

PAEDIATRIC ANAESTHESIA

Paper No: 7.00

6mg/kg Oral Ketamine Premedication in Children Results in Oversedation

Terence Loughnan¹, Lisa Akelisi-Yockopua², Harry Ageeling³ and Joseph Goswami⁴

¹Department of Anaesthesia Port Moresby Hospital, ²Dept Anaesthesia, Frankston Hospital, Frankston, ³Victoria, Australia Department of Anaesthesia Port Moresby Hospital, ⁴Department of Anaesthesia Port Moresby Hospital

Introduction and Objectives: We undertook this study to compare the effectiveness of placebo vs 3mg/kg vs 6mg/kg oral ketamine as a premedicant in children (ASA 1 and 2 aged 1–10yrs) presenting for elective surgery at Port Moresby General Hospital, Papua New Guinea. This agent is freely available throughout the world and has been recommended as a safe and reliable sedative for premedication and as a sole agent for sedation for procedures such as radiology where it is required that a child be still.

Methods: After Institutional Ethics Committee approval and obtaining Informed Consent from the accompanying parent, patients received doses of study solution that was administered with 0.2ml/kg cola. The level of sedation was assessed after 30mins by a blinded trained observer who scored on a four point scale from unrouseable to awake and agitated. All patients were monitored and directly observed in the Theatre Suite after administration of the study solution.

Results: The placebo group resulted in 20 patients assessed as unsedated with five sedated. The 3mg/kg Ketamine group resulted in nine patients assessed as being distressed and sixteen sedated. The 6mg/kg group resulted in no patients being assessed as being distressed with 21 relaxed or asleep but four were deeply asleep. The use of oral ketamine resulted in a statistically significant increased level of sedation compared to placebo. These results were present in both ketamine 3mg per kg ($p = 0.002$) and 6mg per kg ($p < 0.001$). However 4 out of 25 patients who received 6mg/kg of Ketamine were deeply asleep compared with the 3mg/kg Ketamine group where none were so affected $p = 0.037$

Discussion and Conclusion: We found that 16% of children who received 6mg/kg oral ketamine were oversedated and difficult to rouse whereas none of those receiving 3mg/kg ketamine or placebo were assessed

thus. Similar studies have not usually investigated oversedation as an outcome. One other study reported 13% oversedation with the 6mg/kg dose. We believe that oversedation to a level of difficult to rouse should be seen as an adverse outcome.

References

- 1 Turhanoglu S, Kurarmaz A, Ozyilmaz MA, Kaya S, Tok D. "Effects of different doses of oral ketamine for premedication of children". *European Journal of Anaesthesiology*. 2003 Jan; **20**(1): 56–60
- 2 Darlong V, Shende D, Subramanyam MS, Sunder R, Naik A. Oral ketamine or midazolam or low dose combination for premedication in children. *Anaesth Intensive Care*. 2004 Apr; **32**(2): 246–9
- 3 Sekerci C, Donmez A, Ates Y, Okten F. "Oral ketamine premedication in children (placebo controlled double-blind study)". *European Journal of Anaesthesiology*. 1996 Nov; **13**(6): 606–11
- 4 Gustein HB, Kirsten LJ, Heard HB. Oral ketamine preanaesthetic medication in children. *Anesthesiology* 1992; **76**:28–33.
- 5 Kulkarni JA. Oral ketamine for premedication in Children. *Bombay Hospital Journal* 2003, July; **45**(3) 6.

Paper No: 88.00

Anesthesia in surgical separation of omphalopagus conjoined twins

Eduardo Paganini, Jose Noya, Horacio Bodor, Diego Carboni and Pablo Goncalvez

Hospital Nacional Gervasio Posadas, Buenos Aires, Argentina

Introduction: Conjoined twins were first reported BC. The first successful surgery dates back from 1689. Incidence is 1/50000 pregnancies and approximately 1/250000 live births.

Objectives: Description of this surgery in a non-pediatric, general-public hospital setting, overcoming its related limitations and assuring a successful outcome.

