

Original Article

Interventional management of acute myocardial infarction type 5. Case presentation and literature review.

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ABSTRACT

Objectives: To identify the diagnostic criteria and adequate interventionist management of type 5 infarct.

Clinical case: 60-year-old female with history of type 2 diabetes (DT2), systemic arterial hypertension (SAH) and chronic renal disease (CKD), history of acute myocardial infarction without ST segment elevation, with transthoracic echocardiogram with left ventricle with moderate concentric hypertrophy, Posterior hypokinesia, left ventricular ejection fraction (LVEF) 50%, currently chronic coronary syndrome type 3, was identified in diagnostic coronary artery disease and trivascular with SYNTAX score of 58 points. It was decided to perform coronary revascularization surgery with implant of venous hemoduct to anterior descending artery. In the immediate post-surgery period (48 hours) it presents changes in the electrocardiographic trace, with ST segment elevation of V1 - 4 and positive cardiac biomarkers, with diagnostic criteria of acute myocardial infarction type 5. It was decided to perform percutaneous coronary intervention, which is currently considered the best treatment option.

Conclusion: Acute myocardial infarction type 5, is an entity with low incidence (5.3%), represents a challenge for the interventional cardiologist in both diagnosis and treatment. The success of percutaneous coronary angioplasty and post-interventional TIMI flow are the most important pillars for the patient's prognosis.

Keywords: Chronic coronary syndrome, trivascular disease, SYNTAX, acute myocardial infarction type 5.

1. INTRODUCTION:

Acute myocardial infarction is defined as the presence of acute myocardial damage detected by the elevation of cardiac biomarkers in the clinical context of evidence of acute myocardial ischemia. In 2018, the European cardiology guide published the fourth definition of infarction, in which it plasma five types, type 1 is caused by coronary atherosclerotic disease,

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which is precipitated by the rupture or erosion of the atherosclerotic plaque, type 2 is characterized by ischemic myocardial damage due to the mismatch between oxygen supply and demand (for example, severe anemia, sustained tachyarrhythmia), type 3 is in the context of sudden death of cardiac etiology in which the patient presented symptoms suggestive of myocardial ischemia with electrocardiographic alterations including ventricular fibrillation, with death prior to obtaining cardiac biomarkers, type 4 occurs in the context of percutaneous coronary intervention (PCI), and is subdivided into three types, 4a, it is defined as elevated troponins 5 times above its upper limit accompanied by electrocardiographic changes, cardiovascular imaging evidence, or complications related to PCI (for example coronary dissection or distal embolization), type 4b is defined as myocardial ischemia caused by PCI-related stent thrombosis, type 4c is defined as focal, diffuse restenosis or complex lesion accompanied by troponin elevation^{1,2,3}

Type 5 infarction is defined as that related to coronary artery bypass graft surgery (CABG), there must be an elevation of troponins greater than 10 times the upper reference limit during the first 48 hours after the surgical event, or present greater elevation 20% of pre-surgical troponin after the procedure; however, the absolute value after the intervention must be greater than 10 times above the upper limit of reference.^{1,3.}

2. PRESENTATION OF THE CASE

55-year-old female with TD-2, CKD, dyslipidemia, and SAH. 6 months before non-ST segment elevation myocardial infarction (SICASEST), managed conservatively. Echocardiogram with a report of posterior hypokinesis, left ventricular ejection fraction (LVEF) of 50%, without valvular heart disease. In February 2020 type 3 chronic coronary syndrome, a coronary angiography was performed, reported a left main coronary artery (LMCA) with a 70% distal lesion, anterior descending (LAD) with 50% ostial lesion and 70% in its middle segment, artery circumflex (Cx) 80% in origin, upper lateral branch 80% in origin, dominant right coronary artery (RDC) with 80% stenosis in vertical segment, angiographic diagnosis of trivascular coronary disease and TCI with SYNTAX I score of 58 was concluded points, SYNTAX II ICP / CABG 26.3 / 2.7%, EuroSCORE 2.06% and STS 0.52%.

