Cardiology Research and Cardiovascular Medicine
Poursadrolah S, et al. Cardiolog Res Cardiovasc Med 8: 233.
www.doi.org/10.29011/2575-7083.100233
www.gavinpublishers.com

OPEN ACCESS

GAVIN PUBLISHERS

Review Article

Cutting Balloons in Patients with Spontaneous Coronary Artery Dissection Presented with ST-Elevation Myocardial Infarction; A Review Article

Sayna Poursadrolah[1*], Habib Rahban[2], Carlos Garibay[1], Selvana Poursadrolah[3], Tongwa Aka[1], Chi Kieu[1], Kristy Leker[1], Guy Treves[1], Andrew Rubin[4], Mehrdad Saririan[2]

[1]Eisenhower Medical Center, Rancho Mirage, CA, USA

[2]Cardiology Department at Creighton University School of Medicine, Pheonix, AZ, USA

[3]Guilan University of Medical Sciences, Rasht, Iran

[4]Cardiology Department at Eisenhower Medical Center, Rancho Mirage, CA, USA

***Corresponding author:** Sayna Poursadrolah, Eisenhower Medical Center, Rancho Mirage, CA, USA, 210 Desert Falls Drive East Palm Desert,CA, 92211

Citation: Poursadrolah S, Rahban H, Garibay C, Poursadrolah S, Aka T, et al. (2024) Cutting Balloons in Patients with Spontaneous Coronary Artery Dissection Presented with ST-Elevation Myocardial Infarction; A Review Article. Cardiol Res Cardiovasc Med 9: 233. DOI:https://doi.org/10.29011/2575-7083.100233

Received Date: 25 February, 2024; **Accepted Date:** 01 March, 2024; **Published Date:** 04 March, 2024

Abstract

Spontaneous coronary artery dissection (SCAD) is defined as non-iatrogenic and non-traumatic dissection of the coronary artery which can lead to hematoma formation affecting the blood flow. Conservative management is preferred over revascularization in patients with SCAD and preserved blood flow, however, revascularization is recommended in patients with ongoing ischemia, left main artery involvement, or impaired blood flow. Since conventional revascularization is associated with an increased risk of stent misplacement, thrombosis, and hematoma propagation, new techniques including cutting balloons (CB) have been offered. Cutting balloon makes fenestrations in the wall of the hematoma and leads to drainage of the hematoma. Our study includes 25 published cases of SCAD who presented with ST-elevation myocardial infarction and underwent CB revascularization. Isolated CB resulted in thrombolysis in myocardial infarction (TIMI) 3 blood flow restoration in 15 patients and TIMI 2 blood flow in one patient. Eight patients required further stenting due to ongoing ischemia after using CB. One patient underwent coronary artery bypass graft (CABG) due to cardiogenic shock. Hematoma expansion was reported in 2 cases. Except for one patient, all cases remained asymptomatic at follow-up.

Introduction

Spontaneous Coronary Artery Dissection (SCAD) is one of the less common causes of acute coronary syndrome. It is defined by non-iatrogenic, non-traumatic dissection of the coronary artery resulting in the formation of a false lumen affecting the blood flow. It is more common in females and is associated with pregnancy, fibromuscular dysplasia, infertility treatment, migraine headaches, and hypothyroidism [1,2]. Chest pain is the most common presentation; most patients manifest with ST-elevation myocardial infarction (STEMI) or non-ST-elevation myocardial infarction (NSTEMI). Angiography is the gold standard for diagnosis. SCAD is divided into three subtypes based on the angiographic features: Type 1 is characterized by multiple lumens separated by a flap.6Type 2 presents as a long section of smooth stenosis along the vessel lumen, further divided into Type 2a, where the caliber continues beyond the stenosis, and Type 2b, where the stenosis extends to the most distal angiographic area. Type 3 is defined as a

focal stenosis resembling atherosclerotic plaque [3].

