Marijuana and Coronary Dissection: A Case Report and Review of Literature

Pramod Theetha Kariyanna1, Harshith Priyan Chandrakumar2, Yuvraj Singh Chowdhury2, Apoorva Jayarangaiah1, Susruth Das1, Amog Jayarangaiah4, Moro O. Salifu2, Isabel M. McFarlane2,*

1Division of Interventional Cardiology Fellow, Mount Sinai Heart, Icahn School of Medicine at Mount Sinai Morningside/Beth Israel, New York City, New York-10025
2Division of Cardiovascular Disease, Department of Internal Medicine, State University of New York-Downstate Medical Center, Brooklyn, New York, USA
3Department of Internal Medicine, Albert Einstein College of Medicine, NYC Health and Hospitals/Jacobi Medical Center, Bronx, New York-10461, USA
4Trinity School of Medicine, 925 Woodstock Road, Roswell, GA 30075, U.S.A.
*Corresponding author: isabel.mcfarlane@downstate.edu

Received December 02, 2020; Revised January 05, 2021; Accepted January 14, 2021

Abstract Spontaneous coronary artery dissection (SCAD) is a cardiac emergency and an uncommon cause of acute coronary syndrome (ACS) with a higher predominance in younger women. It is a non-traumatic, non-atherosclerotic lesion found to be associated with pregnancy, inflammatory disorders, connective tissue diseases and substance abuse. Our patient was a young woman with a chronic marijuana smoking history who was found to have a NSTEMI. Initial angiogram showed triple vessel disease involving left anterior descending artery (LAD), left circumflex artery (LCX) and obtuse marginal artery (OM). A repeat angiogram notably showed spontaneous progression with dissection in all three vessels attributable to substance abuse. We present you this rare occurrence of triple vessel SCAD secondary to marijuana with a literature review and discussion.

Keywords: marijuana, coronary artery dissection, risk factors

Cite This Article: Pramod Theetha Kariyanna, Harshith Priyan Chandrakumar, Yuvraj Singh Chowdhury, Apoorva Jayarangaiah, Susruth Das, Amog Jayarangaiah, Moro O. Salifu, and Isabel M. McFarlane, “Marijuana and Coronary Dissection: A Case Report and Review of Literature.” American Journal of Medical Case Reports, vol. 9, no. 3 (2021): 172-179. doi: 10.12691/ajmcr-9-3-11.

1. Introduction

Coronary artery dissection is an uncommon emergency condition that occurs when a tear forms in a blood vessel in the heart and can occur secondary to atherosclerosis, instrumentation, mechanical trauma, arrhythmias or spontaneously. Spontaneous dissection in a patient with no prior cardiac history is a rare cause of acute coronary syndrome (ACS) and carries the potential of deterioration into sudden cardiac death. Spontaneous coronary artery dissection (SCAD) is defined as non-traumatic, non-iatrogenic, non-atherosclerotic separation of the coronary arterial wall leading to the formation of a false lumen with or without an intimate tear. This separation may occur between the intima and media or the media and adventitia leading to the formation of an intramural hematoma (IMH) within the walls. The IMH rather than atherosclerotic plaque rupture or intraluminal thrombus can obliterate the lumen of the coronary artery reducing antegrade blood flow leading to myocardial ischemia or infarction [1,2]. The true incidence of SCAD is unclear predominantly because it remains underdiagnosed. Studies report an incidence of 1.1% - 4% all ACS cases as being secondary to SCAD with the majority of cases seen predominantly affecting women [3,4]. SCAD has been associated with pregnancy, fibromuscular dysplasia, multiparity, systemic inflammatory disease and connective tissue disorders [5,6,7,8,9].

Although the spectrum of presentation of SCAD may vary depending on the extent of blow flow limitation, patients typically present with angina or its equivalents, ischemic ECG changes and elevation of cardiac biomarkers [5,10]. Based on their presentation of ACS these patients often undergo coronary angiography which demonstrates obliteration of the lumen of the coronary artery by the IMH. Comprehensive evaluation of the IMH is often then assessed with the use of intravascular ultrasound (IVUS) and optical coherence tomography (OCT). Cardiac CT angiography has emerged as a useful modality to subsequently monitor arterial healing in patients with SCAD.

