

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Spontaneous coronary dissection: A rare etiology of acute coronary syndrome [☆]

Zakaria el Marraki^{a,*}, Karim Mounaouir^b, Pierre Marcolet^a, Nassim Halet^a, Valerian Didot^a, Thierry Dechery^a

^aDepartment of Cardiac Intensive Care, Faculty of Medicine and Pharmacy, Tours, France

^bDepartment of Cardiac Intensive Care, Faculty of Medicine and Pharmacy, Casablanca, Morocco

ARTICLE INFO

Article history:

Received 9 December 2023

Revised 24 December 2023

Accepted 26 December 2023

Keywords:

Spontaneous coronary dissection
Acute coronary syndrome, Case report

ABSTRACT

Spontaneous coronary artery dissection is a rare etiology of acute coronary syndrome and falls into the category of myocardial infarction with no obstructive coronary arteries. It occurs mainly in young women with no cardiovascular risk factors. Diagnosis is often made by coronary angiography and sometimes by endocoronary imaging. The association of coronary dissection and ACS is rare, especially in men. The management is poorly codified and depends mainly on the habits of the practitioner, and may be medical, percutaneous or surgical. The outcome is often favorable, but sometimes there is a risk of recurrence with a guarded prognosis.

In this context, we report the case of a 43-year-old patient with antecedent spontaneous coronary dissection, admitted to our unit for the management of acute coronary syndrome following recurrent coronary dissection.

© 2023 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

Spontaneous coronary dissection (SCAD) is defined as a spontaneous, nontraumatic, noniatrogenic, and nonatherosclerotic separation of the artery wall due to an intramural hemorrhage, which may be triggered by intimal tearing or due to spontaneous hemorrhage [1].

The true prevalence of the condition is unknown as it is an underdiagnosed entity. According to recent publications, SCAD is diagnosed via coronary angiography in 0.1%–4% of all ACS. It predominantly affects women, who represent around 81%–92% of patients [1]. It is the cause of ACS in 0.1%–4% of cases [2].

Coronary dissection in men is rare, occurring in only 8% of cases. In this context, we report the case of a 43-year-old pa-

[☆] Competing Interests: The authors declare no conflict of interest.

* Corresponding author.

E-mail address: zakariaelmarraki@gmail.com (Z.e. Marraki).

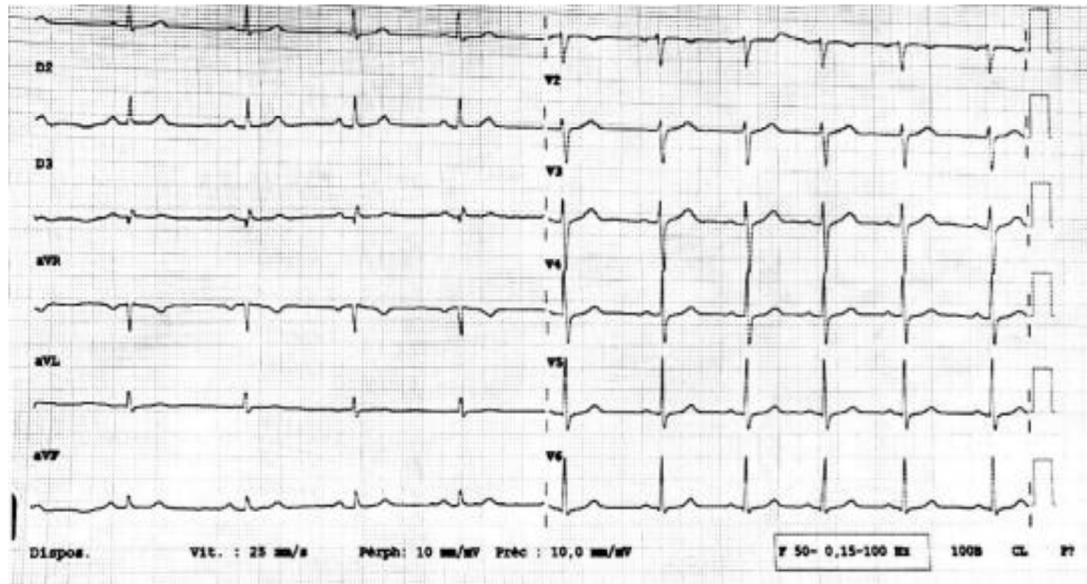


Fig. 1 – Coronary angiography showing type B dissection of the distal anterior interventricular retrovascular artery.