Currently, conservative management is recommended in stable patients, however, patients with hemodynamic instability, ongoing ischemia, and dissection of the left main artery need revascularization. There is no solid guideline regarding the type of invasive treatment and decisions are made on a case-by-case basis [4].

As stenting can be challenging and may result in complications, novel techniques including cutting balloon (CB) revascularization, have been offered [5]. CB makes fenestrations in the hematoma resulting in hematoma decompression and blood flow restoration (Figure- 1).

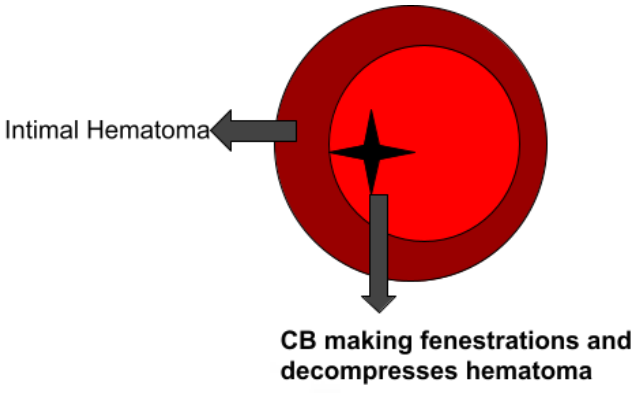

Figure 1: Schematic presentation of CB

Purpose

CB therapy is an appropriate management of SCAD. However, relatively small amounts of research have been conducted on this matter. In this manuscript, we intend to review the efficacy of CB usage in the cases of SCAD in patients who presented with STEMI by examining currently available data.

Materials and methods

A systematic literature review was performed on 2 major databases including Google Scholar and Pubmed. The keywords "SCAD", "STEMI", and "cutting balloon" were used. The inclusion criteria were case reports written in English that presented patients with STEMI who underwent cutting balloon revascularization. The exclusion criteria were papers in languages other than English and articles requiring a subscription. The final analysis included 25 case reports published between 2014 and 2023.

Results

Among the cases, 92% were female, and the average age was 44.56 years. Past medical history including diabetes, hypertension, hyperlipidemia, and recent pregnancy was reported in 7 of the cases. The left anterior descending artery (LAD) was the most frequently affected artery, accounting for 80% of cases and the middle LAD was the most commonly involved segment (55%). 55.5 % had an extension of dissection from the middle to the distal part of LAD. Multi-vessel dissection was observed in only four cases. Details of the utilized manuscripts are presented in (Table- 1).

Author	Year of Publication	Sex	Age	Past Medical History	Affected Artery
Besis et al. [6]	2023	F	58	None	LADA (after the first septal branch)
Nelson et al [7]	2023	F	36	None	LADA,RCA
Bastante et al.[8]	2022	F	43	N/A	LADA
Yamamoto et al. [9]	2022	M	70	N/A	Proximal LADA
Bastante et al. [8]	2022	F	46	N/A	LADA
Zghouzi et al. [10]	2021	F	72	N/A	Mid-LADA
Matsuura et al. [11]	2021	F	31	Recent pregnancy	Mid- distal LADA
Fujito et al. [12]	2021	F	50	None	Distal RCA
Bresson et al. (13]	2019	F	36	None	Proximal LADA
Kaya et al.[14)	2019	F	46	None	Proximal to mid- LADA
Noguchi et al. [15]	2018	M	42	None	Distal LM, proximal- mid LADA, proximal-mi d LCX
Main et al. [16]	2018	F	62	None	Diagonal
Lee et al. [17]	2017	F	42	None	Mid-LADA
Lee et al.[17]	2017	F	39	Recent	Pregnancy Ostial to distal RCA