Few scattered cases of SCAD have also been reported with the use of recreational drugs like cocaine [11], methamphetamine [12] and marijuana [13,14,15,16,17].
Marijuana has been implicated as causative in a wide spectrum of cardiac disorders which range from ACS, coronary spasm, myocarditis to arrhythmias [18,19,20,21,22,23]. However, the presentation of SCAD with marijuana has rarely been reported. We are reporting a rare case of SCAD occurring secondary to chronic marijuana use in a young female patient. Our literature review yielded only 6 cases of SCAD with marijuana use. Our case is also only the second ever reported case of a triple vessel SCAD with marijuana [14].

2. Case Report

A 25-year-old African-American female presented to the emergency room with 2 hours of aching left-sided, 7/10 intensity, non-radiating non-pleuritic chest pain. The pain had been associated with shortness of breath, nausea and 1 episode of non-bloody non-bilious vomiting. She had been a regular marijuana smoker since the age of 15. She smoked one blunt each day after work and two blunts on the weekend. She was not on any oral contraceptive pills and only used an over-the-counter multivitamin syrup. She had been in good health prior to the onset of symptoms and had a good exercise tolerance. Her heart rate was 81 beats/minute, respiratory rate 18 cycles/minute, 106/56 mm of Hg, saturation 98% on room air and was afebrile. Her physical exam was unremarkable. She had no jugular venous distention or pedal edema. Her chest was bilaterally clear to auscultation. First and second heart sounds were appreciated and no murmurs were auscultated. ECG was consistent with a normal sinus rhythm and incomplete right bundle branch block pattern (QRS duration 108 msec.). A complete blood count, comprehensive metabolic panel, D-dimer and lipid panel were within normal limits. The initial troponin at presentation was 2.9 ng/ml, which subsequently peaked at 7.5 ng/ml 12 hours later. A diagnosis of non-ST segment elevation myocardial infarction was established. Her pain resolved completely in the emergency room with the administration of sublingual nitrate. She was treated with 325 mg of Aspirin, 300 mg of Clopidogrel and 1mg/kg of enoxaparin and referred for cardiac catheterization. Right femoral arterial access was obtained and a 6F sheath was introduced. Right radial access had failed due to radial artery spasm. Right coronary angiography was performed with a 6 French three-dimensional right curve (3DRC) catheter. Dissection of the proximal right coronary artery with closure of the posterior descending artery was appreciated (Image 1); Left coronary artery collaterals to the right coronary distribution were appreciated (Image 2). The patient was asymptomatic and hemodynamically stable at this time and no EKG changes were observed. A 6 French JL4 catheter was used to engage the left coronary system which revealed diffuse 60% narrowing of the proximal left anterior descending artery and focal 70% stenosis of the distal circumflex before the origin of the third obtuse marginal artery (Image 3). Ventriculography established a left ventricular ejection fraction of approximately 55%. A diagnosis of triple vessel coronary artery disease was established and she was referred to a tertiary care center for coronary artery bypass grafting. At the referral center the patient developed symptomatic hypotension and a decision was made to perform a repeat coronary angiogram. A repeat angiogram of left coronary artery showed diffuse 80-90% long narrowing of the proximal left anterior descending artery. This was more severe than 60% narrowing noted in the initial angiogram thus a diagnosis of dissection was established. There was also a diffuse 70% narrowing of the left circumflex artery (blue arrow) and appearance of subtotal occlusion of the obtuse marginal artery suggesting both the lesions in left circumflex artery and obtuse marginal artery to be dissection. (Image 4, Image 5). She was transferred to a heart transplant center for left ventricular assist device placement as a bridge to cardiac transplant.

