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Adverse Clinical Outcomes Associated with Conventional Versus Distal Radial Access in Patients with Acute Coronary Syndrome with ST-segment Elevation Treated by Percutaneous Coronary Intervention

Unique Protocol ID: 23-1367

BACKGROUND

The radial artery (RA) is considered to be the vascular access of choice to perform percutaneous coronary intervention (PCI). (1, 2) The main advantage of conventional radial access (CRA) compared to femoral artery access is the reduction in major vascular complications and major bleeding. (3) This benefit reduces the rate of major adverse events and cardiovascular mortality. Outstanding randomized studies have confirmed the superiority of RA associated with a lower rate of vascular complications and mortality. (4, 5)The MATRIX study (Minimizing adverse haemorrhagic events by transradial access site and systemic implementation of angiox) demonstrated lower global mortality at 30 days with RA in patients with Acute Coronary Syndrome (ACS) (1.65 vs. 2.2%, p=0.045).(6) This reduction was also demonstrated in the rate of compound events of death, myocardial infarction (MI), cerebrovascular event, and BARC type 3 or 5 (9.8% vs. 11.7%, p=0.0092). (6, 7) In the RIVAL study (Radial versus femoral Access for percutaneous coronary intervention) the effectiveness of RA was similar to femoral access, with a lower rate of local vascular complications.(8) A subsequent analysis of the same study documented a greater benefit of RA in reducing net clinical adverse events and mortality in patients with AMI (Acute Myocardial Infarction) and elevation of the ST segment (STEMI).(9) The combination of events of death, MI, cerebrovascular event, or major bleeding was 4.19% with RCA and 8.18% with femoral access (p<0.001) in patients with STEMI.

Distal radial access (DRA) has emerged as an alternative to CRA in PCI. (10) Compared to CRA access, RDA is associated with a lower rate of radial artery occlusion (RAO) and hematoma (10);

however, it requires more time for radial artery cannulation, more puncture attempts, and a higher rate of conversion to femoral. (10, 11)

There is no evidence that RDA is superior to CRA in patients with STEMI undergoing interventional treatment in relation to net adverse clinical events.

STATEMENT OF THE PROBLEM

Randomized studies have shown that DRA is associated with lower local complication rates than CRA access, primarily reducing the rate of RAO. A recent meta-analysis documented a 68% reduction in the relative risk ratio (RRR) of RAO at 24 hours with RDA and 64% RRR of RAO at longer follow-up. (10) In addition, a reduction in local complications, mainly hematomas, has been reported. However, the need to change vascular access is greater with the RDA. At present, there is no evidence to support that the RDA is superior or non-inferior to the CRA in relation to the rate of net adverse clinical events in patients with STEMI receiving interventional treatment. This aspect should be studied in order to determine the place that the RDA should occupy in the context of interventional treatment for STEMI.

JUSTIFICATION

Compared to femoral access, CRA is associated with a lower rate of adverse cardiovascular events and a lower incidence of vascular complications related to vascular access, mainly hemorrhagic. (4-6, 8) As of 2018 the European Society of Cardiology recommends RA as the access of choice in patients with ACS and as of 2021 the ACC/AHA for coronary interventions in patients with ACS. (1, 2) The most important complication of CRA is RAO, which, according to the latest good practice recommendations should not exceed 5%. (12) Advances in the technological development of hydrophilic and low-profile introducers have managed to reduce the RAO rate. However, the use of hemostasis with classic permeable radial artery, facilitated by or with compression of the ulnar artery, is the most important method that has reduced the RAO rate at 24 hours and at 30 days when CRA is used. (13) On the other hand, the optimal method of anticoagulation when radial access is used has not yet been defined, considering that the use of systemic anticoagulation is essential for the performance of PCI. (12)

One of the strongest pieces of evidence that has reduced the rate of proximal RAO from 8.4% to 0.7% at 24 hours is the use of the DRA. (11) A recent meta-analysis of randomized studies comparing CRA versus DRA documented a relative risk reduction of 68% for in-hospital RAO when using RDA. (10)

Randomized experimental studies have shown that the RDA does not increase the rate of RAO, in addition to offering advantages such as a lower bleeding rate and shorter hemostasis time compared to the CRA. (14) Therefore, it is essential to establish whether the benefit of the RDA in patients with ACS, particularly in patients with STEMI, is non-inferior to that which has been demonstrated with the CRA.

RESEARCH QUESTION

Is the 30-day net adverse clinical event rate at 30 days in patients with STEMI undergoing PCI non-inferior when comparing DRA with CRA?

HYPOTHESIS

H0: Is there a difference between the 30-day net adverse clinical event rates in patients with STEMI undergoing PCI when comparing DRA with CRA?