Methods: Omphalopagus twin pregnancy was ultrasound-confirmed in the 5th month of pregnancy. C-section was scheduled. Twins weighed 5.095 kg in all. Apgar score for both: 9/10. Abdominal scan showed that liver was shared on the front anterior side. Magnetic resonance angiography did not show cross circulation. No other abnormality was detected. Multidisciplinary meetings were organized to discuss the feasibility of a successful surgery. Our team was composed by 2 anesthesiologists assisting each twin, and a

team leader to coordinate the whole activity. We were also in charge of monitoring, fluids and electrolytes control, and postoperative pain management. Surgery was scheduled to be performed when the patients turned 3 months old. Total weight: 10.720 kg. No previous medication was administered to reduce any potential adverse effect. Anesthetic induction was performed simultaneously in the twins with Sevoflurane. Endotracheal intubation was particularly difficult due to the small anatomical room available to perform it. To do this, one twin was placed supine and the other was supported in such a manner that the space above the face of the other one was unobstructed. Induction was followed by Remifentanyl 0.4 mcg/kg/min and the relaxation was performed with Atracurium 0.5 mg/kg. Monitoring was performed with central venous catheter, pulse oximetry, temperature control, ECG and urine output. No blood transfusion was required. The total duration of surgery was 120 min. Morphine 0.05 mg/kg was administered subsequently for pain.

Results: After 22 days, they were successfully discharged from hospital without showing any sign of complication. Twins are alive, without showing any sequel.

Discussion: The logistic and the technique to be performed had to be thoroughly planned due to the lack of antecedent of similar cases in a general hospital. Surgical room was conditioned to meet the requirements so its limitations could be overcome.

Conclusion: The satisfactory intrasurgical and postoperative outcome showed that the choice of both, the moment of surgery as well as the technique used, was appropriate. Successful outcome proved that having an adequate team makes this kind of surgery possible even in a general hospital setting.

Keywords: Omphalopagus; Pediatric anesthesia; Surgical separation of conjoined twins

References

- 1 Mchugh K, Kiely EM, Spitz L. Imaging of conjoined twins (Review). *Pediatr. Radiol.* 2006; **36**: 899–910.
- 2 Van Der Weiden RM. The first successful separation of conjoined twins (1689). *Twins Res* 2004; **7**: 125–127.
- 3 Ebensperger A., et al. Gemelos onfalópagos con síndrome de trans-fusión Gemelo-gemelar. *Rev. Chilena de Cirugía*. Vol 62- N° 2, Abril 2010; pág. 188-196.

Paper No: 100.00

Perioperative pain management for below the knee amputation in a failing fontan patient with severe immunosuppression from macrophage activation syndrome

Rosalie Tassone¹ and R. Scott Dingeman²

¹ University of Illinois Medical Center at Chicago, ² Children's Hospital Boston and Harvard Medical School

Introduction: We describe a child with chronic pain and complex medical history who presented with several peri-operative management challenges.

Case Description: A ten year-old boy with a history of chronic pain, double-inlet left ventricle with transposition of the great arteries and palliated Fontan physiology was scheduled for bilateral below the knee amputations for lower limb necrosis. On admission for acute onset multi-system organ failure as a result of macrophage activation syndrome, he was emergently placed on ECMO. He had a protracted post- ECMO course. His pain regimen consisted of gabapentin, methadone, lorazepam, and clonidine patch for pre-operative pain control and sedation. An aggressive intraoperative and postoperative plan was devised to decrease the development of phantom limb pain. Intraoperatively, bilateral infragluteal sciatic nerve catheters were placed and dosed with Ropivacaine until POD 5.. Ketamine infusion was also started intraoperatively and continued until POD 3. Gabapentin and methadone doses were increased to ensure adequate pain control. He also remained on lorazepam and a clonidine patch until POD 6 when these medications were tapered. The patient exhibited no signs of phantom limb pain, and his chronic pain diminished to a level managed with lorazepam, methadone, and clonidine.

Discussion: Phantom limb pain has been reported to occur in 48% of children with cancer-related amputations and 12% of children with trauma-associated amputations. (1-2) A multimodal approach and a combination of therapies can enhance analgesia with fewer untoward side effects in the child with chronic pain. (3) Regional anesthesia and other adjunct therapies such as intraoperative ketamine infusion are described (4) and becoming more prevalent with pediatric anesthesiologists.

