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Prognostic Value of Access Site and Nonaccess Site Bleeding After Percutaneous Coronary Intervention

A Cohort Study in ST-Segment Elevation Myocardial Infarction and Comprehensive Meta-analysis

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Objectives This study sought to investigate the prognostic value of access site bleeding (ASB) and non-ASB for recurrent ischemic outcomes and mortality in patients with ST-segment elevation myocardial infarction (STEMI).

Background The prognostic value of ASB-related complications after STEMI is subject to debate.

Methods The prognostic value of ASB and non-ASB for 1-year mortality, recurrent myocardial infarction (MI), stent thrombosis, and stroke was investigated in 2,002 STEMI patients undergoing primary percutaneous coronary intervention. In addition, we performed a meta-analysis of studies investigating the prognostic value of ASB and non-ASB in patients undergoing percutaneous coronary intervention.

Results Seventy-four patients (3.7%) were treated by radial access. ASB developed in 124 patients (6.3%) and non-ASB developed in 102 (5.2%). By multivariable analysis, ASB was not associated with a higher risk of 1-year mortality (hazard ratio [HR]: 1.03; $p = 0.89$), recurrent MI (HR: 1.16; $p = 0.64$), stent thrombosis (HR: 0.55; $p = 0.42$), or stroke (HR: 0.47; $p = 0.31$). Non-ASB was independently associated with 1-year mortality (HR: 2.77; $p < 0.001$) and stent thrombosis (HR: 3.10; $p = 0.021$), but not with recurrent MI and stroke. In a meta-analysis including 495,630 patients, non-ASB was associated with a greater adjusted risk of subsequent 1-year mortality than ASB (HR: 1.66; 95% CI: 1.56 to 1.76 and HR: 1.21; 95% CI: 1.11 to 1.31).

Conclusions In STEMI, ASB was not significantly associated with 1-year clinical outcomes, whereas non-ASB was significantly associated with 1-year mortality and stent thrombosis. These results taken together with those of previous studies indicate a greater risk of subsequent mortality in patients with non-ASB. (J Am Coll Cardiol Intv 2014;7:622–30) © 2014 by the American College of Cardiology Foundation

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Bleeding complications after percutaneous coronary intervention (PCI) are associated with an increased risk of mortality and morbidity (1–4). Therefore, considerable effort has been made to develop novel treatment strategies directed at minimizing bleeding complications. One such strategy, performing PCI via the radial artery, has been shown in prospective, randomized trials to result in a reduction in bleeding complications arising at the arterial puncture site (5,6). Unfortunately, although access site bleeding (ASB) represents a common source of bleeding in patients undergoing PCI, as many as 50% to 60% of major or minor bleeding complications originate at a site not related to the arterial access site (non-ASB) (7–10). Furthermore, ASB was shown in some studies to be associated with increased mortality after PCI, whereas others have failed to confirm these findings (7–9,11,12). Moreover, in the RIVAL (RadIal Vs femorAL access for coronary intervention) trial, the reduction in ASB did not translate into a reduction in mortality (5). Therefore, it is of paramount interest to investigate whether ASB significantly affects the prognosis of patients undergoing PCI because a reduction in ASB may or may not affect long-term prognosis. In this study, we investigate the impact of ASB and non-ASB on discontinuation of antiplatelet therapy and subsequent 1-year clinical outcomes in patients with ST-segment elevation myocardial infarction (STEMI) undergoing primary PCI (PPCI). In addition, we perform a meta-analysis of current literature to assess the prognostic impact of ASB and non-ASB on 1-year mortality in patients undergoing PCI.

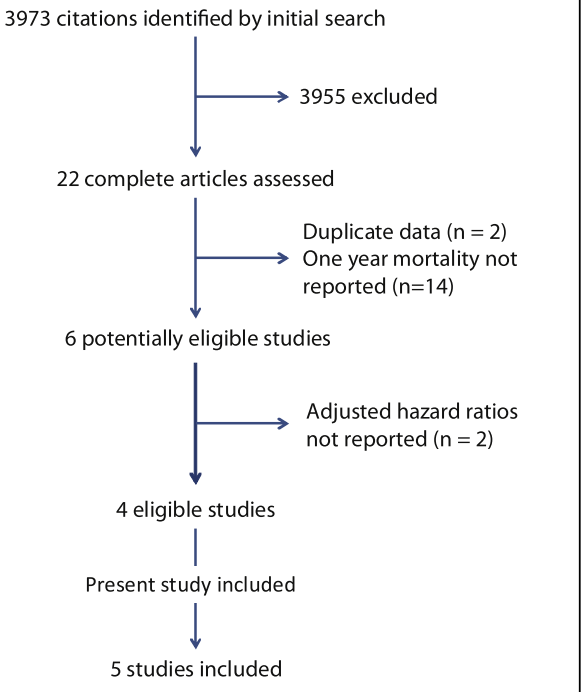

Figure 1. Flow Chart of Search Strategy

Flow chart demonstrating the search strategy and selection of eligible studies for the meta-analysis.

Methods

Source population and procedures. The data analyzed in this study were obtained from consecutive STEMI patients who were accepted for PPCI at the Academic Medical Center–University of Amsterdam between January 1, 2003 and July 31, 2008. The study complied with the Declaration of Helsinki, and the local ethics committee approved the study protocol. In general, patients qualified for PPCI if they had typical ischemic chest pain and at least 1-mm ST-segment elevation in ≥2 contiguous leads, a new left bundle-branch block, or a true posterior myocardial infarction (MI). The PPCI and adjunctive pharmacological treatment were performed according to American College of Cardiology/American Heart Association and European Society of Cardiology guidelines. Patients received a standard 300- to 600-mg loading dose of clopidogrel. If a coronary stent was implanted, clopidogrel was prescribed for at least 1 month in patients with a bare-metal stent and for 6 to 12 months in patients with a drug-eluting stent. Patients were routinely pretreated with 300 mg aspirin and 5,000 IU unfractionated heparin. An additional heparin bolus was administered at the catheterization laboratory, if necessary, to achieve a targeted activated clotting time of 300 s followed by an infusion of 12 U/kg/h with titration to achieve a target activated partial thromboplastin time (aPTT) of 1.5 to 2 times the control. Glycoprotein IIb/IIIa inhibitors were used at the discretion of the operator.

Abbreviations and Acronyms

aPTT = activated partial thromboplastin time
ASB = access site bleeding
HR = hazard ratio
IABP = intra-aortic balloon pump
IQR = interquartile range
MI = myocardial infarction
PCI = percutaneous coronary intervention
PPCI = primary percutaneous coronary intervention
STEMI = ST-segment elevation myocardial infarction

Procedural and angiographic data were prospectively collected in a dedicated database by interventional cardiologists and specialized nurses. Chart review for consecutive STEMI patients with available aPTT measurements was performed in the context of a study designed to investigate the relationship between periprocedural aPTT and clinical outcome in STEMI patients treated with PPCI. A detailed description of the study protocol was previously reported (13). Laboratory measurements (including hemoglobin) that were performed in referring hospitals were added to the study database. We obtained clinical history and detailed information on periprocedural treatment from inpatient records in the PCI center and referring hospitals. We obtained