa lekovima.

SCAD je stanje koje se može javiti u svakodnevnoj praksi kod pacijenata sa akutnog koronarnoig sindroma (AKS) i može se očekivati kao uzrok AKS kod mladih pacijenata bez značajnih faktora rizika. Ne postoji univerzalni princip u vezi sa metodom lečenja, tako da se ne preporučuje žurba sa izvođenjem intervencije (PCI ili CABG), osim ako ne postoji produžena ishemija. U nekim slučajevima disekcija se spontano regeneriše, ali je u akutnoj fazi ponekad potrebna intervencija ili operacija.

Ključne reči: *spontana koronarna disekcija, infarkt miokarda, lečenje*