

**INTRACRANIAL  
ANEURYSM IN A  
PATIENT WITH  
ACUTE MYOCARDIAL  
INFARCTION: A  
SUCCESSFUL  
COMBINED  
ENDOVASCULAR  
APPROACH AT  
THE HOSPITAL  
DAS CLÍNICAS DE  
TERESÓPOLIS**

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**Abstract: Introduction:** Cerebrovascular and cardiovascular syndromes have the highest morbidity and mortality rates worldwide. An increase in the prevalence of unruptured intracranial aneurysms has been observed as a result of the evolution of non-invasive imaging techniques, most of which are asymptomatic until the moment of rupture. Preventive treatment is indicated when the risk of bleeding outweighs the risks of treatment. **Objective:** To report the case of a septuagenarian patient admitted to Hospital das Clínicas Costantino Ottaviano with acute non-ST elevation myocardial infarction, who was observed concomitantly with aneurysmal dilation at the level of the middle cerebral artery branch with risk of rupture, who underwent combined endovascular approach in the hemodynamics room, which led to a favorable outcome, highlighting the challenges of the simultaneous endovascular approach. **Method:** A retrospective analysis of the patient's medical records was performed concomitantly with the narrative review with an active search in the PubMed database. **Conclusion:** Although the diagnosis of intracranial aneurysm associated with coronary syndrome requiring anticoagulation is a challenge for the clinician, the combined endovascular approach offers the possibility of a successful and minimally invasive treatment for a potentially catastrophic condition. Currently, HCTCO provides high-performance intensive and cardio-intensive medicine services, in addition to the new hemodynamics laboratory, where the endovascular approach was successfully performed, providing a lower risk of complications, greater survival and improvement in the patient's quality of life.

**Keywords:** Myocardial infarction; non-ST-segment elevation myocardial infarction; intracranial aneurysm; endovascular procedures.

## INTRODUCTION

Ischemic heart diseases represent the main cause of mortality in the world, corresponding to 7.1% of deaths in 2015 in Brazil. One of its clinical spectra is non-ST elevation coronary syndrome (NSTEMACS), with full anticoagulation being one of its therapeutic pillars. It must be noted that bleeding is the most common non-ischemic complication in its management, with major bleeding associated with a fourfold increase in the risk of death, of recurrent acute myocardial infarction in five times and of cerebrovascular accident in 30 days of three times.<sup>1-3</sup>

In the guidelines of the European Society of Cardiology (ESC Guidelines 2021), an early invasive approach (< 24 hours) is recommended in patients with high-risk NSTEMACS, which include patients with a troponin dosage curve, Grace score > 140 points, dynamic T-wave changes, or transient ST elevation. Immediate approach (< 2 hours) is reserved for unstable or very high-risk patients.<sup>4,5</sup>

Systematic reviews have been published evaluating the invasive strategy compared to conservative treatment in NSTEMACS. However, the ideal time to perform it (the *timing*) has not been established with strong evidence. In the case to be reported in this study, the procedure was performed during the first week of diagnosis, given the clinical evolution and the combined programming by the indication of a double approach to exclude the cerebral aneurysm.<sup>4-7</sup>

The capacity to rupture is intrinsic to all cerebral aneurysms, defined as dilated areas of cerebral arteries. Its rupture generates serious complications, such as hemorrhagic cerebrovascular accident, a critical event known as subarachnoid hemorrhage when the rupture affects arteries that have not yet penetrated the brain parenchyma.

