Introduction: One method of improving anesthesia practice may be to provide outcome data to individual anesthesiologists and groups of anesthesiologists, causing them to reflect on their own practices, as well as systemic factors in the perioperative environment. We undertook to evaluate a group of pediatric patients undergoing tonsillectomy and perform a detailed analysis of their perioperative experience and outcomes with the purpose of providing feedback to anesthesiologists on their own practice and those of their peers. The expectation was that this would provide a stimulus for personal educational objectives, and changes in practice to improve perioperative and postoperative outcomes for children.

Methods: Local research ethics committee approval was obtained for the study. Over a six month period, willing parents or guardians of all children undergoing tonsillectomy at a free-standing children’s hospital provided written informed consent to participate. Data collected included demographics, anesthetic techniques, in-hospital outcomes as well as outcomes for the first day postoperatively. The practice of all 19 consenting anesthesiologists in the group was included. Parents/guardians received a structured telephone questionnaire on the first postoperative day, which included quantitative and qualitative data. Confidential individual patient outcomes, as well as aggregate group data, were provided to anesthesiologists, both in written format and at a facilitated group discussion session.

Results: 89% (263/296) of eligible families consented to participate in the study. 243 families completed the study. 78% of parents were very satisfied and 2% were quite dissatisfied with the care they received. Individual anesthesiologists were able to reflect on their own practice, considering items such as premedication, parental presence at induction, the use of cuffed tubes, analgesic and antiemetic regimes, and fluid management. Individual comments from families were made available to the anesthesiologist who provided care to their child. Specific findings of note were a postoperative vomiting rate of 22% over 24 hours, and a mean "worst" pain score of 6.9/10, which was felt to be unacceptably high. Cuffed tubes were used in 61% of cases, parental presence in 44%, and deep extubation in 76%.
Discussion: Anesthesiologists found the ability to reflect on the outcome data of their own patients, as well as their peers to be a powerful way to stimulate practice improvement. Individual comments from families were also valued highly by participating anesthesiologists. If such models of providing outcome data to anesthesiologists were more widely made part of everyday practice, this might well lead to an improvement in patient and family satisfaction. As an example, the unacceptably high pain scores encountered in the first 24 hours will need new strategies to manage. It is hoped that tracking of perioperative outcome data will become the standard for all children in the institution.
Introduction: This study identifies the incidence, common features and clinical management of difficult intubation in children treated at a pediatric tertiary care center over a two-year period.

Methods: With REB approval the anesthetic records of patients aged 0 to 17 years undergoing general anesthesia between December 2009 and December 2011 were reviewed. Cases with documented difficult airway (C-L grade 3 or more) were identified and analyzed for incidence, demographics, airway history, physical assessment, airway management details, and complications. Descriptive statistics were used to analyze the data.

Results: The total number of anesthetics was 22766. Ninety-four patients with difficult airway underwent 125 anesthetics, for an incidence of 5 in 1000 anesthetics. The highest proportion of children with difficult airway was in adolescents greater than 13 years of age (49%), with infants less than one year representing 21% of cases.

A difficult intubation was anticipated in 80.6% of cases. Seventy (74.4%) of the difficult airway patients had previous anesthetics. Figure 1 outlines the history and physical findings in those patients.

In 76 (60.8%) of patients spontaneous respirations were maintained for intubation. Sevoflurane and propofol were used as induction agents with similar frequency and rocuronium and remifentanil were administered in 31.2 and 22.4% of patients, respectively. Muscle relaxation had been administered to all but 4 of the 25 unanticipated difficult airways.

Ninety one percent of the patients with difficult airways were managed with tracheal intubation, 5.6% with an LMA, 1.6% with nasal prongs and 1.6% with face mask. Of those patients with an anticipated difficult airway, DL was the first intubation method of choice in 53 patients (42.4%). Four emergency tracheotomies and 2 rigid
bronchoscope intubations were performed, each after at least one failed intubation attempt. Of the 38 anesthetics in patients aged 14-17 years, six intubations were performed awake after airway topicalization.