Lee et al.[17]	2017	F	46	None	Mid- distal LADA
Ito et al. [18]	2016	F	46	None	Mid- distal LADA
Alkhouli et al. [19]	2015	F	50	None	Mid- distal LADA
Yumoto et al. [20]	2014	F	47	None	Mid- distal LADA
Uemi et al. [21]	2013	F	42	Hyperlipidemia	Mid- distal LADA
Macaya et al. [22]	2021	F	28	Pregnancy	Left main, LAD and ostium LCx
Kahata et al. [23]	2017	F	39	None	Distal OM
Mailey et al. [24]	2022	F	30	Pregnancy	LAD with extension to LCx
Ejima et al. [25]	2015	F	32	Pregnancy	Mid LAD
Low et al. [26]	2020	F	32	Pregnancy, Hyperlipidemia	Proximal LAD
McConkey et al.[27]	2023	F	49	None	LCX
F, female; M, male; Mid, middle; LADA, left anterior descending artery; LCX, left circumflex; RCA, right coronary artery, LM; left main					

Table 1: Characterization of the utilized case reports and their available data

The Boston Scientific CB was the predominant balloon used in the cases, however, in 8 cases the type of CB was not reported. The balloon diameter ranged from 2 mm to 4 mm with a length of 10 mm to 30 mm. In most cases, the balloon was inflated in the middle of the dissection. Multiple inflations were reported in different cases. In 37.5% of cases, CB was inflated 2 times [10,11,16,17]. Case-specific procedure details are described in (Table 2).

Author	Ballon Type	Ballon diameter and length	Inflation location	Number s of inflation	Ballo on ATM	Stent	Reason for stent
Besis et al [6]	Boston Scientific, Flextome	(2,3.5)x (10,20)	Mid and distal -LADA	4	N/A	No	N/A
Nelson et al. [7]	NA	N/A	LADA	N/A	N/A	Yes	Recurrent chest pain and involvement of significant vessel
6Bastante et al.[8]	Spectranetics Angiosculpt	2.5x15 mm	NA	Multiple	N/A	No	N/A
Yamamoto et al. [9]	N/A	4x15 mm	Proximal LADA (Distal to stenosis)	N/A	N/A	No	N/A
Bastante et al. [8]	Spectranetics Angiosculpt	2x20 mm	N/A	Multiple	N/A	No	N/A
Zghouzi et al.[10]	Boston Scientific	3.0x20 mm	Mid-LAD A	2	N/A	No	N/A
Matsuura et al. [11]	Boston Scientific Wolverine	3.5x NA 2.5x NA	Distal LADA	2	N/A	No	N/A
Fujito et al. [12]	NA	2.0x 10 mm	N/A	1	N/A	No	N/A
Bresson et al. [13]	Boston Scientific	2.5X10 mm	Mid- LADA	N/A	N/A	Yes	TIMI 2
Kaya et al. [14]	Boston Scientific, Flextome	2.5 xNA	Mid and distal LADA	3	4	No	N/A
Noguchi et al. [15]	Boston Scientific, Flextome	3 (LCX), 3.5(LADA)	Proximal and Mid-LADA; Mid-LCx	8 (LCX); 10 (LADA)	6	Yes	TIMI 1 and dissection newly occurred in the proximal LAD

Main et al. [16]	Boston Scientific, Flextome	2.5x10 mm	Mid-Diagonal	2	3	No	N/A
Lee et al. [17]	N/A	3.5x30 mm	Whole RCA	Multiple	N/A	No	N/A
Lee et al. [17]	NA	2.25x10 mm	After the 1st diagonal	2	N/A	No	N/A
Lee et al. [17]	NA	2.5x NA	NA	N/A	N/A	Yes	TIMI 1
Ito et al. [18]	Boston Scientific, Flextome	2x NA	Distal LADA	1	8	No	N/A
Alkhouli et al. [19]	Boston Scientific, Flextome	2.0x10 mm	Mid and distal LADA	2	2-4	Yes	Not mentioned
Yumoto et al. [20]	N/A	2.5x NA	Mid and distal LADA	2	2-4	No	N/A
Uemi et al. [21]	Boston Scientific, Flextome	3x NA	N/A	N/A	N/A	No	N/A
Macaya et al. [22]	Wolverian	2 and 2.5	Mid – distal LAD	N/A	N/A	Yes	Not mentioned
Kahata et al. [23]	Boston Scientific, Flextome	N/A	N/A	N/A	N/A	No	N/A
Mailey et al. [24]	Boston Scientific, Wolverian	2.5 and 3	Mid-distal Proximal LAD	N/A	N/A	CABG	Despite TIMI2 had cardiogenic shock
Ejima et al. [25]	Boston Scientific, Flextome	3x 10	Mid LAD	multiple	N/A	Yes	Transient improvement in the flow
Low et al. [26]	N/A	2,3,3.5	Proximal LAD	3	N/A	No	N/A
McConkey et al. [27]	Wolverine	2.5	LCX	N/A	N/A	Yes	No significant changes after ballooning