Fig. 2 – Resting sinus ECG at 72 beats/min with no repolarization disorder.

coronary artery dissection diagnosed by coronary angiography.

Our case report was written according to CARE guideline [3].

Case presentation

A 43-year-old patient was admitted to the emergency department of our hospital for the management of prolonged acute infractoid chest pain dating back to the day of his admission on examination, the patient had no cardiovascular risk factors; his antecedents included a spontaneous distal anterior interventricular artery dissection in 2020 (Fig. 1) which had been treated medically. It should be noted that the patient had never undergone surgery, and there were no similar cases in the family. The patient was conscious, of normal weight and height with a BMI of 25 kg/m². His heart rate on admission was 72 beats/min, hemodynamically stable with a heart pressure that was 140/90 symmetrical to both limbs. He was eupneic with respiratory rate of 18 breaths/min and O₂ saturation of 99% on room air. There was no sign of right or left heart failure, the complementary physical examination normal. The electrocardiogram showed a regular sinus rhythm with a HR of 63beats per minute, a constant PR of 182 ms and a fine QRS of 103 ms, without repolarization disorders (Fig. 2). The differential diagnoses included all the etiologies of acute chest pain: acute coronary syndrome, pulmonary embolism, aortic dissection, pneumothorax, acute pericarditis.

The transthoracic echocardiography (TTE) showed a nondilated LV with nonhypertrophied walls and a good radial Left ventricular ejection fraction (LVEF) of 60% . The biological assessment showed a high ultra-sensitive troponin 82 ng/L (5 times higher than normal); C-reactive protein at 1 mg/L (normal between 0.00 and 5.00 mg/L), his renal function was correct.

tient with no cardiovascular risk factors. He had spontaneous coronary artery dissection in 2020, and was admitted to our clinic for acute coronary syndrome associated with recurrent

