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ISSN: 2637-885X

Journal of Radiology and Medical Imaging

Open Access | Case report

The Role of Coronary Computed Tomography Angiography in the Diagnosis of Spontaneous Coronary Artery Dissection: A Case Report

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Received: Jun 03, 2020

Accepted: Jul 15, 2020

Published Online: Jul 21, 2020

Journal: Journal of Radiology and Medical Imaging

Publisher: MedDocs Publishers LLC

Online edition: http://meddocsonline.org/

Abstract

Spontaneous Coronary Artery Dissection (SCAD) is a rare acute coronary artery disease that mostly occurs in young women. The current algorithms applied for the diagnosis and follow up of suspected cases of SCAD does not include the utility of Coronary computed Tomography Angiogram (CCTA). It currently depends on invasive procedures such as the conventional Coronary Angiogram (CAG). In this article, we are presenting 2 cases in which CCTA contributed significantly in both the diagnosis and the follow up of the disease. We demonstrate that the new emerging imaging modality could contribute to improve the flow of this cohort of patients in treatment pathway. It also provides a wider option for the diagnosis and follow-up.

Keywords: Acute coronary artery disease; Computed tomography; Coronary angiogram; Diagnosis.

Introduction

Spontaneous Coronary Artery Dissection (SCAD) is a rare acute coronary artery disease that mostly occurs in young women [1]. The usual presentation is with acute chest pain with clinical findings of acute coronary syndrome. The current utilized pathways in the diagnosis of this disease involve invasive procedures such as Conventional Coronary Artery Angiogram (CAG).

There have been few studies looking at the utility of Coronary Computed Tomography Angiogram (CCTA) in the diagnosis as well as the follow up of these patients [2]. The fast-emerging evolution of CCTA in the diagnosis of multiple cardiovascular diseases is now widely accepted and incorporated in the treatment algorithms of different cardiac patients. The role of CCTA in the early evaluation of patients presenting to the emergency with chest pain had been studied extensively [2].

We are presenting two young female patients who presented with acute chest pain and were diagnosed to have SCAD and how CCTA was incorporated in the management of these patients.

Cite this article: Al Kindi F. The Role of Coronary Computed Tomography Angiography in the Diagnosis of Spontaneous Coronary Artery Dissection: A Case Report. J Radiol Med Imaging. 2020: 3(1); 1031.

Case Report

Patient one

A 34-year-old women, 2 weeks post-partum spontaneous normal delivery. Presented with vague heavy chest pain, not related to exertion and was not associated with orthopnea or paroxysmal nocturnal dyspnea. On physical examination; she was in pain and had normal vital signs. She had no raised JVP or lower limb edema. Her chest auscultation was clear with normal S1 and S2. The laboratory tests showed a high Troponin level of 1000 pg/ml. Echocardiography showed mildly dilated left ventricle with moderately impaired systolic function. Ejection fraction was 40% with global hypokinesia and grade II diastolic dysfunction. She was suspected to have SCAD versus Aortic dissection. Coronary and Aortic CTA was requested by the treating cardiologist.

CCTA showed a dissection flap at the origin of the Left Anterior Ascending (LAD) artery extending to the distal part. In the proximal LAD, both the false and true lumen appeared to be patent, however in the middle LAD there was complete thrombosis for a distance of 3.5 cm. The distal part of the LAD after the thrombosis demonstrated irregular lumen. The dissection appeared to also extend to the large first diagonal artery (D1) (Figure 1 A & B).

The patient remained stable with down trending of the troponin levels and resolution of the chest pain. She was managed conservatively and no intervention was done. She was eventually discharged with a followup appointment after 2 months. Her follow up CCTA showed re-cannulation of the middle LAD lumen with development of mild aneurysmal dilatation of the LAD (Figure 1C).

She then presented again at 6 months with acute chest pain. Her follow up CCTA showed progression of the aneurysmal dilatation of the proximal and part of the middle segments of the dissected LAD with poor filling of parts of the middle and the distal segments (Figure 1D).