Mid, middle; LADA, left anterior descending artery; LCX, left circumflex; RCA, right coronary artery; N/A not available; TIMI, thrombolysis in myocardial infarction

Table 2: Case-specific procedure details

In 15 out of 16 patients, thrombolysis in myocardial infarction (TIMI) 3 flow was successfully achieved with isolated CB. In 1 case TIMI 2 was established after CB and no stenting was performed [13]. In 8 out of 25 cases (32%), stenting became necessary due to ongoing ischemia or impaired blood flow after CB. [7,9,13,15,17,19,22,25,27]. CABG was performed in just one case. Further hematoma expansion was reported in two cases [9,15].

The most frequent follow-up imaging was coronary angiography (CAG) performed in about 50% of patients. Computed tomography angiography (CTA) was performed in 6 cases within a span of 4 weeks to 36 months. In 2 cases, an echocardiogram was performed at the time of discharge and 6 weeks afterward. Among all cases subjected to follow-up, 36.8% had residual partial intimal tearing. However, 31.5% demonstrated complete healing over 36 months. Case-specific follow-up details are detailed in (Table 3).

Author	Time of follow-up	Imaging	Imaging finding
Besis et al. [6]	4 months	CAG	Well healed LADA,
Nelson et al.[7]	4 hours later and 6 months later	4 hours (LADA): CAG 6 months (RCA): CAG+OCT	Improved flow in LADA expanded and apposed stents In RCA
Bastante et al. [8]	6 months	CAG	Residual partial intimal tear
Yamamoto et al. [9]	6 months	CAG+OCT	Residual partial intimal tear
Bastante et al. [8]	6 months	CAG	Residual partial intimal tear

Zghouzi et al.[10]	4 weeks	CTA	Healing of coronary dissection
Matsuura et al. [11]	10 months	CTA	Healing of coronary artery dissection
Fujito et al. [12]	6,12, and 36 months	CTA	Dissection present up to 12 months, healed at 36 months
Bresson et al.[13]	NA	NA	NA
Kaya et al. [14]	3 days, 1 month And 1 year	CAG:3 days, CTA 1 month and 1 year	Healing of coronary artery dissection
Noguchi et al. [15]	6 months	CAG	Residual partial intimal tear
Main et al. [16]	6 weeks	Echocardiography	EF to 60%, No regional wall motion abnormality
Lee et al. [17]	None	None	None
Lee et al. [17]	None	None	None
Lee et al. [17]	Discharge	Echo	EF 25-30% with severe hypokinesis
Ito et al. [18]	3 months	CTA	Residual partial intimal tear
Alkhouli et al.[19]	NA	NA	NA
Yumoto et al. [20]	6 months	CAG+OCT	Residual partial intimal tear
Uemi et al. [21]	13 days	CAG	Residual partial intimal tearing
Macaya et al. [22]	7 days	CAG	Patent vessels with partially thrombosed false lumen
Kahata et al. [23]	4 months	CAG	Favorable vascular healing
Mailey et al. [24]	N/A	N/A	CABG
Ejima et al.[25]	N/A	N/A	N/A
Low et al. [26]	N/A	Coronary CTA	luminal irregularity of her LAD
McConkey et al. [27]	A few months	CAG with IVUS	Stent malposition