Postoperatively 34 (27.2%) of patients were admitted to the pediatric intensive care unit, 2 (1.6%) of which were unplanned admissions.

Discussion: The almost 20% incidence of unanticipated difficult intubation in this series is in contrast to the adage that difficult airways are almost always predictable in children. Over half the patients with a difficult airway had at least one prior anesthetic in which intubation difficulty was not an issue, suggesting that reliance upon prior anesthetic history alone is insufficient and careful physical assessment is essential. In most of the patients with a known or suspected difficult airway direct laryngoscopy was still chosen as the first choice despite the increasing number of fiberoptic and videolaryngoscopic intubating devices available on the market.

Conclusion: Even in a tertiary care pediatric center the rate of unanticipated difficult intubation remains considerable.

References:
ANTRAL SONOGRAPHY IN PEDIATRIC PATIENTS WITH LARGE GASTRIC VOLUMES

Author(s)
Adam Spencer
University of Alberta
Primary Author / Presenting Author

Co-Authors(s)
Andrew Walker - University of Calgary
Alfred Yeung - Alberta Children's Hospital, University of Calgary
David Lardner - Alberta Children's Hospital, University of Calgary
Kevin Yee - University of Calgary
Jamin Mulvey - Alberta Children's Hospital, University of Calgary
Anahi Perlas - Toronto Western Hospital, University Health Network

Introduction: Ultrasonography is a non-invasive tool to assess gastric fullness and aspiration risk at the bedside in adults and pediatric patients (1, 2). The aim of this study was to evaluate the performance of a 3-point grading system in the prediction of full stomach in the pediatric population by correlating antral grade with gastric volume assessed by suctioning under gastroscopic vision.

Methods: Local ethics board approval was obtained and legal guardians and/or patients scheduled to undergo elective upper gastroscopy provided written informed consent for the study. Following induction of anesthesia, gastric sonography was performed using a Phillips CX50 system (Philips Healthcare, Andover MA, USA) with a curvilinear (low frequency 2-5 MHz) or a linear (high frequency 7-12 MHz) transducer with the patient in both supine and right lateral decubitus (RLD). A video clip and three still images of the antrum between peristaltic contractions were recorded for each patient. Immediately following sonographic assessment, gastric contents were suctioned under gastroscopic guidance and the volume was measured. Qualitatively, the antrum was classified as empty (grade 0) if it appeared flat, with the anterior and posterior walls juxtaposed during a dynamic scan in both supine and RLD. The antrum was deemed to contain fluid if it appeared to have an endocavitary lumen with hypoechoic content and distended walls. In a grade 1 antrum, fluid was visualized only in the RLD position. In a grade 2 antrum, fluid was observed in both supine and RLD positions. A Mann-Whitney U test was completed using SPSS 19.0 (IBM, Armonk NY, USA).

Results: One hundred fasted pediatric patients (aged 11-216 months) presenting to a tertiary hospital for upper gastrointestinal endoscopy were included in the final analysis. A qualitative (content) and quantitative (volume) assessment of the gastric antrum was completed in the supine and RLD positions for each patient. 10% of patients presented with suctioned gastric volumes > 1.12 mL/kg, which is used as our full stomach cutoff volume (3). 0% (0/54), 10.8% (4/37) and 55.6% (5/9) of grade 0, grade 1 and grade 2 classified patients, respectively had suctioned volumes > 1.12 mL/kg. One patient with a
full stomach was not graded as fluid was observed only in the supine position. Specifically, within the nine graded patients with a full stomach, a significant difference (p < 0.05) was noted in suctioned volumes between grade 1 (x = 1.20 ± 0.06 mL/kg, 95% CI = 1.10-1.30) and grade 2 (x = 2.05 ± 0.87 mL/kg, 95% CI = 0.97-3.13).