References

- 1 Krane EJ, Heller LB. The prevalence of phantom sensation and pain in pediatric amputees. *J Pain Symptom Manage.* 1995 Jan; **10**(1): 21–9.
- 2 Smith J, Thompson JM. Phantom limb pain and chemotherapy in pediatric amputees. *Mayo Clin Proc.* 1995 Apr; **70**(4):357–64.
- 3 Kost-Byerly S. New concepts in acute and extended postoperative pain management in children. *Anesthesiol Clin North America.* 2002 Mar; **20**(1):115–35.
- 4 Vas L. Continuous sciatic block for leg and foot surgery in 160 children. *Paediatr Anaesth.* 2005 Nov; **15**(11): 971–8.

Paper No: 136.00

Quality evaluation of Rocuronium bromide during tracheal intubation in pediatric patients with heart diseases less than 6 months

Junior Lima¹, Manuel Lima², Antolin Romero³, Abel Facenda³ and Nestor Sanchez³

¹ Cardiocentro Pediátrico William Soler, La Habana, Cuba,

² Hosapital Leopoldito Martínez, Mayabeque, Cuba and

³ Cardiocentro Pediátrico William Soler, La Habana

Introduction: Muscle relaxants show some differences in pediatric patients. These differences are more pronounced in neonates and infants, precisely because these age groups are the particular physiological characteristics.

Objetives: To evaluate intubation conditions using Rocuronium bromide at 60 seconds after administration.

Methods: We performed a descriptive, prospective, transversal study, included 48 cardiac patients younger than 6 months for correction of congenital heart disease. Preoperative medication was used with Midazolam 0.1 mg / kg IM, Racemic ketamine 5mg/kg IM and Atropine 0.02mg/kg IM. The induction of anesthesia was done using total intravenous anesthesia with midazolam 0.1mg/kg, Fentanyl 5mcg/kg and Rocuronium bromide 0.6mg/kg. The air way was approached one minute after the relaxing run. The intubation conditions were observed according to the modified scale Domaol 60 seconds after administration of the muscle relaxant. This scale include, relaxation grade of the masseter muscle, quality of laryngoscopy, vocal cord movility and rejection of the endotracheal tube. We appointed 1 to 4 points depending of the patients response. Higher score mean greater difficulty of intubation which was defined in excellent, good, fair or poor. We evaluated heart rate, rhythm, SpO2 and any cutaneuos anaphylactic reaction during and after anesthesia induction. The relationship between cyanotic and non cyanotic congenital heart defects and the use of rocuronium was evaluated too.

Results: Intubation conditions were excellent in 45 patients and good in 3, there were not modification of heart rate, rhythm, SpO2 . We did not find cutaneuos anaphylactic reaction and there was not relationship between cyanotic and non cyanotic congenital heart disease.

Conclusions: Rocuronium bromide is an effective relaxant for rapid control of the airway in patients with heart disease younger than 6 months.

References

- 1 Lee SK, Hong JH, Kim AR. Is the rapid sequence induction possible with 0.6 mg/kg rocuronium in pediatric patient?; *Korean J Anesthesiol.* 2010 Jan; **58**(1):20–4.
- 2 Bock M, Haselmann I, Bottiger BW, Motsch J. Priming with rocuronium accelerates neuromuscular block in children: A prospective randomized study. *Can J. Anaesth* 2007; **54**:538–43
- 3 Chatrath V, Singh I, Chatrath R, Arora N. Comparison of intubating conditions of rocuronium bromide and vecuronium bromide with succinylcholine using “timing principle”; *Anesthesiol Clin Pharmacol.* 2010 Oct; **26**(4):493–7.
- 4 Liou J, Hsu J, Liu F, Ching-Wah Sum D, Lui P. Pretreatment with small-dose ketamine reduces withdrawal movements associated with injection of rocuronium in pediatric patients. *Anesthesia And Analgesia* [serial on the Internet]. (2003, Nov), [cited June 29, 2010]; **97** (5):1294–1297. Available from: MEDLINE with Full Text.

