## POSTER DISCUSSION 10

### Airway Management

**Chair:** Dr Orlando Hung, Department of Anesthesia, Pain Management and Perioperative Medicine, Dalhousie University, Halifax, NS

Monday June 24  
10:15 – 12:00  
Chinook 3

<table>
<thead>
<tr>
<th>Abstract Number</th>
<th>Title</th>
<th>Presenter</th>
<th>Co-authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1626780</td>
<td>UPPER AIRWAY ANESTHESIA EFFECT ON PHARYNGEAL CROSS-SECTIONAL AREA IN THE MORBIDLY OBESE</td>
<td>Christelle Poulin-Harnois, Anesthesiology, Royal Victoria Hospital (MUHC), Montreal, QC</td>
<td>Steven B Backman</td>
</tr>
<tr>
<td>1629656</td>
<td>AIRWAY COMPLICATIONS IN OCCIPITOCERVICAL FUSION</td>
<td>Rebecca Moga, Department of Anesthesiology, University Health Network, Toronto Western Hospital, Toronto, Ontario, ON</td>
<td>Lashmi Venkatraghavan</td>
</tr>
<tr>
<td>1634311</td>
<td>INFLUENCE OF GLIDESCOPE ASSISTED INTUBATION ON INTRAOCULAR PRESSURE</td>
<td>Nauman Ahmad, Anesthesia, King Khaled Eye Specialist Hospital, Riyadh, Saudi Arabia</td>
<td>Abdul Zahoor, Saeed A Motowa, Waleed Riad</td>
</tr>
<tr>
<td>1650628</td>
<td>A NOVEL AIRWAY RESCUE TECHNIQUE: CAMERA-IN-TUBE INTUBATION THROUGH A SUPRAGLOTTIC AIRWAY</td>
<td>Naveen Eipe, The Ottawa Hospital, Ottawa, ON</td>
<td>Eric Koopman, Dick V Groeningen, Johannes M Huitink, Anna Craenen</td>
</tr>
<tr>
<td>1652223</td>
<td>THE ACCURACY OF CRICOTHYROID MEMBRANE IDENTIFICATION BY PALPATION</td>
<td>Jinbin Zhang, Anesthesia, QE II Health Sciences Centre, Halifax, NS</td>
<td>Austin Lamb, Orlando Hung, Bruce Flemming, Tim Mullen, Mary B Bissell</td>
</tr>
<tr>
<td>1652860</td>
<td>ADVANCED AIRWAY TRAINING IN CANADIAN ANESTHESIA RESIDENCY PROGRAMS</td>
<td>Jinbin Zhang, Anesthesia, QE II Health Sciences Centre, Halifax, NS</td>
<td>Mary B Bissell, Orlando Hung</td>
</tr>
<tr>
<td>1653004</td>
<td>DEXMEDETOMIDINE FOR AWAKE FIBREOPTIC INTUBATION: A META-ANALYSIS</td>
<td>Li Wang, EPiCOR Group, MEDICI Centre, Department of Anesthesia &amp; Perioperative Medicine, University of Western Ontario, London, ON</td>
<td>Janet Martin, Miguel Arango, Chris Harle, Davy C Cheng</td>
</tr>
</tbody>
</table>
1626780 - UPPER AIRWAY ANESTHESIA EFFECT ON PHARYNGEAL CROSS-SECTIONAL AREA IN THE MORBIDLY OBESE

Christelle Poulin-Harnois¹, Steven B. Backman¹

1. Anesthesiology, Royal Victoria Hospital (MUHC), Montreal, QC, Canada

Introduction: Awake tracheal intubation is a standard of practice for airway management when difficulties are anticipated with ventilation and/or intubation. This requires airway anesthesia which may be achieved using a variety of techniques. Regardless of the technique used, airway anesthesia may result in collapse of the upper airway with associated airflow obstruction & compromised breathing. The incidence and severity of such airway compromise has never been studied in the morbidly obese patient who is at increased risk for presenting with a difficult airway. The purpose of this study is to examine the effect of upper airway anesthesia on pharyngeal cross sectional area in the morbidly obese.

Methods: With institutional ethics committee approval and informed consent, morbidly obese (BMI > 45 m/kg²) patients scheduled for gastric bypass surgery were recruited into the study if pre-operative assessment of the airway indicated awake intubation. Patients were positioned supine on an operating table using Troop Elevation and Head Cradle® pillows and table controls to achieve a standardized semi-seated (35°) "sniffing" position. Following cannulation of a vein and radial artery, 2 mg midazolam and 50µg fentanyl and 0.3mg glycopyrrolate were administered. Pharyngeal cross-sectional area was measured using acoustic pharyngometry prior to and after upper airway anesthesia achieved with atomized (O2 carrier) 2% lidocaine in a standardized manner. A paired t-test was used to compare the pharyngeal cross sectional area. The minimum number of patients required for an alpha level of 0.05 (two-tailed) and a power of 0.8 to detect a 30% difference is 16 patients.

