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CASE REPORT

Cardiocerebral Infarction: A Combination to Prevent

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Background

The acute complications of myocardial infarction (MI), such as mechanical, arrhythmic, ischemic, and inflammatory sequelae, may be responsible for significant cardiovascular morbimortality.[1]

Life-threatening arrhythmias, namely ventricular fibrillation or tachycardia, may be a challenging complication requiring a prompt approach. In some cases, acute ischemia leads to polymorphic ventricular tachycardia (PVT), and, rarely, to potentially lethal torsades de pointes ventricular tachycardia.[2-3]

Another potential complication in the onset or after a MI is a cerebral infarction. The expression "cardiocerebral infarction" was first described by Omar et al.,[5] in 2010. It can be classified as "synchronous" or "metachronous" which are simultaneous or sequential infarctions in the cerebral and coronary vascular territories, respectively.[4-5]

In-hospital stroke after an acute coronary syndrome is estimated around 0.9% with the highest incidence for ST segment elevation myocardial infarction (STEMI). Despite uncommon, it is a severe complication with a tough and unclear management.[6-8]

Description

A 46-year-old woman, smoker, oral contraceptive user, was admitted to the emergency department due to syncope and transitory acute chest pain. On admission, she was asymptomatic and the physical examination result was normal. The electrocardiogram (ECG) revealed sinus rhythm, normal QT interval, and an inframillimetric ST segment elevation in inferior leads (Figure 1). Bedside echocardiography showed normal systolic function and hypokinesis of the inferior and inferolateral walls. During clinical examination, she initiated slight chest pain, and the reassessment of the ECG revealed a moderate ST segment elevation in V1-V3 and inferior leads (Figure 2).

A dual loading dose of antiplatelet therapy was administered and she was immediately transferred to the cardiac catheterization lab. A suspected image of proximal occlusion of dominant right coronary artery (RCA) was noted, with thrombus distal embolization during contrast injection (Figure 3), treated with aspiration. Due to distal TIMI 0, balloon dilatation was performed, followed again by thrombus aspiration. At this time, a distal embolism of the posterior descending artery was noted , which was not successfully resolved with balloon dilatation (Figure 4). Finally, by visualizing a proximal dissection flap (Figure 5), it was decided upon a drug eluting stent, adjusted to the ostium (Figure 6).

During the procedure, she suffered from PVT, torsade de pointes type (Figure 7), which was reverted with electrical defibrillation. At the end, she was clinically stable and the ECG showed sinus rhythm, with inverted T waves in inferior and anteroseptal leads (Figure 8).

About 4 hours later, she had a sudden onset of dysarthria, facial palsy and mild right hemiparesis — National Institutes of Health Stroke Score (NIHSS) 11. The computed tomography (CT) angiography revealed a proximal occlusion of the left internal carotid artery (ICA), suggestive of thrombosis. The cranial CT showed contrast attenuation of the left cerebral parenchyma (Figure 9).

It was considered no indication for thrombolysis or thrombectomy, taking into account the location of the occlusion, the existence of signs of cerebral infarction and the high hemorrhagic risk. She evolved unfavourably to NIHSS 21 with global aphasia, dysphagia, right facial paralysis,

Keywords

Cerebral Infarction/complications; Myocardial Infarction; Arrhythmias Cardiacs; Ventricular Fibrillation; Stroke.

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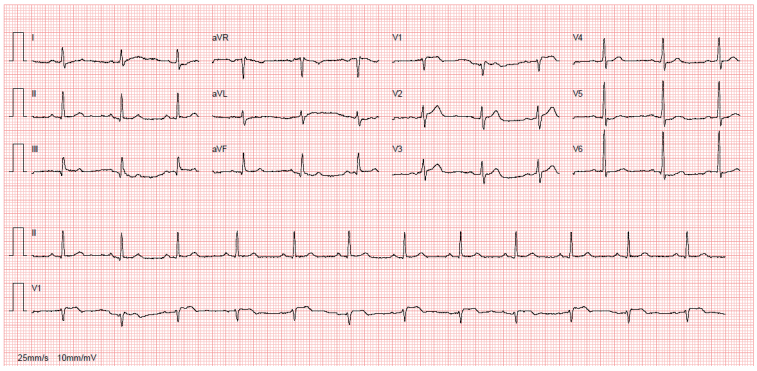

Figure 1 – Arrival 12-lead electrocardiogram.

