SPECIAL NOTICE:

The September Issue will be a single topic issue consisting of a comprehensive, evidence based review of PostOperative Nausea and Vomiting. This review has been prepared exclusively for Anesthesia Abstracts subscribers by Joseph F. Burkard, DNSc, CRNA. Dr. Burkard is an associate professor in the Hahn School of Nursing & Health Science, University of San Diego, San Diego, CA. He will be serving as the Associate Editor for the September issue.

Pharmacology specific CE will be included. (May meet requirements for Alabama, Alaska, Idaho, Kentucky, Nevada, and New Mexico.)
Pain
- DETERMINATION OF THE EFFICACY AND SIDE EFFECT PROFILE OF LOWER DOSES OF INTRATHecal MORPHINE IN PATIENTS UNDERGOING TOTAL KNEE ARTHROPLASTY

Patient Safety
- NOSOCOMIAL CONTAMINATION OF LARYNGOSCOPE HANDLES: CHALLENGING CURRENT GUIDELINES

Pediatric Anesthesia
- OVERWEIGHT/OBESITY AND GASTRIC FLUID CHARACTERISTICS IN PEDIATRIC DAY SURGERY: IMPLICATIONS FOR FASTING GUIDELINES AND PULMONARY ASPIRATION RISK

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.
THE DIAGNOSTIC VALUE OF THE UPPER LIP BITE TEST COMBINED WITH STERNOMETAL DISTANCE, THYROMENTAL DISTANCE, AND INTERINCISOR DISTANCE FOR PREDICTION OF EASY LARYNGOSCOPY AND INTUBATION: A PROSPECTIVE STUDY

Anesth Analg 2009;109:822-824

Khan ZH, Mohammadi M, Rasouli MR, Farrokhnia F, Khan RH

Abstract

Purpose The purpose of this study was to compare the ability to predict difficult intubation using the Upper Lip Bite Test combined with assessments of Thyromental Distance and Interincisor Distance.

Background Most clinical tests designed to predict difficult intubation are not reliable. They typically have low sensitivity and produce false positives. Some evaluations of the Upper Lip Bite Test (ULBT) have shown better specificity and accuracy for predicting difficult intubation than Mallampati classification. Comparisons with Thyromental Distance (TMD) and Interincisor Distance (IID) have not been made.

The ULBT is graded as Class I, II, or III. When the patient is able to touch his lower incisors to the skin of the upper lip above the vermilion border the ULBT is class I. When the lower incisors can touch the skin of the upper lip below the vermilion border the ULBT is class II. Lastly, when the lower incisors cannot touch the upper lip the ULBT is class III. A TMD <6.5 cm or an IID <4.5 cm have each been associated with difficult intubation.

Methodology This prospective, observational, blinded study included patients 16 years old and older scheduled for elective surgery. Patients with an airway abnormality or obvious neck pathology were excluded. TMD was defined as the distance between the upper border of the thyroid cartilage and the mandible with the neck extended. The IID was defined as the distance between the upper and lower incisors with the mouth maximally opened. In all cases, laryngoscopy was performed with a Macintosh 3 blade and the laryngeal view described using the Cormack-Lehane (C-L) grading system. “Difficult Intubation” was defined a C-L grade 3 or 4. All laryngoscopies were performed by the same individual who was unaware of the ULBT result.

Result The study included 309 men and women, mean age 34±10 years. About two thirds were male. Two patients were assessed as C-L grade 4 (epiglottis not visible) and 17 patients C-L grade 3 (epiglottis but none of the glottis visible). All together 6.1% (n=19) of all patients were C-L grade 3 or 4; a difficult intubation.

A class I ULBT was more likely to predict an easy intubation than either the IID or TMD. Combining the results of the ULBT and either the IID or TMD measurement did not increase the specificity of the airway assessment (probability of a negative test in patients without a difficult airway). In this study, the ULBT produced a sensitivity of 78.95%, specificity of 91.96%, and accuracy of 91.05%.

Conclusion The Upper Lip Bite Test has the advantage of being qualitative and does not require a distance to be measured accurately to produce an accurate result. The accuracy of an airway assessment is not improved by adding a measurement of the interincisor distance or thyromental distance to the ULBT.
Comment

I think most of us employ a combination of Mallampati classification, mouth opening, thyromental distance, and neck extension to assess the likelihood of a difficult intubation in most patients. But we all know that all of these tests can look good and the intubation can still be difficult. Some of the tests can look bad and the intubation can be easy. They aren’t as accurate as we’d like. This is the third or fourth article on the Upper Lip Bite Test that I have read. I’ve been waiting to see if the ULBT is a “better” test then the ones we use now. This article says it is. I’ve been trying it out clinically. Even with a demonstration (my ULBT is class I) I’m not sure patients always “get” what I’m asking them to do. Sometimes they look like they could bite their upper lip above the vermilion border but their teeth never get there. I can’t tell so far if those are really class III results or the patient’s just didn’t understand how to do what I was asking them to do. If it turns out that patients really can make their best effort at performing an ULBT when shown an example then I’ll be anxious to clinically correlate the class III ULBT results with difficulty intubating. If most patients never “get it” when I ask them to bite their upper lip, then I don’t think it matters how good the test is at predicting difficult intubations.