Results: Ten patients (5 males, 5 females; mean age 51.2 years, mean BMI 58.0 kg/m²) were studied. Following airway anesthesia, pharyngeal cross-sectional area decreased in 7 patients (range 12.3 - 74.1 %) and increased slightly in 3 (range 1.2 - 7.9 %). The mean change in pharyngeal cross-sectional area was -0.37 cm² (-26.9 %, p = 0.052). Although there were no overt signs of upper airway obstruction, this was not objectively measured.

Discussion: This interim analysis suggests that upper airway anesthesia in the morbidly obese decreases the cross-sectional area of the pharynx. The clinical relevance of this observation has yet to be determined in this unique patient population.

References: Anesthesiology. 2003; 98:1269-77
Can J Anesth. 2004;51:838-841
Anaesthesia 2010; 65: 12-17

Pharyngeal cross sectional area (cm²) as a measure of the distance from the teeth (cm)
Airway management is challenging in patients undergoing occipitocervical fusions. Postoperative airway complications have been reported to be as high as 6.9% in this group of patients. (1, 2). Currently there is little information available in literature regarding the incidence, severity, mechanism and identifiable risk factors for post op airway complications after occipitocervical fusions (3–5). The aim of our study is to review the anesthetic management of patients who underwent an occipitocervical fusion to determine the incidence, nature and risk factors for postoperative airway complications.

Methods: After research ethics board approval, we retrospectively reviewed the charts of all patients who underwent occipitocervical fusions from 2005-2012. Data collected include patient demographics, airway management, anesthesia and surgical data and postoperative complications. Airway complications were defined as delayed extubation, failed extubation, respiratory distress and postoperative surgical airway. Descriptive statistics were used to identify risk factors for postoperative airway complications.

Results: 29 patients underwent 32 surgical procedures. Demographics are shown in Table 1. All patients had FOB, 22 awake, 8 asleep. One patient had a preoperative tracheostomy. Intubation was reported to have been difficult in 6 patients. Postoperative airway complications were seen 15/32 (46%) patients which included 4 re-intubations (3 immediate and 1 delayed), 8 delayed extubations, 4 tracheostomies postoperatively and 2 cases of respiratory distress without reintubation. Prolonged surgery and blood loss were predictors of delayed extubation, but there were not predictors for reintubation.

Discussion: In patients undergoing occipitocervical fusion intubation is anticipated to be difficult, but is successfully managed with the fiberoptic brochoscope. However, postoperative airway complications are common. There is a need for a prospective study to identify the risk factors for postoperative airway complications.

5. Spine 2007 32: 267–70

Table 1

<table>
<thead>
<tr>
<th>Complication N=15</th>
<th>No Complication N=17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean ± SD)</td>
<td>63.5 ± 13.1</td>
</tr>
<tr>
<td>Sex (M:F)</td>
<td>7:6</td>
</tr>
<tr>
<td>Posterior: Anterior Approach</td>
<td>12:3</td>
</tr>
<tr>
<td>Vertebral Levels (n) (mean ± SD)</td>
<td>6.0 ± 3.4</td>
</tr>
<tr>
<td>Duration (hr) (mean ± SD)</td>
<td>7.7 ± 3.1</td>
</tr>
<tr>
<td>Blood loss (range) (mL)</td>
<td>200 -15400</td>
</tr>
<tr>
<td>Fluid administration (range) (mL)</td>
<td>1750 -18860</td>
</tr>
<tr>
<td>Awake: Asleep FOB intubation</td>
<td>11:2</td>
</tr>
</tbody>
</table>

SD = standard deviation, FOB = Fiberoptic
1634311 - INFLUENCE OF GLIDESCOPE ASSISTED INTUBATION ON INTRAOCULAR PRESSURE

Nauman Ahmad¹, Abdul Zahoor¹, Saeed A. Motowa², Waleed Riad³

1. Anesthesia, King Khaled Eye Specialist Hospital, Riyadh, Saudi Arabia
2. Ophthalmology, King Khaled Eye Specialist Hospital, Riyadh, Saudi Arabia
3. Anesthesia, Toronto Western Hospital, Toronto, ON, Canada