In heart team surgical treatment is decided; Coronary artery bypass graft (CABG) surgery was performed without the use of an extracorporeal circulation pump, with implantation of a venous hemoduct to LAD, with an endarterectomy, without complications. In the postoperative unit, an electrocardiogram with an elevation of the ST segment of V1-4 was observed, and an elevation of cardiac biomarkers more than 10 times the upper reference limit, with diagnostic criteria of type 5 acute myocardial infarction; the infarction code was activated and he was transferred to the hemodynamic laboratory without ventricular assistance (intra-aortic balloon pump or Impella); TCI was reported with 70% stenosis, LAD with total occlusion in the distal segment, Cx with tortuous lesion with severe calcium type C AHA / ACC SCAI 2 at its origin, lateral branch high 90% stenosis, TIMI 3 flow, CD eccentric lesion type B 2 AHA / ACC SCAI 1 in the middle segment and start of the distal segment, TIMI 3 distal flow, angiography shows amputation of the distal bed of the LAD, it is decided to implant a drug-eluting stent (everolimus) of TCI a Gives. 3.5 mm x 18 mm, and PCI to DC with drug-eluting stent (everolimus) 3.00 mm x 28 mm. ICP to Cx failed. Favorable evolution, being discharged at home after 20 days.

3. DISCUSIÓN

Type 5 infarction is defined as that related to coronary revascularization surgery, presenting an elevation of troponins greater than 10 times above the upper reference limit during the first 48 hours after the surgical event, or presenting an elevation greater than 20% of pre-surgical troponin after the surgical event, however the absolute value after the

intervention must be greater than 10 times above the upper limit of reference and to fulfill the diagnosis it must present at least one of the following, 1) appearance of new pathological Q waves, 2) new occlusion of the graft or native coronary artery, angiographically documented, 3) imaging evidence of loss of viable myocardium, or 4) new segmental motility abnormalities consistent with an ischemic etiology, however the elevation ST segment with reciprocal ST depression or other specific electrocardiographic patterns may be findings reliable results of an ischemic event. Our case presented a significant elevation of cardiac enzymes, accompanied by elevation of the ST segment, and coronary occlusion of the vessel undergoing coronary revascularization treatment was documented by coronary angiography.^{1,2,3}

In the PAMI-2 study (Second Primary Angioplasty in Myocardial Infarction Trial), it was reported that 58 (5.3%) of 1,100 patients presented AMI, coinciding with various clinical trials that the incidence of type 5 AMI ranged between 5-15% in whom 72% underwent percutaneous coronary angioplasty, obtaining TIMI 3 flow, 70% of the grafts were saphenous vein, and mortality at 6 months post-CABG was 22.6% versus 4.1% in patients without CABG, reinfarction at 6 months of 7.3% versus 5.2%, respectively.⁴

A meta-analysis, in which 5 clinical trials were integrated with a total of 3,391 patients with AMI, 169 (5%) had a history of CABG, of which 93 patients (3%), was the saphenous vein graft detected as the artery responsible for the infarction, of these only 83% were able to perform percutaneous coronary angioplasty, with a success rate of 92%, mortality of 20% was reported at one year in patients with CABG of 20%. Unlike the 6% in patients without such a history, determining that flow quality is the best factor related to survival.⁵

With the aforementioned, the high mortality and risk of reinfarction in patients with type 5 AMI are reaffirmed, compared to those with type 1 or 2 AMI. TIMI flow is an important factor in predicting long-term mortality, in our case it was possible to perform PCI successfully, recovering TIMI 3 flow, without presenting complications with good in-hospital evolution post-intervention, for which a one-year survival of greater than 90% can be considered.⁵

The Society for Cardiovascular Angiography and Interventions (SCAI) published in 2012 that 90% of type 5 AMI were venous grafts, 8.7% arterial graft and 1.1% mixed graft, 88.2% had injury in a single vessel (graft), 11.8% in two vessels and 0% in three vessels, TIMI 0 or 1 flow in 55%, TIMI 2 in 23.4% and TIMI 3 in 21.6% pre-procedure, at the end of PCI, reported TIMI 0 and 1 flow of 14.4%, TIMI 2 of 5.4% and TIMI 3 in 80.2%, of these, the lesion responsible was the graft to the Da artery in 39.6%, circumflex artery in 20.7% and coronary artery right at 31.5%. Mortality in 47.8% of the patients occurred during a follow-up period of 3.2 ± 2.4 years. The cause of death was cardiac in 35 patients (80%), vascular in 4 patients (9%), and non-cardiovascular in 5 patients (11%).