Paper No: 137.00

Internal jugular venous canalization by anterior right access for the anesthetic management of pediatric patients with heart diseases

Junior Lima¹, Manuel Lima², Abel Facenda³, Antolin Romero³ and Jacqueline Barrial³

¹ Cardiocentro Pediátrico William Soler. La Habana. Cuba,

² Hosapital Leopoldito Martínez. Mayabeque. Cuba, ³ Cardiocentro Pediátrico William Soler. La Habana

Introduction: To prove the utility of the internal jugular venous canalization by anterior right access for the management of pediatric patients with heart diseases.

Objetives: To determinate the usefulness of the internal jugular venous canalization by anterior right in cardiac pediatric patients.

Methods: We performed a prospective, analytical, descriptive and observational study which included 200 patients younger than 1 year, were placed supine, head in central position, 15 degrees trendelenburg and interscapular shim, arterial pulse was located at cartilage cricoids level and lateral to this we proceeded to puncture the internal jugular vein to place the catheter by the Seldinger method. We measured the distance between the skin to jugular internal lumen making a mark at skin level in intravenous cannula which was used during the puncture.

Results: We localized the internal jugular vein in the first attempt in 89% of patients, we located the internal jugular vein on average 1.2 cm from skin to the jugular lumen and it was not necessary to introduce the catheter more than 6 cm. Complications included impossibility to find the venous in four children, and arterial puncture in one of them.

Conclusions: Internal jugular venous canalization by anterior right access is a useful way and easily accessible for the management of pediatric patients with heart diseases.

References

- 1 Roth B, Marciniak B, Engelhardt T, Bissonnette B. Anatomic relationship between the internal jugular vein and the carotid artery in pre-school children: an ultrasonographic study. *Pediatric Anaesth* 2008 Nov; **Vol 18**(11):1045–9
- 2 Downie L, Sschalop, Mazurek JN, Savitch G, Lelonek GJ, Olson TR. Bilateral Duplicated Internal Jugular Veins: Case Study and Literature Review. *Clinical Anatomy.* 2007; **20**:260–6.
- 3 Satheesha Nayak. Surgically Important Variations of the Jugular Veins. *Clinical Anatomy.* 2006; **19**:544–546.
- 4 Arul Ganeshan, Dinuke R, Warakaulle , Raman Uberoi. Central Venous Access. *Cardiovasc Intervent Radiol.* 2007; **30**:26–33.

Paper No: 154.00**Calculating dose of sugammadex in obese male children undergoing minor urological procedures**Nikolaos Noulas¹, Giorgos Loukas², D Maliamanis¹, D Skodis² and Savas Stokidis²¹ Department of Anaesthesia, NHS-Hospital State of Corinth, Corinth-Greece, ² Urology Clinic, NHS-Hospital State of Corinth

Introduction: According to International Obesity Task Force (IOTF), children with BMI above the 95th position (for sex and age) are obese. Greece has the highest percentage of overweight children in Europe. The latest statistical data showed that about 4/10 children are obese under 10 years old. Sugammadex is a new reversal neuromuscular agent.

Objectives: The purpose of this study is to determine the effective dose of this drug according to the total body weight or the ideal body weight.

Method: The study took place from February 2010 to May 2011. After written consent of parents and approval of hospital ethical committee, 22 obese children between 5-11 years old, ASA I were enrolled. Induction of anaesthesia was achieved with Atropine 0,01 mg/kg, Propofol 2 mg/kg, Remifentanyl 0,3 mcg/kg/min and Rocuronium 0,6 mg/kg based on actual body weight. For maintenance of anaesthesia we used mixture O₂/air (40/60), Desflurane 7%, Remifentanyl 0,2 mcg/kg/min and repeated doses of rocuronium 0,15 mg/kg as needed. At the end of the surgical procedure they were randomized to receive either Sugammadex 2 mg/kg (n = 11, according to IBW), or Sugammadex 2mg/kg (n = 11, according to TBW) at 2/4 TOF responses using acceleromyography (AMG). At first we calculated time from administration of sugammadex to reached TOF > 0,9 (time TOF). Secondly we measured time from administration of sugammadex to tracheal extubation (time EXTUB). Data were presented as mean, plus-minus standard deviation. Student T-test was used for comparison using SPSS version 17. A p-value < 0,05 was considered statistically significant.

