European Heart Journal (2009) **30**, 2180–2181
doi:10.1093/eurheartj/ehp349

Thrombectomy in acute ST-elevation myocardial infarction: keep it simple

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This commentary refers to 'Clinical impact of thrombectomy in acute ST-elevation myocardial infarction: an individual patient-data pooled analysis of 11 trials'†, by F. Burzotta *et al.*, on page 2193

Primary percutaneous coronary intervention (PCI), a life-saving act, has been recommended as a Class I–Level of Evidence A indication by the 2008 Society Guidelines on the management of myocardial infarction in patients with persistent ST-segment elevation (STEMI).[1] The recently launched 'Stent For Life' initiative, endorsed by the Society, EAPCI, the working group on Acute Cardiac Care, national societies and EUCOMED, aims to implement primary PCI in >70% of all STEMI patients and to achieve primary PCI rates >600/million/year in Europe.[2] Therefore, one can assume that primary PCI will take an important place in the overall practice of the European interventional cardiologist. Consequently, achieving optimal myocardial perfusion will be the cardiologists' daily concern.

In the era of fibrinolysis, the TIMI (thrombolysis in myocardial infarction) flow was considered the gold standard for the assessment of reperfusion during STEMI. With the advent of primary PCI, it became quickly apparent that the TIMI flow was no longer the reference for the judgement of reperfusion at tissue level. In up to 40% of patients undergoing primary PCI, a persistant ST-elevation can be observed despite the presence of a TIMI 3 flow.[3] The mechanism, of this so-called 'no-reflow' phenomenon is complex and multifactorial. It involves distal embolization of the thrombus during mechanical instrumentation of the infarct-related artery but also reperfusion injury.[4] Prevention of no-reflow is a major objective during primary PCI as this condition has repeatly been associated with a worse prognosis on follow-up.[4] In this respect, the current STEMI guideline recommend a pharmacological (abciximab) and mechanical (manual thrombus aspiration) strategy with a Class IIA–Level of Evidence B indication.[1] Mechanical aspiration had been added at the last moment to the 2008 STEMI guidelines after the publication of the 1-year follow-up of the randomized TAPAS trial, which demonstrated a lower mortality at 1 year with aspiration compared with control.[5]

Burzotta *et al.* have presented a meta-analysis with 10 additional randomized controlled trials on thrombectomy during primary PCI (ATTEMPT).[6] They identified 17 trials between 2003 and 2008 on a MEDLINE search expanded to the websites of the major cardiology scientific societies and the TCT and EuroPCR congresses. Eleven investigators agreed to provide a total of 2686 individual patient data for a pooled analysis. The primary endpoint was all-cause mortality and a subgroup analysis was pre-defined on the type of thrombectomy technique and the administration of IIb/IIIa antagonists. The investigators were requested to provide the longest follow-up available.

The main findings of the ATTEMPT study may have important practical implications. First, this meta-analysis confirms the key message from the large, single-centre TAPAS study: systematic thrombectomy during primary PCI improves 1-year survival. Secondly, survival benefit is confined to manual thrombectomy only. Finally, additional survival benefit is observed in patients treated with IIb/IIIa antagonists. Basically, there are three simple messages for best practice of primary PCI: routine thrombectomy, manual aspiration, and systematic administration of IIb/IIIa antagonists.

The conclusions of the authors are reinforced by the positive elements of the meta-analysis. This is a pooled analysis of individual patient data, investigator driven, without any financial support. Furthermore, adequate statistics were applied to check the internal validity and quality of the contributing studies as well as publication bias. Finally, the follow-up of each study was updated and prolonged from a median of 135 to 365 days for the present meta-analysis. This extended follow-up is one of the strongest components of the ATTEMPT study as new clinical data confirm a long-lasting survival benefit from manual thrombectomy.

In general, a meta-analysis is subject to individual differences in definitions and endpoints and is dependent on the quality of each contribution. Again, the authors tried to circumvent these concerns by citing 'validated statistical analyses'. These do not abrogate the arguments. In particular, interpretation of the secondary endpoints (such as myocardial infarction and the need for reintervention) is more subject to error. Their role in the ATTEMPT

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† doi:10.1093/eurheartj/ehp348

study is unclear in view of the hard and positive mortality endpoint. Finally, only the death rate matters.

Besides the type of thrombectomy and the use of IIb/IIIa antagonists, several other subgroups were defined. They included the presence of diabetes, time to reperfusion, the infarct-related artery, and the baseline TIMI flow. Unfortunately, none of these subgroups was adequately powered and no relevant conclusions could be drawn. At present, ATTEMPT confirms that default thrombectomy improves survival. Even if, from a pragmatic point of view, thrombectomy may be questionnable in the case of TIMI 3 flow with a low thrombus burden, ATTEMPT does not answer this practical question. This issue would require a dedicated trial.

The major limitation of ATTEMPT undoubtly is the absence of six out of 17 eligible trials (accounting for 1019 patients) due to investigators' refusal. As a consequence, 88% of studies on manual vs. only 44% for non-manual thrombectomy were included. This additionally imbalances the non-direct comparison in favour of manual thrombectomy, even if a careful literature review of each individual absent trial reveals negative results.

Still, one may wonder why non-manual thrombectomy performs worse. Even if non-manual catheters may theoretically extract more thrombus, they are more difficult to operate and certainly require a longer learning curve than simple manual aspiration. In this perspective, the first randomized trial investigating the efficacy of a non-manual thrombectomy device in saphenous vein grafts (SAFER) demonstrated that, even if successful application of the device resulted in a lower complication rate at 30 days (7.9% vs. 16.5%), technical failure resulted in a higher complication rate than control (25%). It must be reminded that saphenous vein graft interventions and primary PCI have a common denominator (the risk for plaque–thrombus embolisation) and a common tool for its prevention (distal protection and/or non-manual thrombectomy, basically being the same devices). Therefore, the technical challenge of non-manual thrombectomy may well be the main reason for the negative results in the present meta-analysis.

This brings us to the title of this editorial that applies to many fields in interventional cardiology. In general, interventional technology should be kept simple to allow a generalized and optimal application. At present, manual thrombectomy should be considered standard practice during primary PCI.

Conflict of interest: none declared.

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