Spontaneous myocardial infarction occurred in 30 patients (32.6%) and cardiac arrest in 11 patients (12.5%).⁶

In our case, the poor prognosis of incomplete revascularization was evidenced in trivascular disease involving LMCA. He presented occlusion at the anterior descending level, becoming manifest with type 5.1.2 AMI, it is important to take into account the probability of presenting complications in the short term, such as acute failure of the vein graft, which is manifested by acute occlusion of the same or of the vessel Corresponding native, emphasizing the current management of type 5 AMI, PCI of the vessel (graft) or native vessel, is preferred as treatment. Despite the complications during her hospitalization, our patient had a favorable evolution and was discharged 20 days after her intervention.

4. CONCLUSIONS

Acute myocardial infarction type 5 (according to the 4 definition of infarction), is one of the complications that occurs with lower incidence within the context of SICAs, with high rates of mortality and acute complications of the surgical event of coronary revascularization, being a challenge for the clinical cardiologist who must be very clear about the diagnostic criteria of this class of myocardial infarction (elevation of cardiac biomarkers, new pathological electrocardiographic changes such as Q waves and changes in the ST segment, and angiographic confirmation) the identification and timely treatment They will have a direct impact on the forecast in the short, medium and long term. The therapeutic option, of first choice, is a second revascularization surgery, but given the high risk of a new surgical event, the performance (with ventricular support or not), of PCI aimed at recovering the blood flow of the responsible artery is preferred of the infarction, or its myocardial territory at risk, preferably the native vessels, and in case of great technical complexity, an intervention could be attempted on the coronary graft.⁷ The success of the procedure is determined by the quality of flow obtained after PCI, The latter being a good or bad prognostic factor according to the type of flow obtained at the end of the procedure. In our hospital unit, we have as the treatment of choice for type 5 infarction, angioplasty of the native vessel related to electrical changes, with implantation of drug-eluting endoprostheses. Trying to achieve the primary objective, which is to obtain TIMI 3 flow from said native vessel and with this impact on a good prognosis in this group of patients. Decreasing mortality rates in this entity and prolonging long-term survival curves.

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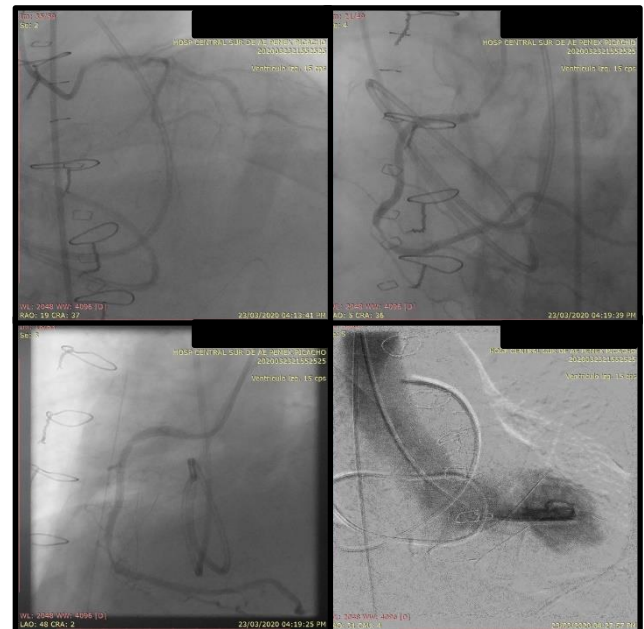


Figura 1. Descripción. Coronariografía diagnóstica 4 horas post-CABG. Panel A. TCI obstrucción 70%, DA 100%, flujo TIMI 0, Cx ostial 80%, ramo lateral alto 80%, ramo obtusa marginal 100%. Panel B y C) CD dominante, obstrucción 80% en tercio medio - distal. Panel D) Ventriculografía, hipocinesia grave anterolateral y diafragmática, discinesia apical, D2VI 20 mmHg, FEVI 45%.