Michael Fiedler, PhD, CRNA

If you try the Upper Lip Bite Test in your practice we’d all be interested in hearing your impressions. You can share them with other readers in Blog with the Editors at www.AnesthesiaAbstracts.com

© Copyright 2009 Anesthesia Abstracts - Volume 3 Number 8, August 31, 2009
THYROMENTAL DISTANCE MEASUREMENT – FINGERS DON’T RULE

Anaesthesia 2009;64:878-882

Baker PA, Depuydt A, Thompson JMD

Abstract

Purpose The purposes of this study were 1) to identify how thyromental distance was measured during a preanesthetic assessment, 2) to measure the finger widths of a number of anesthetists and compare this measurement to the critical value for thyromental distance of 6.5 cm, and 3) perform a meta-analysis of published studies to determine the accuracy of thyromental distance as a predictor of difficult intubation.

Background A number of tests are used to predict difficult intubations but none are very reliable. One of these tests is a measurement of the thyromental distance. Thyromental distance is measured with a specially designed thyromental gauge, a ruler, or finger breadths. Below a critical value of 6.5 cm, thyromental distance correlates to some extent with difficult intubation.

Methodology This was a combination survey, prospective observational study, and meta-analysis. At a professional meeting, 118 anesthetists were asked how they measured thyromental distance, what the minimum acceptable distance was, and, if they measured with finger breadths, how many fingers was minimally acceptable. The width of the respondent’s fingers at the proximal and distal interphalangeal joint was then measured with a ruler.

For the meta-analysis, prospective studies over a 28 year period were included if they contained sensitivity and specificity data for the thyromental distance as a predictor of difficult intubation.

Result Of the 118 anesthetists surveyed, all but three provided demographic information, 24 were trainees and 91 were attending anesthesiologists; 74 male and 41 female. Most respondents (72%) used finger width to measure thyromental distance. Visual estimation alone was used by 24% of respondents. Most (55%) used 6.5 cm as the critical value for thyromental distance, but 42% used a shorter distance. Measured in finger widths, the critical value was identified by 71% as three finger widths and by 21% as four finger widths. When measured with a ruler, three finger widths was less than 6.5 cm in 84% of respondents. The mean width of three fingers was 5.8 cm ±0.62 cm. Mean three finger width distance was 5.38 cm in women and 5.91 cm in men (P<0.0001). The width of three finger breadths at the proximal interphalangeal joint had a range from 4.6 to 7.0 cm.

The meta-analysis included 24 studies with a total of 23,146 patients. In 14 studies (6,066 patients) (designated Group A) thyromental distance was measured with a ruler. In group A the sensitivity and specificity of thyromental distance as a predictor of difficult intubation was 48% and 79% respectively. In 10 studies (17,080 patients) (designated Group B) there was no mention of measuring thyromental distance with a ruler. In group B the sensitivity and specificity of thyromental distance as a predictor of difficult intubation was 16% and 94% respectively.

Conclusion The critical value for thyromental distance was most often assessed using three finger breadths as a gauge but this practice did not correlate well with the recommended 6.5 cm critical value. Measuring thyromental distance with a ruler improves the sensitivity of the test. Even then, sensitivity remains low for clinical use.
Comment

It is pretty well established that a thyromental distance less than 6.5 cm in an adult is somewhat predictive of a difficult airway … but not very predictive; at least by itself. What this study shows is that it is a really poor predictor of difficult intubation when we approximate the thyromental distance rather than measuring it. Clearly, at least in this survey, “measuring” thyromental distance with one’s fingers rather than a ruler reduces one’s chances of finding a difficult airway when the patient has one by two thirds.

The solution seems simple to me. We could stick a little plastic ruler in the pocket of our scrubs and use it. Or, we could stop guessing and measure our own hand to see how many finger widths is about 6.5 cm. Call me a nerd (and you’d be right), but I did this years ago. Starting from the tip of my little finger and measuring across to my index finger is 7 cm. I use this as my “gauge” when measuring thyromental distance.

Michael Fiedler, PhD, CRNA

Sensitivity = probability of a thyromental distance less than 6.5 cm in patients with a difficult airway

Specificity = probability of a thyromental distance more than 6.5 cm in patients without a difficult airway

© Copyright 2009 Anesthesia Abstracts - Volume 3 Number 8, August 31, 2009
DETERMINATION OF THE EFFICACY AND SIDE EFFECT PROFILE OF LOWER DOSES OF INTRATHecal MORPHINE IN PATIENTS UNDERGOING TOTAL KNEE ARTHROPLASTY

BMC Anesthesiology 2008;8:5

Hassett P, Ansari B, Gnanamoorthy P, Kinirons B, Laffey J

Abstract

Purpose The purpose of this study was to compare intrathecal doses of morphine to determine the most effective dose with the lowest side effects.

