Implementation of acupuncture and acupressure under surgical procedures in children: a pilot study

Arne Johan Norheim,1 Ingrid Liodden,2 Michael Howley2

ABSTRACT
Objective To test the feasibility of research on acupuncture and acupressure for children undergoing tonsillectomy and/or adenoidectomy.

Methods During January and February 2008, 20 patients from the ordinary waiting list at Lovisenberg Diakonale Hospital in Oslo were randomised to either acupuncture while under anaesthesia or standard care as control. The authors gave acupuncture at Pericardium 6 (P6) at a depth of approximately 0.7 cm on both forearms. The needles were removed when the patient was transferred to the recovery unit and replaced with acupressure wristbands. The outcome measure in the pilot study was to explore if acupuncture and acupressure could be implemented without extending the anaesthesia time and surgical time. This pilot study also tested the feasibility of the research protocol for future investigation in the field, with postoperative nausea, vomiting and retching as the primary end points for effect.

Results The study showed no delay in the surgical procedure and no additional anaesthesia time attributable to the introduction of acupuncture. The protocol was found to be feasible with regard to performance of the main study. Vomiting occurred in five patients in the treatment group and 10 patients in the control group. The total numbers of vomiting events were 13 in the treatment group and 19 in the control group.

Conclusion The results encouraged performance of the main study according to the research protocol.

INTRODUCTION
Postoperative nausea and vomiting (PONV) can cause distress and discomfort1 and patients report PONV as the least desirable side effect of surgical treatment.2 Risk factors for PONV have been identified, and drug treatment is only partially effective in prevention.3 PONV is of especial concern for children undergoing tonsillectomy and/or adenoidectomy.4

The efficacy of acupuncture as an antiemetic might be regarded as evidence based.5 However, contradictory studies have been published.6 Acupressure following acupuncture seems to prolong the antiemetic effect.7 While some authors have suggested that acupuncture/acupressure administered after the induction of anaesthesia has little or no effect,8 others have demonstrated to the contrary.9 Finally, acupuncture and acupressure are inexpensive and the adverse effects are considered minimal.9

Acupuncture has been integrated into standard hospital procedures, has been used in Norwegian pain clinics for decades,10 and is implemented as standard care in some hospitals for nausea in chemotherapy.11

Bearing in mind that we consider the risk of adverse effects in acupuncture to be minimal,12 and the fact that standard conventional care is insufficient, there is a need for research into the role of acupuncture in optimised surgical care.

In the planning process of a full-scale pragmatic effectiveness study of acupuncture for postoperative nausea, we considered piloting the research procedure to be of great importance.

The aim of this pilot study was therefore to focus on the feasibility of the protocol of acupuncture and acupressure as a supplement to the ordinary perioperative treatment for children undergoing tonsillectomy and/or adenoidectomy.

METHODS
Study design
During January and February 2008, we completed a randomised controlled pilot study among 20 patients at Lovisenberg Diakonale Hospital in Oslo, Norway. Ten patients served as controls and 10 patients underwent acupuncture while under anaesthesia given by the anaesthetist.

The children were selected from the ordinary patient lists including children with an ASA grade ≤2, weighing at least 10 kg. Children with concomitant gastrointestinal diseases, or emesis or antiemetic treatment <24 h preoperatively, were excluded together with patients whose parents’ informed consent could not be obtained (figure 1).

According to the aim of the full-scale study, we applied a pragmatic design.13 A licensed, experienced acupuncturist (AJN) trained four anaesthetists, who gave the acupuncture with minimal interference with standard procedures. We did not recruit any extra personnel into the team, because we expected that insertion of the two acupuncture needles could be done without additional anaesthetic time for each child.

Intervention
We used a needle at the acupuncture point Pericardium 6 (P6) on each forearm. According to the ‘cun’ measurement system of traditional Chinese medicine, the anaesthetist located the points on the anterior forearm at a distance equivalent to the combined width of the child’s middle three fingers, proximal to the most prominent wrist crease, and between the tendons of palmaris longus and flexor carpi radialis. We tried to keep the depth of the needle to about 0.7 cm.

Since we inserted the needles after induction of anaesthesia, we did not seek the needle sensation (‘de qi’). The needles were not stimulated during surgery, approximately 20 min or more, and were removed when the patient was transferred to the recovery unit, where they were replaced with...
acupressure wristbands. The wristbands were applied at P6 when the needles were removed, and worn up to 24 h, if tolerated by the child. The wristbands were self-adjusting, elastic wrist bands, equipped with plastic studs for pressing. The bands were delivered free of charge by Sea Band UK Ltd, through B&T Acupressure, Oslo, Norway.

**Procedure**

Before surgery, a surgeon and anaesthesiologist, both examined the child, who was enrolled in the study if eligible. The children were randomised in variable block sizes of between two and six in an electronic randomisation procedure, directed by telephone from the Clinical Research Centre, University Hospital of North Norway, in Tromsø.

The ear, nose and throat surgeons all had extensive experience. The children had not eaten on the day of surgery, but were allowed to drink clear fluids until 2 h preoperatively. An anaesthesiologist and a nurse anaesthetist remained with the child throughout the anaesthetic procedure. Sevoflurane 8% in 30% oxygen and 70% nitrous oxide was administered by mask for the induction of anaesthesia. When sufficient depth was attained, sevoflurane was regulated to 3%, an intravenous cannula was inserted and an infusion of 500 ml of Ringer’s acetate started at a non-standardised rate. An orotracheal tube secured the airway. Before the gag was put in place, a bolus dose of 2.5 mg/kg propofol was given intravenously, followed by a maintenance infusion of 12–15 mg/kg/h and remifentanil 0.8–0.7 mg/kg/min. After the gag was put in place, sevoflurane and nitrous oxide were discontinued.

