

Acupuncture and Postoperative Vomiting in Day-Stay Paediatric Patients

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SUMMARY

The stimulation of the acupuncture point P6 has been used to prevent nausea and vomiting in the adult population. It has, however, been subject to limited comparative evaluation in children. We proposed that stimulation of P6 and the analgesic point Li4 would reduce the incidence of postoperative vomiting. Eighty-four unpremedicated paediatric patients having day-stay surgery (circumcision or herniotomy/orchidopexy) were included in a randomized, double-blind, placebo-controlled study of transcutaneous stimulation of P6 and Li4, or no stimulation. The incidence of vomiting was recorded for 24 hours postoperatively. There was no statistically significant difference in total postoperative vomiting in those patients who were stimulated, compared with the control group ($P=0.909$), or between any group for postoperative vomiting in the recovery ward, day-stay ward or at home. For all groups, vomiting was more common within the first four hours and more likely to occur in the day-stay ward.

Key Words: ANAESTHETIC TECHNIQUES; transcutaneous acupuncture stimulation; VOMITING: incidence, prophylaxis; SURGERY: paediatric

Day-stay surgery is an ever-increasing service in the health-care system. Although serious complications are rare, the discomfort and inconvenience of postoperative nausea and vomiting (PONV) is a recognized complication in children, occurring in up to 24% of patients¹. The aetiology of PONV is multifactorial, but includes the drugs used, the type of surgery and perhaps the predisposition of the patient. Pain itself is a recognized triggering agent for nausea.

Stimulation of the acupuncture point P6 has been used to prevent and treat nausea and vomiting. The point Li4 is a strong analgesic point, and our hypothesis was that stimulation of both of these points would result in a decreased incidence of PONV.

This study aimed to assess the effect of transcutaneous stimulation of acupuncture points P6 and Li4 on postoperative vomiting in paediatric patients for day-stay surgery.

METHOD

The study was approved by the Hospital Ethics Committee and written, informed consent was obtained from all patients' parents. Eighty-four patients scheduled for elective day-stay surgery were studied: four of these were excluded due to inadequate data, therefore a total of 80 patients' results were analysed. Two groups of patients were assessed within this group:

- (1) those undergoing circumcision surgery (33 patients),
- (2) those undergoing inguinal hernia repair/orchidopexy surgery (47 patients).

Exclusion of patients was on the basis of

- lack of consent,
- known history of protracted postoperative nausea and vomiting,
- administration of intraoperative antiemetics.

ECG electrodes were applied to P6 and Li4 on the same hand on all patients, controls and subjects. P6 is between the tendons of palmaris longus and flexor carpi radialis two Chinese inches proximal to the distal wrist crease. (One Chinese inch = distance between interphalangeal joints of the little finger, or the distance across the interphalangeal joint of the thumb of the patient). Li4 is between the 1st and 2nd metacarpals, at the midpoint of the 2nd metacarpal.

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Patients were randomly allocated to either receive stimulation of these two points or not. The method of randomization was a computer-generated list of random numbers (even-stimulated, odd-control). The patients were allocated to each group after the induction of anaesthesia and the anaesthetist was the only person aware of which patients were stimulated. For the subjects, the Meyer Model-501 Acupuncture point stimulator was attached to the electrodes, the black lead to P6 and the red lead to Li4 to maintain consistency throughout the study. The stimulator provides an impulse of 60 microseconds width, with a maximum amplitude of 100 volts without a resistance and an amplitude of 40-80 volts under load. There is a non-linear output to these maximum values. The frequency was adjusted to 15 Hz and the amplitude adjusted until the thumb and fingers began to contract, thereby ensuring supramaximal stimulation of the acupuncture points. Stimulation of the acupuncture points was commenced at the beginning of the operation, and the duration of stimulation was 20 minutes. The reason for this duration of stimulation is that it has been demonstrated in rats that during acupuncture stimulation there is an increase in the level of opioid-like substances in the brain, and this level declines after 30 minutes. The level also declines with repeated doses due to the development of tolerance². Hans et al also found a decrease in effect of electroacupuncture after 30 minutes³.

Anaesthesia

The patients were all day-stay cases and were unpremedicated. On arrival in the anaesthetic room anaesthesia was induced by a mask inhalational induction technique with nitrous oxide in oxygen and halothane. Venous access was established and the airway was maintained by mask with or without a Guedel airway, or laryngeal mask airway.

For the circumcision group, analgesia was provided by a dorsal nerve block, intramuscular pethidine 1 mg/kg, and rectal paracetamol 20-25 mg/kg.

For the orchidopexy/herniotomy group, analgesia was provided by local anaesthetic infiltration and nerve block by the surgeons and rectal paracetamol 20-25 mg/kg. The orchidopexy patients also received a dose of intramuscular pethidine 1 mg/kg.

Postoperative Management

Patients were assessed in the recovery unit (average stay was 30 minutes), the day-stay postoperative ward (average stay was four hours) and the parents were telephoned the next morning to enquire whether the child had vomited at home and if so, how

many times. Nausea was not recorded as this was considered to be too subjective and difficult to assess in children. The use of postoperative antiemetics and postoperative analgesics was also recorded, and these were given according to need by staff, unaware of the treatment received. In our unit, first-line antiemetic therapy consists of metoclopramide 0.1 mg/kg intravenously, with or without intravenous fluids.

Statistics

The data for incidence of vomiting were analysed using the Mann-Whitney U test. A *P* value less than 0.05 was considered significant. Fisher's exact test was used to compare the requirements for analgesia or antiemetics.