Introduction: Macintosh laryngoscopy has been traditionally used to facilitate tracheal intubation. This maneuver is associated with increased intraocular pressure (IOP), tachycardia and hypertension. These changes are not suitable for patients with glaucoma and open globe injury. Glidescope functions independently of the line of sight, reduces upward lifting forces to expose the glottis and requires less cervical neck movement for intubation, making it potentially less stimulating than Macintosh laryngoscope¹,². Aim of this study was to compare variations in IOP and hemodynamics, associated with Glidescope Vs Macintosh laryngoscope assisted intubation

Methods: After approval of local IRB and informed patient consent, 50 adult ASA I & II patients with normal IOP were enrolled in prospective, randomized study for ophthalmic surgery requiring tracheal intubation. General anesthesia was induced in a standardized manner in all patients. Patients were randomly assigned to either Glidescope or Macintosh laryngoscope groups for intubation. IOP (non-operated eye), heart rate, blood pressure and duration of intubation were measured before induction, one minute after induction, one and five minutes after tracheal intubation. Power analysis indicated that 25 patients were required in each arm to detect a difference of 30% in the IOP with 80% power and alpha error was set to 0.050 two-sided. Statistical analysis was done using SPSS version 19. Differences between Glidescope and Macintosh in intubation time, IOP, heart rate and mean arterial pressure (MAP) were tested by Mann-Whitney U test. A p-value less than 0.05 were considered statistically significant

Results: Demographic and clinical data was similar in both groups. IOP was not significantly different between groups before and after induction and five minutes after tracheal intubation (P = 0.217, 0.726, 0.110 respectively). The only significant difference was for IOP of non-operative eye at one minute after intubation (p=0.041) Fig 1. No significant difference was found between the groups in Mean arterial pressure (P = 0.899, 0.62, 0.47, 0.82 respectively) and in the Heart rate (P= 0.21, 0.72, 0.07, 0.29 respectively) at all measurements. Duration of intubation was slightly longer in Glidescope compare to Macintosh group (20.12 ± 8.05 and 16.12 ± 5.67 seconds respectively) but was not significant statistically (p= 0.079)

Discussion: Glidescope assisted tracheal intubation cause less rise in the IOP at 1 minute after intubation in comparison to Macintosh laryngoscope. Glidescope may be preferable when rise in IOP is undesirable.


Intraocular pressure variations during intubation
1650628 - A NOVEL AIRWAY RESCUE TECHNIQUE: CAMERA- IN- TUBE INTUBATION THROUGH A SUPRAGLOTTIC AIRWAY

Anna Craenen², Eric Koopman², Dick V. Groeningen², Naveen Eipe¹, Johannes M. Huitink²

1. The Ottawa Hospital, Ottawa, ON, Canada. 
2. Anesthesia, VU University Medical Center, Amsterdam, Netherlands.

Introduction: Airway rescue techniques are of vital importance in cases of unanticipated difficult airways and cannot intubate- cannot oxygenate scenarios [1]. Tracheal intubation with a camera in tube intubation (CITI) technique through a supraglottic device may offer easier and faster intubation [2, 3]. Aim of the current study was to compare this novel technique with direct laryngoscopy in a simulated position of difficult intubation- the lateral decubitus.

Methods: Review Board approval was obtained for this study in the simulation lab. A Laerdal SimMan™ manikin was placed in the lateral decubitus on a bean bag mattress - left- and subsequently in right lateral tilt to simulate a difficult intubation position. Five participants- two 4th year registrars, two experienced consultants and one experienced nurse anesthetist were divided into sequential pairs. The first operator attempted conventionally tracheal intubation with a laryngoscope Macintosh blade 3 and this was followed by the second operator’s attempt with CITI- Igel [a VivaSight™ (ET View) 7.0 through an I-gel 5.0]. Times were recorded until visual confirmation of correct tracheal tube placement. For both techniques the same VivaSightTM tube was used. Maximal time for intubation was set at 40 seconds. If the intubation took longer the intubation was scored as failed attempt. The intubation times were compared with a Mann-Whitney test (IBM SPSS 20.0).

Results: A total of 120 intubations (60 with a laryngoscope and 60 with the CITI I-gel technique) were performed. With laryngoscopy 56 attempts (93%) were successful within 40 s with the CITI I-gel technique we observed the same overall success rate (93%). The mean (SD) time to intubation with a laryngoscope was 10.1 (4.2) s and with the CITI I-gel combination 10.6 (4.1) s (p=0.243). In contrast to the consultants and nurse anesthetist, the registrars had a higher success rate using the CITI I-gel technique (100%) than with the conventional method (83%). Their intubation times were also significantly faster using this technique, 10.3 (3.9) s vs 12.8 (4.9) s (p=0.041).