CAG, coronary angiography; OCT, optical coherence tomography; EF, ejection fraction; N/A, not available; CTA, computed tomography angiography; IVUS, intravascular ultrasound; LAD, Left anterior descending; CABG, coronary artery bypass graft

Table 3: Case-specific follow up details

Discussion

In our study, most patients were female and the median age was less than 60 years old, consistent with the findings of existing literature [22]. Six out of 25 patients had SCAD postpartum. Except for two patients who had HLP, none of the patients had typical cardiac risk factors including diabetes and hypertension. LAD was the most common culprit artery and middle segment involvement was reported more frequently [6,10, 12-14,19,20,22,24,25]. TIMI 3 blood flow was established in 93.3% of patients who underwent isolated CB. One case underwent CABG. Recurrence of SCAD was not reported in any of our patients. However, chest pain was reported in one of the cases a few months later.

Currently, available SCAD treatment guidelines advise medical therapy for stable patients. In a meta-analysis, there were no significant differences in all-cause mortality, heart failure, and myocardial infarction among patients in stable condition who were treated with conservative management compared to the patients treated with an intervention; furthermore, targeted vessel revascularization (TVR) was even lower in patients managed conservatively [29]. Revascularization is recommended, however, in unstable patients or with ongoing ischemia or left main artery involvement. Conventional PCI revascularization might be challenging in patients with SCAD due to the false lumen interaction and risk of stent displacement. The success rate of revascularization is notably lower compared to atherosclerotic lesions (47%) [30]. Moreover, given the length of dissection, longer stents might be needed which can be associated with an increased risk of stent thrombosis. One of the other complications of stenting in SCAD is hematoma propagation, which has been reported in 33% of patients [31]. However, in our study hematoma propagation was reported in 2 out of 25 cases after CB [9,15]. Although CB can potentially lead to hematoma expansion, it not only decompresses the false lumen and decreases the risk of

stent misplacement, as demonstrated in multiple case reports but can also restore TIMI 3 blood flow, resolve ST-segment elevation, alleviate chest pain, and prevent stenting.

The prognosis of SCAD is favourable and spontaneous healing of the vessel wall is anticipated [1]. The recurrence rate is approximately 10.4 % [1]. In our study, 31.5 % of patients who underwent follow-up had complete healing within 36 months after CB [6,10-12,14]. Residual partial intimal tearing after 6 months was reported in 36.8% of patients who had follow-up [8,9,15,20,21]. Since no documented follow-up was performed in these cases beyond 6 months, complete healing could have been documented with further follow-up. No recurrence of SCAD was reported throughout the study period.

Intravascular ultrasound or optical coherence tomography (OCT) was utilized in almost all cases for the SCAD diagnosis and determining an appropriate CB size. However, OCT might be associated with an increased risk of hematoma propagation due to the use of contrast [14]. Based on the published case reports, CB smaller than the size of the affected vessel and lower pressure (2 ATM to 4 ATM) is favored and might be associated with a lower risk of vessel perforation [12].

Limitations

There are some limitations in this study. As it is an emerging method, there are a few case reports about CB in SCAD patients. Documentation of the patient's risk factors, balloon type, vessel size, and number of insufflation was not complete in all of the studied cases. Since most of the patients did not have typical cardiac risk factors like diabetes which can affect the coronary artery wall, the use of CB in these patients may not have been appropriate. To our knowledge, no studies are comparing conservative management versus CB who do not meet the criteria for an intervention. Multiple imaging modalities with different sensitivities were used for follow-up. Patients' follow-ups were at different time frames. The selective use of free published case reports as funding for the acquisition of paid data was unavailable likely introducing bias to the reported trends. To have better insight into the efficacy and complications of CB in SCAD patients, further trials are required.