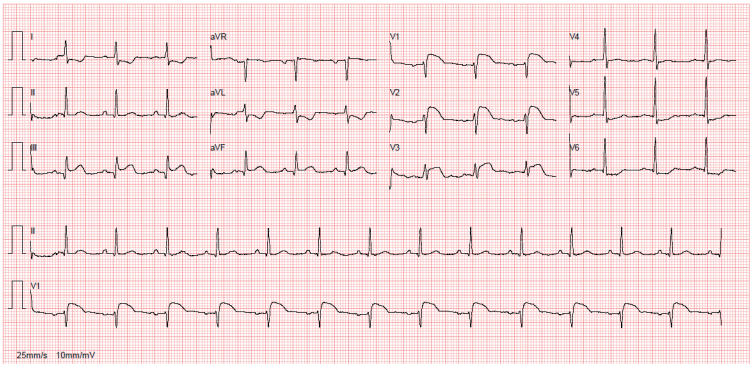

Figure 2 – Reassessment 12-lead electrocardiogram showing moderate ST segment elevation affecting the inferior (leads aVF and DII) and the anteroseptal wall (leads V1 to V3), with a mirror image in the high lateral wall.

right homonymous hemianopsia, right hemiplegia of brachial predominance and right hypoesthesia. The 24-hours cranial CT showed an extensive left cortico-subcortical parietotemporal infarction and midline shift (Figure 10). Due to subsequent clinical and imagiological stabilization, a decompressive craniectomy was not necessary.

Further analytical study showed hyperthyroidism and dyslipidemia. The genetic study revealed heterozygosity for methylene tetrahydrofolate reductase (MTHFR) A1298C with normal homocysteine levels.

During hospitalization, she attended a stroke rehabilitation program with dysphagia resolution and motor improvement. After 33 days of hospitalization, she was discharged to a physical rehabilitation hospital.

Discussion and conclusions

In a first approach, the authors reported a case of MI, in which a less careful ECG pattern analysis could have led to an erroneous definition of the culprit vessel. The pattern of anteroseptal infarction in a proximal RCA occlusion is less commonly reported and can lead to delayed treatment.[9]

In the setting of acute MI, the patient suffered from life-threatening electrical events, in the form of PVT. In this context, PVT is usually induced by ischemia and triggered by ventricular extrasystoles with short coupling interval, the called "R-on-T phenomenon". Besides unusual, it is a potentially fatal condition, which must be promptly reversed.[2-3]

Finally, the described "metachronous cardiocerebral infarction" may underlie several pathophysiological mechanisms. Some of them may include embolic causes, like those related to the procedure or arrhythmias; and hypotensive causes, associated with hypoperfusion, previous atherosclerotic stenosis, or, more rarely, aortic dissection.[8] In the case reported here, a possible relationship with percutaneous revascularization was

