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Multivessel Coronary Atherosclerotic Disease in Exclusive Pharmacological Treatment: Case Report and a Critical Literature Review

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ABSTRACT

Three-vessel coronary atherosclerotic disease (CAD) presents a clinical challenge in managing heart cardiac patients, especially when they resist undergoing interventional therapies such as coronary artery bypass grafting (CABG) or percutaneous coronary intervention (PCI). This article presents a challeging case report of a patient with three-vessel CAD who refused invasive therapies and was managed solely through medical treatment. It also critically reviews the literature on the atual benefits and drawbacks of medical treatment *versus* interventional therapies in multivessel CAD. The recommendations from Cardiology Societies, as well as data from randomized controlled trials (RCTs), were critically analyzed, comparing outcomes such as mortality, morbidity, and quality of life, in order to assess the actual magnitude of benefit across different therapeutic modalities. In selected cases, the current optimized medical therapy (OMT) alone may be a viable alternative, particularly for patients who refuse invasive interventions.

Keywords: Coronary artery disease; Multivessel; Atherosclerotic disease;

INTRODUCTION

Coronary artery disease (CAD) is one of the leading causes of cardiovascular morbidity and mortality worldwide (MORAN *et al*., 2014). In patients with multivessel CAD, particularly when triple-vessel involvement is present, myocardial revascularization, either through surgery or percutaneous coronary intervention (PCI), is often recommended to improve symptoms and reduce the risk of future cardiovascular events (CESAR *et al*., 2014; CHRISTIAAN *et al*., 2024). However, exclusive medical management may be a viable alternative for these patients (CHRISTIAAN *et al*., 2024), especially considering the evolution of pharmacological therapies over the past few decades, especially with the combination of at least one antiplatelet drug, statin, beta-blocker, and angiotensin-convertin enzyme inhibitor/ angiotensin receptor blocker (IQBAL *et al*., 2015) optimized medical treatment (OMT) the magnitude of the benefits of different treatment modalities, the risks of invasive therapies, and the reluctance of some patients toward interventional procedures (MARON *et al*., 2020; PRADO-OLIVARES; CHOVER SIERRA, 2019).

According to the Brazilian Society of Cardiology guidelines for stable coronary artery disease OMT is considered the cornerstone of management for patients with stable CAD, with interventions indicated for cases of refractory angina or significant ischemia (CESAR *et al*., 2014). This approach is supported by important clinical trials demonstrating that OMT may offer benefits equivalent to PCI in stable patients (BODEN *et al*., 2007).

In the therapeutic decision-making process between OMT and interventional therapies, various debates arise, especially for patients with multivessel CAD (MARON *et al*., 2020). Randomized studies have provided important insights into the advantages and disadvantages of comparing interventional *versus* conservative approaches (FRYE *et al*. 2009; HUEB *et al*., 2004). Furthermore, when opting for invasive/surgical therapy, despite the documented potential benefits, there can be significant drawbacks, such as an increased risk of stroke, perioperative mortality, and anxiety disorders related to the cardiac surgery process (FARKOUH *et al*., 2012; PRADO-OLIVARES; CHOVER SIERRA, 2019).

Thus, the aim of this study is to present the case of a patient with triple-vessel CAD diagnosed after an acute myocardial infarction (AMI), who resisted and refused invasive treatments despite adequate explanation of therapeutic measures, opting instead

for exclusive OMT. The patient's clinical progression was satisfactory, generating a reflection on the actual benefit of interventional therapies, considering factors such as NNT and the particularities of invasive management.

CASE REPORT

A 56-year-old male patient, a physically active rancher, Caucasian, married, and a former smoker for 10 years (20 pack-years), with a prior diagnosis of diabetes mellitus (DM), presented to the emergency room in January 2018 with a history of prolonged retrosternal chest pain at rest. The electrocardiogram did not show signs of acute ischemia, but high-sensitivity troponin T elevation confirmed a diagnosis of non-ST-elevation myocardial infarction (NSTEMI).

On physical examination, the patient was eupneic, hydrated, lucid, and oriented, with normal cardiac and pulmonary auscultation, full and symmetrical peripheral pulses, elevated blood pressure (154/92 mm Hg), and a heart rate of 90 beats per minute. The chest X-ray showed no abnormalities, peripheral capillary blood glucose was 113 mg/dL, and serum creatinine was normal (1.1 mg/dL).

Following clinical measures for acute coronary syndrome, including the administration of dual antiplatelet therapy (aspirin 300 mg and clopidogrel 300 mg), anticoagulation therapy (enoxaparin 60 mg), and isosorbide dinitrate 5 mg, the patient was referred to the catheterization laboratory and underwent radial-access coronary angiography. The examination revealed a mild ostial lesion of the left main coronary artery (LMCA) with significant diffuse atheromatosis involving the left anterior descending artery (80% stenosis), the circumflex artery (70% stenosis), and the acute marginal branch of the right coronary artery (80% stenosis). Ventriculography showed normal global left ventricular (LV) function, despite inferior wall akinesia.