Background Patients undergoing total knee arthroplasty are typically older patients with co-existing health problems. The use of intrathecal morphine can reduce the need for additional pain medication post operatively which may lower the risks of IV pain medication side effects. However, intrathecal morphine itself has potentially life threatening side effects such as respiratory depression, along with other serious side effects like pruritus, urinary retention, nausea, and vomiting. Other studies have determined that a dose of 300 micrograms (µg) of intrathecal morphine is effective for post operative pain relief, but these studies also report that the side effect of post operative nausea and vomiting (PONV) is as high as 60% with this dose. This study evaluated lower doses to determine if pain management was effective while decreasing undesirable side effects.

Methodology The study included patients scheduled for elective total knee arthroplasty and were classified as physical status I-III. Patients were excluded who had a history of allergic reaction or severe nausea associated with morphine or anesthetic agents. The study was a prospective, randomized, double blind, controlled clinical trial. All patients received a spinal anesthetic of 15 mg hyperbaric bupivacaine along with intrathecal morphine randomized at doses of 100, 200, and 300 µg. Post operatively each patient was given 2 mg of IV morphine PRN for pain and 12.5 mg of IM prochlorperazine PRN for nausea. If nausea was persistent, the patient was given 4 mg of ondansetron. For pruritus, the patient was initially given 20 mg of IM promethazine which was followed by naloxone if the promethazine was not effective. The patients were assessed post operatively for severity of pain, PONV, pruritus, sedation and respiratory depression. The primary variable was severity of pain in the first 24 hours postoperatively and was graded using a Visual Analogue Scale (VAS).

Result The study included 60 patients and was divided into three study groups. There were no demographic differences between the three groups. VAS pain scores and post operative morphine use was higher in the 100 µg group than it was in the 200 and 300 µg groups. There were no significant differences in pain scores or post operative morphine use between the 200 and 300 µg groups. There were no differences between any of the groups in PONV, pruritus, or sedation. There was one incident of respiratory depression that required intervention in the 300 µg group.

Conclusion Both the 200 and 300 µg groups had comparable analgesia and side effects. The results indicated that 100 µg of morphine was not as effective for pain relief but had similar side effects as the other two doses. Although one patient in the 300 µg group did have respiratory depression, the finding was not statistically significant. However, because the 200 µg dose was just as effective for pain management as the 300 µg dose along with having the same incidence of side effects, it was suggested that a dose of 200 µg of intrathecal morphine be used for post operative pain management in total knee arthroplasty patients.
I do use intrathecal morphine for total knee arthroplasty patients in addition to a continuous femoral nerve block. This might seem to be overkill, but when I am not able to use a spinal anesthetic and obviously not able to administer intrathecal morphine, I find that those patients take more supplemental pain medications over the entire post operative period than those who had the intrathecal morphine. Although femoral nerve blocks are very effective, I believe that the discomfort of pressure from swelling and possibly post operative anxiety can both be reduced from the effects of intrathecal morphine. I have struggled in some cases with PONV and pruritus associated with intrathecal morphine and found that in a few cases the side effects are worse than the benefit received, but overall it is worth using. Naloxone seems to be very effective in counteracting both PONV and pruritus, which makes perfect sense because the interaction of morphine with the receptor sites is the reason for these side effects. That is why I often question the use of an antihistamine in the treatment of pruritus, or the use of a conventional antiemetic in these cases. The authors of this study used both of these as a first line treatment for pruritus and PONV. I am convinced that an antihistamine sometimes works only because it provides sedation which helps the patient forget about their itching. I have never found a conventional antiemetic to work for intrathecal morphine induced nausea. Sometimes I think that the practice of anesthesia is just as much an art as it is a science, so if you find something that works in your practice then use it.

This study was very simple and straight forward in relationship to finding an effective dose of intrathecal morphine. I would agree with the authors that 200 µg might be the best dose. Even though they found that there were no differences in side effects and effectiveness between 200 and 300 µg, it is always best to use the lowest effective dose of any drug.

Steven R. Wooden, MS, CRNA
NOSOCOMIAL CONTAMINATION OF LARYNGOSCOPE HANDLES: CHALLENGING CURRENT GUIDELINES


Call TR, Auerbach FJ, Riddell SW, Kiska DL, Thongrod SC, Tham SW, Nussmeier NA

Abstract

Purpose The purpose of this study was to assess institutional laryngoscope handle cleaning and describe organisms found on handles. The investigators hypothesized that more thorough disinfection of laryngoscope handles would be necessary.

Background Transmission of bacterial infections have been attributed to laryngoscope blades. Laryngoscope handles may be contaminated after laryngoscopy if the blade is closed against the handle or when patient secretions are transferred to the handle by the laryngoscopist’s hands. Laryngoscope handles have been demonstrated to be contaminated with blood and bacteria. Practice guidelines from the Australian and new Zealand College of Anesthetists’ specify that laryngoscope handles should be “decontaminated” between patient uses but not all professional associations address the issue. Some experts advocate sterilization of laryngoscope handles between use.