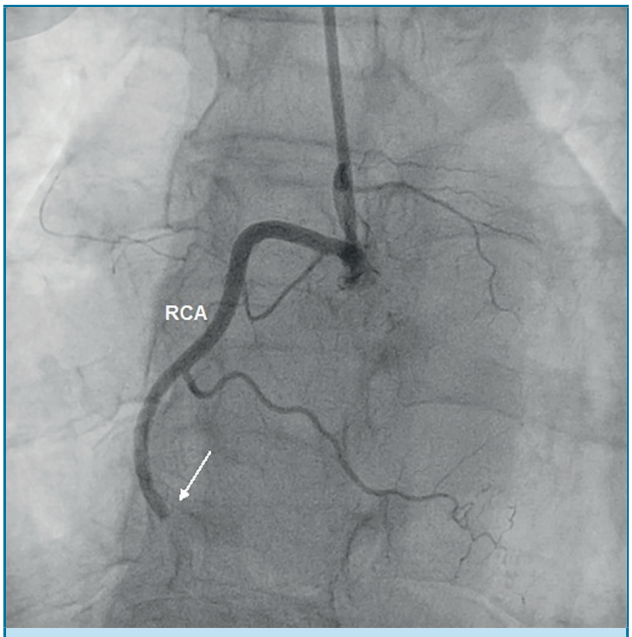

Figure 3 – Coronary angiogram showing a distal occlusion of the dominant right coronary artery (arrow).

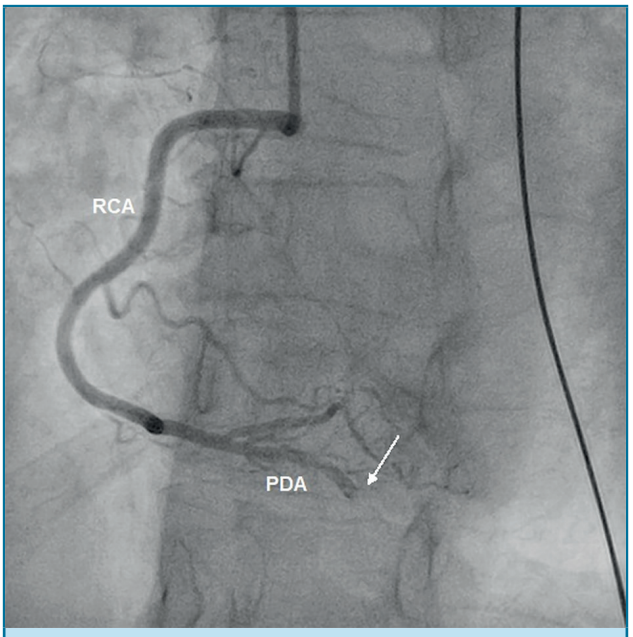

Figure 4 – Coronary angiogram showing a distal embolization of thrombus to the posterior descending artery (arrow) during the procedure.

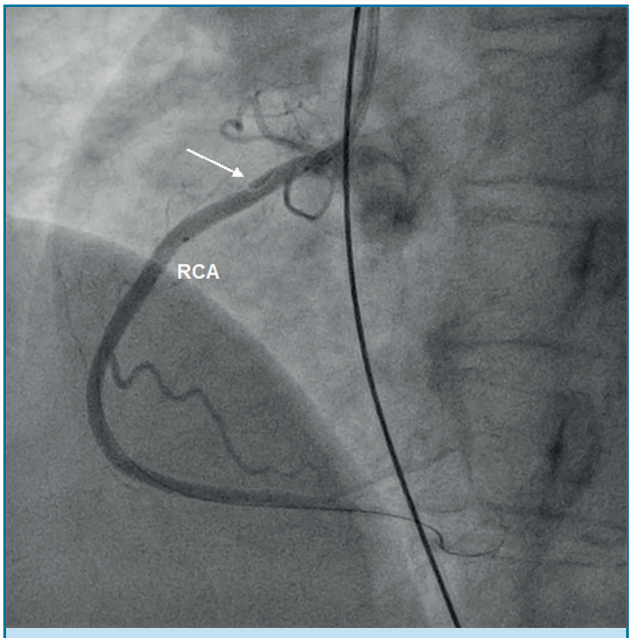

Figure 5 – Coronary angiogram showing a proximal dissection flap of the right coronary artery (arrow).