H1: The 30-day net adverse clinical event rate in patients with STEMI undergoing PCI is non-inferior when comparing DRA and CRA.

OBJECTIVES

Primary:

The primary objective is to compare the composite of adverse events of all-cause mortality, AMI, cerebral vascular events, BARC type 3 or type 5 (Bleeding Academic Research Consortium) at 30 days in patients with STEMI who received PCI via RDA versus CRA.

Secondary:

To compare the composite of net adverse events of all-cause mortality, AMI, cerebral vascular events, urgent Revascularization of Treated Vessel, definite stent thrombosis, type 3 or 5 BARC at 30 days evolution in patients with STEMI who received PCI via RDA versus CRA.

To compare the rate of clinical adverse events individually at 30 days of evolution in patients with STEMI who received PCI via RDA versus CRA.

METHODOLOGY

Study design:
Prospective: Because of the temporality.
Randomized: For the assignment of the intervention.
Comparative: For the type of analysis.
Multicenter: Participation of 5 centers for patient recruitment.

*Five centers in Mexico will participate, including the National Institute of Cardiology.

Description of the study population

Target population:
Patients with a diagnosis of STEMI who underwent PCI.

Eligible population:
Patients >18 years old, of both genders, with the diagnosis of STEMI undergoing PCI via RDA and CRA who are not in cardiogenic shock and have not previously undergone coronary revascularization surgical treatment.

Inclusion criteria:

Patients > 18 years old, with a diagnosis of STEMI undergoing PCI treatment at the Instituto Nacional de Cardiología Ignacio Chávez.

Patients with permeable radial artery in its proximal and distal segments.

Patients who agree to participate in the study and sign the informed consent form.

Exclusion Criteria:

Patients meeting cardiogenic shock criteria, with a history of previous coronary revascularization surgery, and patients with absent radial pulse, carriers of AV fistula for hemodialysis or history of RAO will be excluded.

Patients who do not wish to enter the protocol or sign the informed consent form will also be excluded.

Elimination criteria:

Patients who do not complete the 30-day follow-up and those who withdraw from the study by their own decision will be eliminated.

Randomization:

Randomization will be computerized.

Blinding:

Open, no blinding will be used.

Sample size:

The significance level (Alpha) will be 5%, power (1-beta) 80%. The composite major adverse event rate (all-cause mortality, AMI, cerebral vascular event, BARC type 3 or type 5) in the CR group was set at 4.19% based on the RIVAL study and with a non-inferiority cutoff of 1.89%. In the presence of a true difference in favor of the experimental group of 1.89%, the total population required is 2782 and 1391 patients per group to be 90% certain that the upper limit of the one-sided 95% confidence interval will exclude a difference in favor of the standard group of > 1.89%. The calculation of the final overall population with a 5% loss is 2922, 1461 patients per group.

Feasibility:

In the Cath-lab at the Instituto Nacional de Cardiología Ignacio Chávez, 4608 procedures are performed per year, of which 3600 are in adults with ischemic and structural heart disease. Of this total group, 2880 are PCI. Approximately 90 procedures per month or 1080 per year correspond to patients with SICA; of these patients, approximately 65% (702) correspond to STEMI; thus, at least our institute would contribute 2106 patients for this multicenter study, which corresponds to 75% of the total population required; the rest of the centers should only contribute 766 patients. It is feasible to carry out the study over a period of 36 months.

Specification of the variables

Independent: distal and proximal radial access.

Dependent: age, gender, body weight, body mass index, diabetes mellitus, systemic arterial hypertension, smoking, chronic obstructive pulmonary disease, dyslipidemia, overall death, cardiovascular death, myocardial infarction, vascular complications, vascular access bleeding, stent thrombosis, new revascularization of the treated vessel, cerebral vascular event, radial artery thrombosis, culprit vessel, stent type, left ventricular ejection fraction, troponin levels, ECG ST segment changes, ECG T wave changes.

Data collection technique

The EXCEL database will be used to record all the variables selected, and the SPSS 2020 package will be used for the statistical analysis of the study and comparison of the variables.

STATISTICAL ANALYSIS PLAN

The SPSS 2020 package will be used for the statistical analysis as described above. No interim analysis has been pre-specified. The analysis will be by treatment intention according to assignment. Categorical variables will be expressed as percentages, and continuous variables as means ± standard deviation. To compare categorical variables, the chi-square test or Fisher's exact test will be used, and to compare continuous variables, the Student's t-test or Mann-Whitney U test will be used. Survival

curves will be constructed using the Kaplan-Meier method. Conditional logistic regression models will be obtained to obtain OR and CI to establish the association of baseline patient characteristics and net adverse clinical events. The pre-specified subgroup for analysis is STEMI.

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