At the study institution, normal procedure was to wipe laryngoscope handles with a disinfectant between patients.

Methodology Bacterial and viral cultures were taken from 60 laryngoscope handles in the main adult operating room of a single institution. All samples were collected after a case had been completed, the room and equipment cleaned, and the room designated as ready to receive the next case. Bacterial cultures were collected over eight days and viral cultures over the following two days. Handles were swabbed along their length using 20 top to bottom swipes.

Result Bacterial cultures were positive on 75% of laryngoscope handles. Of the positive cultures, 62.5% (n=25) grew coagulase-negative staphylococci, 17.5% (n=7) Bacillus spp. not anthracis, 7.5% (n=3) alpha-hemolytic Streptococcus spp., and 2.5% (n=1) each vancomycin-susceptible Enterococcus spp., methicillin-susceptible S. Aureus, and Corynebacterium spp. No methicillin-resistant S. Aureus, vancomycin-resistant enterococci, respiratory viruses, or Gram-negative bacteria were grown. Culture density was graded as rare, few, moderate, or many. Most cultures were graded as “rare,” and no culture densities were graded higher than “few” (> 10 colonies zone one, < 10 colonies zone two, no growth zone three). No viruses were identified.

Conclusion These data support continued low level disinfection of laryngoscope handles. Guidelines should be adopted that mandate at least low level disinfection of laryngoscope handles after each use.

Comment The more studies I read lately, the more it seems like everything we use in the operating room is contaminated with pathogenic bacteria that is invisibly spread to patients in a myriad of ways. It is reassuring to read a study that seems to indicate that something
we use is relatively “clean.” At first read, one might see only that 75% of laryngoscope handles cultured positive for bacteria. But with a closer read one discovers that these positive cultures didn’t grow large colonies, nor were they the bacteria we worry about from an infection control perspective. While some can cause disease under some circumstances, by and large they are common residents of the skin and mouth. Notably absent are antibiotic resistant pathogenic bacteria. So, the practice of wiping laryngoscope handles appears to be adequate cleaning in the practice environment in which the study was conducted.

I must, however, take issue with the second conclusion the investigators drew from their data. They said that, “guidelines should be adopted that mandate at least low level disinfection of laryngoscope handles after each use.” Cleaning laryngoscope handles is a good idea. I certainly would not argue against it. But … in this study ONLY laryngoscopes that had been wiped with a disinfectant were examined. The study did not include a group in which the laryngoscope blades were NOT wiped with a disinfectant. As a result, we have no way of knowing that handles that have not been wiped down are any more contaminated than those in this study. Maybe wiping the handles with a disinfectant once a week is enough, maybe once a day, maybe it has to be between every case to keep the handles free from pathogenic bacteria. This study doesn’t tell us. I think disinfecting laryngoscope handles is a great idea but one can’t rationally conclude that disinfection should be mandated based upon the data presented in this study.

Michael Fiedler, PhD, CRNA
OVERWEIGHT/OBESITY AND GASTRIC FLUID CHARACTERISTICS IN PEDIATRIC DAY SURGERY: IMPLICATIONS FOR FASTING GUIDELINES AND PULMONARY ASPIRATION RISK


Abstract

Purpose The purpose of this study was to quantify the prevalence of overweight and obesity in a pediatric day surgery population and to assess whether current adult fasting guidelines (clear liquids up to 2 hours before induction) could be applied safely to a pediatric population.

Background It has been a time honored principle of anesthesia practice that obesity engenders a “full stomach” condition regardless of nil per os (NPO) duration. Research in obese adults has shown that residual gastric fluid volume in obese fasting adults is no different than that in lean fasting adults. The caveat to the change in NPO guidelines is that no known condition that delays gastric emptying may be present (diabetes mellitus, use of narcotics, trauma, extreme anxiety, etc.). This means that obesity is no longer considered an independent predictor of gastric fluid status. As new fasting guidelines have been put in place to reflect these adult data, many providers have extended them to include the pediatric population. This research sought to describe the gastric fluid volume and pH in a large group of NPO 2 to 12 year-old day surgery patients partitioned by weight and to verify the safety of these “new rules” in a pediatric population.

Methodology In Part A of the study, a retrospective chart review of 1,000 pediatric patients was performed to determine the epidemiology of the day surgery pediatric case group and to determine the prevalence of overweight and obese children served by the institution. Overweight and obesity were defined according to current CDC growth charts. Subjects were classified as lean/normal (BMI between 25th and 75th percentile), overweight (BMI = 85th to <95th percentile), or obese (≥95th percentile). Subjects were 2 to 12 years of age. In Part B, the prospective part of the study, 1,000 day surgery subjects who satisfied inclusion criteria and had planned tracheal intubation, were enrolled to undergo post-intubation gastric fluid volume measurement and pH determination. Patients who received drugs known to slow gastrointestinal transit time were excluded. Full epidemiologic data were collected including medical history, planned surgical procedure and current medications.

