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Seeking the culprit in a patient presented with lateral ST elevation myocardial infarction

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Abstract

ST Segment Elevation Myocardial Infarction (STEMI) is a frequent manifestation of coronary heart disease (CAD). The standard medical practice in centers equipped with a heart catheterization laboratory involves performing an immediate coronary angiogram with angioplasty of the responsible lesion. This case report describes a patient with lateral STEMI where identification of the culprit lesion causing the myocardial infarction was challenging. However, after meticulous examination of the coronary angiography, the lesion was detected, and the patient was treated with stent implantation, resulting in an uneventful recovery. Therefore, in cases of STEMI with an indistinct culprit lesion, careful investigation of the coronary angiography may offer a solution to the problem.

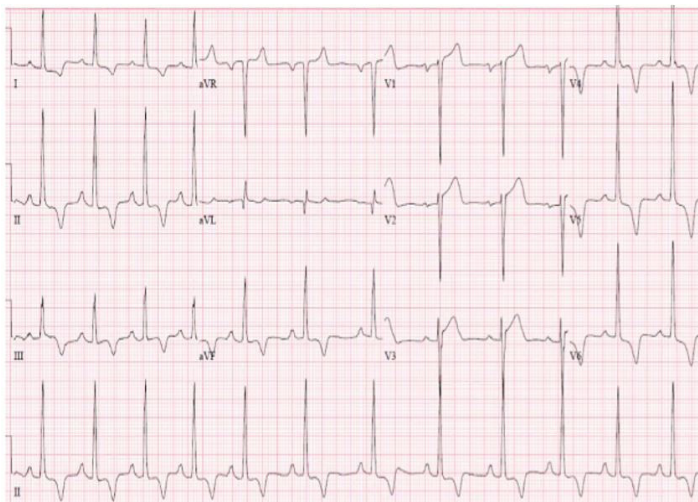
Background

ST Segment Elevation Myocardial Infarction (STEMI) is a frequently encountered manifestation of coronary heart disease (CAD) [1]. Accurate diagnosis of STEMI requires an electrocardiogram (ECG), with ST Segment Elevation and fulfillment of the myocardial infarction criteria [2]. Immediate treatment is crucial and should be initiated promptly. In hospitals without access to a catheterization laboratory, thrombolysis is the only available option, but if a cath lab is present, an emergency coronary angiogram must be performed [1]. After identifying the responsible lesion (culprit), balloon angioplasty and stent implantation are usually the next steps. However, in some cases, the culprit lesion may not be detectable or may not exist, leading to a diagnosis of myocardial infarction with no obstructive coronary arteries (MINOCA) [3]. Conversely, in other cases, diligent investigation of the coronary angiography may reveal the culprit, allowing for subsequent coronary angioplasty.

Case Study

A 65-year-old male smoker presented to our medical center with symptoms of acute coronary syndrome, including chest pain radiating to his right upper limb and upper back for the last three days. Upon clinical examination, his blood pressure was 155/87 mmHg, heart rate was 97 bpm, and oxygen saturation was 96%. A third heart sound (S3) and a mild systolic heart murmur were detected, but S1S2 were normal. The initial electrocardiogram (ECG) showed inferior ST-segment elevation with reciprocal anterior changes. A chest X-ray did not reveal any significant pathology. Echocardiography demonstrated abnormal ventricular wall motion with akinetic posterior wall segments and hypokinetic inferior and apex segments. Mild mitral regurgitation was also observed with an ejection fraction of 45%.

Given the diagnosis of acute myocardial infarction with ST-segment elevation (STEMI) and ongoing ischemia, an indication for an acute coronary angiogram was established due to the patient's ongoing chest discomfort. During the cardiac catheterization, an atherosclerotic dominant right coronary artery with no angiographic stenosis and a mild (maximum 50%) stenosis of the left descending artery were identified. However, as the culprit lesion causing



the ongoing ischemia and the ST-segment elevations could not be identified, a careful inspection of the coronary angiography was conducted. After meticulous investigation of the examination, the lack of an artery supplying the lateral myocardial wall was observed, and an anomalous type I origin of the left circumflex coronary artery was visualized, originating from a separate 90% stenotic ostium under the right coronary artery from the right coronary cusp of the Valsalva sinus. Upon visualization, the artery was engaged with an Amplatz Left 0.75 catheter, and a 2.5x26mm Medtronic Onyx drug-eluting stent (DES) was implanted, resulting in a TIMI III flow and an uneventful recovery of the patient during his stay at the hospital. Therefore, in patients with STEMI and unclear culprit lesions, a careful investigation of the coronary angiography may be necessary to identify an anomalous coronary artery as the underlying cause of the myocardial infarction.

Discussion

ST-elevation myocardial infarction (STEMI) is a common manifestation of coronary heart disease, and its treatment can be challenging. Hemodynamic instability, heavy thrombus burden, and delayed presentation are some of the common challenges encountered in the management of STEMI [1]. However, in some cases, the most difficult part of treatment is identifying the culprit lesion, as illustrated in this case of a STEMI caused by a coronary anomaly. Congenital coronary artery anomalies involving the origin of coronary arteries are rare, with left circumflex arising from the right sinus of Valsalva being the most common [4]. While some coronary anomalies can be malignant and lead to cardiac arrest [5], the one reported in this case is

considered benign. As the identification of patients with myocardial infarction with no obstructive coronary arteries (MINOCA) is increasing, the diagnostic algorithm before establishing this diagnosis is crucial. A careful inspection of the coronary angiography must take place prior to such a diagnosis [1]. This case report highlights the importance of this step in the diagnostic algorithm for the treatment of patients with acute coronary syndromes.

Conclusion

In this case report, we presented a patient with myocardial infarction in whom the identification of the culprit lesion was challenging due to a coronary anomaly. Specifically, an anomalous origin of the left circumflex artery arising from the right sinus of Valsalva was discovered only after a thorough examination of the coronary angiography. This case highlights the significance of careful inspection of coronary angiography in the diagnosis and treatment of patients with STEMI and acute coronary syndromes.

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