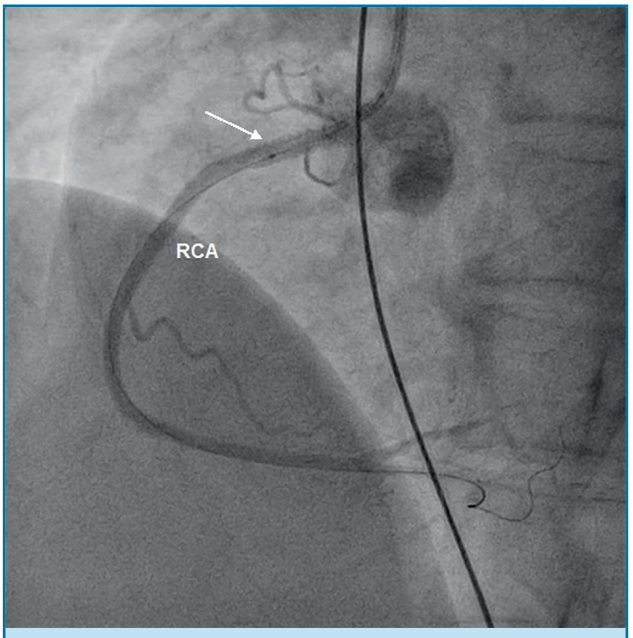

Figure 6 – Coronary angiogram showing an implanted drug eluting-stent in proximal right coronary artery (arrow).

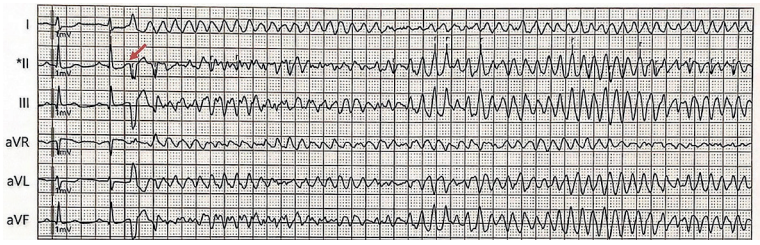

Figure 7 – Electrical monitoring during coronary angiogram showing a polymorphic ventricular tachycardia, torsade de pointes type, initiated by the "R-on-T" phenomenon (arrow).

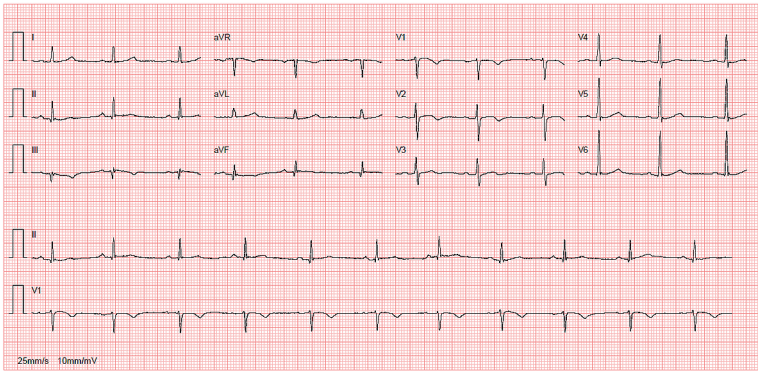

Figure 8 – 12-lead electrocardiogram after percutaneous coronary intervention showing inverted T waves in inferior and anteroseptal leads.

