Table of Contents

Pharmacology

Preoperative continuation versus interruption of oral hypoglycemics in type 2 diabetic patients undergoing ambulatory surgery: a randomized controlled trial ......................................................... 3

Randomized trial of acupuncture with antiemetics for reducing postoperative nausea in children ................................................................. 5

Intravenous infusion of lidocaine significantly reduces propofol dose for colonoscopy: a randomised placebo-controlled study ..................... 9
1 Pharmacology CE credit.*

None of the editors or contributors have any real or potential conflicts of interest to disclose.

Indicates Continuing Education Credit is available for this abstract and comment during the CE approval period. Continuing Education Credit is available to individual subscribers on the Anesthesia Abstracts web site at www.AnesthesiaAbstracts.com.

New health information becomes available constantly. While we strive to provide accurate information, factual and typographical errors may occur. The authors, editors, publisher, and Lifelong Learning, LLC is/are not responsible for any errors or omissions in the information presented. We endeavor to provide accurate information helpful in your clinical practice. Remember, though, that there is a lot of information out there and we are only presenting some of it here. Also, the comments of contributors represent their personal views, colored by their knowledge, understanding, experience, and judgment which may differ from yours. Their comments are written without knowing details of the clinical situation in which you may apply the information. In the end, your clinical decisions should be based upon your best judgment for each specific patient situation. We do not accept responsibility for clinical decisions or outcomes.

* This program has been prior approved by the American Association of Nurse Anesthetists for 20 Class A CE credits; Code Number 1035464; Expiration Date 10/31/2020.
Abstract

Purpose The purpose of this study was to examine the effect of withholding or continuing oral hypoglycemic drugs, metformin and/or sulfonylureas, on perioperative blood glucose levels.

Background Consensus guidelines from the Society for Ambulatory Anesthesia recommend oral hypoglycemic drugs be continued until the day before surgery and should be held on the day of surgery. However, the Joint British Diabetes Societies recommend oral hypoglycemic drugs can be continued if a patient is missing only a single meal. The concern is if oral hypoglycemic drugs are continued, patients may experience hypoglycemia; and, if continued, there is some data to suggest patients may be at increased risk for lactic acidosis. The authors of this study hypothesized that continuing oral hypoglycemic drugs would result in lower perioperative blood glucose levels in type 2 diabetics.

Methodology This was a randomized controlled trial that enrolled 160 adults with type 2 diabetes on oral hypoglycemic drugs (metformin and/or sulfonylureas), ages 18-80, who were scheduled to undergo ambulatory surgery. Patients were excluded if they had renal dysfunction or were on insulin. Patients were randomized into one of two groups—continuation or withholding groups. On the day of surgery, a baseline blood glucose level was drawn. All patients received a standardized general anesthetic and postoperative pain prophylaxis, and antiemetic therapy with dexamethasone 4 mg after induction and 4 mg of ondansetron prior to emergence. Additional blood glucose levels were drawn at least once intraoperatively and in the PACU. If multiple blood glucose levels were drawn, mean intra- and postoperative blood glucose levels were used for analysis. A P < 0.05 was considered significant.

Result There were 160 subjects randomized to the study, 80 in each group; however, exclusions and protocol violations resulted in N = 69 patients in the Continuation Group and N = 73 in the Discontinuation Group.

Mean preoperative blood glucose levels were significantly lower in the Continuation Group, 138 mg/dL (95% CI 130-146), compared to the Discontinuation Group, 156 mg/dL (95% CI 146-167, P < 0.001). Mean glucose levels increased over time, but the increase in each group was not significantly different from each other. Mean glucose levels were significantly higher in both groups postoperatively compared to preoperative and intraoperative glucose levels (P < 0.05). No patients experienced hypoglycemia, a blood glucose
< 70 mg/dL. The incidence of hyperglycemia, blood glucose > 180 mg/dL, was 28% in the Continuation Group and 38% in the Discontinuation Group (P = NS; Figure 1).

**Conclusion**

Day of surgery preoperative glucose levels were lower when oral hypoglycemic drugs (metformin and/or sulfonylurea) were continued.

**Comment**

At most centers I have worked at, diabetic patients are told to hold their oral hypoglycemic agents on the day of surgery. I recall learning in my nurse anesthesia program that if metformin or other sulfonylureas are continued, patients were at increased risk of lactic acidosis. However, I have never seen a case of metformin-related lactic acidosis during the perioperative period. A systematic review found metformin was not associated with an increased risk of lactic acidosis when compared to other anti-hyperglycemic agents. However, if the patient has renal dysfunction or is likely to receive IV contrast, then metformin and/or sulfonylureas should be held before surgery.