Cerebral aneurysms, even asymptomatic,

are present in approximately 5% of the population. The location, size, shape and previous history of rupture are factors that interfere with the increased risk of rupture.<sup>8,9</sup>

The incidence of cerebral aneurysms has been increasing due to technological advances in propaedeutic methods, in addition to better knowledge of the natural history and prevalence of the condition. The most severe configuration of the presentation spectrum of ruptured intracranial aneurysms is subarachnoid hemorrhage. In this sense, the management of unruptured intracranial aneurysms becomes more difficult not only from the perspective of decision-making, but also in relation to the treatment to be followed.<sup>10-12</sup>

The treatment of cerebral aneurysms that have not yet ruptured and in the presence of subarachnoid hemorrhage is carried out by excluding the aneurysm from the cerebral circulation through surgical or endovascular treatment. The first surgical intervention by vascular clip took place in 1937, with the use of this technique continuing until the end of the 1980s, with the emergence of platinum coils, establishing microsurgery as the main form of management. The percutaneous endovascular technique was initially used as a therapeutic resource for patients who were not good candidates for surgical treatment; however, given its advantages, there has been an increasing popularity of this alternative and less invasive method.<sup>13-16</sup>

## **JUSTIFICATION**

The diagnosis of an intracranial aneurysm in a patient in need of anticoagulation is a challenge for clinicians, given the chance of bleeding after the institution of such therapy. Thus, given the severity of the diagnoses made and the need for appropriate management at the appropriate time, this work is justified, in order to present a case with combined

therapeutic intervention for these two conditions, in a few days of hospitalization, which contributed to a successful outcome of the case.

## **OBJECTIVES**

### **GENERAL OBJECTIVE**

To highlight the challenges and success of the simultaneous endovascular approach in a patient with non-ST elevation acute myocardial infarction concomitant with the presence of aneurysmal dilation at the level of the middle cerebral artery branch.

### **SPECIFIC OBJECTIVES**

- Expose relevant clinical and epidemiological aspects in the context of acute non-ST elevation myocardial infarction and intracranial aneurysm;
- Correlate the findings observed in the present case with the data described in the literature.

## **METHODOLOGY**

This work consists of a case report referring to the combined procedure via endovascular route, in a hemodynamics room at the Hospital das Clínicas de Teresópolis Costantino Ottaviano (HCTCO), in a patient with acute myocardial infarction without ST elevation simultaneously with the presence of aneurysmal dilatation at the level of the branch of one of your middle cerebral arteries.

The information used was obtained by reviewing the medical records, interviewing the patient, photographing the diagnostic methods to which she was submitted, and reviewing the literature.

For the review, searches were carried out on the PubMed and UpToDate platforms, using the following terms, previously consulted on the DECS platform as a research source: "Myocardial Infarction", "Myocardial Infarction without ST Segment Elevation",

“Intracranial Aneurysm” and “Endovascular Procedures”. In the search, articles consistent with the objectives of the work were included, excluding those that did not present data to be extracted.

## RESULTS AND DISCUSSION

### CASE REPORT

A 78-year-old woman, with a past history of transient ischemic attacks and recent vascular dementia, in addition to a previous diagnosis of abdominal aortic aneurysm (under conservative treatment), was admitted to the emergency department of HCTCO. The patient had started with hemiparesis in the left side of the body with 24 hours of evolution, associated with pre-syncope, which encouraged the search for medical care. She showed a worsening of her usual pattern of disorientation, scoring 14 on the Glasgow Coma Scale, but no other appreciable complaints. She denied dyspnea or typical chest pain, but reported a feeling of heaviness in her chest when her blood pressure rose. He had been a smoker for 50 years, consuming two packs a day – a smoking load of 100 packs a year.

The patient was referred to the Intensive Care Unit with head and chest tomography at entrance without showing any acute alteration, with a positive second troponin dosage, with a value of 0.56 ng/ml, values that persisted increased throughout the day (0.4 and 0.26 ng/ml). His electrocardiogram did not show acute variation, while the echocardiogram showed apical hypokinesia of the inferior septum, a finding that a recent previous echocardiogram, presented by the family, did not show. In the *Grace Score*, it totaled 116 points and in the *Heart Score*, 7 points, categorizing the patient at high risk and, therefore, indicating an invasive stratification through coronary angiography. No other alterations were found in the laboratory screening.