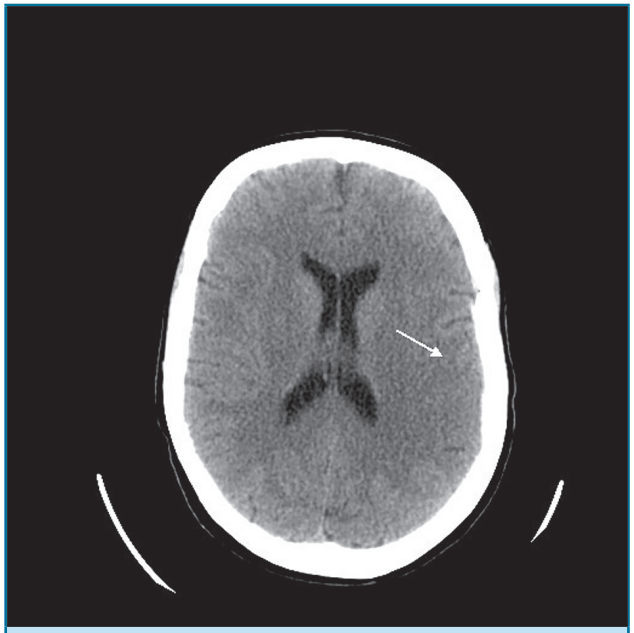

Figure 9 – Cranial computed tomography showing contrast attenuation of the left cerebral parenchyma (arrow), an early sign of ischemic stroke.

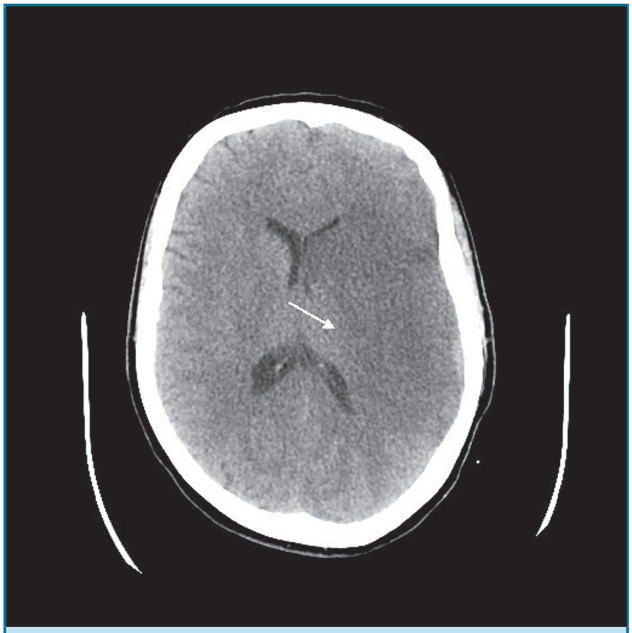

Figure 10 – Cranial computed tomography of reassessment showing an extensive left cortico-subcortical parietotemporal infarction (arrow) and midline shift.

assumed, probably associated with the patient's high thrombotic risk. There is some evidence that thrombus aspiration during percutaneous coronary intervention is associated with an increased risk of ischemic stroke. This has been explained by technical issues and/or inadequate post-procedure therapeutic management.[10-11] In addition, the patient is a woman smoker, uses contraceptive pill, has a strong cardiovascular family history, unmedicated hyperthyroidism and dyslipidemia, potentiating the hypercoagulable state and arterial cardiovascular disease.[12] The clinical impact of the MTHFR A 1298C allele on thrombotic risk, regardless of homocysteine levels, is controversial.[13]

Some recent evidence suggests that the high thrombotic load in STEMI patients may lead to a benefit of adding a direct oral anticoagulant to antiplatelet therapy, reducing the risk of cerebrovascular events in selected patients.[6-8,14,15]

In conclusion, despite its rarity, "cardiocerebral infarction" is a serious complication with a poor prognosis and challenging management. Thus, further studies would be important to outline new possibilities in the management of this condition and improve the associated devastating prognosis.

Author contributions

Conception and design of the research and acquisition of data: Cabral M, Ponciano A; analysis and interpretation of the data and writing of the manuscript: Cabral M; critical revision of the manuscript for intellectual content: Santos B, Morais J.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Study Association

This study is not associated with any thesis or dissertation work.

Ethics approval and consent to participate

This article does not contain any studies with human participants or animals performed by any of the authors.

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