A systematic review of the effectiveness of oxygen in reducing acute myocardial ischaemia

Nicholson C

CRD summary
This review assessed the effectiveness of oxygen in reducing acute myocardial ischaemia. The main conclusion was that there is a lack of evidence to support the use of oxygen as a therapy in myocardial ischaemia. However, as the review was conducted entirely by a single author, it is not clear how reliable this conclusion is.

Authors' objectives
To review the evidence for the use of oxygen to treat acute myocardial ischaemia.

Searching
The Cochrane Library, DARE, MEDLINE, EMBASE, British Nursing Index, CINAHL, National Research Register and Web of Knowledge were searched electronically. The dates the searches covered were not reported. However, the search terms were reported and no language restrictions were applied. The reference lists of retrieved papers were checked and authors of relevant papers were contacted for any information on further publications. Five relevant journals (Lancet, BMJ, Journal of the American College of Cardiology, Heart, and the New England Journal of Medicine) were handsearched.

Study selection
Study designs of evaluations included in the review
Controlled trials were eligible for the review. Both randomised controlled trials (RCTs) and non-randomised controlled clinical trials (CCTs) were included.

Specific interventions included in the review
Studies of oxygen delivered by any delivery device (nasal cannula, mask or tent) or at any flow rate were eligible for the review. Hyperbaric oxygen was excluded. Most of the included studies used variable flow rates and lengths of treatment.

Participants included in the review
Studies of patients with acute coronary syndrome were eligible for the review. Most of the included studies were of patients with acute myocardial infarction; others were of patients with coronary artery disease or severe angina pectoris. Eighty per cent of the included patients were men.

Outcomes assessed in the review
Studies that reported some measure of myocardial ischaemia were eligible for the review. Four measures were used in the included studies: haemodynamic parameters, metabolic markers, electrocardiogram markers and changes in clinical symptoms.

How were decisions on the relevance of primary studies made?
The single author determined the relevance of studies for the review.

Assessment of study quality
The included studies were quality assessed using Crombie's Critical Appraisal Questions (reference given in the review). The single author applied the quality assessment tool.

Data extraction
The single author extracted the data. No details were reported.
Methods of synthesis
How were the studies combined?
The studies were grouped according to the outcome measures and combined in a narrative.

How were differences between studies investigated?
There was no formal test for heterogeneity. Differences between the trials were described in the text.

Results of the review
Nine studies (n=463) were included in the review: 2 RCTs and 7 CCTs.
The quality of the included trials was limited, with concerns over the methodology, sample size and statistical analysis.

Haemodynamic outcomes (7 trials): oxygen reduces stroke volume and cardiac output but increases systemic vascular resistance. Heart rate was unchanged and arterial blood-pressure was unchanged or slightly increased.

Metabolic outcomes (5 trials): trial findings for lactate levels were equivocal. One trial that measured the cardiac enzyme aspartate aminotransferase found it was statistically significantly higher for those patients who received oxygen.

Electrocardiogram outcomes (3 trials): 2 trials that assessed effects on ST-segment depression as a measure of ischaemia found no benefit of oxygen therapy, while one that monitored ST-segment elevation reported a benefit.

Clinical outcomes (5 trials): there was no evidence of beneficial effects on angina or dyspnoea. No trial was powered to test effects on mortality.

Authors' conclusions
No definite conclusions could be drawn regarding the effects of oxygen therapy on acute myocardial ischaemia. The main finding of the review was that there was a lack of evidence addressing this question.

CRD commentary
This review addressed an appropriate question, but the inclusion criteria were not reported clearly. The literature search was sufficiently broad. The methods used in the review were clearly reported. The main problem with this review was the fact that it was conducted by a single author; this might have introduced reviewer bias and error. The included studies were quality assessed and details of each included study were reported in the review. However, there were insufficient details of the outcomes data. The diversity of the trials and their outcomes means that the narrative synthesis was appropriate. The results reported in the review suggest that there is little evidence to support the use of oxygen as a therapy in myocardial ischaemia. Given the limitations of the review, it is not clear how reliable the author’s conclusion is.

Implications of the review for practice and research
Practice: The author stated that the lack of supporting evidence for the use of oxygen is concerning.

Research: The author stated that there is a need for good-quality, suitably powered trials of the effectiveness of oxygen in reducing myocardial ischaemia.

Bibliographic details

PubMedID
15533106
DOI
10.1111/j.1365-2702.2004.00997.x

Indexing Status
Subject indexing assigned by NLM

MeSH
Acute Disease; Humans; Myocardial Ischemia /therapy; Oxygen Inhalation Therapy

AccessionNumber
12005003273

Date bibliographic record published
30/06/2006

Date abstract record published
30/06/2006

Record Status
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.