Image 1. Left anterior oblique caudal view of the right coronary artery in which dissection is evident
Image 2. Right anterior oblique cranial view of the left coronary artery showing diffuse 60% narrowing of the proximal left anterior descending artery

Image 3. Right anterior oblique cranial view of the left coronary artery showing diffuse 70% narrowing of the left circumflex artery
Image 4. A repeat angiogram in the right anterior oblique cranial view of the left coronary artery showing diffuse 80-90% long narrowing of the proximal left anterior descending artery. This was more severe than 60% narrowing noted in the initial angiogram thus a diagnosis of dissection was established.

Image 5. A repeat angiogram in the right anterior oblique cranial view of the left coronary artery showing improvement in the diffuse 70% narrowing of the left circumflex artery (blue arrow) also appearance of subtotal occlusion of the obtuse marginal artery was noted suggesting both the lesions in left circumflex artery and obtuse marginal artery to be dissection.

3. Discussion

The underlying mechanism of non-atherosclerotic SCAD is not fully understood, but an intimal tear or bleeding of vasa vasorum with intramural hemorrhage has been proposed. Both result in creation of a false lumen filled with intramural hematoma [24,25]. SCAD is a disease which predominantly affects women (>90% of all documented cases). It has been estimated to be the etiology of 15%-35% of all cases of ACS in women presenting under the age of 50 [26,27,28]. Studies also show that women account for 81-100% of cases of SCAD in the age range of 45-56 years [6,7,29,30,31]. SCAD has been most notably associated with pregnancy, with 40%
of myocardial infarctions during pregnancy being secondary to SCAD. Multiparity, fibromuscular dysplasia owing to associated coronary artery tortuosity, systemic lupus erythematosus, connective tissue disorders like Marfan’s syndrome, Ehlers Danlos syndrome and Takotsubo cardiomyopathy are conditions which predispose to SCAD. A review of 20,195 patients with ACS from Japan revealed prevalence of SCAD in 0.31% (females 94%) with 29% developing after emotional stress. Other triggers for SCAD other than emotional stress include physical exertion, Valsalva-like maneuvers, corticosteroids use and recreational drugs abuse (cocaine, methamphetamine and marijuana) [6,7,8,9,32,33,34].

Tetrahydrocannabinol (THC) is the active component in marijuana and binds to the CB1 and CB2 receptors. Activation of receptors in the cardiovascular system increases sympathetic stimulation leading to tachycardia, peripheral vasodilation, elevated systolic and diastolic blood pressures and augmentation of left ventricular function [35,36,37]. THC also increases the risk of ACS 4.8 times within the 1st hour of its use, has a procoagulant effect and a tendency to provoke cardiac arrhythmias [38]. The mechanism behind marijuana use leading to SCAD is not completely understood. Sympathetic overdrive and elevated blood pressures likely lead to an increased shear stress on the coronary arterial wall leading to SCAD in susceptible individuals.

While most patients with SCAD have a presentation similar to ACS, a small proportion of patients present with syncope, ventricular arrhythmias and cardiogenic shock [10,31]. There is often a reversible drop in ejection fraction which may show improvement after revascularization [39]. Anatomically the left anterior descending artery is most commonly culprit vessel followed by circumflex and right coronary arteries [30]. Single vessel dissection is the most common presentation, but 9-19% of cases have multivessel involvement [28,30]. While dissections predominantly affect the mid to distal segments of coronaries, <10% affect the proximal segments [7]. Triple vessel SCAD though extremely rare has been reported [14,40].

Angiographically SCAD may demonstrate extraluminal contrast staining, multiple radiolucent lumens, spiral dissection or intraluminal filling defects [41]. On occasion it may mimic atherosclerosis and give the appearance of diffuse or focal tubular stenosis [25]. While conventional angiography helps visualize the lumen of the coronary arteries it does not image the arterial wall. This limits its utility in SCAD which is predominantly an intramural pathology of the coronary arterial walls. Intracoronary imaging techniques like optical coherence tomography (OCT) and intravascular ultrasound (IVUS) provide much more data on the composition of the vessel wall and aid in visualizing the false lumen, intimal tear and hematoma when present. Instrumentation induced vessel wall injury should always be considered while performing intracoronary imaging. OCT has been demonstrated to be superior to IVUS in terms of providing better spatial resolution and finer depiction of vessel wall [42].