Conclusion

Our knowledge regarding CB usage in patients with SCAD is very limited. CB angioplasty appears to be a promising technique in the management of SCAD patients based on the published case reports. Our study demonstrated its potential to prevent stenting or optimize PCI outcomes. To solidify this observation and establish CB as a standard treatment for SCAD, large trials are essential.

Funding: The authors received no funding for the writing of this manuscript

Conflicts of interest: The authors declare no conflict of interest in preparing this article

Consent statement: As this is a literature review, informed consent was not obtained

References

1. Matta A, Levai L, Elbaz M, Nader V, Parada FC, et al. (2023) "Spontaneous Coronary Artery Dissection: A Review of Epidemiology, Pathophysiology and Principles of Management." Current Problems in Cardiology, 48: 101682.
2. Saw J, Starovoytov A, Humphries K,Sheth T, So D, et al. (2019) "Canadian spontaneous coronary artery dissection cohort study: in-hospital and 30-day outcomes." European Heart Journal, 40: 1188-1197.
3. Kenny V, Chua F, Ghashghaei R (2023) "Pregnancy-related spontaneous coronary artery dissection: a rare cause of acute coronary syndrome in the third trimester." BMC Cardiovascular Disorders, 23: 292.
4. Hayes SN, Kim ESH, Saw J, Adlam D, Arslanian-Engoren C, et al. (2018) "Spontaneous coronary artery dissection: current state of the science: a scientific statement from the American Heart Association." Circulation, 137: e523-e557.
5. Poursdarolah S, Seliman M, Ghazaleh JA, Poursadrolah S, Rubin A (2023) "Spontaneous Coronary Artery Dissection: A Challenging Diagnosis." Cureus 15.
6. Besis G, De Biase C, Subkovas E, Rakhit R (2023) "Balloon assisted hematoma fenestration in spontaneous coronary artery dissection. Case presentation and literature review." Catheterization and Cardiovascular Interventions, 102: 241-246.
7. David CN, Elbarouni B, Shah AH (2023) Multi-vessel spontaneous coronary artery dissections. Coronary Artery Disease, 34: 374-375.
8. Bastante T, Rivero F, Cuesta J, Del Val D, Roquero P, et al. (2022) "Treatment of spontaneous coronary artery dissection with fenestration: clinical and angiographic follow-up." Revista espanola de cardiologia (English ed.) 75: 177-179.
9. Yamamoto T, Takaya T, Ishii T, Ishida A (2023) "ST-segment elevation myocardial infarction originating from the preceding spontaneous coronary artery dissection: a case report." Cardiovascular Intervention and Therapeutics 38: 127-129.
10. Zghouzi M, Pacha HM, Sattar Y, Alraies MC (2021) "Successful Treatment of Spontaneous Coronary Artery Dissection With Cutting Balloon Angioplasty." Cureus 13: e13706.
11. Matsuura S, Otowa K, Maruyama M, Usuda K (2021) "Successful revascularization with percutaneous coronary intervention using a combination of the subintimal transcatheter withdrawal technique and coronary artery fenestration for spontaneous coronary artery dissection." Clinical Case Reports 9: e05045.
12. Fujita H, Yokoi M, Ito T, Nakayama T, Shintani Y, et al. (2021) Unusual interventional treatment of spontaneous coronary artery dissection without stent implantation: a case series. Eur Heart J Case Rep. 5: ytab306.
13. Bresson D, Calcaianu M, Lawson B, Jacquemin L (2019) "Coronary artery fenestration as rescue management of intramural hematoma with luminal compression." Catheterization and Cardiovascular Interventions, 94: E17-E19.
14. Kaya E, Iwata H, Miyazaki S, Mattson PC,Takamura K, et al. (2019) "Successful coronary flow restoration by stent-free strategy using the pull-back method of cutting balloon in spontaneous coronary artery dissection." CJC open, 1: 213-215.
15. Noguchi M, Obunai K, Fukui Y, Okumura H, Watanabe H (2018) "Usefulness of cutting balloon angioplasty before stenting with intravascular ultrasound imaging guidance for spontaneous multi-vessel coronary artery dissection including the left main coronary artery." Internal Medicine 57: 1867-1871.

