Review and meta-analysis of randomized controlled clinical trials of remote ischemic preconditioning in cardiovascular surgery

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CRD summary
This review concluded that there is a significant benefit of remote ischaemic preconditioning over control for reduction in biomarkers for myocardial injury in patients undergoing cardiovascular surgery. Given the potential for missed studies, the lack of reporting of the review process and study quality assessment, and the small number of participants, the authors’ conclusions should be treated with caution.

Authors' objectives
To investigate the effectiveness of remote ischaemic preconditioning (RIPC) in patients undergoing cardiovascular surgery.

Searching
MEDLINE was searched from 1966 to 2008. Search terms were reported. Bibliographies of retrieved studies and reviews were also scanned.

Study selection
Randomised controlled trials (RCTs) comparing RIPC to a control in patients undergoing cardiovascular surgery, that reported biomarkers of myocardial injury, were eligible for inclusion. Included studies recruited patients undergoing aneurysm repair, coronary artery surgery or children undergoing repair of congenital heart defects. The number and timing of RIPC cycles varied across studies. Biomarkers used included troponin I, troponin T and lactate dehydrogenase.

The authors did not state how studies were selected for the review, or how many reviewers performed the study selection.

Assessment of study quality
The authors did not state that they assessed study quality.

Data extraction
Mean and standard deviation biomarker levels were extracted for each trial. The authors did not state how data were extracted for the review, or how many reviewers performed the data extraction.

Methods of synthesis
Standardised mean differences (SMD) in biomarker levels and 95% confidence intervals (CI) were calculated using a random-effects model. Heterogeneity was assessed using the $\chi^2$ and $I^2$ statistics.

Results of the review
Four trials met the inclusion criteria (n=184, range 8 to 82). There was a statistically significant reduction in biomarkers of myocardial injury with RIPC (SMD -0.81, 95% CI: -1.29, -0.33, p=0.001) compared to control. There was no statistically significant heterogeneity.

Authors' conclusions
There is a statistically significant benefit of RIPC over control for reduction in biomarkers for myocardial injury in patients undergoing cardiovascular surgery.

CRD commentary
The authors addressed a clear review question with appropriate inclusion criteria. The search was limited; therefore the review may not represent the entire evidence base and may be subject to language and publication bias. The methods
used to select studies and extract data were not reported, so it is unclear whether attempts were made to reduce the potential for error or bias. The quality of the included studies was not assessed. There was insufficient information provided for the reader to perform an assessment. Although there was no statistical heterogeneity between studies, clinical heterogeneity was evident. The number of participants was extremely small, even when the studies were combined. Given the mentioned limitations, the conclusions should be treated with caution.

**Implications of the review for practice and research**

Practice: The authors did not state any implications for practice.

Research: The authors stated that large RCTs of RIPC investigating clinical outcomes in cardiovascular surgery were required.

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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.