Preoperative instructions included directives for no solids after midnight and clears up to 2 hours before arrival at hospital. Actual NPO status was documented in hours and minutes. The vast majority of patients received PO midazolam and acetaminophen 15 to 30 minutes before induction (maximum combined volume 11.5 mL) followed by 5 to 10 mL of apple juice. After induction and intubation, gastric residual content was aspirated with 14 to 18 Fr orogastric tube in the supine, left lateral and right lateral positions and measured with a graduated syringe. Colorimetric paper was used to measure pH. If emesis occurred during induction, the anesthetist estimated emesis volume and evaluated the patient for evidence of aspiration (bilious secretions in ETT, particulate matter at or below vocal cords, bronchospasm, persistent increased oxygen requirements).

Result In the retrospective sample (A), 14% of subjects were overweight and 13.3% were obese. Overweight and obese children were more likely to be older and be assigned ASA III status. In the study sample (B), 14.6% of subjects were overweight...
and 17.8% were obese; 38.4% of subjects had obstructive sleep apnea, 23.7% had reactive airway disease and 2.5% had gastroesophageal reflux disease. Gastric fluid volume based on actual body weight (GFV-ABW) was lower in the obese group (0.66 ± 0.49 mL/kg) compared to the lean/normal (0.97 ± 0.67 mL/kg) or the overweight (0.92 ± 0.66 mL/kg, P < 0.001). Gastric fluid volume based on ideal body weight (GFV-IBW) was no different across BMI groups (mean 0.96 ± 0.71 mL/kg). Mean fasting time was 9.7 ± 5.0 hours with a range of 2 to 24 hours, median time 11.5 hours and interquartile range 9.5 hours. Only 10.6% of subjects actually ingested clear liquids 2 to 4 hours prior to induction (liberal fasting subgroup). Among this subgroup, GFV-ABW was lower in the obese group (0.63 ± 0.35 mL/kg) than in the lean/normal (1.07 ± 0.63 mL/kg) and overweight group (0.87 ± 0.77 mL/kg), and GFV-IBW was no different among the weight classes (1.00, 1.06, 1.05 mL/kg for obese, lean/normal, and overweight classes respectively). There was no difference in GFV-IBW between the liberal fasting group and the overall group of all study patients. Fasting duration had no effect on pH.

There were significant differences in GFV-IBW between patients who received PO midazolam/juice or not (GFV-IBW 0.97 ± 0.71 mL/kg v. 0.57 ± 0.64 mL/kg, P = 0.001) and PO acetaminophen/juice or not (GFV-IBW 0.97 ± 0.71 mL/kg v. 0.73 ± 0.71 mL/kg, P = 0.025). The groups with low GFV-IBW due to withholding PO meds were small (midazolam, N= 25 and acetaminophen, N=33). Patients who were taking lansoprazole (Prevacid) had GFV-IBW 0.14 ± 0.12 mL/kg.

In univariable analyses, BMI, gender, ASA status, history of GERD, and use of acetaminophen, midazolam or lansoprazole were predictive of gastric fluid volume based on ideal body weight. BMI and ethnicity were predictive of pH. Eight subjects (0.8%) vomited during anesthesia induction; among these, six had OSA (P = 0.061) and six were being induced for tonsillectomy and/or adenoidectomy. Two of the emetic patients weighed 96 and 142 kg (BMI 33.7 and 54.0 respectively); these patients had planned rapid sequence inductions with propofol and succinlycholine. No patients with emesis on induction had evidence of aspiration noted.

**Conclusion**

The obesity epidemic is alive and well in a typical pediatric day surgery population. Data from this pediatric study support the body of research in adults that increasing BMI does not increase GFV or aspiration risk in properly fasting patients. This study found an overall GFV-IBW of 1 mL/kg across all weight categories in fasting patients aged 2 to 12 years. Withholding PO midazolam and/or acetaminophen (followed by apple juice) was effective in reducing GFV-IBW. Administering PO medications with a chaser not only increased absolute gastric volume but also increased the gastric osmotic load and salivary and gastric secretions.

**Comment**

Be aware that quantifying excess fat in children is defined differently than in adults; body mass index is defined numerically but currently children are classified as overweight or obese not by BMI but by BMI percentile rank on pediatric growth charts. Using this schema, 2 patients are labeled “obese” that have calculated BMIs of 18.3 and 23.9 kg/m² (they are in the 96th and 97th percentiles for sex and age, respectively, and were therefore classed with the obese group). These charts are available on the CDC website.

Eight patients were reported as vomiting on induction however Table 6, which reports the comparison between emetic and non-emetic subjects, has missing data in the BMI percentile categories. Where are the missing 2 emetic patients? Sometimes when you read the charts, things just don’t add up. Interestingly, 5 of 6 patients with emesis had estimated gastric volumes of > 1 mL/kg (one lean subject with 0.6 mL/kg IBW, the rest with 1.3 to 2.7 mL/kg IBW, 2 had no data reported). Six of the 8 emetic patients had OSA and all 6 were presenting for tonsillectomy and/or adenoidectomy. Is there a relationship between airway obstruction (chronic and/or acute) and reflux? In prematurity infants, periods of apnea induce decreases in lower esophageal sphincter pressure. It is possible that negative intrathoracic pressure swings accompanying upper airway obstruction during induction of an OSA patient.
increases the pressure gradient across the diaphragm, potentially increasing reflux. Application of CPAP appears to increase both LES pressure and barrier pressure in normal adults, whether this may apply to using elevated end-expiratory pressure during inhalation induction is uncertain, but an interesting possibility.