16. Anthony M, Lombardi WL, Saw J (2019) "Cutting balloon angioplasty for treatment of spontaneous coronary artery dissection: case report, literature review, and recommended technical approaches." Cardiovascular Diagnosis and Therapy 9: 50-54.

17. Regina L, Ben-Dor I (2017) "Revascularization methods in spontaneous coronary artery dissection: a focused review." Cardiovascular Revascularization Medicine 18: 544-548.

18. Ito T, Shintani Y,Ichihashi T, Fujita H, Ohte N (2017) "Non-atherosclerotic spontaneous coronary artery dissection revascularized by intravascular ultrasonography-guided fenestration with cutting balloon angioplasty." Cardiovascular intervention and therapeutics 32: 241-243.

19. Mohamad A, Cole M, Ling FS (2016) "Coronary artery fenestration prior to stenting in spontaneous coronary artery dissection." Catheterization and Cardiovascular Interventions 88: E23-E27.

20. Yumoto K, Sasaki H, Aoki H, Kato K (2014) "Successful treatment of spontaneous coronary artery dissection with cutting balloon angioplasty as evaluated with optical coherence tomography." JACC: Cardiovascular Interventions 7: 817-819.

21. Uema A, Araki M, Sonoda S, Shimizu A, Kashiyama Ket al. (2013) "Successful coronary intervention for spontaneous coronary dissection in a patient with fibromuscular dysplasia." Journal of Cardiology Cases 8: 158-160.

22. Macaya F, Yeoh J, Kanyal R, MacCarthy P, Byrne J (2021) Haematoma decompression for a postpartum extensive left main spontaneous dissection. Coronary Artery Disease, 32: 352–353.

23. Kahata M, Otsuka M, Kataoka S, Yazaki K, Kumagai A, et al. (2017) Successful angioplasty with intravascular ultrasound and optical frequency domain imaging guidance for tandem intramural hematoma caused by coronary artery spasm. Journal of Cardiology Cases, 16: 199–201.

24. Mailey JA, Thompson P, Johnston PW, Owens CG (2022) A Complex Case of Pregnancy-related Left Main Stem Spontaneous Coronary Artery Dissection. Interv Cardiol. 13:17:e09.

25. Ejima E, Murasato Y (2015) TCTAP C-140 Acute Coronary Syndrome Caused by Spontaneous Coronary Artery Dissection in a 32-Year-Old Pregnant Woman. Journal of the American College of Cardiology, 65: S320–S321.

26. Low T, Houdmont M, Sim HW, Chan HK, Loh PH, et al. (2020) Spontaneous coronary artery dissection: clinical implications and diagnostic challenges. Overlooked and underappreciated in Asia? Clinical Cardiology, 43:1240–1247.

27. McConkey HZR, de Maria GL. (2023) Juxtaposition of urgent angioplasty results in spontaneous coronary artery dissection: a case report of fresh vs. organized intramural hematoma. European Heart Journal - Case Reports, 7.

28. Candreva A, Rizzini ML, Schweiger V, Gallo D, Montone RA, et al. (2023) "Is spontaneous coronary artery dissection (SCAD) related to local anatomy and hemodynamics? An exploratory study." International Journal of Cardiology 386: 1-7.

29. Tweet MS, Eleid MF, Best PJM, Lennon RJ, Lerman A, et al. "Spontaneous coronary artery dissection: revascularization versus conservative therapy." Circulation: Cardiovascular Interventions 7:777-786.

30. Cathevine Y, Offen S, Saw J (2023) "What is New in Spontaneous Coronary Artery Dissection?." CJC Open.

31. David S, Shah V, Singh R, Antony R, Jain S, et al. (2023) "A Problem In The Main Street: Spontaneous Coronary Artery Dissection In The Left Main." Chest 164: A682-A683.