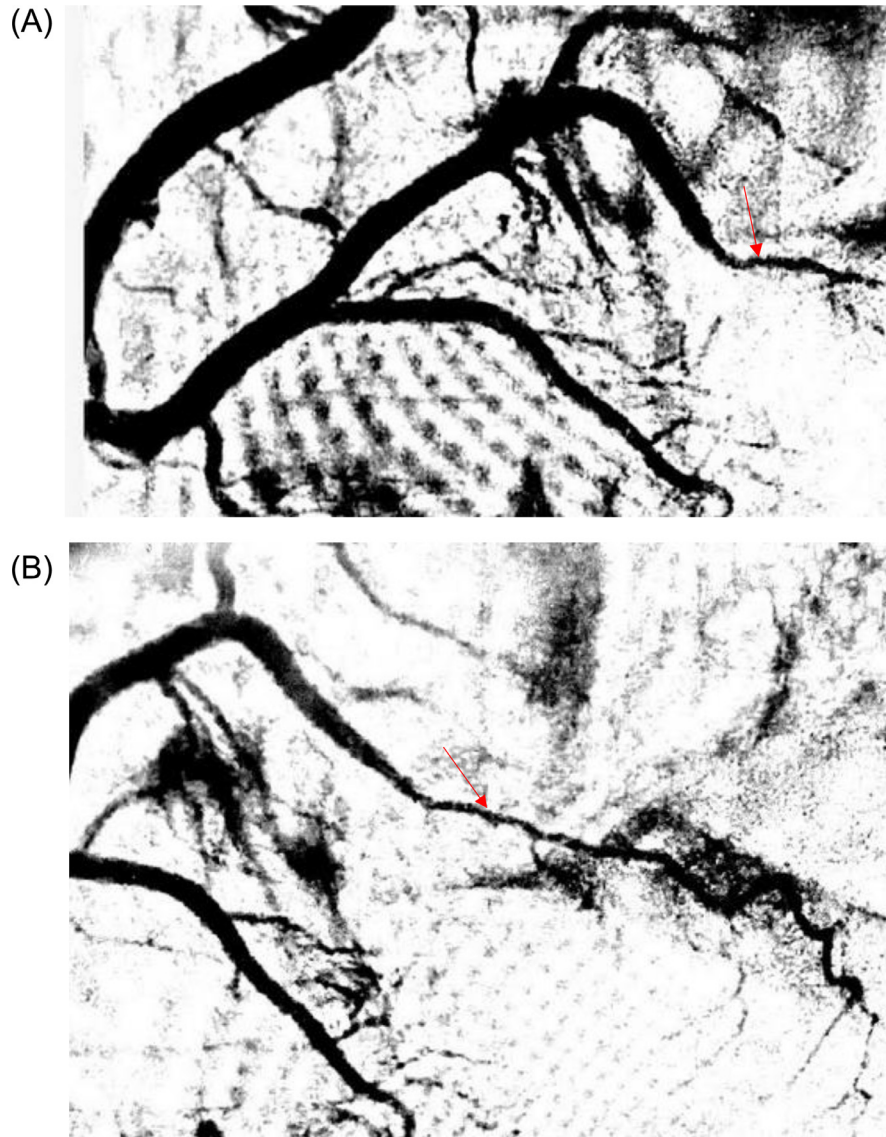


Fig. 3 – (A and B) Coronary angiography showing type B dissection of the posterior retroventricular artery.

It was decided to perform an emergency coronary angiography on the basis of the clinical, electrical, and biological data that came back in favor of spontaneous dissection of the posterior retroventricular artery (Figs. 3A and B). The decision was to treat medically and not to place a stent. The patient was then transferred to intensive care cardiology, where he was monitored for 8 days, he had no recurrence of angina or rhythm disorders during his hospitalization. He was subsequently discharged with a consultation appointment in 1 month.

Discussion

SCAD is characterized by the spontaneous formation of intramural hematoma (IMH) within the wall of a coronary artery (Fig. 4). This has been confirmed by both intracoronary imaging [4,5] and histopathological case reports and series [6,7].

More recent publications confirm historical reports [8–10] that describe the separation occurring in the outer third of the tunica media and intramural hematoma occupying the dissection and compressing the true lumen, leading to coronary insufficiency and myocardial infarction MI [11,12].

Two theories of how SCAD develops have been described [13]. The first theory proposes that the first stage of spontaneous dissection corresponds to an intimal tear that allows blood from the true lumen to penetrate and generate a false lumen. The second theory proposes that the first stage is spontaneous hemorrhage, which in turn is caused by vasa vasorum inside the vascular wall [14]. Several risk factors for coronary dissection have been identified, such as fibromuscular dysplasia in 3.4% of cases, pregnancy, physical, or mental stress, and finally Coronary artery tortuosity on angiography was found to have a strong association with SCAD [15]. The Denmark Heart Registry reports that the incidence of spontaneous coronary dissection is 2/1000. In a prospective evaluation, 2.9% of those with acute infarction, 0.3% of those with

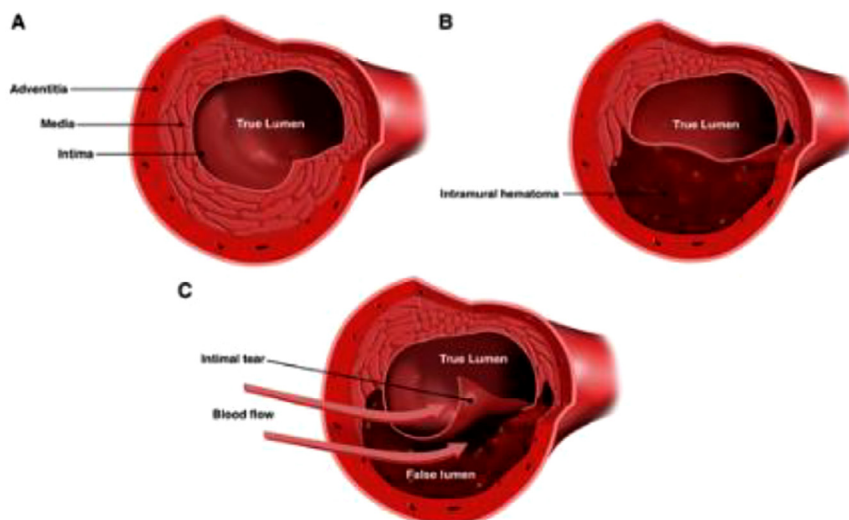


Fig. 4 – Cross-sectional views of the coronary artery. (A) Normal coronary artery. (B) Coronary artery with intramural hematoma and (C) Coronary artery with intimal tear.

stable angina, and 4.2% of those with postinfarction angina developed SCAD. Another contemporary case series showed that the prevalence of SCAD was in the order of 22% to 35% in young women under 50, with the greatest proportion of morbidity concentrated in middle-aged women [15].