After the catheterization procedure, the patient was admitted to the Coronary Care Unit for continuous monitoring. Clinical treatment for acute coronary syndrome was continued with aspirin 100 mg/day, clopidogrel 75 mg/day, rosuvastatin 40 mg/day, enalapril 10 mg twice daily, metoprolol 25 mg/day, and enoxaparin 60 mg twice daily. The patient was discharged after 5 days, asymptomatic.

At the 30-day follow-up, the patient reported chest discomfort during strenuous activities. Aspirin, clopidogrel, rosuvastatin, and enalapril were maintained, metoprolol

was adjusted to 50 mg/day, and colchicine 0.5 mg/day and amlodipine 5 mg/day were added to improve survival, optimize cardiac workload (double product), and relieve angina symptoms. Transthoracic echocardiography showed preserved global LV contractile function (58%) with inferolateral wall akinesia and signs of fibrosis.

In addition to OMT, therapeutic options including CABG and PCI were presented to the patient, but he was resistant and refused invasive procedures, opting for medical therapy alone. He has been on regular clinical follow-up since then (up to 2024), showing good symptom control, pain remission, no limitations in daily activities, normal clinical and laboratory parameters, and no global ventricular dysfunction. Both the patient and his family report psychological well-being and satisfaction with his clinical evolution, respecting his beliefs and individual convictions.

DISCUSSION

The decision between OMT and interventional therapies for patients with CAD must be carefully individualized. One of the major studies on CAD management demonstrated that in stable patients, PCI did not significantly reduce the risk of death or myocardial infarction compared to pharmacological treatment (BODEN *et al*., 2007). These findings are particularly relevant for patients whose symptoms are well-controlled with medication.

Conversely, CABG is frequently recommended in cases of three-vessel CAD, particularly for diabetic patients or those with significant LV dysfunction. However, it is important to note that there was no statistically significant difference in all-cause mortality as the primary endpoint in the BARI-2D and STICH trials (FRYE *et al*., 2009; VELAZQUEZ *et al*., 2011). Additionally, in patients undergoing surgical treatment who experienced perioperative death, this outcome could be perceived as "anticipated." Moreover, the psychological stress and anxiety related to the surgical process should not be overlooked, especially when facing the prospect of cardiac surgery (PRADO-OLIVARES; CHOVER SIERRA, 2019).

The benefits of CABG over PCI (which, in a previous study, was shown to be equivalent to OMT in terms of survival) in patients with three-vessel CAD were highlighted in the FREEDOM clinical trial, demonstrating a reduction in the primary outcome, composed of death, myocardial infarction, or stroke (FARKOUH *et al*., 2012).

However, the magnitude of this benefit should be scrutinized. Five years after the randomization of this RCT, the NNT for the primary outcome was approximately 13. This means that, for every 130 patients undergoing cardiac surgery, ten would experience a reduction in the combined outcome mentioned, implying that 120 patients would not benefit from such outcomes despite undergoing an invasive surgical therapy, with an increased risk of stroke, estimated at 5.2% in the surgical group *versus* 2.4% in the PCI group after five years (FARKOUH *et al*., 2012). It is also worth noting that there was a difference in the benefit of surgical procedures performed in North America compared to other regions of the world, raising the possibility of performance bias (FARKOUH *et al*., 2012). Factors such as access to more advanced technologies, standardized surgical protocols, and team experience can directly influence surgical outcomes (HUSSAIN *et al*., 2023).

On the other hand, OMT has already demonstrated promising results in the management of CAD (HUEB *et al.,* 2004) and consequently, in patients with multivessel disease, being an important ally for those with adequate symptomatic control. The ISCHEMIA trial, considered by many to be the largest RCT on chronic coronary artery disease in history, showed no statistically significant difference between OMT alone *versus* an initial invasive strategy (cardiac catheterization followed by revascularization either by PCI or CABG, whichever was deemed as more appropriate by each participating center's heart team on a case by case basis) plus OMT for patients with moderate or severe ischemia, regarding the combined outcome of cardiovascular death, myocardial infarction, hospitalization for unstable angina, heart failure, or resuscitated cardiac arrest (MARON *et al*., 2020). This outcome is surprising, yet justified using the current OMT, which was incomplete in previous studies but has been proven effective.

Additionally, conservative therapy also has the advantage of avoiding surgical complications and the need for reinterventions, which are relatively common in patients undergoing PCI, particularly in cases of persistent chronic occlusion.

CONCLUSION

The choice of the best therapeutic modality for patients with three-vessel CAD, whether through medication alone or combined with invasive procedures, is complex and should be based on a careful evaluation of the risks and benefits of each approach, including the analysis of the magnitude of potential advantages. The patient's and

family's concerns, beliefs, and opinions should be considered when defining the treatment, which is dynamic and adjustable over time. Although CABG and PCI may offer benefits in terms of symptom reduction and cardiovascular event prevention for patients with three-vessel coronary disease, it can be concluded that OMT constitutes a valid and effective alternative for managing these patients, especially for stable patients who are resistant to invasive measures.

Pharmacological management should be considered a viable option for selected multivessel coronary patients, both for symptom control and event reduction, as long as they are adequately monitored and followed up, with adjustments made according to their needs. Future studies should continue to evaluate the role of contemporary and non-invasive therapies, especially for patients at high perioperative risk and those facing psychological and clinical barriers to revascularization.

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