**Discussion:** These results suggest that a 3-point grading system (grades 0-1-2) based on qualitative gastric sonography may be a good predictor of gastric fullness and aspiration risk in pediatric patients. However, caution must be taken in the interpretation of significance in gastric volumes between grade 1 and grade 2 full stomach patients given the small size of this cohort. This suggests a larger study with appropriate statistical power is warranted to assess the utility of antral ultrasound in this population. Greater awareness and the ability for risk stratification could eventually influence a provider’s choice of sedation, anesthetic, and airway management.

**References:**


Background: Post-operative vomiting (POV) in children is a frequent (8.9-42%) and common indication for unexpected hospital admission (1-3). Intravenous (IV) fluids containing dextrose are commonly used in children. Studies using these IV fluids in the perioperative period have shown improvement of POV in adults (4, 5). Similar studies have not been done in paediatric patients.

Objective: To investigate the efficacy of intraoperative IV dextrose for antiemetic prophylaxis in children undergoing ambulatory surgery.

Methods: Local Research Ethics Board approved this double-blinded randomized control trial on 290 healthy children (3-9 years old) with low risk of POV undergoing ambulatory dental surgery. Patients were randomized into two groups based on antiemetic prophylaxis. The control group received dexamethasone (0.15 mg/kg IV) and ondansetron (0.05 mg/kg IV); the intervention group received dexamethasone (0.15 mg/kg IV) and intravenous 5% Dextrose in 0.9% normal saline (D5NS) maintenance fluid (6).

The primary outcome, emesis in the post anaesthetic care unit (PACU), was compared using Chi-Square. The secondary outcomes were analysed by T-test and non-parametric analysis where appropriate. Non-inferiority analysis of intraoperative IV dextrose relative to ondansetron was conducted with δ = 10 % as the non-inferiority limit.

Results: Data from 289 patients were analyzed (intervention group 144, control group 145). Demographics and intraoperative anaesthetic management were similar. Results are displayed in Figure 1. Emesis in PACU was not different between groups (p = 0.11)
The 95% CI upper limit of the POV proportion was below the non-inferiority margin (7 vs 21.7), demonstrating that intraoperative IV dextrose was non-inferior compared to ondansetron. Patients who vomited in the PACU were 6.2 times more likely to vomit at 24 hours (p=0.015). POV within 24 hours of surgery occurred in 36 participants (12.4%).

Conclusion: This study demonstrates that IV dextrose is not less effective than ondansetron in preventing POV. The effectiveness, different mechanism of action, and safety profile of IV dextrose may lead clinicians to consider this as an alternative, or additional therapy for POV prophylaxis.

References:


**Introduction**: Magill Forceps (MF) are commonly used as an adjunct in nasal tracheal intubation (NTI). (1) No literature has investigated whether the design of the forceps can be altered to account for differences in adult versus pediatric airway anatomy. Knowing that the pediatric larynx and trachea are angled posteriorly, we hypothesized that a +45° change to the MF tip would ease manipulation of the nasal RAE tube, preventing it from getting caught on the anterior trachea and thus, reduce time to intubation TTI. (2)

**Methods**: Following local research ethics board approval, an open label study enrolling 100 consenting patients was conducted. Subjects were randomized to NTI via an aMF or conventional MF. Randomization was conducted using a computer generated randomization list. Group assignment was blinded using sealed opaque envelopes. Inclusion criteria comprised patients aged 0-15yrs and ASA ≤ 2. Exclusion criteria included patients with upper airway abnormalities, risk factors for aspiration or known difficult airway. All intubations were performed by staff anesthesiologists and TTI was recorded via a stopwatch with a sole operator.

**Results**: Data from 52 patients in the aMF group and 48 patients in the MF group were analyzed using non parametric tests. Using intent to treat analysis, the median TTI and interquartile ranges for the MF and aMF were 8.89s (6.52s - 12.51s) and 10.48s (7.07s - 14.29s), respectively (p=0.23). A subset analysis of the data excluding all subjects in whom the corkscrew technique was used to facilitate passage of the nasal RAE tube showed the median TTI for the aMF to be slightly less than the MF, although not statistically significant.