There have been no randomized controlled trials to guide the management of SCAD. While conservative management can be attempted in hemodynamically stable patients without ongoing chest pain, patients with ongoing chest pain, dynamic ECG changes or hemodynamic instability are often taken to the cardiac catheterization suite for percutaneous intervention [7]. Aortic dissection in patients with SCAD of left main coronary artery, proximal dissections, patients in whom primary PCI has failed or when the lesion is not anatomically suitable for PCI [44]. While beta blockers, angiotensin converting enzyme inhibitors or angiotensin receptors inhibitors, dual antiplatelet therapy and heparin are routinely administered, the role of GPIIb/IIIa inhibitors and thrombolytic in this population has never been prospectively studied. Multidetector cardiac CT imaging is now being increasingly used to follow the course arterial healing after SCAD in those with proximal large caliber arteries [45].

A comprehensive review of existing literature shows that the incidence of SCAD in the setting of marijuana use has been rarely reported. There have been only 7 reported cases till date including ours.

In our review, we found that these patients were fairly young with a mean age of 30 (Table 1 & Table 2). Interestingly 71% of the patients were male. None of these patients had any cardiovascular risk factors of obesity, diabetes, hyperlipidemia, hypertension, chronic kidney disease or a family history of coronary artery disease. Almost unanimously all the cases presented with typical ACS like pictures with chest pain, ECG changes and elevated cardiac bio markers. The most commonly affected artery was proximal LAD (Table 3) [13,14,15,16,17]. Our review yielded only one case with triple vessel involvement [14]. 2 of the patients underwent drug eluting stent and 1 underwent CABG [14,15,16].

### Table 1. Reported cases of coronary dissection secondary to marijuana use

| Year of publication and Author | Country | Artery affected | Number of results affected |
|-------------------------------|---------|----------------|---------------------------|
| 2011, Schmid (13)             | Austria | Proximal LAD   | 1                         |
| 2013, Filali (14)             | Tunisia | Proximal LAD, LCx, RCA | 3                       |
| 2015, Tarig (15)              | USA     | Proximal LAD, diagonal 1 | 2                       |
| 2015, Cruft (16 Obesity 0)    | USA     | Proximal LAD   | 1                         |
| Diabetes 0                    |         |                |                           |
| Hyperlipidemia 0              |         |                |                           |
| Hypertension 0                |         |                |                           |
| Chronic kidney disease 0      |         |                |                           |
| Family history of coronary artery disease 0) |         |                |                           |
| 2016, Noamen (17)             | Tunisia | Proximal LAD   | 1                         |
| 2016, Noamen (17)             | Tunisia | Proximal LAD   | 1                         |
| 2019, Theetha Kariyanna (present case) | USA | Proximal LAD, proximal RCA, mid-LCx | 3 |
Table 2. Summary of Patient Characteristics

| Total number of cases | 7 |
|-----------------------|---|
| Cases reported from   | USA 3 (43%), Tunisia 3 (43%), Austria 1 (14%) |
| Age                   | Median = 27 ± 6.5 years, Mean = 30 ± 6.5 years |
| Sex                   | Male 5 (71%), Female 2 (29%) |
| Presenting symptoms   | Chest pain 7 (100%) |
| Other drug use        | History of heroin use 1 (14%), History of cocaine use 1 (14%) |
| History of smoking    | 3 (43%) |

Other cardiovascular risk factors reported
- Obesity 0
- Diabetes 0
- Hyperlipidemia 0
- Hypertension 0
- Chronic kidney disease 0
- Family history of coronary artery disease 0

Reported ECG finding
- STEMI 4 (57%)
- Dynamic ST segment changes 1 (14%)
- Incomplete RBBB 1 (14%)
- Poor R wave progression 1 (14%)
- Reported arrhythmias 0 (0%)

Imaging studies
- Wall motion abnormality on echocardiography reported in 5 (71%)
- Normal EF was reported in 4 (57%)