Results: Demographic data were statistically similar in both groups as well as dose of Sugammadex and time TOF. The only difference was a shorter extubation time observed in group TBW. Group TBW (n = 11) Group IBW (n = 11) p-value Age (years) 7,78+1,71 7,64+1,34 0,838 Weight (kg) 46,32+11 45,08+8,07 0,768 Length(m) 1,39+0,12 1,40+0,10 0,856 Dose Sugammadex 92,64+22 85,81+15,03 0,407 time TOF(sec) 88+10 95+8 0,087 time EXTUB(sec) 138+16 155+14 0,018* *p < 0,05.

Conclusions: Calculating Sugammadex in a dose of 2 mg/kg according to TBW seems to be safe in obese children,

secures the reversal of neuromuscular blockade and shortens the time for extubation. More studies with larger sample size are necessary for safer results.

Paper No: 161.00**Age-specific web-based information to prepare children and parents for anaesthesia and surgery**

Gunilla Lööf, Ulf Lindsten and Per-Arne Lönnqvist

Astrid Lindgren Childrens Hospital, Karolinska University Hospital, Stockholm

Introduction: Despite the use of verbal and written information prior to anaesthesia and surgery many children and parents still arrive to the OR unprepared for the experience. The goal of this project was to create a web-based age-specific information system that may improve children and parent comfort prior to anaesthetic induction.

Background: Following a preparation period of 9 months involving a multidisciplinary team (nurses, doctors, advertising agencies and web-designers) plus extensive interviews with children and parents the information system was launched at our hospital in November 2006. The system is interactive and contains for example age-specific cartoons, web-books, videos and interviews with pre-school and school children as well as teenagers. It also contains information for parents in 25 languages. The site has an average 1500 visitors monthly, including visitors from more than 20 different countries to date.

Patients and methods: During the audit period September-December 2007, 2076 children underwent anaesthesia of which 1350 (65 %) were elective. All families whose children were planned for elective procedures associated with anaesthesia where encouraged in their scheduling letter to visit the web-site prior to their hospital visit. A questionnaire was prepared for parents and distributed to them immediately following the anaesthesia induction. The parents were asked to answer the questions during their stay in the waiting room and collected by the staff at the recovery unit.

Results: 94% of the respondent parents felt well-informed after visiting the website. 93 % of the respondent parents also felt that their child was well-informed after the visit. When asked what they would like to receive as supplemental information to future pre-anaesthetic visits to the anaesthesiologist, most preferred web-based information over written information or an operating room tour (table 1). 22 % of the respondent felt well-informed after visiting the web-site and expressed no need for additive information to the

pre-anaesthetic visit to the anaesthesiologist. Table 1 What information would you like to receive in the future as a complement to the regular pre-anaesthetic visits to the anaesthesiologist?

Limitations/Future development: Despite that parents and children were encouraged to visit the web-site at the regular preoperative meeting with the anaesthesiologist still only a minority in fact did so (30%). To generate even better results substantial efforts are needed to improve the use of this information tool.

Conclusions: Based on the results of the audit of our web-based information system we conclude that it was well received by the families and was preferred to more traditional options, e.g. written information and pre-anaesthetic operating room tours. This web-based information system provides a new, modern and effective tool to provide pre-anaesthetic information.

Paper No: 260.00

Airway management with supraglottic airway device at pierre robin sequence

Elif Copuroglu, Alkin Colak, Gonul Sagiroglu, Cem Copuroglu and Isil Gunday

Trakya University, Faculty of Medicine, Department of Anesthesiology and Reanimation, Edirne, Turkey

Introduction: Pierre Robin Sequence (PRS) is a congenital syndrome characterized with glossoptosis, retrognathia and micrognathia. Also a high incidence of temporomandibular joint ankylosis has been described in PRS (1). Those craniofacial anomalies often make mask ventilation and airway management difficult. Neonates and babies with PRS may be affected in different degrees of airway obstruction, feeding difficulties and chronic hypoxemia (2).