**Discussion**: NTI of pediatric dental surgery patients using an aMF compared to a traditional MF did not result in a significant reduction in TTI. Several pediatric anesthesiologists, however, felt the aMF to be a handy alternative in certain patients. Having mastered using the conventional MF from years of experience, most anesthesiologists in the study felt there was a slight learning curve to using the aMF. This may have contributed to the difficulty in trying to detect a reduction in TTI, if one exists. Nonetheless, equivalence with minimal training was seen. Further studies comparing the aMF with the conventional MF in novice laryngoscopists may be warranted.
References:
Introduction: Ultrasound guided IL/IH nerve block is gaining popularity for pediatric groin surgery with success rate more than 95% in experience hand. However, despite the benefits, the absence of ultrasound machine should not hinder the provider from performing an IL/IH nerve block, considering that many institution are not able to afford an ultrasound machine. The main aim of this study was to assess the accuracy of needle tip in anatomical landmark technique and to compare the efficacy and success rate of IL/IH nerve block using ultrasound guidance and anatomical landmark technique.

Methods: Ethics committee approval was attained and 40 children (1-8 yrs) posted for inguinal hernia day care surgery were divided into 2 groups, group A (ultrasound) and group B (anatomical landmark). Following induction of general anesthesia, group A received IL/IH nerve block under ultrasound guidance. Group B received IL/IH nerve block using conventional landmark technique and ultrasound scan was done to assess the accuracy of needle tip before injecting the LA. The distance of needle tip from IL/IH nerve and plane of needle tip were recorded and LA were injected irrespective of the position of needle tip. 0.5% ropivacaine (0.25ml/kg) were used in both groups with maximum volume of 5 ml. Perioperative opioid requirement and duration of analgesia were recorded.

Results: IL/IH were visualized in all 40 Patients. The success rate was 90% in group A and 60% in group B. Needle tip were seen between internal oblique and transverse abdominis in all 20 patients (100%) in group A and in 15 patients (75%) in group B. The duration of analgesia (p=0.025) and intra-operative (p=0.029) and post-operative (p=0.019) opioid consumption were significantly lesser in the group A. In group B, needle tip was placed in internal oblique muscle in 2 patients, external oblique/internal oblique plane in 1 patient, transverse abdominis muscle in 1 patient and peritoneum in 1 patient.

Conclusion: Ultrasound guided IL IH nerve block is superior to anatomical landmark technique for IL/IH nerve block in terms of efficacy and success rate. However, in case of non availability and lack of experience in handling ultrasound machine, landmark-
based technique can be used with lesser success rate for IL/IH nerve block for day care inguinal hernia repair.
Background: Tranexamic Acid (TXA) is a potent Antifibrinolytic, which is efficacious at decreasing blood loss and transfusion of blood products in pediatric cardiac, craniofacial and orthopedic surgery. To date conclusive evidence from a well-designed trial is lacking to support its efficacy in Adolescent Idiopathic Surgery. The primary aim of this study is to determine if tranexamic acid is efficacious in this setting. Secondary aims are to determine the pharmacokinetic profile of Tranexamic acid in this specific group.

Methods: This prospective study randomized double blind study will enroll 120 children and adolescents ages undergoing scoliosis repair with the diagnosis of idiopathic scoliosis. This initial report will define the pharmacokinetic (PK) profile of TXA in children and adolescents will be determined and therefore the optimum dose will be predicted. These results are part of a larger efficacy and safety trial.

