



Research Article

# Efficacy of laser acupuncture in attenuating hemodynamic response to orotracheal intubation and postoperative nausea and vomiting in children undergoing strabismus surgery



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## KEYWORDS

Laser;  
Acupuncture;  
PONV;  
Pressor response;  
Strabismus surgery

**Abstract** *Background:* Laser acupuncture may be offered to patients with needle phobia and children. This study aimed to investigate efficacy of the acupuncture point stimulation (Liv3 and P6) in preventing PONV and hemodynamic response to intubation in children.

*Methods:* Sixty children, ASA I or II aged 3–12 years, undergoing strabismus surgery were divided into 3 equal groups; 20 child each Group I (laser acupuncture group), Group II (ondansetron group) 0.15 mg/kg IV group and Group III (control group). Laser stimulation was performed bilaterally over 30 s, 15 min before induction of anesthesia and 15 min after arriving in the recovery room. Systolic, mean and diastolic BP and HR were measured in groups I and III before induction (times 1, 2), before intubation (time 3) and every minute after intubation for 5 min (times 4–8). 0–3 PONV scale was reported in all 3 groups I, II and III at 0–1 h, 1–6 h and 0–12 h postoperatively.

*Results:* MABP and HR were significantly less in the acupuncture group at T4, T5 ( $P$  values are  $< 0.05$ ) as compared with the control group. Nausea, retching and vomiting in the control group were statistically significantly higher than both acupuncture and ondansetron groups at all intervals.

*Conclusion:* Laser stimulation of acupuncture points P6 and Liv3 decreases but does not prevent hemodynamic stress-response to endo-tracheal intubation in children, and effectively decreases postoperative nausea, retching, and vomiting in children undergoing strabismus surgery.

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## 1. Introduction

Acupuncture, one of the leaders in alternative medicine, was approved by the WHO as a complementary management method in several diseases and painful conditions. Being likely simple and nearly without untoward responses acupuncture was attempted in nearly most medical diseases [1]. When a

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child is anesthetized for strabismus or middle ear surgery, anesthetist may face several difficulties: hypertension and tachycardia accompanying intubation, hemodynamic responses accompanying ocular muscles traction as well as higher prevalence of postoperative nausea and vomiting [2].

Laryngoscopy and orotracheal intubation are coupled with hemodynamic reflexes and rise in plasma concentrations of catecholamines [3]. The resulting tachycardia and hypertension may be coupled with an increased morbidity in some of the patients [4,5]. Post-operative nausea and vomiting (PONV) have an incidence between 40% and 90% without antiemetic prophylaxis [6,7]. Although pro-emetic rationale of squint surgery is still not clear, drugs acting on serotonergic, histaminic, or dopaminergic receptors in the chemoreceptor trigger zone decrease PONV after squint surgery [8,9]. Different non-pharmacological methods have been investigated as substitutes to antiemetic medications, these comprise acupuncture, electro-acupuncture, laser acupuncture, transcutaneous electrical nerve stimulation, acupuncture point stimulation as well as acupressure [10]. Most non-pharmacological clinical trials have focused on the stimulation of the wrist at the Pericardium (P6) acupuncture point to decrease nausea and vomiting. The rationale by which P6 acupuncture point stimulation reduces PONV has not been established. There are twelve major meridians in the human body, which are regarded as channels for the flow of vital energy named qi (also written ch'i or ki, and pronounced "chee" or "kee") in living organisms. Meridians represent an internal communication system between specific organs and networks of organs. Regarding traditional Chinese medicine, illness arises as a block or imbalance in energy flow along one or more meridians occurs. Acupuncture restores energy flow well being and balance. Acupuncture is claimed to treat physical illness, addiction, as well as mental illness [11]. Vital energy is claimed to modify spiritual, emotional, mental, as well as physical health and to influence yin and yang, as disease is postulated to emerge from restrictions in qi flow in addition to yin and yang imbalance [12].

Postoperative nausea and vomiting (PONV) are two of the most common complications after anesthesia and surgery. Medications only partly prevent PONV and may cause side effects. Alternative modalities as wrist acupuncture point (P6 acupuncture point) stimulation have been investigated in many studies. This can decrease the risk of postoperative nausea and vomiting with least side effects. The risks of postoperative nausea and vomiting were comparable after P6 acupuncture and antiemetic medications. A laser (light amplification by stimulated emission of radiation) is a light amplifier. Low-level lasers are mostly with divergent beams for safety as well as operating at very low power levels (0.05–0.5 W) [13].

Post-operative nausea and vomiting (PONV) and pressor response to laryngoscopy and endotracheal intubation are serious events accompanying surgeries and drug therapies only partially effective. An alternative approach is acupuncture points stimulation [14].

The aim of work was to investigate the efficacy of the acupuncture point stimulation (Liv3 and P6) in preventing the hemodynamic response to laryngoscopy and orotracheal intubation in healthy children, and to assess the efficacy of laser stimulation of P6 in prevention of PONV.

## 2. Patients and methods

After the study was approved by the Ethical Committee of the anesthesia department, Cairo University, written informed consents were obtained from the parents of children. We studied 60 children, ASA I or II, aged 3–12 years, undergoing strabismus surgery.

Exclusion criteria are as follows:

- Children with any cardiovascular disease.
- Children received antiemetic or antihistaminic in the 24 h before the surgery.
- Children with gastro-esophageal reflux.
- Children with D.M.

Laser acupuncture device:

Laser stimulation of P6 and Liv3 was performed by using laser acupuncture device (Petra electric AL10, Germany) which produces a low level laser with the following characteristics; continuous laser beam; red light with wave length between 635 and 670 nm (Fig. 1).

Patients were assigned randomly by computer into three groups:

Group I (acupuncture group  $n = 20$  children).

Laser stimulation was performed on each of the acupuncture points (Liv3 and P6) bilaterally over 30 s, 15 min before induction of anesthesia and 15 min after arriving in the recovery room.

The acupuncture points are:

- Pericard 6 (P6) is located at the wrist between the tendons of palmaris longus and flexor carpi radialis, 2 Cun proximal from the distal palmar crease. 1 Cun is equivalent to the width of the patient's thumb across the interphalangeal joint.
- Point Liv3 is located in the first metatarsal space 1–2 Cun proximal to the web space (Fig. 2).
- Group II (ondansetron group  $n = 20$  children).

The children received ondansetron hydrochloride 0.15 mg/kg IV (Glaxo Wellcome Schere DDS, UK), 15 min before induction of anesthesia.

- Group III (control group  $n = 20$  children).



**Figure 1** Laser acupuncture device.

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