The patient underwent CAG that showed the LAD was dissected from the ostium with narrow true lumen. A large aneurysm of the ostioproximal segment particularly involving the false lumen was also confirmed. There was faint antegrade filling of true lumen and good retrograde filling of the middle and distal segments from the Right Coronary Artery (RCA) (Figure 2).

She underwent coronary artery bypass surgery with left internal mammary artery (LIMA) to distal LAD graft and reversed saphenous venous graft (SVG) to D. A longitudinal proximal and mid LAD pseudoaneurysm plication was also performed.

The patient is currently doing well. At a follow-up CCTA, the LIMA-LAD graft was patent with good opacification of the distal LAD. There were traces of contrast noted within the true lumen from the proximal LAD to the middle part just before the graft anastomosis. The false lumen was not opacified (Figure 3).

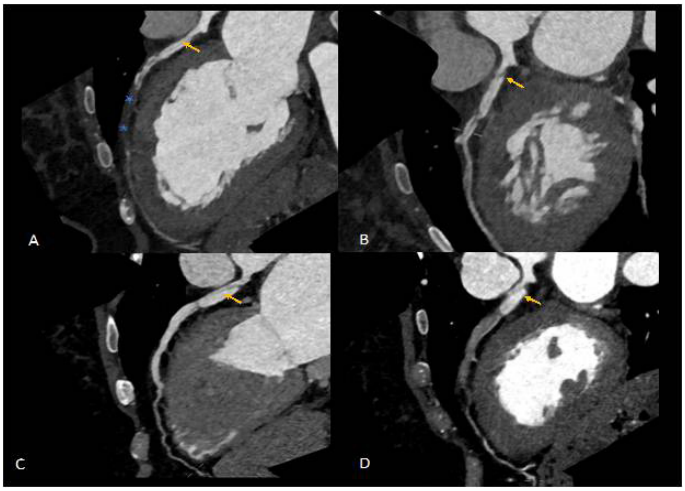

Figure 1: Images from multiple CCTA and CAG of the first patient. **(A)** Curved Multiplanar reformation (MBR) of the LAD showing the dissection flap coursing from the ostium to middle part (orange arrow), the thrombosed middle LAD is marked by the blue stars. **(B)** MBR images of the first diagonal artery showing the extension of the dissecting flap. **(C)** MBR images of LAD from the follow up CCTA showing recannulation of the Middle LAD with persistent flap (orange arrow). **(D)** MBR images from the third visit showing aneurysmal dilatation of the proximal LAD and poor filling of the middle part.

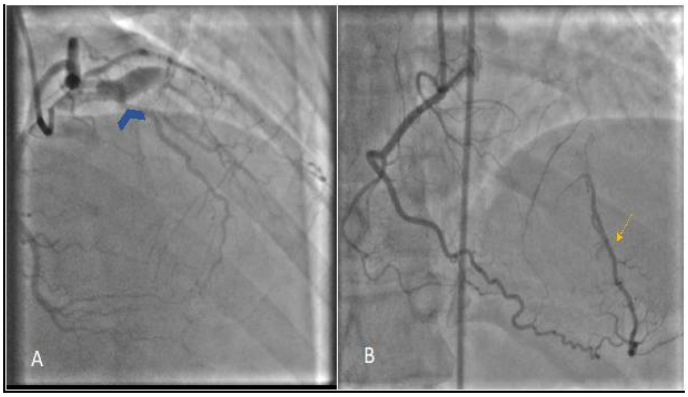

Figure 2: Images from the CAG demonstrating the large proximal aneurysm at LAD (blue arrow head) with absence of filling of the middle LAD and filling of the distal LAD via collaterals from the RCA (orange arrow).

Figure 3: Volume rendered images **(A)** and MBR images **(B)** of the bypass grafted coronary demonstrating intact LAD-LIMA graft (blue arrow heads) and poor filling of the proximal and middle LAD (green arrow).