Management
- Underwent DES 2 (29%)
- Referred for CABG 1 (14%)
- Referred for cardiac transplant 1 (14%)
- Coronary artery bypass surgery 1 (14%)

Reported death 1 (14%)

**ACEi**: angiotensin-converting enzyme inhibitors  
**Cx**: circumflex artery  
**DES**: Drug-eluting stent  
**ECG**: electrocardiogram  
**EF**: ejection fraction  
**RBBB**: right bundle-branch block  
**STEMI**: ST segment elevation myocardial infarction

Table 3. Summary of coronary angiogram and management

| Publication Year/author | Coronary Artery affected | Coronary angiogram findings | Intravascular ultrasound | Medical management | Invasive management | Death |
|-------------------------|--------------------------|----------------------------|--------------------------|--------------------|--------------------|-------|
| 2011, Schmid [13]       | Proximal LAD             | pLAD dissection            | -                        | Dual antiplatelets, B-blockers, ACEi | -      |
| 2013, Filali [14]       | Proximal LAD, LCx, RCA   | Lumenal narrowing of pLAD, Dissection of LAD extending into second segment without flow limitation, dissection in proximal Cx and mid RCA | -                        | Coronary artery bypass surgery | Yes    |
| 2015, Tariq [15]        | Proximal LAD, diagonal 1 | pLDA dissection 90% obstruction, occlusion of D1 | Proximal LAD dissection | GDMT               | Drug-eluting stent to both vessels | -     |
| 2015, Cruff [16]        | Proximal LAD             | pLAD dissection            | -                        | Aspirin, B- blockers, LMWH | DES placement | -     |
| 2016, Noamen [17]       | Proximal LAD             | pLAD dissection            | Proximal LAD dissection  | Tirolibarin         | -                  |
| 2016, Noamen [17]       | Proximal LAD             | pLAD dissection            | Proximal LAD dissection  | Tirolibarin         | -                  |
| 2019, Theetha Kariyanna (present case) | Proximal LAD, proximal RCA, mid- LCx | pLAD dissection, proximal RCA dissection, mid Cx dissection | Dual antiplatelet LMWH B-blockers Statins | Referred for cardiac transplant | -      |

**CABG**: coronary artery bypass graft  
**DES**: Drug-eluting stent 
**ECG**: electrocardiogram 
**EF**: ejection fraction  
**RBBB**: right bundle-branch block  
**STEMI**: ST segment elevation myocardial infarction

4. Conclusion

Our case represents only the 7th reported case of SCAD with Marijuana use and the 2nd such case with triple vessel involvement. The legalization of recreational marijuana in many states across the United States has led to a surge in its use especially among the younger generation. Our study aims to alert the physicians to consider SCAD in the
Acknowledgments

This work is supported, in part, by the efforts of Dr. Moro O. Salifu M.D., M.P.H., M.B.A., M.A.C.P., Professor and Chairman of Medicine through NIH Grant number S21MD012474.