In parallel, following the risk stratification of the neurological condition, arterial angiography of the neck and skull was performed for control, in view of the first innocent tomographic image. In this one, an aneurysmal dilatation was found at the level of the branching of the right middle cerebral artery, measuring approximately 0.4 cm, with a caudally oriented neck and with the same measurement. Given this finding, the administration of dual platelet antiaggregation and anticoagulation imposes a high risk of bleeding and deterioration of the neurological condition presented. Due to neurosurgery, an urgent approach was indicated. As for the abdominal aortic aneurysm, no further conduct was indicated by vascular surgery, given its stable presentation in relation to outpatient follow-up.

As a conduct, neurointerventionist and cardiointerventionist procedures were performed in combination, via endovascular route, successfully. Coronary angiography showed an 80% lesion in the right coronary ostium, and percutaneous coronary intervention was performed with a drug-eluting stent. The anterior descending and circumflex arteries were free of obstruction. In the cerebral arteriography, embolization of the saccular aneurysm of the bifurcation of the right middle cerebral artery was performed, which then revealed to have a wide neck (6 mm), with occlusion of the aneurysm with platinum microcoils and technique with stent covering the neck. After the procedures, the patient evolved without angiographic and/or hemodynamic interferences, excluding the cerebral circulation aneurysm.

The day after the procedure, a control computed tomography scan of the skull was performed, describing the metallic temporal clip on the right without other evolutionary changes. The patient evolved with a satisfactory clinical picture, without cardiovascular or

neurological interurrences after the therapy adopted, and was discharged after ten days of hospitalization.

Figures 01 and 02, they show images obtained during cerebral angiography, showing a saccular aneurysm of the bifurcation of the right middle cerebral artery, measuring 6 mm with a wide neck.

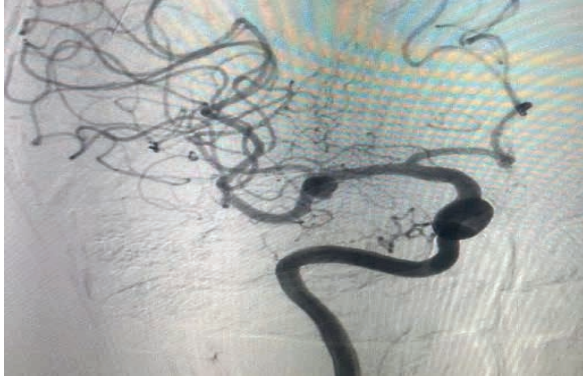


Figure 01 – Image of the intracranial aneurysm (digital subtraction angiography in lateral view).

Source: HCTCO Hemodynamics Center.

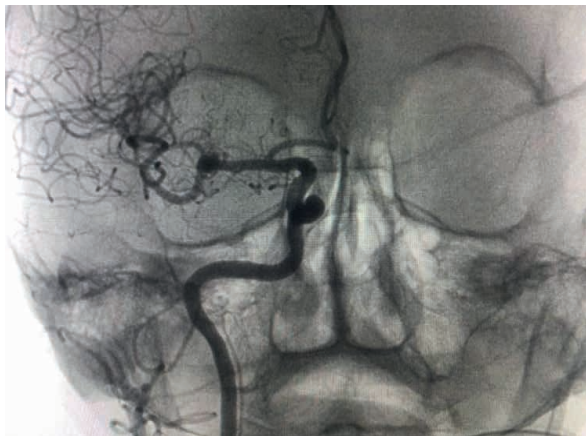


Figure 02 - Image of the intracranial aneurysm (angiography in AP view).

Source: HCTCO Hemodynamics Center.

Figures 03 and 04, they show images taken after occlusion of the aneurysm with platinum microcoils and technique with *stent* covering the neck.



Figure 03 - Intracranial aneurysm occlusion (digital subtraction angiography).

Source: HCTCO Hemodynamics Center.