Discussion: The use of a supraglottic airway is recommended as an adjunct to bag mask ventilation and it may be used to facilitate tracheal intubation [4]. This concept has not been previously formally evaluated or compared to laryngoscopy. Our study suggests that the I-gel may be a suitable conduit for intubation in the lateral position. Further the use of the tracheal tube with the embedded camera may increase the success of this technique. The difference between the trainees and the experienced with regards to success with the intubation through the I-gel both in time and attempts is also noteworthy. In conclusion, camera in tube intubation through a supraglottic airway is a fast technique for tracheal intubation of a manikin placed in a difficult intubation position.


Summary of results for 120 intubations- mean time to successful intubation in seconds with standard deviation for conventional laryngoscopy and CITI-I Gel.

<table>
<thead>
<tr>
<th>Times to Intubation Mean (SD)</th>
<th>Registrar 1</th>
<th>Registrar 2</th>
<th>Consultant 1</th>
<th>Consultant 2</th>
<th>Nurse Anesthetist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Laryngoscopy</td>
<td>12.11 (2.71)</td>
<td>13.36 (6.27)</td>
<td>8.25 (2.93)</td>
<td>9.25 (2.70)</td>
<td>8.25 (3.17)</td>
</tr>
<tr>
<td>CITI I Gel</td>
<td>10.83 (5.01)</td>
<td>9.75 (2.45)</td>
<td>12.10 (4.98)</td>
<td>8.80 (2.86)</td>
<td>11.42 (4.38)</td>
</tr>
</tbody>
</table>
**Introduction:** Cricothyrotomy is a life-saving intervention in a “can’t intubate, can’t oxygenate” airway emergency. Its success depends on the prompt and accurate identification of the cricothyroid membrane. Unfortunately, recent evidence suggests that anesthetists are inaccurate at identifying the CTM, with success rates of 30% or less \(^1\) \(^2\). The goal of this comparative study was to determine the accuracy of locating the cricothyroid membrane (CTM) by anesthesia staff and residents at our institution and to identify factors that influence the success rates.

**Methods:** After obtaining local REB approval and informed consent, 12 volunteer subjects and 61 staff and resident anesthesia participants were recruited. The CTM of the subject was identified using ultrasound with the subject lying supine and the neck in neutral position. The superior and inferior borders and the vertical midline of the CTM were marked with “invisible” ink under ultrasound. Participants were asked to mark the presumed center of the CTM on supine volunteer subjects. Participants were allowed to palpate multiple subjects, but with only one attempt per subject. A correct estimation was defined as a mark made between the superior and inferior borders of the CTM and within 0.5 cm of the vertical midline. Time to identification and ease of palpation on a 10 cm Visual Analogue Scale (VAS) were also recorded.

**Results:** A total of 186 attempts were recorded. There was an equal number of obese (BMI > 30) and non-obese, as well as male and female subjects (6 of each). The overall success rate was 42.5% (79/186), with no difference demonstrated between staff and residents (staff: 40.4% vs. residents: 45.5%, \(p = 0.49\)). Improved success was shown in male subjects (males: 55.4% vs. females: 29.8%, \(p = 0.001\)). Mean BMI was lower in those who were correctly palpated (\(p = 0.02\)). While there was no difference in accuracy between obese and non-obese subjects, the time to palpation (22.7s vs. 30.0s, \(p = 0.05\)) and ease of palpation VAS scores (2.77 cm vs. 7.33 cm, \(p = 0.01\)) were higher in obese subjects.

**Discussion:** While the success rate of correct identification of the CTM was slightly higher than reported in the literature, palpation success rate remains poor at our institution. Factors that contributed to difficulty included the female population and those with higher BMIs.

**References:**
Introduction: With the rapid evolution of airway technologies, a formal rotation dedicated to airway training for anesthesia residents in Canadian Institutions may be necessary. Programs such as these have been increasing in number across Canada over the past fifteen years, however a formal evaluation of the effectiveness of these advanced airway rotations has not been completed. The goal of this project is to determine which Canadian institutions are presently offering these rotations during anesthesia residency training programs and to determine what airway skills are being taught during these rotations. In addition, this project also examines the current self-rated competencies in acquired skills by Canadian-trained anesthesia residents as well as their overall self-rated competency in managing the difficult airway.

Methods: After obtaining institutional REB approval, residents enrolled in all sixteen Canadian anesthesia residency-training programs were asked to participate in a 24-question online survey regarding the availability, structure and content of a dedicated advanced airway management rotation at their institution. Additionally, respondents were asked to rate their perceived competency in various airway skills. Institutional responses to the survey were compiled and analyzed.