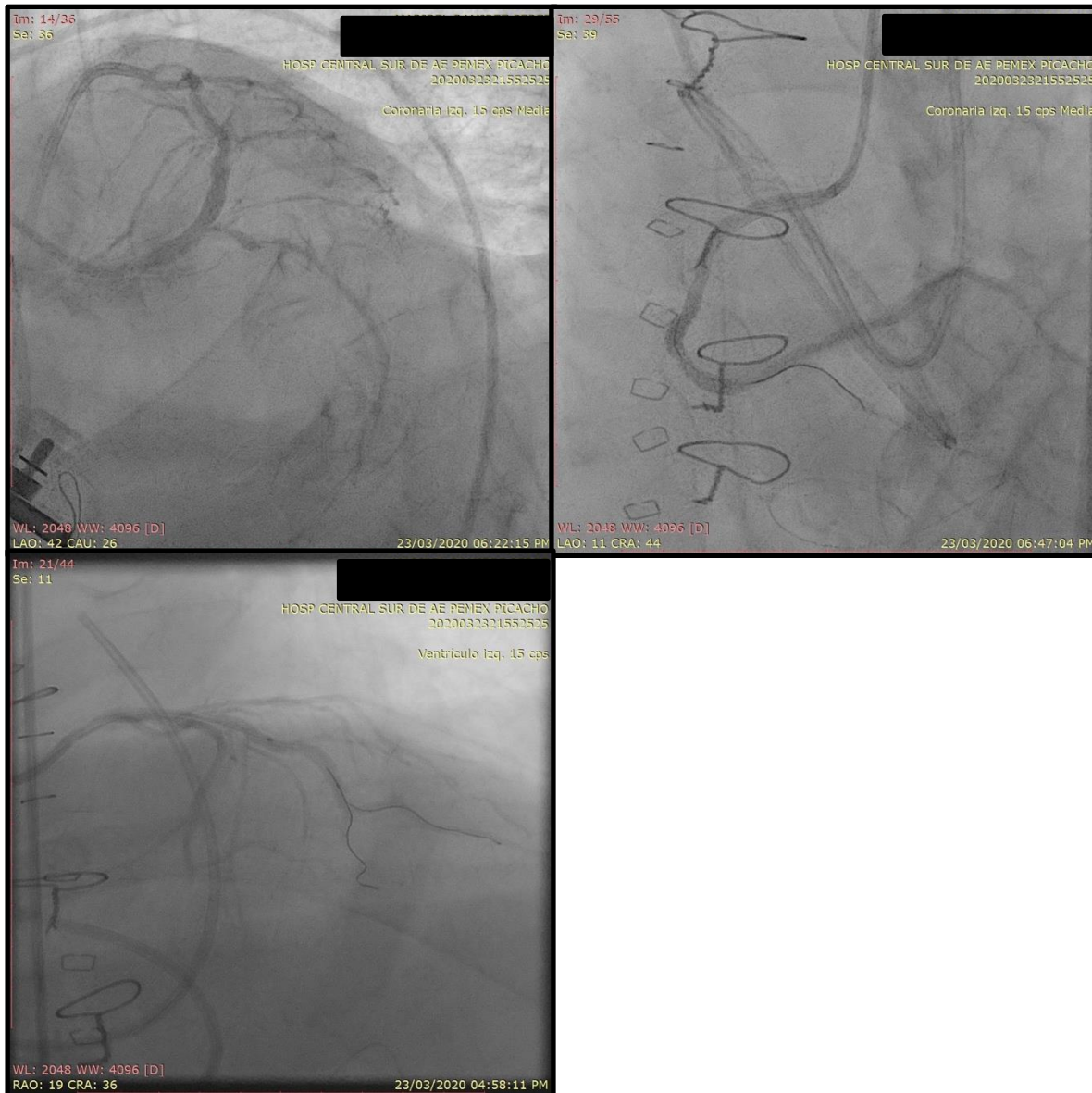


Figura 2. Descripción. Intervencionismo percutáneo. Panel A) No se logró llegar a segmento distal de DA con cuerda guía 0.014". Predilatación (kissing balloon) a TCI, DA y Cx. Stent provisional (platino cromo liberador de everolimus) de TCI a DA, angioplastia con balón de TCI a Cx (intento fallido de stent). Panel C) Stent directo platino cromo liberador de everolimus. Conclusión ICP con técnica de stent provisional de TCI a DA, balón a Cx. Stent directo a CD.

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