Pharmacoinvasive strategy: An essential tool to avoid the reperfusion paradox in STEMI networks

Estrategia farmacoinvasiva: herramienta para evitar la Paradoja de Reperfusión en redes de infarto

Ignacio Barriuso, Tania Ramírez-Martínez, Núria Pueyo, and Diego Fernández-Rodríguez*

Cardiology Department, Hospital Universitari Amat de Vilanova de Lleida, IRBLLeida (Institut de Recerca Biomèdica de Lleida), Lleida, Spain

To the Editor;

We want to congratulate Gopar-Nieto et al.1 for their interesting study on health outcomes in patients with ST-segment elevation myocardial infarction (STEMI) attended by a regional STEMI care network and afterwards admitted to the “Instituto Nacional de Cardiología” in Mexico City.

This research was based on a cohort of patients from the PHASE-MX registry that included 340 patients with STEMI: 166 received a pharmacoinvasive strategy (PS) and 174 primary percutaneous coronary interventions (PCI). Demographic and clinical characteristics as well as laboratory tests and in-hospital mortality are described, evaluating the predictors associated with higher mortality during the hospitalization. It is worth highlighting the precise description of the places where the first medical contact was made, the distance from them to the “Instituto Nacional de Cardiología,” and the delay times to the different medical interventions. The authors found no differences in intra-hospital mortality relating to the reperfusion strategy used, concluding that PS can be an effective and safe alternative to primary PCI in the context of STEMI care network in Mexico1.

The implementation of STEMI care networks, mainly focused on primary PCI, has been widely adopted in many countries on the assumption that reperfusion through primary PCI is superior to fibrinolysis2,3. These national programs have made possible to extend mechanical reperfusion and have obtained a clear benefit in reducing the times for the primary PCI performed in institutions with primary PCI availability 24 h a day, 7 days a week (24/7). Furthermore, the increase in primary PCI has been accompanied by a drastic reduction in fibrinolytic therapy that has become a marginal reperfusion strategy. However, many patients, even in countries with more resources, carry on presenting to non-PCI hospitals or hospitals without a 24/7 primary PCI program2. Most of these patients are denied benefits from either mechanical or pharmacologic therapy due to the delay to primary PCI remains outside current guidelines and fibrinolysis therapy is a marginal treatment. This fact is known as “reperfusion paradox” in STEMI care networks4.

This study1 shows that a global strategy that adequately balances both reperfusion strategies could be extremely useful and extrapolated, not only to countries with similar socioeconomic characteristics to Mexico, but also to certain areas of high income countries that present low availability for 24/7 primary PCI. However, we would like to point to some considerations that could facilitate the understanding of the study and help improve the STEMI care network:
1. Successful reperfusion: One of the key points when assessing the success of PS in STEMI is the percentage of patients who have clinical and electrocardiographic criteria for reperfusion after administration of the fibrinolytic. In the STREAM trial more than a third of the patients required rescue PCI. In the present study, the authors report that the median time to coronary angiography was 24 h, but they do not specify the percentage of patients in whom fibrinolysis was unsuccessful and/or required rescue PCI.

2. Contraindications and complications of fibrinolytic treatment: Fibrinolytic therapy presents a high number of contraindications (a previous intracranial hemorrhage, a recent major surgery, etc.) that primary PCI does not present, and is also associated with a high number of hemorrhagic complications which is strongly related to prognosis. However, the authors do not provide information in this regard.

3. Door-to-needle time: The success of fibrinolysis and its prognostic influence is highly dependent on door-to-needle time. The authors report a median of 54 min with an interquartile range of 30-103 min, which means that a vast majority of patients are outside of the recommended time in guidelines, which could limit the benefit of fibrinolysis and penalize PS in this study.

4. Improving transfers on STEMI care network: Patient transport plays a crucial role in reducing system delays. One of its main conditioning factors is the availability of emergency physicians to identify STEMI and to carry out transfers. This limitation can be reduced by training nurses or paramedics in the recognition of electrocardiographic patterns, defibrillation, and/or orotracheal intubation, thus expanding the capacity of a STEMI care network to transfer patients, both for primary PCI and for rescue PCI. There are experiences in this regard that could be useful for the metropolitan area of Mexico City.