There is a theoretical risk that metformin may cause hypoglycemia; however, metformin decreases hepatic gluconeogenesis and increases insulin sensitivity but does not directly cause hypoglycemia. If metformin is continued, I recommend closely monitoring the blood glucose level. At a minimum, check a blood glucose level preop- and postoperatively in all diabetic patients undergoing ambulatory surgery. I would follow your departmental guidelines with regards to continuation or discontinuation of metformin of other sulfonylurea agents.

**Dennis Spence, PhD, CRNA**


The views expressed in this article are those of the author and do not reflect official policy or position of the Department of the Navy, the Department of Defense, the Uniformed Services University of the Health Sciences, or the United States Government.
Randomized Trial of Acupuncture with Antiemetics for Reducing Postoperative Nausea in Children

Abstract

Purpose  The purpose of this study was to determine if a combination of P6 Acupuncture + AntiEmetic therapy (A+AE) would reduce PONV compared to prophylactic AntiEmetic therapy alone (AE) in children undergoing tonsillectomy with or without adenoidectomy.

Background  Tonsillectomy is one of the most common surgical procedures performed in children. Unfortunately, 25-30% of children experience vomiting after tonsillectomy despite prophylactic antiemetic therapy. Acupuncture at the pericardium 6 (P6) point in adults has been demonstrated in systematic reviews to significantly decrease PONV and need for antiemetic rescue therapy compared to controls. However, no significant difference was found when acupuncture was compared to antiemetic therapy or a combination of acupuncture and antiemetic therapy.

There have been few studies on acupuncture in children; with one study examining a combination of acupuncture plus droperidol vs. droperidol alone finding no difference in the incidence of PONV. Another trial found that acupuncture decreased PONV in children only during the first two hours after surgery.

Figure 1: Location of P6 Acupuncture Point

Note: In an adult, the P6 acupuncture point is located 2 inches proximal to the palmer crease between the palmaris longus tendon and the flexor carpi radialis tendon.
**Methodology**  This was a randomized, double-blind, controlled study comparing A+AE to AE alone in pediatric patients undergoing tonsillectomy with or without adenoidectomy. Children in the A+AE group received bilateral acupuncture at the P6 point plus ondansetron 0.15 mg/Kg and dexamethasone 0.25 mg/Kg, up to 10 mg 15 minutes before the end of surgery. Children in the AE group received only antiemetic therapy. For the A+AE group Seirin pionex press needles were inserted in each wrist after induction.

Acupuncture needles were removed after completion of the surgical procedure and prior to leaving the operating room. A small bandage was placed over each needle insertion site. Children in the AE group also had bilateral small bandages placed over each wrist to blind nurses, patients, and parents. A standard general anesthetic and postoperative analgesic and rescue antiemetic protocol was used. Parents received a prescription for oxycodone and were instructed to only administer oxycodone if the pain was not controlled by acetaminophen and ibuprofen.

The primary outcome was the incidence of PONV in the PACU and on postoperative day one (POD 1). Secondary outcomes included individual frequency of nausea, retching and vomiting in PACU and on POD 1; rescue antiemetic administered; amount of pain medication, and duration of PACU. Nurses in the PACU asked the child about feelings of nausea, and recorded episodes of retching and vomiting. On POD 1 an investigator contacted the child's parents to obtain information on PONV, opioid and antiemetic consumption. Investigators obtained outcome data from the electronic medical record. The study was powered to find a 17.5% difference in PONV which required N = 90 in each group. An intention to treat analysis was used. An interim analysis after N = 164 children (both groups) were enrolled was required by the institutional review board.

**Result**  The study was stopped after the interim analysis because a clinical effect was detected. There were N = 164 children enrolled, with three excluded because randomization group was not recorded. For analysis there were 86 in the A+AE group and 75 in the AE only group. No significant differences were found in demographics, intraoperative or postoperative characteristics, including opioid consumption. Rescue antiemetic use was similar in the A+AE and AE groups (1.2% vs. 1.3%, P = NS). Post-discharge antiemetic use was also similar (1.4% vs. 2.9%, P = NS).

Children in the A+AE group had an absolute 28% lower incidence of PONV in recovery (Table 1; P <0.001). The lower incidence of PONV was primarily due to an absolute 26% decrease in nausea (P <0.001). The rate of vomiting and retching was similar (P = NS). No significant differences were seen in PONV or retching on POD 1 between the two groups. Between 43-53% of patients experienced PONV on POD 1 (Table 1).