Results: With local institutional board approval and patient/parent consent; we have recruited 79/120 patients to date. We have completed an interim pharmacokinetic analysis of our plasma levels in 34 patients in the treatment group receiving tranexamic acid; 50 mg/kg loading dose and 10 mg/kg/h infusion for the duration of the surgery. The study investigators have remained blinded. Plasma samples were assayed for the drug with a validated LC/MS methodology. All plasma levels of TXA are above the recommended lowest therapeutic concentration to inhibit fibrinolysis. The highest concentrations reached at the end of the loading dose averaged 226 ug/mL (min=151; max=318). During the constant rate infusion till the end of the surgery, steady state concentrations were achieved, averaging 82 ug/mL (min=47; max=139). Post-infusion the concentrations decayed exponentially with a terminal half-life of 2.1 h (min=1.1;
max=2.7). Interpatient variability is less than 20%, not yet factoring any demographic covariates. Based on previous experience and published information, a population analysis upon full enrollment will certainly shrink this variability based on expected covariates, such as patient’s body weight. The TXA plasma ccn vs time graph is presented in Figure 1. This raw data will be further analyzed to determine the population Pk parameters for TXA, devise a model to predict and recommend the lowest therapeutic dose of TXA for adolescents having AIS surgery; in a similar fashion to our previous report (1).

Discussion: This is the first report of the pharmacokinetic profile of tranexamic acid in children undergoing idiopathic scoliosis surgery. We will develop a model to predict the lowest optimum therapeutic dose for this patient population.

References:
Introduction: Perioperative identification of children at risk of poor post-anesthetic outcome allows the anesthesia team to use appropriate intervention or prevention measure to reduce the incident of poor outcome, thereby enhancing the quality of the anesthetic experience. We defined one aspect of poor post-anesthetic outcome among pediatric anesthesia practice as the presence of emergence agitation. We conducted a prospective observational study to identify perioperative factors predictive of post-anesthesia agitation in children. In the last two years all patient encounter information for patients undergoing anesthesia in our institution has been placed in electronic format. Our research group has taken this information and added supplemental information on the preoperative temperament of children as well as their post-operative behavior, to create a comprehensive anesthesia outcomes analysis database for children undergoing selected surgeries.

Methods: After IRB approval and informed parental consent, we conducted a single-center prospective observational cohort study in 613 patients from age 2–21 years, undergoing a defined set of surgical procedures between August 2013 and May 2014. Preoperative factors included age, gender, weight, The American Society of Anesthesiologists physical status (ASA) classification, history of delayed development, baseline behavior and type of surgery. We also collected information about patient compliance during mask induction (using the Induction Compliance Check list (ICC)), anesthetic agent used and post-anesthetic parental satisfaction score. We defined poor pain control as high level pain (scores of 7 or more) in post-anesthetic care unit (PACU) and agitation as high Pediatric Anesthesia Emergence Delirium (PAED) scale score in PACU (score of 10 or more last longer than 10 minutes). A multivariable ordinal logistic regression model was generated and the performance of the multivariable model was evaluated by the c statistic.

Results: Among the 592 patients with pain data, 159 (26.9%) had high-level pain (scores of 7 or more for more than 10 minutes).[JU1] Among the 429 patients with agitation data, 170 (39.6%) had high agitation score (scores of 10 or more) (95%
Testing all patients by multivariate logistic regression modeling revealed that only age between 2-6 years (adjusted odds ratio (OR): 2.8, 95% CI: 1.7-4.4, P < 0.001) and tonsillectomy and adenoidectomy surgery (TNA) (adjusted OR: 3.2, 95% CI: 2.0-5.1, P < 0.001) were an independent predictor of agitation. When evaluating first 410 patients by multivariate logistic regression modeling high PAED score was independently related to high-level pain (OR: 4.3, 95% CI: 1.6-11.5, P = 0.003). There was no correlation between emergence agitation and post-hospitalization behaviors or family satisfaction.

**Discussion:** Our observational results show a relationship between age, TNA surgery, high-level pain and emergence agitation. The use observational data has been associated with helpful outcome analysis and results have been shown to correlate with Randomized Controlled Trials.

**References:**