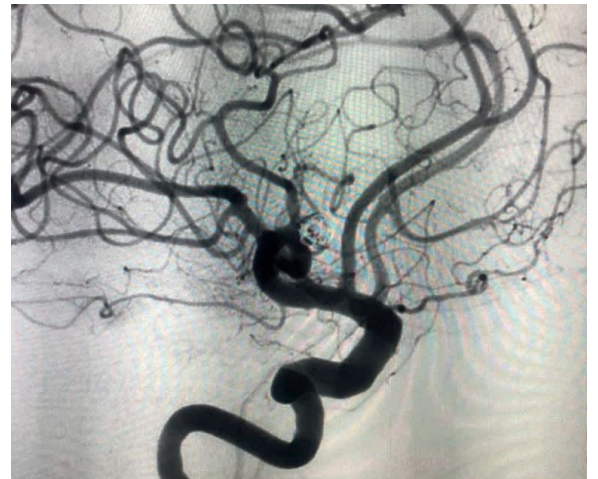


Figure 04 - Intracranial aneurysm occlusion (digital subtraction angiography in another view).

Source: HCTCO Hemodynamics Center.

Figure 05 shows an image obtained from the coronary angiography showing an 80% obstructive lesion in the ostium of the right coronary artery.

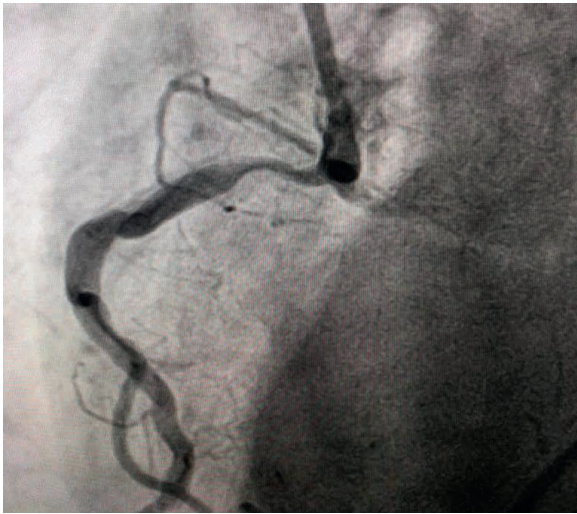


Figure 05 - 80% lesion in the right coronary ostium (coronariography).

Source: HCTCO Hemodynamics Center.

Figure 06 shows an image taken after percutaneous coronary intervention, showing a drug-eluting stent in the right coronary artery, with TIMI III local flow.



Figure 06 - Reperfusion of the right coronary artery (coronariography).

Source: HCTCO Hemodynamics Center.

## FINAL CONSIDERATIONS

The reported case demonstrates the correlation between two relevant pathologies in medical practice, both in terms of severity and

prevalence. Ischemic heart diseases represent the main cause of death in the world, while cerebral aneurysms present subarachnoid hemorrhage as the main complication, a disease with high mortality and morbidity. Studies indicate that 20% of patients who have a ruptured aneurysm have sudden death, and 2/3 of those who remain alive upon hospital admission will progress to death or significant sequelae during hospitalization. The main risk factor associated with aneurysmal rupture is smoking.

It must be noted that the presence of both conditions concomitantly is infrequent and their diagnosis can only be made through clinical suspicion and the availability of complementary workup. The possibility of carrying out the entire follow-up in the same hospital complex favored a brief discharge, with a minimally invasive treatment, reducing the risk of complications.

Until the date of conclusion of this study, the patient had no complications, with no need for readmission, remaining in home recovery and without acquired impairments in her functionality.

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## ANNEXES

Annexes 1 and 2 - Free and informed consent form.

