Acute coronary angiography in patients resuscitated from out-of-hospital cardiac arrest – a systematic review and meta-analysis

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CRD summary
This review concluded that an increasing number of observational studies supported the feasibility, and a possible survival benefit, for acute coronary angiography, following the return of spontaneous circulation, after out-of-hospital cardiac arrest. The authors' conclusions did not strictly reflect the results presented, as most studies did not report a significant survival benefit.

Authors' objectives
To assess the evidence for acute coronary angiography, following the return of spontaneous circulation, after out-of-hospital cardiac arrest.

Searching
The authors searched PubMed, EMBASE and SveMed+ up to May 2012, for studies published in English. Search terms were reported. Reference lists of included articles, and the 2010 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations were screened.

Study selection
To be eligible, studies needed to be of patients with return of spontaneous circulation following an out-of-hospital cardiac arrest. The intervention had to be acute coronary angiography, followed by coronary intervention. The comparator had to be conventional treatment. The outcome had to be survival and studies needed to report prognostic data at hospital discharge, 30 days, or six months.

Few study details were provided. Where reported, the percentage of patients who had an out-of-hospital cardiac arrest ranged from 43 to 100.

Two authors were involved in the selection of studies for the review.

Assessment of study quality
The authors did not formally assess the quality of the included studies.

Data extraction
Studies were classified as prospective or retrospective and assigned a level of evidence from 1 to 5, based on their design. Those favouring acute coronary angiography, in a propensity score analysis, or reporting a statistically significant adjusted odds ratio, in favour of acute coronary angiography or acute percutaneous coronary intervention, were classified as supporting the intervention. Studies with non-significant adjusted results were classified as neutral, as were case series without comparison groups. Studies with statistically significant adjusted results, favouring conservative treatment, were classified as opposing the intervention.

The authors did not state how many reviewers were involved in the extraction of the data for the review.

Methods of synthesis
Studies with a comparator were included in a meta-analysis to estimate an unadjusted pooled odds ratio for survival, using a random-effects model. Heterogeneity was investigated using I².

Results of the review
Thirty-two non-randomised studies (4,781 patients) were included in the review. Twenty-two studies were case-series without a comparison group. Ten comparative studies (3,103 patients) were pooled in a meta-analysis; sample size ranged from 72 to 986.
Seven studies were classified as supporting acute coronary angiography, following the return of spontaneous circulation, after out-of-hospital cardiac arrest. Twenty-five studies were neutral.

Fifteen studies (792 patients) reported on acute coronary angiography in patients with ST-segment elevation myocardial infarction. Survival ranged from 41% to 92%.

Five studies (821 patients) on systematic acute coronary angiography in patients without an obvious non-cardiac aetiology reported survival ranging from 31% to 81%.

Two studies (15 and 50 patients) with selective inclusion criteria had survival of 73% and 82%.

The 10 comparative studies reported on patients resuscitated from cardiac arrest of mixed aetiology, with acute coronary angiography only performed for some patients (from 14% to 83%). Those patients undergoing acute coronary angiography had better survival. All studies except the smallest and oldest one had a statistically significant unadjusted odds ratio that favoured acute coronary angiography. The pooled unadjusted odds ratio was 2.78 (95% CI 1.89 to 4.10). There was statistically significant heterogeneity ($I^2=74\%$).

**Authors' conclusions**
An increasing number of observational studies supported the feasibility and a possible survival benefit for acute coronary angiography, after out-of-hospital cardiac arrest.

**CRD commentary**
This review was based on clear inclusion criteria for patients, intervention and outcomes. Searching was limited to three databases and checking of references. Studies in languages other than English were excluded. It is, therefore, possible that studies were missed. All types of study were eligible and were classified according to levels of evidence. There was no formal assessment of study quality. All studies were of an observational design and most did not have a comparison group.

It was unclear if more than one reviewer was involved throughout the review process, which could minimise bias. A narrative synthesis was appropriate, but the classification of studies into supporting, neutral or opposing might not have been wholly appropriate. The meta-analysis results should be interpreted with caution, due to the possibility of selection bias in the included studies and the heterogeneity. Some of the included studies were not directly related to the specific population; they included patients with in-hospital cardiac arrest or the location was not specified.

Owing to some limitations in the review process and the uncertain quality of the included observational studies, the results may not be reliable. The authors' conclusions did not strictly reflect the results presented as most of the studies did not report a significant survival benefit.

**Implications of the review for practice and research**
**Practice:** The authors advised that in patients without an obvious non-cardiac aetiology, acute coronary angiography should be strongly considered irrespective of electrocardiographic findings due to a high prevalence of coronary artery disease.

**Research:** The authors recommended multicentre randomised studies, including comatose survivors of out-of-hospital cardiac arrest, without ST-segment elevation myocardial infarction or new left bundle branch block, undergoing therapeutic hypothermia.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.