Objective: Is to describe the successful technique of awake insertion of a new supraglottic airway device (I-gel), followed by inhaled induction of anesthesia of two patients with PRS.

Methods: First case: A-28-day-old preterm neonate weighing 2,4 kg with PRS having micrognathia was admitted for gastrostomy. Difficult intubation was anticipated. After securing intravenous access and connecting to the monitors, 100% oxygen was administered for 3 minutes. His baseline heart rate was 135 /min, blood pressure was 70/45 mmHg, and oxygen saturation was 98%. After inhalation induction with oxygen and sevoflurane 8%, breathing spontaneously, direct laryngoscopy with an optic view laryngoscope was made and intubation was tried, but it was unsuccessful. Than no = 1 I-gel was administered to secure the airway. The oxygen saturation was 97-99% throughout the procedure. Second case: A-60-day-old infant weighing 3,5 kg with severe micrognathia, cleft palate, extremity anomalies was admitted for right and left achillotomies. Her respiratory sounds were rough, bilaterally. After routine standard

anesthesia monitoring and pre-oxygenation, inhalation induction was done with oxygen and sevoflurane 8%, breathing spontaneously, than no = 1,5 I-gel was administered to secure the airway. The oxygen saturation was 97-98% throughout the procedure.

Conclusion: There were no descriptions of problems with ventilation before, during, or after induction, suggesting that the supraglottic airway device (I-gel) provided excellent airway control in PRS.

References

- 1 Denny AD, Talisman R, Hanson PR, Recinos RF. Mandibular distraction osteogenesis in very young patients to correct airway obstruction. *Plast Reconstr Surg* 2001; **108**: 302-311.
- 2 Schaefer RB, Stadler III JA, Gosain AK. To distract or not to distract: an algorithm for airway management in isolated Pierre Robin sequence. *Plast Reconstr Surgery* 2004; **113**: 1113-1125.

Paper No: 265.00

Neonatal anesthesia and mortality in The University Hospital of Neiva (Colombia) in 2011

Karen Russi-Garcia¹ and Daniel Rivera Tocancipá²

¹ 3rd year Anesthesia Resident - South-Colombian University - Neiva - Colombia, ² Anesthesia Programme Director - South-Colombian

Introduction: Neonatal anesthesia is the highest level of complexity in pediatric patients. In order to ensure a better service quality in the surgery rooms, it is necessary to achieve the basis for the analysis and the measures of improvement by knowing the mortality of the neonatal anesthesia.

Objective: We retrospectively reviewed the cases of all newborns taken to any procedure under general anesthesia and their mortality up to 7 days to determine our statistics.

Methods: A retrospective and descriptive study was performed in which the admission and discharge books from the neonatal intensive care unit and surgical wards of University Hospital of Neiva were taken as a source of information. Taking a look at the period between January 1st and May 31st, 2011, 32 cases were found but only 22 out of the 32 fulfilled the records for the study. Age, main diagnoses, procedures performed until the age of 28 days, type of anesthesia administered and mortality in 7 d post surgery were taken into account.

Results: All patients received general anesthesia, 9 out of the 22 (40,9%) got inhaled - general anesthesia, 4 patients (18,18%) were balanced with remifentanyl and 9 patients (40,9%) were balanced with caudal anesthesia. One case of endocarditis in a patient led central venous catheter insertion finally died at 6 days postoperatively, another patient who was hemodynamically unstable, anasarca, low output, oligoanuria and finally died at 72 postoperative hours. One

more patient died at 24 postoperative hours in a large deterioration of general condition, previously critical. Finally a death occurred in a patient with dysmorphism, necrosis and hemoperitoneum after 6 postoperative days. Six patients were preterm newborns (27,27%) and 2 (9,09%) out of the six died.

Conclusions: A high mortality (18,18%) was found in severely ill patients. A performance of highly complex procedures for a general high complexity non pediatric hospital is observed. A poor record and file system is evident. This will generate an incentive to seek a self-registration and monitoring of patients under study to generate a database.