Annex 3 - Term of commitment for the use of data

Annex 1:



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Rectory  
Academic Dean's Office  
Graduate, Research and Extension Board  
Research Ethics Committee

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**TERM OF COMMITMENT FOR USE OF DATA**

We, Jorge André Marcos Bravo, CRM (regional Council of Medicine), CPF (social security number); Isabella Cristina Vargas Antunes, CRM, CPF; Isabela Georges Pelógia Farah Trigo, CPF 13097984780, we are committed to preserving the privacy of the patient whose data will be collected in the medical record and complying with the current rules expressed in Resolution No. 466/2012 of the National Health Council/ Ministry of Health. We also agree that this information will be used solely and exclusively for the execution of the present project, Intracranial Aneurysm in a patient with Acute Myocardial Infarction: a successful combined Endovascular Approach at Hospital das Clínicas de Teresópolis. Information may only be disclosed anonymously.

Teresópolis, July 25, 2022

  
Participant signature

  
Signature of the person responsible for the research

  
Signature of the person responsible for the research

  
Signature of the person responsible for the research





Fundação Educacional Serra dos Órgãos  
Centro Universitário Serra dos Órgãos  
Rectory  
Pro Academic Rectory  
Board of Graduate Studies, Research and Extension  
Research Ethics Committee

#### TERMS OF FREE AND CLEAR CONSENT

You are being invited as a volunteer to participate in the research with the following theme: Intracranial Aneurysm in a patient with Acute Myocardial Infarction: a successful Combined Endovascular Approach at Hospital das Clínicas de Teresópolis - Case report.

This study is being conducted by researcher Isabella Cristina Vargas Antunes. Below, some important information of this research is described.

**Objective:** To report the case of a female patient with acute non-ST elevation myocardial infarction concomitantly with aneurysmal dilation at the level of the middle cerebral artery branch, highlighting the challenges of the simultaneous approach and the success of the double endovascular approach.

**Justification:** To present a review and update in the context represented by the mentioned pathologies. Describing the clinical, laboratory and radiological evolution of a patient diagnosed and treated at the HCTCO, from her hospital admission and, due to the availability of local resources, a few days of hospitalization were required for the indicated therapy, contributing to a successful outcome.

**Explanation of the procedure:** case report, preserving the patient's identity. **Freedom of participation:** You will be informed about the research in any aspect you wish. You are free to refuse to participate, withdraw your consent or discontinue participation at any time. Your participation is voluntary and your refusal to participate will not result in any penalty or loss of benefits or any damage to your relationship with the researcher or that institution.

**Risks:** This case report poses no risk to the patient.

**Benefits (direct and indirect):** participation in the research will allow a study on the subject and the main measures to be taken, in addition to allowing a theoretical-practical correlation on the association of a Cerebral Aneurysm and Acute Myocardial Infarction without Supra.

**Confidentiality of identity:** I declare that the information obtained in this research will not be associated with the identity of any of the participants, thus respecting their anonymity. This information will be used for scientific purposes in publications of journals, annals of events and congresses, as long as the identity of the participants is not revealed. In addition, the information collected will be the responsibility of the researchers through access to the medical records and information provided by the volunteer.



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Costs of participation, reimbursement and compensation for any damages: No fee or payment of any kind will be charged to cover project costs, nor will participants receive any kind of payment, justifying the voluntary nature of the research. However, if necessary, you may be reimbursed for expenses you may have with your participation in the research, such as transportation, food. If damage occurs as a result of the research, you may seek compensation.

I agree with what was previously exposed. I, Luisa Ana Porras de Salonikio, RG: W6260636 / CGPI, agree to participate in this research, signing this consent in two copies, keeping one of them.

In case of doubt, you can contact the researcher: Jorge André Marcos Bravo – 21 99979-1473, with the resident Isabella Cristina Vargas Antunes – 2199142-6881, or contact the Research Ethics Committee of the Centro Universitário Serra dos Órgãos, located at Avenida Alberto Torres, nº111. CEP: 25976345. Alto – Teresópolis – RJ, telephone (21) 2641-7088

This free and informed consent term complies with the determinations of Resolution 466/2012.

Teresópolis, July 25, 2022.

Research participant's signature

Signature of the person responsible for