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ORIGINAL ARTICLE

Thrombus aspiration for reperfusion in myocardial infarction: Predictors and clinical impact of ineffectiveness☆

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KEYWORDS
Thrombectomy;
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Abstract
Introduction and Objectives: The benefit of manual thrombus aspiration (TA) in the reperfusion of patients with ST-elevation myocardial infarction (STEMI) has been hotly debated. In most series, failure of TA has been largely unreported. Our objectives were to assess the rate, predictors, and impact on cumulative mortality of failed TA during primary percutaneous coronary intervention (PPCI).
Methods: This was a single-center, retrospective study of consecutive STEMI patients undergoing PPCI with TA. TA was considered ineffective if, before angioplasty, coronary flow was TIMI <2. Independent predictors of TA failure were assessed by logistic regression, and predictors of cumulative mortality were assessed by Cox regression analysis.
Results: Of 574 patients, TA was used in 417 (72.6%), and was effective in 365 (87.5%) and ineffective in 52 (12.5%). On multivariate analysis, SYNTAX score (OR=1.049, 95% CI: 1.015–1.084, p=0.005) and total ischemic time (OR=1.001, 95% CI: 1.000–1.003, p=0.02) were independent predictors of TA failure. Moderate or severe left ventricular dysfunction (HR=6.256, 95% CI: 1.896–20.644, p=0.003), APPROACH score (HR=1.094, 95% CI: 1.016–1.177, p=0.017), Killip class III/IV (HR=2.953, 95% CI: 1.122–7.770, p=0.028) and creatinine clearance on admission (HR=0.973, 95% CI: 0.953–0.994, p=0.011) were independently related to cumulative mortality at 24±0.82 months.
Conclusions: Total ischemic time and SYNTAX score were independent predictors of TA failure. However, in medium-term follow-up, ineffective manual TA was not independently related to cumulative mortality.

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PALAVRAS-CHAVE
Trombectomia;
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A trombectomia aspirativa na reperfusão do enfarte agudo de miocárdio: preditores e impacto clínico da sua ineficácia

Resumo
Introdução e objetivos: O benefício da trombectomia aspirativa manual (TbA) na reperfusão do enfarte de miocárdio com elevação de ST (EAMST) tem sido muito debatida. Na maioria das séries, a ineficácia da TbA tem sido pouco evidenciada. Os nossos objetivos visaram conhecer a taxa, os preditores e o impacto na mortalidade cumulativa da TbA ineficaz (TbANE) numa série de doentes submetidos a intervenção coronária percutânea primária (ICPP).
Métodos: Estudo retrospetivo, unicêntrico, consecutivo, de doentes com EAMST submetidos a ICPP com TbA. Considerou-se TbANE se após a TbA e antes de prosseguir a angioplastia se se obtivesse fluxo coronário TIMI<2. Identificaram-se preditores independentes de TbANE por regressão logística multivariada. Os preditores de mortalidade cumulativa foram identificados por modelo de Cox.
Resultados: Dentre 574 doentes, utilizou-se a TbA em 417 (72,6%), que foi eficaz em 365 (87,5%), ineficaz em 52 (12,5%). Na análise multivariada, o *score* SYNTAX (OR=1,049, 95% CI: 1,015-1,084, p=0,005) e o tempo isquémico total (OR=1,001, 95% CI: 1,000-1,003, p=0,02) foram os preditores independentes de TbANE. A disfunção ventricular esquerda moderada/severa (HR=6,256, 95% CI: 1,896-20,644, p=0,003), o *score* APPROACH (HR=1,094, 95% CI: 1,016-1,177, p=0,017), a classe 3-4 de Killip (HR=2,953, 95% CI: 1,122-7,770, p=0,028) e a *clearance* da creatinina na admissão (HR=0,973, 95% CI: 0,953-0,994, p=0,011), relacionaram-se de forma independente com a mortalidade cumulativa (24±0,82 meses).
Conclusões: O tempo de sintomas e o *score* SYNTAX foram preditores independentes de TbANE. Contudo, a TbANE não teve impacto independente com a mortalidade cumulativa a médio prazo.

List of abbreviations

APPROACH	Alberta Provincial Project for Outcome Assessment in Coronary Heart Disease
CMR	cardiac magnetic resonance
CrCl	creatinine clearance
GRACE	Global Registry of Acute Coronary Events
LVEF	left ventricular ejection fraction
PPCI	primary percutaneous coronary intervention
STEMI	ST-elevation myocardial infarction
SYNTAX	Synergy between PCI with TAXUS drug-eluting stent and cardiac surgery
TA	thrombus aspiration
TIT	total ischemic time

Introduction and Objectives

The benefit of manual thrombus aspiration (TA) as an adjunctive technique in the reperfusion of patients with ST-elevation myocardial infarction (STEMI) has been hotly debated. The advantage of TA during primary percutaneous coronary (PPCI) is that it reduces the risk of distal embolization of thrombotic material during the procedure, thus improving microvascular perfusion and reducing infarct size.[1–6] Compared to mechanical thrombus removal, manual TA is simpler to perform and is of equal or superior efficacy.[7–9]

The introduction of manual TA aroused great interest and it is now widely used in interventional cardiology; it has a class IIa recommendation, level of evidence B, in the European Society of Cardiology guidelines for the management of STEMI.[10] Nevertheless, there is considerable variation in use of this technique as adjunctive therapy to reperfusion.[11] In a recent survey, manual TA was used in less than 20% of PPCI procedures in the US.[12] Although some randomized studies have demonstrated clinical benefit by reducing major cardiovascular events,[13–15] subsequently confirmed in meta-analyses,[8,16–18] other series, including one large-scale study, have not shown the same clinical efficacy.[19–22] However, TA may not be possible in some cases (10% of patients scheduled for TA in the TAPAS study[13]). The effect of failure of TA in patients in whom it was considered to be indicated has been largely unreported.

The primary objective of this study was to identify the predictors of TA failure in a consecutive series of STEMI patients referred for PPCI, in which TA was systematically used as the first option (bail-out procedures were excluded). The secondary objective was to assess the impact of failed TA on cumulative mortality (cardiac and non-cardiac) in the medium term.

Methods

Study population and definitions

This was a single-center retrospective study of consecutive STEMI patients admitted for PPCI between January 2008 and