**Conclusion**  Acupuncture at the P6 point in both wrists combined with dual antiemetic therapy (dexamethasone and ondansetron) reduced the...
incidence of nausea in the immediate postoperative period in children undergoing tonsillectomy with or without adenoidectomy.

**Comment**

PONV is quite common after tonsillectomy in children. I was quite surprised despite treatment with dual antiemetic therapy that children in the AE alone group experienced >30% rate of nausea in the immediate postoperative period. On POD 1, the rate of post-discharge nausea was >40% and the rate of vomiting >23% in both groups. I thought this rate would have been lower; however, the PACU nurses may have been asking more frequently about nausea symptoms because the children were enrolled in the study. I wonder why the parents were not given a prescription for antiemetics?

Treatment with acupuncture and prophylactic dual antiemetic significantly decreased the rate of nausea by 28% in the immediate postoperative period; however, no difference was found in the rate of vomiting. Although the rate of vomiting in the immediate postoperative period was quite low in both groups (<4%). The combination of acupuncture and antiemetic therapy appeared to have no effect on post-discharge PONV. However, there was a higher rate of missing data on POD 1 in the A+AE group. Additionally, acupuncture needles were removed after surgery and the study was underpowered detect a difference in post-discharge PONV.

The take-away from this study is that it appears that the combination of acupuncture at the P6 point and dual antiemetic therapy reduced nausea in the immediate recovery period. I would like to see a study

<table>
<thead>
<tr>
<th>Table 1. Nausea, Retching, &amp; Vomiting Postop</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>A+AE group</strong></td>
</tr>
<tr>
<td><strong>PACU</strong></td>
</tr>
<tr>
<td><strong>PONV</strong></td>
</tr>
<tr>
<td><strong>PACU</strong></td>
</tr>
<tr>
<td><strong>POD 1</strong></td>
</tr>
<tr>
<td><strong>P value</strong></td>
</tr>
<tr>
<td><strong>Nausea</strong></td>
</tr>
<tr>
<td><strong>PACU</strong></td>
</tr>
<tr>
<td><strong>POD 1</strong></td>
</tr>
<tr>
<td><strong>P value</strong></td>
</tr>
<tr>
<td><strong>Retching</strong></td>
</tr>
<tr>
<td><strong>PACU</strong></td>
</tr>
<tr>
<td><strong>POD 1</strong></td>
</tr>
<tr>
<td><strong>P value</strong></td>
</tr>
<tr>
<td><strong>Vomiting</strong></td>
</tr>
<tr>
<td><strong>PACU</strong></td>
</tr>
<tr>
<td><strong>POD 1</strong></td>
</tr>
<tr>
<td><strong>P value</strong></td>
</tr>
</tbody>
</table>

**Note:** PACU = post anesthesia care unit. POD = postoperative day. a15% missing results; b8% missing results; c14% missing results.
in the future examine the effect of keeping the acupuncture needles in place through POD 1 to see if it reduces the rate of PONV in children. Of course, this might be difficult in a child recovering from a tonsillectomy. As a parent I would want a prescription for an antiemetic for my child.

Dennis Spence PhD, CRNA

Notes:

**P6 acupuncture site:** P6 is located 2 inches from the distal palmer crease between the palmaris longus tendon and the flexor carpi radialis tendon on the volar surface of both forearms.

**For more information on location of P6 acupuncture point go to:** [https://exploreim.ucla.edu/self-care/acupressure-point-p6/](https://exploreim.ucla.edu/self-care/acupressure-point-p6/)

**Cochrane Collaboration Systematic Review on acupuncture at P6 for PONV prevention:**


Published 2009 Apr 15. doi: 10.1002/14651858.CD003281

[https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3113464/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3113464/)

The views expressed in this article are those of the author and do not reflect official policy or position of the Department of the Navy, the Department of Defense, the Uniformed Services University of the Health Sciences, or the United States Government.
INTRAVENOUS INFUSION OF LIDOCAINE SIGNIFICANTLY REDUCES PROPOFOL DOSE FOR COLONOSCOPY: A RANDOMISED PLACEBO-CONTROLLED STUDY

Br J Anaesth 2018;121:1059-1064
DOI: 10.1016/j.bja.2018.06.019

Abstract

Purpose  The purpose of this study was to test the hypothesis that a bolus and infusion of lidocaine would reduce the total dose of propofol needed for sedation during colonoscopy.

