Prehospital transcutaneous cardiac pacing for symptomatic bradycardia or bradyasystolic cardiac arrest: a systematic review

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CRD summary
This review explored the use of transcutaneous pacing in the pre-hospital management of bradyasystolic cardiac arrest. The authors concluded that there was no evidence to support pre-hospital transcutaneous cardiac pacing in bradyasystolic cardiac arrest, while data on symptomatic bradycardia were inadequate to draw firm conclusions. The conclusions reflect the evidence presented and are likely to be reliable.

Authors' objectives
To determine the efficacy of pre-hospital transcutaneous cardiac pacing (TCP) in the management of haemodynamically symptomatic bradycardia (SB) and bradyasystolic cardiac arrest (BACA).

Searching
EMBASE, MEDLINE and the Science Citation Index were searched from inception to 2004; the search terms were reported. In addition, the Canadian Institute for Health Research was contacted and the National Institute of Health's website checked for unpublished or ongoing studies. The reference lists of relevant articles were screened.

Study selection

Study designs of evaluations included in the review
All study designs, including controlled trials, case-control trials and case series, were eligible for inclusion.

Specific interventions included in the review
Studies of TCP were eligible for inclusion. Several types of TCP were used: Pace-Aid, Pacetronics Model NI-1, Trans-Pace, Zoll NTP, Quick-Pace and HeartAid 97. Emergency medical technicians performed the initial basic life support and all patients received standard advanced cardiac life support care. The latter included, as appropriate, external chest compressions, electrical defibrillation, tracheal intubation, intravenous fluids, intravenous adrenaline and atropine.

Participants included in the review
Studies of euthermic, non-traumatised adults with pre-hospital haemodynamically SB (64 participants) or BACA (1,221 participants) were eligible. Criteria defining SB and BACA were described.

Outcomes assessed in the review
No inclusion criteria relating to the outcome measures were reported. The primary end points described were in-hospital all-cause mortality and all-cause mortality at 6 months and 1 year. The secondary end points were survival to hospital admission, improvement in blood-pressure, neurological function and quality of life.

How were decisions on the relevance of primary studies made?
Two independent reviewers blinded to the source and author selected the studies. The weighted kappa statistic was calculated to assess the intra-observer agreement.

Assessment of study quality
Two independent reviewers blinded to the journal, author, results and discussion section of each article assessed the quality of the included studies using the Jadad scale. Each study was allocated a score from 0 (lowest) to 5 (highest). Kappa agreement at each level of the review was determined.
Data extraction
Two independent reviewers extracted the data, with agreement achieved by consensus.

Methods of synthesis
How were the studies combined?
The studies were described narratively and in tables.

How were differences between studies investigated?
Differences in the study design, populations and outcomes were discussed in the text and presented in a table.

Results of the review
Seven studies (n=1,487) were included in the review. There were three case series of BACA, three unblinded randomised controlled trials (two of BACA and one of BACA and SB), and one subgroup analysis of SB.

None of the included studies had a Jadad score above 2 and the overall Jadad score was 1; this suggests a uniformly poor-quality methodology.

BACA.
Three case series reported no survivors to hospital discharge. Two randomised controlled trials showed comparable rates of survival to hospital and survival to discharge for TCP and control. SB.

Pooled data of a subgroup of patients with SB and a case series using the same TCP protocol suggested a trend for a higher proportion of survivors to hospital discharge with TCP (4 out of 27) compared with control (0 out of 24)(p=0.07).

There was no difference in survival to hospital admission or survival to discharge between TCP and control.

No study reported an increase in side-effects from either standard care or TCP.

Authors' conclusions
There was no evidence to support the use of pre-hospital TCP in patients with BACA. The evidence on pre-hospital TCP for the treatment of SB was insufficient to determine the effectiveness of TCP in those patients.

CRD commentary
The review addressed a well-defined question in terms of the participants, interventions, outcomes and study design. Several databases were searched and attempts were made to identify unpublished articles. It was unclear whether non-English studies were eligible, although there appears to have been a restriction to English language trials which might have introduced language bias. The potential influence of publication bias was not considered in the report. The authors attempted to minimise bias and errors during the review process, by carrying out the study selection, data extraction and quality assessment processes in duplicate.

The authors' decision not to pool the studies in a meta-analysis was justified given the apparent differences between the studies. Their conclusions were consistent with the strength of the evidence shown and are likely to be reliable.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The efficacy of TCP in the pre-hospital management of SB and cardiac arrest needs further exploration through appropriately powered controlled trials.
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