Only 10% of subjects (N=106) used the most lenient guidelines, that is, ingested clears in the 2 to 4 hours prior to induction (let’s call them the NPO2-4 group). The majority of subjects were NPO longer than the historical 8-hour requirement (mean 9.7 hours, median 11.5 hours). One might suggest then that the data from the majority group (N= 894) is not relevant to the stated aims of the study: these subjects did not utilize the newest NPO guidelines. Unfortunately, the authors published no additional analyses of the NPO2-4 group, so we don’t know the BMI or BMI percentile mix of this group or whether the obese NPO2-4 subgroup might have a higher GFV than the lean/normal NPO2-4 subgroup. We only know that the OVERALL NPO2-4 group data are similar to the well-fasted group. Without this subgroup analysis, I am not sure we can yet answer the question: is it safe for overweight or obese 2 to 12 year-olds to take clears in the 2 to 4 hours prior to anesthesia induction?

Penelope S Benedik, PhD, CRNA, RRT

http://www.cdc.gov/growthcharts/clinical_charts.htm#Set1


© Copyright 2009 Anesthesia Abstracts - Volume 3 Number 8, August 31, 2009
**Abstract**

**Purpose** The aim of this study was to compare the onset, duration of action, and intubating conditions of variable doses of rocuronium in an obese sample.

**Background** Neuromuscular (NM) blocking agents are generally dosed based on ideal body weight (IBW) rather than actual body weight (ABW) on the premise that excess weight in the obese is primarily fat, not lean tissue (muscle). Some clinicians have concerns that in the obese population 1) dosing based on IBW may lead to delays in onset and potentially poor intubating conditions or 2) dosing based on ABW may lead to prolonged NM blockade and delay reversal.

**Methodology** Fifty-one patients scheduled for gastric bypass or gastric banding were enrolled in this prospective, randomized, double-blinded trial. Rocuronium doses were randomized based on IBW, corrected body weight 20% (CBW20% = IBW + 20% × (TBW - IBW)), or corrected body weight 40% (CBW40% = IBW + 40% × (TBW - IBW)). Patients received total intravenous anesthesia using propofol (5 mg/kg/hr) and remifentanil (1.0 mcg/kg/min; both doses based on CBW40%) for 1 minute followed by 200 mg of propofol for induction. Subjects’ BMI ranged from 34 to 72 with mean BMI of 44, 42, and 45 for the IBW, CBW20%, and CBW40% groups respectively. Onset was defined as the time from the injection of rocuronium to a 95% depression of T1 (1st twitch in TOF). Duration of action was defined as the time from injection of rocuronium to the reappearance of T4 (4th twitch in TOF). Researchers also measured the time to return of TOF > 0.9, the current standard for documenting adequate return of NM function.

**Result** Onset time of rocuronium was not significantly different between groups (IBW 85 sec, CBW20% 84 sec, or CBW40% 80 sec; P = 0.16). The time to reappearance of T4 was significantly different between the IBW and CBW40% groups (IBW 32 min, CBW20% 38 min, or CBW40% 42 min; P = 0.001) with a mean difference of 12 min (95% CI 6 to 19 minutes). Mean time to TOF ratio > 0.9 was 63 min, 75 min, and 76 min for the IBW, CBW20%, and CBW40% groups respectively (no P-value reported).

**Conclusion** Basing rocuronium dosing on 0.6 mg/kg of IBW in the morbidly obese does not delay onset of neuromuscular blockade, but does hasten the return of neuromuscular function and reversibility. Dosing rocuronium based on IBW during a propofol-remifentanil induction does not compromise intubating conditions.
Comment

This is an extremely useful study for clinicians who participate in bariatric procedures as the question of dosing NM blocking agents in morbid obesity reemerges as a factor in every “difficult intubation” or “hard to reverse” scenario. We may now be relatively comfortable that dosing rocuronium based on IBW will provide reasonable intubating conditions within an acceptable time frame, and will likely be reversible for mean surgical times of 72 to 85 minutes.

Key to this study was the accurate measurement of NM function using ulnar nerve stimulation with the TOF-Watch® device. This peripheral nerve stimulator uses acceleromyography, which measures the acceleration of a stimulated muscle response with an acceleration transducer taped to the thumb. Rather than rely on a subjective assessment of “fade” during a visual or palpable assessment of TOF or tetanus, a properly calibrated TOF-Watch® provides objective data including the actual TOF ratio. This device is commercially available and should not be relegated by clinicians as useful only for academic researchers. It is actually quite useful in any setting that requires NM blockade until late in the case or when longer-acting NM blocking agents are administered (ie. cases in which inadequate reversal is a risk).