The diagnosis of spontaneous coronary artery dissection (SCAD) can go unnoticed, as the population concerned is usually young and without cardiovascular risk factors, so they are treated symptomatically and then discharged home without further investigation. It is vital to accurately diagnose SCAD in the early stages of ACS presentation, as its management differs from that of atherosclerotic forms of coronary artery disease. The suspicion for SCAD is typically instigated by clinical presenting features such as patient demographics, especially young age, female sex, and few or no conventional cardiovascular risk factors. coronary angiography should be performed as soon as spontaneous coronary dissection is suspected, especially in the case of ST-segment elevation myocardial infarction. The main limiting factor is that angiography is a 2-dimensional "lumenography" and does not provide a precise image of the arterial wall. Intravascular ultrasound and optical coherence tomography are more effective techniques than coronary angiography, as they allow detailed visualization of the arterial wall, making it easier to diagnose SCAD [16]. An algorithm for the angiographic diagnosis of SCAD is presented in Fig. 5.

In a study of 131 SCAD lesions, spontaneous healing occurred in 88.5%. In cases where repeat angiography was performed early (<35 days after the index event), there were residual dissections. However, repeat angiography after 35 days showed angiographic healing in all cases. This study confirms the favorable prognosis in coronary dissection, with complete healing in all cases [16].

The initial management of SCAD must be similar to that of coronary artery disease without dissection. In cases where the patient is stable and if the dissection concerns a single vessel which vascularizes a small myocardial territory, the evolution

is generally favorable and this type of patient can be treated medically.

As there is no specific medical regimen, aspirin, clopidogrel, heparin, betablockers, and ACE inhibitors can be used [17]. It should be noted that antiplatelet agents and heparin help reduce the formation of thrombus at the level of the false channel and promote normal flow through the true channel; on the other hand, glycoprotein IIB-IIIa inhibitors are contraindicated [17]. The outcome of thrombolysis is controversial because it can cause expansion of the dissected area and compression of the true lumen. When medical treatment is inappropriate, percutaneous transluminal coronary angioplasty or coronary artery bypass grafting may be considered [17]. Stent angioplasty provides good results, especially in single-vessel pathologies involving short segments. However, there is a risk of stent implantation in the false lumen. this can be avoided by using endocoronary imaging to guide stenting. Coronary artery bypass grafting is generally indicated in patients with dissection of the left main coronary artery or if the coronary dissection involves several vessels and also in cases of hemodynamic instability and if medical treatment or coronary angioplasty has failed [17].

A proposed algorithm to guide conservative versus invasive management is outlined in Fig. 6.

Recurrence of coronary dissection is a factor in poor prognosis and mortality. In a study of 327 patients in Canada, 100% had early survival to hospital discharge. After a follow-up of 3.1 years, coronary dissection recurrence developed in 10.4% of these patients. Multivariate analysis showed that hypertension was associated with a higher risk of recurrent SCAD, with a hazard ratio of 2.46 and a highly significant P value of .011. Treatment with β -blockers reduced the risk of recurrence by two-thirds, with a hazard ratio of 0.39 ($P = .004$). It should be noted that the absence of early treatment and female gender were the most important predictors of unfavorable clinical outcome [15].