Patient two

A 33-year-old women, with no known comorbidities, mother of 5 children was 3 months post-partum. She presented to the emergency department with severe, recurrent, central chest pain not associated with orthopnea or PND. On examination, she was in distress with shortness of breath, buther vitals remained normal. Heart sounds were normal S1 and S2 with no added sound. The ECG showed T-wave inversion in leads I, aVL, V2-V6 and Q-wavesin leads V1-V3. She was diagnosed to have anterior acute myocardial infarction and was taken for CAG.

The CAG showed SCAD of the LAD from ostium to the distal part. Other vessels were normal (Figure 2 C & D).

With conservative medical management, the patient became asymptomatic through the course of admission. At discharge, she was stable with no chest pain or shortness of breath.

At 3 months follow up, CCTA was requested. It showed diffuse mild narrowing of the lumen of the LAD ostium with features of thrombosed false lumen. There was an abrupt appearance of a dissection flap with opacification of both the true and the false lumen at the proximal and middle segments of the LAD (Figure 2 A & B). The findings of the follow up CCTA correlated with initial CAG and were not showing any signs of progression or complication. It was thus decided to continue conservative treatment with regular followup.

Figure 4: Selected images for the second patient. **(A & B)** Curved and Straitened MBR images showing the dissected LAD (dotted white arrow) starting from the proximal to the distal part. **(C & D)** Images from CAG showing diffuse luminal narrowing of the proximal to distal LAD with features of coronary artery dissection.

Discussion

Spontaneous coronary artery dissection is rare but recognized cause of acute chest syndrome. It particularly affects young females with no previous known risk for cardiovascular diseases [1]. Tokura M et al reported that 0.86% of patients who underwent CAG were diagnosed to have SCAD of which 90% were female. In the majority of cases of young females, the occurrence of SCAD was associated to the peripartum period [3]. Tweet et al described a higher frequency of SCAD in the first month post-partum. He also found that hormonal and hemodynamic physiological changes during pregnancy, are associated with the development of SCAD [4].

Conventional Coronary Angiography (CAG) is currently considered to be the gold standard for the imaging of patients suspected to have SCAD. In his study, Tweet et al divided the findings into 3 types; diffuse stenosis in 67% of the patients, multiple lumens due to contrast staining into a false lumen in 29% and an appearance mimicking atherosclerosis in 4% of the patients. They were labelled type 1,2 and 3 respectively. The findings on CAG could sometimes be misleading. In addition, due to the invasive natures of the test, the utility of CAG in follow up of these patients has not been recommended [5,6].

Other invasive imaging modalities such as intravascular ultrasound and Optical Coherence Tomography (OCT) requires expertise and the availability of the technique. In addition, and is particularly with OCT, there is a theoretical risk of worsening the dissection with the intravascular hydraulic contrast injection [5].

CCTA has a promising and evolving role. The CCTA has evolved significantly since its introduction for more than a decade ago. Recently, the SCOT-HEART multicenter study showed that in the group of patients suspected to have angina due to CAD, CCTA helped clarify the diagnosis and lead to major changes in investigations and treatments. There is a suggestion that this finding is associated with apparent improvements in fatal and non-fatal coronary events, but this needs to be confirmed by further long-term follow-up [2]. The continuously developing technology of cardiac CT is aiding in the wider utility of the modality in the diagnostic workup of cardiac diseases

CCTA is currently being used as a first modality in the imaging of certain patient population presenting with acute chest pain in the emergency department. Currently, the triple rule out Cardiac computed tomography protocol is used widely be the emergency departments for the distinction between coronary artery occlusion versus aortic dissection versus acute pulmonary embolism. It is widely accepted and included in the diagnostic pathways of acute chest pain [7].