I purchased a TOF-Watch® device with my educational funds (about $750, OUCH), but it has been an excellent addition to my armamentarium of monitoring devices.

Penelope S. Benedik PhD, CRNA, RRT

Ideal Body Weight (IBW) in kg = Height in cm - 106 (women) or height in cm - 102 (men).
CLONIDINE AS AN ADJUVANT TO LOCAL ANESTHETICS FOR PERIPHERAL NERVE AND PLEXUS BLOCKS

Anesthesiology 2009;111:406-15

Popping D, Elia N, Marret E, Wenk M, Tramer M

Abstract

Purpose This meta-analysis evaluated studies on clonidine as an adjunct to local anesthetics in order to determine dose response and optimal dose for peripheral and plexus blocks.

Background Clonidine is an alpha 2 adrenergic agonist which is thought to improve the quality and duration of local anesthetic blocks. Studies have shown that clonidine in doses up to 150 micrograms (µg) can increase the duration of action of local anesthetics without significant side effects.

Methodology Studies that included randomized comparisons of local anesthetic blocks with and without clonidine for single injection nerve or plexus blocks were included in the analysis. In addition, the studies contained a report of postoperative pain outcomes and adverse effects. Studies that included general anesthesia, children, repeated injections, and intravenous regional anesthesia were not included.

Result There were 280 studies retrieved with 20 of them meeting the analysis criteria. A total of 1,052 patients were included in the accepted studies with 573 of the patients receiving clonidine. Local anesthetics included were the intermediate acting agents mepivacaine, lidocaine, and prilocaine, and the long acting agents ropivacaine, bupivacaine, and levo-bupivacine. The clonidine doses ranged from 90 to 150 µg.

Clonidine added to local anesthetics reduced the onset of sensory blocks by a mean of 2.2 minutes but had no impact on the onset of motor block. Clonidine did not have an impact on the incidence of failed block. There was an increased duration of analgesia with all types of local anesthetic agents when combined with clonidine by about 2-2.5 hours. Clonidine’s prolongation of sensory block was shortest with prilocaine (average 51 minutes) and longest with ropivacaine (average 113 minutes). Motor block was prolonged by 1.5-2 hours when clonidine was added to all anesthetics with the exception of bupivacaine, which had an increased motor block of 4 hours.

The addition of clonidine increased the incidence of hypotension, bradycardia, and sedation, but there were no other significant side effects associated with the addition of clonidine.

Conclusion Although clonidine alone does not produce analgesia, it appears that when it was added to local anesthetics for peripheral nerve and plexus blocks it provided a significant increase in sensory and motor block time. Analgesia was reported to be
prolonged with the addition of clonidine for an average of 2 hrs. Although not always desired, motor block was also prolonged in the clonidine cases. In addition to the desired effects with clonidine, there were minor but significant side effects; they included bradycardia, hypotension and sedation. The studies evaluated used between 90 and 150 micrograms of clonidine as an additive to the local anesthetics, however the current literature does not establish an optimal dose of clonidine.

**Comment**

Clonidine is an excellent adjunct to local anesthetics when prolongation of analgesia is desired. It does have a few side effects to consider, and hypotension is probably the most significant. I have not found this to be a major problem in my practice, but because of clonidine’s mechanism of action the possibility of hypotension is not surprising. It does prolong the motor block, and that is sometimes a problem, but with inpatient procedures, I have found the prolonged analgesia to be beneficial and the prolonged motor block not to be a problem. The most beneficial use of clonidine may be its use in long-term pain management. One of the problems with using local anesthetics for continuous long-term pain therapy is that patients become tolerant to the local anesthetic agent and a maximum concentration is eventually reached. I have found that the addition of clonidine to the local anesthetic prolongs the effectiveness of analgesia while decreasing tolerance. Clonidine used as an adjunct to local anesthesia is a safe and effective way to prolong analgesia in both short term and long term blocks.

Steven R. Wooden, MS, CRNA
THE INTERACTION BETWEEN EPIDURAL 2-CHLOROPROCAINE AND MORPHINE: A RANDOMIZED CONTROLLED TRIAL OF THE EFFECT OF DRUG ADMINISTRATION TIMING ON THE EFFICACY OF MORPHINE ANALGESIA


Toledo P, McCarthy RJ, Ebarvia MJ, Huser CJ, Wong CA

Abstract

Purpose The purpose of this study was to evaluate the effect of altering the timing of epidural morphine administration, either prior to or after the administration of 2-chloroprocaine, and to compare this to the effect of morphine administered with lidocaine.

Background There have been multiple studies that have suggested that when morphine is administered after the patient has received 2-chloroprocaine the therapeutic effect appears to be diminished. The mechanism is not well understood, and this has led to controversy. Potential mechanisms have been suggested including: direct antagonism, antagonism of second messenger systems, or the creation of a gap that occurs due to the short action of the 2-chloroprocaine and the long latency of morphine. Epidural 2-chloroprocaine is a useful technique because it offers a rapid onset and short duration. However, the decreased efficacy of morphine administered with it is undesirable. This study was designed to further evaluate the effect of morphine when administered with 2-chloroprocaine using two different dosing strategies.