References

[1] Yip, A. and J. Saw, Spontaneous coronary artery dissection—a review. Cardiovascular diagnosis and therapy, 2015. 5(1): p. 37.
[2] Vrints, C.J., Spontaneous coronary artery dissection. Heart, 2010. 96(10): p. 801-8.
[3] Rashid, J.H.N., et al., Incidence and characterisation of spontaneous coronary artery dissection as a cause of acute coronary syndrome—A single-centre Australian experience. Int J Cardiol, 2016. 202: p. 336-8.
[4] Nishiguchi, T., et al., Prevalence of spontaneous coronary artery dissection in patients with acute coronary syndrome. Eur Heart J Acute Cardiovasc Care, 2016. 5(3): p. 263-70.
[5] Hayes, S.N., et al., Spontaneous Coronary Artery Dissection: Current State of the Science: A Scientific Statement From the American Heart Association. Circulation, 2018. 137(19): p. e523-e557.
[6] Eleid, M.F., et al., Coronary artery tortuosity in spontaneous coronary artery dissection: angiographic characteristics and clinical implications. Circ Cardiovasc Interv, 2014. 7(5): p. 656-62.
[7] Saw, J., et al., Spontaneous coronary artery dissection: association with predisposing arteriopathies and precipitating stressors and cardiovascular outcomes. Circ Cardiovasc Interv, 2014. 7(5): p. 645-55.
[8] Reddy, S., et al., Spontaneous coronary artery dissection as the first presentation of systemic lupus erythematosus. BMJ Case Reports, 2016. 2016: p. bcr2016163344.
[9] Henkin, S., et al., Spontaneous coronary artery dissection and its association with heritable connective tissue disorders. Heart, 2016. 102(11): p. 876-81.
[10] Luong, C., et al., Clinical presentation of patients with spontaneous coronary artery dissection. Catheter Cardiovasc Interv, 2017. 89(7): p. 1149-1154.
[11] Merinopoulos, I., D. Bloore, and P. Read, A 'sniff' away from death: a case of cannabis-induced coronary artery dissection. Oxford Medical Case Reports, 2017. 2017(10).
[12] Afzal, A.M., et al., Spontaneous coronary artery dissection in a 22-year-old man on lisdexametamine. Proceedings (Baylouver University, Medical Center), 2015. 28(3): p. 367-368.
[13] Schmid, J. and J. Auer, Spontaneous coronary artery dissection in a young man - case report. Journal of cardiothoracic surgery, 2011. 6(1): p. 22-22.
[14] Filali, T., et al., Spontaneous multivessel coronary artery dissection associated with cannabis use. Journal of cardiology cases, 2012. 7(1): p. e4-e7.
[15] Tariq, U., Spontaneous Coronary Artery Dissection (SCAD) in an HIV Positive Young Female. CHEST, 2015. 148(4): p. 70A.
[16] Klebe, S. and K. Vipul, Spontaneous Coronary Artery Dissection with Intramural Thrombus - Can We Implicate the "Double-Whammy" of Nicotine and Cannabis, in CS1. TOXIC INGESTIONS AND EXPOSURES. p. A4595-A4595.
[17] An, N., et al., Cannabis induced myocardial infarction underlying mechanism and the place of glycoprotein IIIa/IIa inhibitors in its management: Two illustrative cases of acute anterior myocardial infarction related to cannabis. Journal of Integrative Cardiology, 2016. 2: p. 292-294.
[18] Kariyanna, P.T., et al., Atrioventricular Nodal Reentrant Tachycardia Triggered by Marijuana Use: A Case Report and Review of the Literature. Am J Med Case Rep, 2019. 7(9): p. 193-196.
[19] Patel, K.H., et al., Myocardial Infarction Secondary to Marijuana-Induced Coronary Vasospasm. Am J Med Case Rep, 2020. 8(3): p. 76-78.
[20] Kariyanna, P.T., et al., Marijuana and Cardiac Arrhythmias: A Scoping Study. Int J Clin Res Trials, 2019. 4(1).
[21] Kariyanna, P.T., et al., Marijuana Induced Myocarditis: A New Entity of Toxic Myocarditis. Am J Med Case Rep, 2018. 6(9): p. 169-172.
[22] Kariyanna, P.T., et al., Marijuana Induced Type I Brugada Pattern: A Case Report. Am J Med Case Rep, 2018. 6(7): p. 134-136.
[23] Wengrofsky, P., et al., Recurrent STEMI Precipitated by Marijuana Use: Case Report and Literature Review. American journal of medical case reports, 2018. 6(8): p. 163-168.