Results: A total of 174 residents with representation from all institutions across Canada responded to the survey. This represents a response rate of approximately 35% nationally. Ten of sixteen Canadian institutions (62.5%) have a dedicated rotation in airway management and the majority of these 10 institutions use resident logs to record encounters during resident training. Preliminary data analysis shows great variation with respect to the training that institutions provide on devices and airway management techniques. There is no difference in the overall self-reported competency scores after training in advanced airway management at each of the institutions (ANOVA: F=1.646, p=0.133) however, residents at institutions with no airway rotation were vocal advocates for the need of this form of training at their institutions.

Discussion: Although the National Curriculum for Canadian Anesthesia Residency with Airway Evaluation and Management was developed by the Academic Canadian University Department of Anesthesia in 2010, the structure and content of airway training programs in Canada remains highly variable. Implementation of the objectives in airway evaluation and management listed in the 2010 document may help to streamline these programs and will provide quantifiable and comparable outcome measures at training programs across Canada.

Introduction: Dexmedetomidine is a selective alpha-2 receptor agonist which is promising for awake fibreoptic intubation (AFOI) due to its sedative, anxiolytic, opioid-sparing, and antisialagogic effects. This review aimed to assess the efficacy and safety of dexmedetomidine versus alternatives for AFOI among adults with anticipated difficult airway through systematic review and meta-analysis.

Methods: Pubmed, Embase, Cochrane Library, and a Chinese database (CNKI) were searched from the inception to the end of November of 2012. Randomized controlled trials (RCTs) comparing dexmedetomidine with placebo or other alternatives for AFOI among adults were included. Outcomes included overall successful intubation, number of attempts, intubation score, post-intubation score, or patient cooperative score assessed by anesthetists, patient satisfaction, cognition, and adverse events. The random-effects model was used to calculate weighted mean difference (WMD) or relative risk (RR) and their 95% confidence intervals (95%CI).

Results: Eleven RCTs (465 patients) were included. Dexmedetomidine was compared with placebo in 3 RCTs (200 patients) and with other anesthetics in 8 RCTs (265 patients). Eight RCTs had high risk of bias.

Dexmedetomidine vs Placebo: There was no significant difference in overall AFOI success [95% vs. 98.6%, RR 0.35 (95% CI 0.04, 3.52)], intubation score [WMD -0.3 (95%CI -1.1, +0.5)], however, dexmedetomidine resulted in better patient cooperation [WMD -0.9 (95%CI -1.4, -0.4)], less patient discomfort [WMD -1.57 (95%CI -1.92, -1.22)], less pain [WMD -1.8 (95%CI -2.1, -1.4)], higher overall satisfaction [WMD 4.4 (95%CI +3.5, +5.3)] and patient’s recall of endoscopy [WMD 1.1 (95%CI +0.5, +2.0)], and less inadequate sedation [33.7% vs. 90.5%, RR 0.04 (95%CI 0.01, 0.11)]. However, more patients experienced hypotension (20% vs. 4.3%, RR 5.88 (95%CI 1.59, 21.76)), but not for bradycardia (5.3% vs. 0%, RR 8.83 (95%CI 0.46, 168.18)). No respiratory depression was reported for dexmedetomidine or placebo groups.

Dexmedetomidine vs Active Control (remifentanil, sufentanil, propofol, or midazolam): There was no difference in successful intubation on first attempt [88.2% vs. 85.2%, RR 1.47 (95%CI 0.18, 11.87)], overall success [100% vs. 100%], number of attempts [WMD -0.1 (95%CI -0.4, +0.3)], intubation time [WMD -0.6 minutes (95%CI -1.3, +0.2)], sedation score [WMD 1.4 (95%CI -0.7, +3.6)], intubation score [WMD -0.5 (95%CI -1.1, +0.2)], post-intubation score [WMD -0.5 (95%CI -1.1, +0.1)], and patient satisfaction [WMD -0.3 (95%CI -0.8, +0.3)]. Differences for hypotension (4.1% vs. 1.9%) and bradycardia (9.3% vs. 2.8%) did not reach significance. There was significantly less respiratory depression for dexmedetomidine versus alternatives (0% vs. 9.0%, RR 0.19 (95%CI 0.04, 0.93)).

Discussion: Limited evidence demonstrates that patients receiving dexmedetomidine may be more cooperative and satisfied with AFOI than those using placebo, but with higher risk of hypotension. Dexmedetomidine might have comparable effects and hemodynamic stability as other active alternatives, and perhaps with less respiratory depression. However, the small sample size and lower quality of these findings make it difficult to provide definitive conclusions. The role of dexmedetomidine remains to be defined through large, high-quality RCTs.