Methodology This study was a randomized, double-blind, prospective study of patients presenting for a post-partum tubal ligation. Patients had an existing epidural that was used for vaginal delivery with 0.625 mg/mL bupivacaine with 2 mcg/mL fentanyl. Exclusion criteria were: nonfunctioning epidural catheter, chronic opioid use, drug use, history of obstructive sleep apnea or BMI > 40 kg/m². After one hour of monitoring after delivery, the subjects received one of three dosing strategies. The anesthesia provider and the subject were both blind to the study medication. Syringes were prepared by an anesthesia provider who was not involved in the study. Three syringes were made for the following doses and groups:

**MCS group:** a morphine syringe contained 6 mL of 0.5 mg/mL morphine (3 mg), a 30 mL syringe of 2-chloroprocaine and a preservative free saline syringe of 6 mL.

**SCM group:** a 6 mL syringe of preservative free saline, a 30 mL syringe of 2-chloroprocaine and a morphine syringe with 6 mL of 0.5 mg/mL (3 mg).

**SLM group:** a 6 mL syringe of preservative free saline, a 30 mL syringe of lidocaine and a morphine syringe with 6 mL of 0.5 mg/mL (3 mg).

The first syringe (containing either morphine or saline) was administered 30 minutes prior to the local anesthetic dose. The local anesthetic was administered to achieve a T-4 level (15-30 mL). The third syringe was administered at the same time as the skin incision. Any supplemental local anesthetic that was given was recorded. All subjects received ibuprofen 600 mg po within 15 minutes of being in the PACU. If subjects requested, acetaminophen 325 mg with hydrocodone 10 mg could be administered every 4 hours. PACU nurses were blinded to the study group.
The primary outcome variable was the time to first pain medication request. In addition to demographic variables, other variables of interest were pain, nausea and pruritus verbal numeric rating scores, PACU duration of stay, and opioid and antiemetic requirements for the first 48 hours.

**Result**  
A total of 99 subjects were consented for the study and 87 completed the protocol. The SLM and the MCS groups had similar duration of analgesia with a median of 25.8 - 28.6 hours. The SCM group had a median analgesia duration of 2.2 hours. Thirty-three percent (33%) of the SCM group had a first request for analgesia in the first 90 minutes after the procedure, but no subjects in the other groups required analgesia in this short time interval. However, at 48 hours, the groups were not significantly different in opioid use (in morphine equivalents) or pain scores. There was no difference in the groups in the time intervals, i.e. time from delivery to procedure, PACU duration, and procedure duration. Incidence of side effects was not different between the groups in terms of pruritus, nausea or vomiting at any time point.

**Conclusion**  
This study demonstrated the difference in efficacy of morphine delivered 30 minutes before epidural administration of 2-chloroprocaine compared to the administration of morphine after the administration of 2-chloroprocaine. When morphine was administered before the local anesthetic, the efficacy was similar to morphine administration with lidocaine. The reduction in analgesia when morphine was administered after 2-chloroprocaine was consistent with previous reports of this clinical finding.

Further research is necessary to determine the mechanism of the decreased efficacy of morphine after 2-chloroprocaine in the epidural space. However, this study does suggest that the timing of the administration of morphine relative to the local anesthetic dose may be important. The interval for the morphine dosing for this study was 30 minutes prior to the local anesthetic. Further investigation is necessary to determine the ideal interval.

**Comment**  
The design of this study is excellent because all of the providers involved in the care of the patient were blinded to the study group. The randomization was also appropriately performed. The only decision that I would have questioned was the choice to give ibuprofen to all subjects within 15 min of being in the PACU. Although this is part of a multimodal approach to postoperative pain, it does make it a little more difficult to ascertain the analgesic effects of the variable of interest.

I think the results of this study are particularly interesting for the obstetric population. 2-chloroprocaine is an excellent choice in situations that require a rapid onset of action. In addition, it is potentially safer to use in the emergency situation because if it is inadvertently administered in the intravascular space, it is rapidly metabolized (unlike an amide local anesthetic) by the mother and fetus.

Many providers prefer not to use this local anesthetic because of the decreased analgesia following its use. However, there has been some inconsistency in the literature about the decreased efficacy. This inconsistency might be due to the fact that the timing of the narcotic was previously unknown to be a factor. An increased understanding of this mechanism of decreased efficacy of morphine would allow providers the ability to utilize 2-chloroprocaine for situations that warrant it, and still provide adequate analgesia for the patient.

Future investigation to evaluate the time interval that is required to provide the same result is necessary. I personally find that 30 minutes is an unsatisfactorily long time to have to wait to administer the local anesthetic, especially since I tend to use this drug when I am in a situation that requires rapid action. It would be very interesting to test the result with shorter intervals, i.e. 10 or 15 minutes. If it is true that the morphine efficacy remains similar to that of lidocaine + morphine with a shorter interval, this would be very clinically significant.