In conclusion, PS is an essential tool to maximize reperfusion therapy in patients treated by a STEMI care network and thus avoid the appearance of the “reperfusion paradox” when 24/7 PCI availability is limited.

References

1. Gopar-Nieto R, Araiza-Garaygordobil D, Raymundo-Martínez G, Martínez-Amezquía P, Cabello-López A, Manzur-Sandoval D, et al. Demographic description and outcomes of a metropolitan network for myocardial infarction treatment. Arch Cardiol Mex. 2021. DOI: 10.24875/ACM.20000133 (Ahead of Print).
2. Keeley EC, Boura JA, Grines CL. Primary angioplasty versus intravenous thrombolytic therapy for acute myocardial infarction: a quantitative review of 23 randomised trials. Lancet. 2003;361:13-20.
3. Ibanez B, James S, Agewall S, Antunes MJ, Bucciarelli-Ducci C, Bueno H, et al. 2017 ESC guidelines for the management of acute myocardial infarction in patients with ST-segment elevation: the task force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European society of cardiology (ESC). Eur Heart J. 2018;39:119-77.
4. Armstrong PW, Boden WE. Reperfusion paradox in ST-segment elevation myocardial infarction. Ann Intern Med. 2011;155:389-91.
5. Armstrong PW, Gershick AH, Goldstein P, Wilcox R, Danays T, Lambert Y, et al. Fibrinolysis or primary PCI in ST-segment elevation myocardial infarction. N Engl J Med. 2013;368:1379-87.
6. Global Use of Strategies to Open Occluded Coronary Arteries in Acute Coronary Syndromes (GUSTO IIb) Angioplasty Substudy Investigators. A clinical trial comparing primary coronary angioplasty with tissue plasminogen activator for acute myocardial infarction. N Engl J Med. 1997;336:1821-6.
7. Sloman M, Williamson GR. Thrombolysis administration by nurses: an evolving UK evidence base? Int Emerg Nurs. 2009;17:193-202.
8. Zughalt D, Hamek J. A review of the role of nurses and technicians in ST-elevation myocardial infarction (STEMI). EuroIntervention. 2014;10 Suppl T: T83-6.
To the authors,

We are glad to read the comments about our article entitled “Demographic description and outcomes of a metropolitan network for myocardial infarction treatment”1. Our study describes and highlights the importance of integrating a metropolitan network to treat ST-segment elevation myocardial infarction, which remains a critical issue in low-to-middle income countries due to social, cultural, geographical, and logistical disparities. The full description of the 30-day outcomes in patients receiving either primary PCI or pharmacoinvasive strategy within our network is published elsewhere1. Regarding the questions raised by the authors, successful reperfusion after fibrinolytic was achieved in 59.1%; however, the number of patients with contraindications to fibrinolysis was not recorded. Nevertheless, our complication rate was low2. We agree that door-to-needle time was higher than other similar studies, although we did not find significant differences in clinical outcomes. A possible explanation for this phenomenon is that education regarding STEMI standards of care, and access to diagnostic and therapeutic resources is still limited within the network. We must clarify that one of our main purposes is to educate health personnel to identify patients undergoing myocardial infarction, and since 2017, the national reperfusion program (PREMIA) has supported different educational and research initiatives to achieve such goal. Finally, we consider of utmost importance to communicate that the development of a STEMI network is feasible, even within a highly populated city in a middle-income country, and that outcomes within such networks are comparable with those of industrialized countries and well established reperfusion systems.

References
1. Gopar-Nieto R, Araiza-Garaygordobil D, Raymundo-Martínez GI, Martínez-Amezcua P, Cabello-López A, Manzur-Sandoval D, et al. Demographic description and outcomes of a metropolitan network for myocardial infarction treatment. Arch Cardiol Mex. 2021;91:167-77.
2. Araiza-Garaygordobil D, Gopar-Nieto R, Cabello-López A, Martínez-Amezcua P, Eid-Lidt G, Baeza-Herrera LA, et al. Pharmacoinvasive strategy vs primary percutaneous coronary intervention in patients with ST-elevation myocardial infarction: Results from a study in Mexico City. CJC Open 2020;3:409-18.