[24] Kwon, T.G., et al., Proliferation of Coronary Adventitial Vasa Vasorum in Patients With Spontaneous Coronary Artery Dissection. IACC Cardiovasc Imaging, 2016. 9(7): p. 891-892.
[25] Saw, J., et al., Angiographic appearance of spontaneous coronary artery dissection with intramural hematoma proven on intracoronary imaging. Catheter Cardiovasc Interv, 2016. 87(2): p. E54-61.
[26] Nakashima, T., et al., Prognostic impact of spontaneous coronary artery dissection in young female patients with acute myocardial infarction: A report from the Angina Pectoris-Myocardial Infarction Multicenter Investigators in Japan. Int J Cardiol, 2016. 207: p. 341-8.
[27] Motreff, P., et al., How and when to suspect spontaneous coronary artery dissection: novel insights from a single-centre series on prevalence and angiographic appearance. EuroIntervention, 2017. 12(18): p. e2236-e2243.
[28] Saw, J., et al., Nonatherosclerotic coronary artery disease in young women. Can J Cardiol, 2014. 30(7): p. 814-9.
[29] Alfonso, F., et al., Spontaneous coronary artery dissection: long-term follow-up of a large series of patients prospectively managed with a "conservative" therapeutic strategy. IACC Cardiovasc Interv, 2012. 5(10): p. 1062-70.
[30] Rogowski, S., et al., Spontaneous Coronary Artery Dissection: Angiographic Follow-Up and Long-Term Clinical Outcome in a Predominantly Medically Treated Population. Catheter Cardiovasc Interv, 2017. 89(1): p. e59-e68.
[31] McGrath-Cadell, L., et al., Outcomes of patients with spontaneous coronary artery dissection. Open Heart, 2016. 3(2): p. e000491.
[32] Elkayam, U., et al., Pregnancy-associated acute myocardial infarction: a review of contemporary experience in 150 cases between 2006 and 2011. Circulation, 2014. 129(16): p. 1695-702.
[33] Saw, J., et al., Spontaneous Coronary Artery Dissection: Clinical Outcomes and Risk of Recurrence. J Am Coll Cardiol, 2017. 70(9): p. 1148-1158.
[34] Chou, A.Y., et al., Spontaneous Coronary Artery Dissection Misdiagnosed as Takotsubo Cardiomyopathy: A Case Series. Can J Cardiol, 2015. 31(8): p. 1073.e5-8.
[35] Beaconsfield, P., J. Ginsburg, and R. Rainsbury, Marihuana smoking. Cardiovascular effects in man and possible mechanisms. N Engl J Med, 1972. 287(5): p. 209-12.
[36] Gash, A., et al., Effects of smoking marihuana on left ventricular performance and plasma norepinephrine: studies in normal men. Ann Intern Med, 1978. 89(4): p. 448-52.
[37] Mittelman, M.A., et al., Triggering myocardial infarction by marijuana. Circulation, 2001. 103(23): p. 2805-9.
[38] Ghuran, A.V. and A.J. Camm, Ischaemic heart disease presenting as arrhythmias. Br Med Bull, 2001. 59: p. 193-210.
[39] Franco, C., et al., Changes in left ventricular function after spontaneous coronary artery dissection. Clin Cardiol, 2017. 40(3): p. 149-154.
[40] Choi, E.Y., Y. Jang, and J.W. Ha, Spontaneous triple vessel coronary artery dissection in a patient with effort angina. Heart, 2005. 91(7): p. 850-4.
[41] Rogers, J.H. and J.M. Lasala, Coronary artery dissection and perforation complicating percutaneous coronary intervention. J Invasive Cardiol, 2004. 16(9): p. 493-9.
[42] Paulo, M., et al., Combined use of OCT and IVUS in spontaneous coronary artery dissection. IACC Cardiovasc Imaging, 2013. 6(7): p. 830-2.
[43] Tweet, M.S., et al., Spontaneous coronary artery dissection: revascularization versus conservative therapy. Cire Cardiovasc Interv, 2014. 7(6): p. 777-86.
Patel, K.P., R.P. Sotolongo, and T.W. Myrick, Off-pump coronary artery bypass grafting for spontaneous coronary dissection in a 26-year-old patient two weeks post-partum: a case report and review. J Extra Corp Technol, 2008. 40(2): p. 127-9.

Roura, G., et al., Noninvasive Follow-Up of Patients With Spontaneous Coronary Artery Dissection With CT Angiography. JACC Cardiovasc Imaging, 2016. 9(7): p. 896-897.