In the presented cases, the first woman, presented with acute chest pain that was concerning for coronary artery dissection. CCTA clearly demonstrated the dissection flap and the origin and extension of the dissection. The distinction between the true and false lumens was also demonstrated with clear details. The data provided by the CCTA was sufficient enough for the diagnosis and contributed to the overall management decision. The limitations caused by coronary artery calcifications and the motion artefacts that Tweet et al mentioned in his article are not applicable in our case as the two patients are young and the high resolution of the new generation cardiac CT-scan helped in alleviating these limitations [5]. CCTA also proved valuable at the post-operative phase where the grafts and native vessels were evaluated. For the second patient, the CCTA contributed in the management with imaging at follow up of the coronary dissection at a routine visit.

In both the first and the second cases, it was clear that the CCTA had provided a safer and quick approach for followin SCAD patients.

Conclusion

CCTA is a valuable diagnostic modality for the diagnosis and the follow-up of patients with SCAD. It should readily be available in centers of excellence and its use will help in the diagnosis and management of acute coronary syndrome in scenarios similar to what we have demonstrated in this report.

References

1. Nishiguchi T, Tanaka A, Ozaki Y, Taruya A, Fukuda S, et al. Prevalence of spontaneous coronary artery dissection in patients with acute coronary syndrome. Eur Hear J Acute Cardiovasc Care. 2016; 5: 263-270.
2. SCOT-HEART investigators. CT coronary angiography in patients with suspected angina due to coronary heart disease (SCOT-HEART): an open-label, parallel-group, multicenter trial. Lancet. 2015; 6736: 60291-60294.
3. Tokura M, Taguchi I, Kageyama M, Nasuno T, Nishiyama Y, et al.Clinical features of spontaneous coronary artery dissection. Journal of Cardiology. 2014; 63: 119-122.
4. Tweet MS, Hayes SN, Codsi E, Gulati R, Rose CH, et al. Spontaneous Coronary Artery Dissection Associated with Pregnancy. J Am Coll Cardiol. 2017; 70: 426-435.
5. Tweet MS, Gulati R, Williamson EE, Vrtiska TJ, Hayes SN. Multimodality Imaging for Spontaneous Coronary Artery Dissection in Women. JACC. Cardiovascular Imaging. 2016; 9: 436-450.
6. Vijayaraghavan R, Verma S, Gupta N, Saw J. Pregnancy-related spontaneous coronary artery dissection. Circulation. 2014; 130: 1915-1920.
7. Wnorowski AM, Halpern EJ.Diagnostic Yield of Triple-Rule-Out CT in an Emergency Setting. American Journal of Roentgenology 2016; 207: 295-301.
8. Maeder M, Ammann P, Angehrn W, Rickli H. Idiopathic spontaneous coronary artery dissection: incidence, diagnosis and treatment. Int J Cardiol. 2005; 101: 363-369.
9. Nishiguchi T, Tanaka A, Taruya A, Matsuo Y, Ino Y, et al. Clinical characteristics and angiographic features of optical coherence tomography verified spontaneous coronary artery dissection in patients with acute coronary syndrome (abstr). Eur Heart J. 2015; 36: 300.
10. Desai S, Sheppard M. 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: 26-29.
11. Alfonso F, Paulo M, Dutary J. Endovascular imaging of angiographically invisible spontaneous coronary artery dissection. J Am Coll Cardiol Intv 2012;5:452-453.
12. Alfonso F, Paulo M, Gonzalo N, Dutary J, Jimenez-Quevedo P, et al. Diagnosis of spontaneous coronary artery dissection by optical coherence tomography. J Am Coll Cardiol 2012; 59: 1073-1079.
13. Saw J. Coronary angiogram classification of spontaneous coronary artery dissection. Circ Cardiovasc Interv. 2014; 84: 1115-1122.
14. Saw J, Aymong E, Sedlak T, Buller CE, Starovoytov A, et al. Spontaneous coronary artery dissection: Association with predisposing arteriopathies and precipitating stressors and cardiovascular outcomes. Circ Cardiovasc Interv. 2014; 7: 645-655.
15. Mortensen KH, Thuesen L, Kristensen IB, Christiansen EH. Spontaneous coronary artery dissection: A Western Denmark Heart Registry Study. Catheter Cardiovasc Interv. 2009; 74: 710-717.