Postoperative pain was treated as a standard with ketobemidone intravenously in the recovery unit. None of the children received antiemetic drugs. The standard policy is to use antiemetic drugs if emesis continues, since the persistence of blood in the stomach may cause vomiting. All children were offered flavoured ice 2 h after surgery and a clear liquid drink before being discharged from the postoperative ward. The children were permitted to take in soft, unspiced, cold or lukewarm food after 2 h following adenoidectomy, 6 h following tonsillectomy.

We regarded the primary end points to be retching and vomiting, and occurrences during the first postoperative 24 h were registered on a case report form. We considered any retching and vomiting occurring within a period of 2 min as one event. The recovery unit nurses noted any emetic events during the recovery period, while the parents/guardians recorded events after discharge according to directions given by the nurses.

**Results**

The recovery nurse recorded data in a purpose-designed data sheet during the recovery period, and after discharge, this was completed by the parents/guardians. The parents also stated their subjective opinion of the degree of discomfort the child had experienced from POV, from the range of none, minimal, moderate, great, to severe. The principal investigator collected the data registered by the parents/guardians by telephone, and any missing baseline data were completed. In order to obtain complete collection of data, the principal researcher consecutively followed-up and surveyed the personnel involved.

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**Data collection**

Data such as age, duration of anaesthesia and surgery and use of drugs were collected from the anaesthetic and postoperative records. The anaesthetist registered duration of acupuncture as well as the point of time of wristband application. The administrations of opioid and antiemetic drugs were recorded in this study only during the recovery period.

We also collected data at baseline about factors that might influence postoperative vomiting (POV), the child’s history of PONV and motion sickness, parents’ history of PONV and exposure of the child to tobacco smoke at home. Any surgical, technical and/or anaesthetic factors were registered. Any adverse effects from the acupuncture or acupressure were also registered.

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**Conclusion**

Particular attention was paid to the intervention procedure and the feasibility of the research protocol. This includes, in particular, recruitment procedure, recruitment rate, drop-out rate and the process of data collection. The analysis only considered feasibility of the study and no statistical analysis was conducted.

The regional ethics committee approved both the pilot and the main study.

The full-scale study is registered at the http://www.clinicaltrials.gov; Norway Protocol Record 125/2007.

**Results**

The study showed no additional surgical time or anaesthetic time attributable to the use of acupuncture and acupressure according to the anaesthetic record. No major logistical or administrative problems were noticed in the progress of the research. About 50% of the children presenting for surgery were eligible for inclusion and the sample of 20 participants was recruited without difficulty or delay.

However, the electronic randomisation procedure, which was supported by Clinical Research Centre, University Hospital of North Norway in Tromsø, was found to be too time consuming for optimal effectiveness in the operating theatre. In the data collection process, the regular administrative staff failed to collect all the data according to the appointed procedure.

Eight girls and 12 boys, aged 2–8 years (mean 4.6 years), weighing 12–29 kg (mean 17.8), were included in the pilot study. Operating time averaged 20 min. There was no difference in the postoperative use of ketobemidone between the two groups, and none of the children received rescue medication for PONV during their stay on the postoperative ward.

Vomiting and retching were present among five patients in the treatment group and 10 in the control group. The numbers of

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**Figure 1** Flowchart for the study.

All children referred to Lovisenberg Diakonale Hospital for tonsillectomy and/or adenoidectomy

Parents/guardians receive information about the study 2–4 weeks prior to admission

At admission, checking for inclusion and exclusion criteria for the study

Drop-out due to exclusion criteria and/or no informed consent given

Randomization into two groups

1. Standard treatment

2. Standard treatment and Acupuncture/acupressure

Data collection up to 24 h after surgery

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episodes of vomiting or retching were 13 in the treatment group and 19 in the control group.

Nausea was only registered among children older than 5 years. Among these children, none of the three in the control group complained of nausea while three out of seven children in the treatment group experienced nausea.

No major adverse events occurred, but three children complained of tightness of the wristband.

**DISCUSSION**

The study design seems to fit well with the normal surgical and anaesthesia procedures at Lovisenberg Diakonale Hospital. Giving acupuncture during anaesthesia at the time of surgery seems to minimise discomfort, compliance problems and stress for the children.

The pilot study showed that the need for a telephone call for electronic randomisation was time consuming and thus not acceptable. Consequently, in the main study, we decided to perform the variable block randomisation using sealed envelopes in numerical order.

The administrative staff had difficulty with data collection as an additional task to their ordinary workload. In addition, phone calls to the parents often had to be done outside office times. We therefore decided that the principal researcher (IL) should collect data from the parents in the main study.

The data on vomiting seem promising, but numbers are too small to perform statistical analysis. We expected the registration of nausea to be difficult, especially in small children, as described in the literature. In the pilot study, we did not record nausea in children less than 5 years old, in accordance with previous research. And further, vomiting was decided not to be the primary end point in the main study, but will be registered in the main study in children older than 5 years.

The children’s experience of tight wristbands can be regarded as a side effect. However, a certain degree of force must be applied in order to obtain an acupressure effect. In the main study, we will therefore not change the procedure, but closely register any adverse events. We also registered the possibility that the colourful wristbands might serve to divert attention from nausea.

**CONCLUSION**

According to results from the pilot study, it seemed feasible to perform the main study to explore the effectiveness of acupuncture/acupressure for children undergoing tonsillectomy and/or adenoidectomy. The effectiveness of acupuncture and acupressure for POV could not be demonstrated in this pilot, but the results encourage further research in the field. The pilot study was easy to conduct and provided crucially important data for designing the main study.

**References**

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