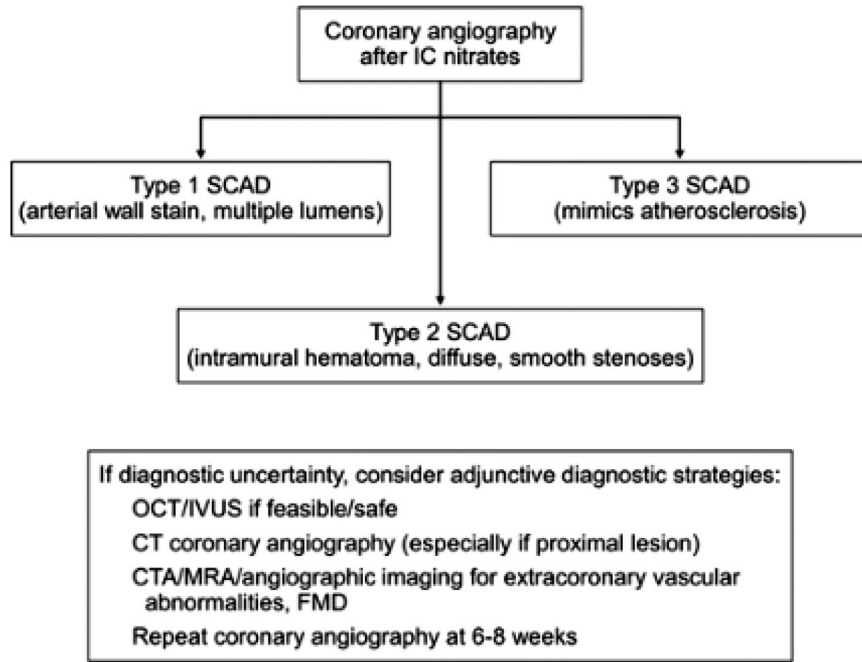


Fig. 5 – Algorithm for diagnosis of spontaneous coronary artery dissection (SCAD) in the setting of acute coronary syndrome. CT indicates computed tomography; CTA, computed tomography angiography; FMD, fibromuscular dysplasia; IC, intracoronary; IVUS, intravascular ultrasonography; MRA, magnetic resonance angiography; and OCT, optical coherence tomography [16].

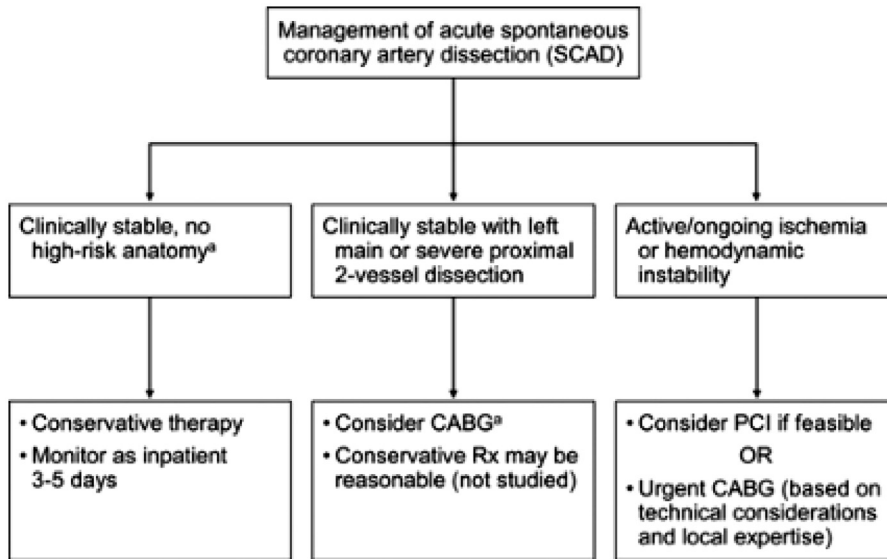


Fig. 6 – Algorithm for management of acute spontaneous coronary artery dissection. CABG, coronary artery bypass grafting; PCI, percutaneous coronary intervention; Rx, management. ^aLeft main or proximal 2-vessel coronary artery dissection [16].

Conclusion

Spontaneous coronary dissection is a rare and little-known etiology of ACS.

Positive diagnosis is often made by coronary angiography and sometimes requires endovascular imaging.

Management may be conservative, percutaneous or surgical, depending on the habits of the practitioner and the center.

Patient consent

Written informed consent was obtained from the patient for publication of this case report. CARE guidelines were applied for reporting this case report' finding.