Background  Anesthetists often provide sedation for GI endoscopy. Millions of patients undergo endoscopy every year in the USA alone. Most commonly, propofol, midazolam, and an/or opioid are administered during colonoscopy. These drugs, especially in combination, not uncommonly result in respiratory depression. The 2006 American Society of Anesthesiologists closed claims project reported that respiratory depression due to over sedation was integral in adverse events during sedation. They reported the risk of respiratory depression with propofol or midazolam was up to 14%.

In an effort to reduce respiratory depression from propofol it can be combined with a second drug. For example, propofol and ketamine has been associated with fewer hemodynamic and respiratory adverse events than propofol alone. Lidocaine infusion reduces the perception of visceral pain. A lidocaine infusion has been demonstrated to reduce the amount of general anesthetic administered, reduce postop pain, and result in faster recovery following major abdominal surgery. Studies involving visceral surgery have shown that IV lidocaine infusion was associated with an up to 40% reduction in the requirement for potent inhalation anesthesia. Since colonic distention and traction are primary noxious stimuli during colonoscopy the investigators hypothesized that a lidocaine infusion might reduce propofol requirements during colonoscopy, reduce pain postop, and improve overall recovery.

Methodology  This was a prospective, double-blinded, randomized study of 40 ASA I & II patients undergoing colonoscopy. Sedation was provided by the same anesthetist for all cases. All patients received 4 L oxygen by nasal cannula. Each patient in both groups received propofol 0.5 mg/Kg followed by propofol boluses as needed to produce unconsciousness during insertion of the endoscope. Ketamine 0.3 mg/Kg was given to all patients after loss of consciousness. Thereafter, the Lidocaine group received 1.5 mg/Kg lidocaine plus an IV infusion of 4 mg/Kg/h. The Control group received an identical volume of saline as a bolus and infusion.

During the procedure patients were maintained at a level of sedation that allowed verbal responses to simple questions. Propofol 20-30 mg was given if the patient complained or showed physical evidence of discomfort. If this dose of propofol was insufficient, ketamine 10 mg was given. The primary outcome of interest was the total dose of propofol used for colonoscopy. Secondary outcomes included:
• oxygen desaturation
• pain postop
• fatigue postop
• operative conditions per endoscopist

Result  The average age of the Lidocaine Group was greater than the Control Group due to outliers in both groups. Otherwise the demographics of the two groups were similar.

Subjects in the Lidocaine Group received 50% less propofol than the Control Group (P=0.02). Both groups received a similar total dose of ketamine. In fact, additional doses of ketamine were rare in either group. The number and depth of oxygen desaturations was also similar in both groups. The endoscopists judged the conditions during colonoscopy to be no different between groups. Pain scores and fatigue postoperatively were statistically significantly lower in the Lidocaine Group.

Conclusion  An IV lidocaine infusion during propofol / ketamine sedation for colonoscopy resulted in a 50% reduction in the propofol administered without changing the working conditions for the endoscopist.

Comment  There is plenty of evidence that a lidocaine infusion during general anesthesia results in less postoperative pain following major abdominal surgery. The results are stunning when you see them for the first time. So it was good thinking when these investigators decided to see if a lidocaine infusion would benefit colonoscopy patients. But let’s be careful what we take away from this study. The lidocaine group clearly needed less propofol to achieve the same operative conditions. Less propofol, less respiratory depression; that’s a win. But, while the pain and fatigue scores were both statistically lower in the lidocaine group, the differences were not even close to being clinically significant. I suspect that if you looked for a difference in postop pain or fatigue you wouldn’t even be able to see it. That said, part of the reason the difference in postop pain was so small may have been the fact that both groups received ketamine. Ditto for the lack of a difference in desaturations between groups. There were very few in either group, likely because of the ketamine. If you don’t want ketamine in the mix then with just propofol and lidocaine you may see a noticeable improvement in postop pain in the lidocaine group. (But I just have to say, propofol and ketamine is a sweet combination. Their undesirable effects cancel each other out while dramatically reducing respiratory depression and providing analgesia.)

A lot of us have gotten really good at deep propofol sedation, but we do so with a very small margin of safety compared to the rest of our practice. That’s not a criticism, there is no one better suited to do it than us, it is simply a fact. Putting a lidocaine infusion in the mix benefits the patient and significantly increases the margin of safety. I hope you’ll give it a try.

Michael A. Fiedler, PhD, CRNA

Note:  For more information about the beneficial effects of a lidocaine infusion during abdominal surgery see the following issues of Anesthesia Abstracts — 7.8, 7.9, & 12.3.