RESULTS

Eighty-four patients were included in this study, with four results excluded from analysis due to inadequate data collection. Therefore a total of 80 patients' results were analysed. Patient characteristics did not differ significantly between the groups (Table 1), and no patient had any history of postoperative nausea and vomiting.

TABLE 1
Demographic data

	Orchidopexy/hernia		Circumcision	
	Treatment	Control	Treatment	Control
Sex: M/F	21/4	19/3	15/0	18/0
Age (range)	1-13 yrs	1-11 yrs	0.5-11 yrs	1-11 yrs
(mean)	5 yrs	4.5 yrs	4 yrs	4 yrs

There was no statistically significant difference in total postoperative vomiting in those groups having acupuncture stimulation in this paediatric population (Table 2). Total incidence of vomiting was 11 for the group of patients stimulated compared with 11 in the control group (*P*=0.909). Within the circumcision group, the incidence of total vomiting was 4/15 in the stimulated group, compared with 5/18 in the control group (*P*=0.981). Within the hernia repair/orchidopexy group, the incidence of total vomiting was 7/25 in the stimulated group, compared with 6/22 for the control (*P*=0.786).

There was no statistically significant difference between any group for postoperative vomiting in recovery/day-stay/home. For all groups, vomiting was most common within the first four hours, i.e. during their in-hospital stay. In the majority of groups vomiting was most likely to occur in the day-stay ward.

Interestingly, the only groups requiring post-

TABLE 2
The incidence of vomiting

	Recovery	Day-stay ward	Home	Total vomiting	Total no.
Orchidopexy/hernia—treatment	24% (6)	16% (4)	8% (2)	28% (7)	25
Orchidopexy/hernia—control	9% (2)	14% (3)	9% (2)	27% (6)	22
Circumcision—treatment	0% (0)	27% (4)	13% (1)	27% (4)	15
Circumcision—control	6% (1)	22% (4)	6% (1)	28% (5)	18

operative antiemetics were the groups which received acupuncture stimulation. This was not found to be statistically significant ($P=0.285$). Again, the patients who were stimulated also received more post-operative analgesia (pethidine/paracetamol) but this was also not statistically significant ($P=0.102$) (Table 3). Of the patients who received postoperative analgesia, none required antiemetic treatment.

TABLE 3
Postoperative analgesic and antiemetic requirements

	Orchidopexy/hernia		Circumcision	
	Treatment	Control	Treatment	Control
Nil	16	21	14	18
Metoclopramide/IV fluids	3	0	1	0
Paracetamol	3	1	0	0
Pethidine	3	0	0	0
Total	25	22	15	18

Only one patient (who had a circumcision) required overnight stay and this was due to bleeding at the operative site. He did vomit once post-operatively, but was able to tolerate some oral fluids later in the evening.

There were no adverse effects from the acupuncture treatment.

DISCUSSION

A previous survey at our hospital (unpublished) suggested a relatively high incidence of vomiting in patients undergoing circumcision (30%) or hernia repair/orchidopexy (20%). Although postoperative complications of a serious nature are rare, nausea and vomiting are a major concern and can result in a need for postoperative fluids to prevent dehydration and electrolyte imbalance, and/or the use of antiemetic drugs with their potential for significant side-effects. It may also necessitate a prolonged stay in hospital.

In 1989, the National Health and Medical

Research Council of Australia recognized acupuncture as a legitimate form of pain relief and that it has a scientific basis. The Australian Medical Acupuncture College has been formed and conducts a Fellowship examination. It aims to maintain the highest standard of acupuncture treatment through its members.

This study aimed to assess a simple-to-perform, safe, low-cost, non-pharmacological method for reducing nausea and vomiting. The acupuncture technique has low risk and few side-effects, reduced further by transcutaneous stimulation, compared with the invasive use of needling.

Current literature suggests the stimulation of the P6 acupuncture pressure point may result in a significant reduction in perioperative nausea and vomiting². In this particular study, manual needling for five minutes was applied. Yang et al found invasive acupuncture as effective as intravenous droperidol in preventing postoperative vomiting in gynaecological laparoscopic surgery³. A further study, again in adults, using non-invasive stimulation was effective in reducing nausea and vomiting, and "was as effective as standard antiemetics"⁴. Other studies have shown transcutaneous stimulation of acupuncture points to be effective in adult populations, and even more so if the invasive technique is used^{5,6}. However, both invasive and non-invasive forms of acupuncture have been shown to be ineffective in strabismus and tonsillectomy surgery in children^{7,9}.

In our study, no statistically significant difference was determined in the overall incidence of vomiting within the first four hours and within the first 24 hours. Although the incidence of vomiting was relatively high, no adverse side-effects occurred. The cause of one patient needing overnight stay was a surgical complication.

The previously untested concept of stimulation of Li4 to provide improved analgesia not only did not reduce the analgesic requirements but did not decrease postoperative vomiting either. Patients in both groups received the same dosage of analgesic on induction and then were assessed in recovery for the need for additional analgesic. The stimulation of Li4 did not appear to improve analgesia; in fact more patients required supplemental analgesics in the stimulated group, although this was not statistically significant.

Our results are consistent with the quoted studies in being unable to demonstrate an improvement in postoperative nausea and vomiting using acupuncture techniques in children. This may be related to the use of transcutaneous stimulation rather than

invasive needling, or there may be an unrecognized limitation due to the age of the patients.

CONCLUSION

This study has shown that transcutaneous acupuncture of points P6 and Li4 as a prophylactic antiemetic for postoperative vomiting in paediatric day-stay surgery is unsuccessful in reducing the overall incidence.

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