REFERENCES

- [1] Saw J, Aymong E, John Mancini GB, Tara S, Andrew S, Donald R. Nonatherosclerotic coronary artery disease in young women. *Can J Cardiol* 2014;30(7):814–19. doi:10.1016/j.cjca.2014.01.011.
- [2] Hassan S, Prakash R, Starovoytov A, Saw J. Natural history of spontaneous coronary artery dissection with spontaneous angiographic healing. *JACC Cardiovasc Interv* 2019;12:518–27. doi:10.1016/j.jcin.2018.12.011.
- [3] Riley DS, Barber MS, Kienle GS, Jeffrey KA, Tido Von SA, Peter T. CARE guidelines for case reports: explanation and elaboration document. *J Clin Epidemiol* 2017;89:218–35. doi:10.1016/j.jclinepi.2017.04.026.
- [4] Arnold JR, West NE, van Gaal WJ, Theodoros DK, Adrian PB. The role of intravascular ultrasound in the management of spontaneous coronary artery dissection. *Cardiovasc Ultrasound* 2008;6:24. doi:10.1186/1476-7120-6-24.
- [5] Paulo M, Sandoval J, Lennie V, Dutary J, Medina M, Gonzalo N, et al. Combined use of OCT and IVUS in spontaneous coronary artery dissection. *JACC Cardiovasc Imaging* 2013;6:830–2. doi:10.1016/j.jcmg.2013.02.010.
- [6] De Giorgio F, Abbate A, Vetrugno G, Capelli A, Arena V. Non-atherosclerotic coronary pathology causing sudden death. *J Clin Pathol* 2007;60:94–7. doi:10.1136/jcp.2005.035360.
- [7] Melez IE, Arslan MN, Melez DO, Arzu A, Yalcin B, Abdullah A. Spontaneous coronary artery dissection: report of 3 cases and literature review hormonal, autoimmune, morphological factors. *Am J Forensic Med Pathol* 2015;36:188–92. doi:10.1097/PAF.000000000000167.
- [8] Robinowitz M, Virmani R, McAllister HA. Spontaneous coronary artery dissection and eosinophilic inflammation: a cause and effect relationship? *Am J Med* 1982;72:923–8. doi:10.1016/0002-9343(82)90853-1.
- [9] Basso C, Morgagni GL, Thiene G. Spontaneous coronary artery dissection: a neglected cause of acute myocardial ischaemia and sudden death. *Heart* 1996;75:451–4. doi:10.1136/hrt.75.5.451.
- [10] Lepper PM, Koenig W, Möller P, Perner S. A case of sudden cardiac death due to isolated eosinophilic coronary arteritis. *Chest* 2005;128:1047–50. doi:10.1378/chest.128.2.1047.
- [11] Hill SF, Sheppard MN. Non-atherosclerotic coronary artery disease associated with sudden cardiac death. *Heart* 2010;96:1119–25. doi:10.1136/hrt.2009.185157.
- [12] Desai S, Sheppard MN. Sudden cardiac death: look closely at the coronaries for spontaneous dissection which can be missed: a study of 9 cases. *Am J Forensic Med Pathol* 2012;33(1):26–9. doi:10.1097/paf.0b013e3181e29598.
- [13] Saw J, Mancini GB, Humphries K, Anthony F, Robert B, Andrew S. Angiographic appearance of spontaneous coronary artery dissection with intramural hematoma proven on intracoronary imaging. *Catheter Cardiovasc Interv* 2016;87:E54–61. doi:10.1002/ccd.26022.
- [14] Kwon TG, Gulati R, Matsuzawa Y, Aoki T, Guddeti RR, Herrmann J, et al. Proliferation of coronary adventitial vasa vasorum in patients with spontaneous coronary artery dissection. *JACC Cardiovasc Imaging* 2016;9:891–2. doi:10.1016/j.jcmg.2015.11.030.
- [15] Ghani AR, Inayat F, Ali NS, Anjum R, Viray M, Hashmi AT, et al. Spontaneous coronary artery dissection: a case series of 9 patients with literature review. *J Invest Med High Impact Case Rep* 2018;6:2324709618770479. doi:10.1177/2324709618770479.
- [16] Hayes SN, Kim ESH, Saw J, David A, Cynthia A-E, Katherine E-E. Spontaneous coronary artery dissection: current state of the science: a scientific statement From the American Heart Association. *Circulation* 2018;137:e523–57. doi:10.1161/CIR.0000000000000564.
- [17] D'Ovidio C, Sablone S, Carnevale A. Spontaneous coronary artery dissection: case report and literature review. *J Forensic Sci* 2015;60(3):801–6. doi:10.1111/1556-4029.12722.