Metaanalysis of acustimulation effects on postoperative nausea and vomiting in children  
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CRD summary
This review concluded that acupressure and acupuncture are effective in reducing post-operative vomiting in children, with acupuncture showing the greatest impact and being equally beneficial when compared with medication. Given the variation between the studies and the limitations in study number, size and quality, the reliability of the authors’ conclusions is unclear.

Authors' objectives
To determine the effects of different acustimulation (AS) techniques on children with post-operative nausea and vomiting (PONV) compared with other treatments.

Searching
PubMed, MEDLINE, EMBASE, CINAHL, CISCOM, the Cochrane Library and Dissertations International were searched from 1966 to May 2005, using the reported search terms. In addition, the reference lists of retrieved articles were checked. Publications were restricted to those in the English language.

Study selection
Randomised controlled trials (RCTs) comparing AS (including acupressure, acupuncture, laser acupuncture, and electrical stimulation (ETS)) with medication or a control, in children aged between 0 and 18 years and undergoing surgery, were eligible for inclusion. The included participants were in- or out-patients undergoing strabismus surgery, tonsillectomy, general surgery, hernia repair, circumcision or dental surgery; their ages ranged from 4 to 18 years (mean 6.38). A variety of acupressure and acupuncture points were used, further details of which were reported in the review. Treatment durations ranged from 0.5 to 24 hours for acupressure and from a few seconds to 15 minutes for acupuncture. ETS was applied consistently for 20 minutes. Dose frequencies varied. Some studies administered known emetogenic pain medications intra-operatively (10 studies) or within 24 hours following surgery (7 studies). The interventions were compared with the following controls: sticky bands to acupoints without studs, tape to bilateral K-K9, bilateral P6 seabands without studs, sham laser with or without normal saline, normal saline alone, medication, no treatment or simulation, sham dorso-medial forearm/placebo bands, superficial skin prick at P6, or insulated wires inside arm covers without stimulation. Eligible studies had to report the effects on PONV.

Two reviewers independently screened studies for relevance.

Assessment of study quality
Two reviewers independently assessed the validity of the studies. Criteria (R) included randomisation, concealment of allocation, double-blinding, use of a placebo group, and intention-to treat data. Other criteria (T) included the consistency of treatment delivery, balanced group assignment, balanced baseline data, description of placebo, and the internal validity of findings. Separate scores (0 to 5) for both R and T criteria were assigned to each included study.

Data extraction
Two independent reviewers extracted data on the proportion of PONV, and relative risks (RRs) with 95% confidence intervals (CIs) were calculated for each included study.

Methods of synthesis
The RRs for PONV were pooled using a fixed-effect model. Egger's test and funnel plots were used to assess publication bias.

Statistical heterogeneity was assessed using the χ² test. Subgroup analyses by AS type were also undertaken.
Results of the review

Twelve RCTs (n=1,096: 418 received AS and 609 received medication or controls). There were some discrepancies between numbers reported in the text and those in the tables; this abstract presents the numbers reported in the text. Sample sizes ranged from 40 to 187 participants.

The quality scores ranged from 1 to 4 for R criteria, and from 1.5 to 4 for T criteria. Random allocation was reported in all 12 trials, and concealment was attempted in 10 trials. Two trials used a single-blind (participant only) method, but otherwise a double-blind method was used for all trials.

Overall (12 studies).

All studies reported fewer incidences of vomiting and nausea in children receiving AS compared with controls; the RRs were 0.69 (95% CI: 0.59, 0.80, p<0.0001) and 0.59 (95% CI: 0.46, 0.76, p<0.0001), respectively. There was evidence of publication bias from Egger's test and funnel plots.

Acupressure (3 studies).

The proportion of children vomiting after acupressure was significantly lower than in the control groups; the RR was 0.69 (95% CI: 0.55, 0.87, p=0.002). The greatest relief was reported for the K-K9 acupoint, but no data were provided.

Acupuncture (6 studies).

The incidence of vomiting was significantly lower in the 6 studies comparing acupuncture with a control; the pooled RR was 0.42 (95% CI: 0.29, 0.67, p<0.0001). The 4 studies using acupuncture alone reported an RR of 0.53 (95% CI: 0.32, 0.88, p=0.015), while the 2 studies using laser acupuncture reported an RR of 0.24 (95% CI: 0.11, 0.53, p=0.0004). One study using acupuncture and acupressure indicated no difference in vomiting incidences between the two groups. Only one study reported proportions of nausea: 32% of children receiving acupuncture and 56% of controls.

Electrical stimulation (2 studies).

There were no significant differences between the ETS group and controls for incidence of vomiting.

Medication (3 studies).

Significantly fewer incidences of vomiting were reported in children receiving medication compared with controls; the RR was 0.42 (95% CI: 0.22, 0.78, p=0.0056). There were no significant differences between the medication and AS groups.

Authors' conclusions

Acupressure and acupuncture are effective in reducing post-operative vomiting in children, and are as effective as medications. Acupuncture showed the greatest benefit in comparison with acupressure and ETS. Reductions in vomiting were also indicated using acupressure on the K-K9 point, but further research is required.

CRD commentary

The review question was clear and supported by appropriate inclusion criteria for the participants, interventions, outcomes and study design. Relevant literature searches were conducted using several electronic databases and another appropriate source. However, relevant papers might have been missed because of the language restrictions and no apparent search for unpublished material. Indeed, publication bias was indicated in the review. Validity was assessed according to published criteria, and attempts were made to minimise errors and bias at each stage of the review process. Appropriate methods were used to investigate statistical heterogeneity but, as no data were reported, it is difficult to determine whether pooling of the results was appropriate. Furthermore, meta-analyses for the different treatments often included only small numbers of studies, and sample sizes were small for most studies. Some of the included studies were also of a poor quality and in some the CIs appeared wide. Given these considerations, the reliability of the authors' conclusions is unclear.
Implications of the review for practice and research

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

Research: The authors stated that further research is required to evaluate the effects of AS on K-K9 and other multiple acupoints.

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