References

- 1 Benjamin F van der Griend, Nichole A Lister, Ian M McKenzie, Martin Nick, Philip G Ragg, Suzette J Sheppard, Andrew J Davidson. Postoperative Mortality in Children After 101,885. *Anesthetics at a Tertiary Pediatric Hospital Anesth Analg* 2011; **112**:1440–7.
- 2 Braz Gobbo Leandro, Gobbo Braz Danilo, Da Cruz Deyvid Santos, Fernandes Luciano Augusto, Pinheiro Mòdolo Norma Sueli, Braz Cerqueira José Reinaldo. Mortality In Anesthesia: A Systematic Review. *Clinics* 2009; **64**(10):999–1006.
- 3 Chan RPC Jr, Auler JOC Jr. Retrospective study of anesthetic deaths in the first 24 hours. Review of 82,641 anesthetics. *Rev Bras Anestesiol* 2002; **52**:719–27.
- 4 Jiménez Méndez E, Vidal Pineda Díaz M, González Guzmán M P. Índice De Mortalidad Pediátrica Asociada Con Anestesia Y Cirugía. Revisión De 56,358 Casos En El Hospital General Del Centro Médico La Raza. *Fed Mex Col Anest Rev* 1997 Oct; **9**(5).
- 5 Cohen MM, Cameron CB, Duncan PG. Pediatric anesthesia morbidity and mortality in the perioperative period. *Anesth Analg* 1990; **70**:160–7.

Paper No: 269.00

Pre-operative airway assessment in pediatric patients

Nosheela Rafique¹ and Fauzia Khan²

¹ Aga Khan University Hospital, Karachi, ² Pakistan Aga Khan University Hospital, Karachi, Pakistan

Introduction: Several clinical criteria are being routinely used in adults, in order to identify patients with a difficult airway. This is essential in planning anesthetic management and endotracheal intubation. Several anatomical airway differences exist between adults and children. There is very scant literature available which relates to pre-operative airway assessment in pediatrics and its relationship to difficult intubation.

Objective:

- To assess the following variables i.e., age, gender, body mass index (BMI) and body weight, Mallampati classification and thyromental distance in two groups of pediatric patients (pre-school; less than 5 years and school going; more than 5 years) pre-operatively and correlate

these to the different grades of Cormack and Lehane classification observed at the time of laryngoscopy.

- Evaluate the relationship between distance from nares to tragus with the different grades of Cormack and Lehane classification.

Material and Method: This quasi experimental study was performed at Aga Khan University Hospital, Karachi, after approval from the ethical committee. One hundred and ninety six pediatric patients, age range between infant to eight years and ASA I and II grade undergoing elective surgery under general anaesthesia with planned endotracheal intubation were included. Demographic and clinical measurements like age, sex, weight (kg), Body Mass Index (BMI), distance between tragus to nares (cm), Mallampati grades and thyromental distance (cm) were noted. Relationship of these variables with Cormack and Lehane grading at the time of laryngoscopy was recorded. All tracheal intubations were done by one author.

Results: Cormack and Lehane grades 2 and 3 was observed in 22% of children < 5 years as compared 02% of children > 5 years ($p < 0.001$). In children < 5 years increasing grade (2&3) of Cormack and Lehane classification was seen with decreasing tragus to nares distance ($p < 0.002$) but this trend was not observed in older children. A similar trend was observed with thyromental distance in children < 5 years ($p 0.025$) and > 5 years ($p 0.02$). There was no significant relationship seen for Cormack and Lehane classification with respect to gender, body mass index (BMI) and distance between tragus to nares for children 5 years and above.

Conclusion: We conclude that thyromental distance (Tm), distance between tragus to nares (Tn) can be helpful in assessment of difficult airway in pediatric patients younger than 5 years of age. Further studies are required on larger sample size.

References

- 1 Kopp VJ, Bailey A, Valley RD, et al. Utility of the Mallampati classification for predicting intubation in pediatric patients. *Anesthesiology* 1995; **83**:A1147.
- 2 Samsoon GLT, Young JRB: Difficult tracheal intubation: A retrospective study. *Anaesthesia* 1987;**42**:487–490.

Paper No: 290.00

Previous exposure to anesthesia and autism spectrum disorder (ASD): a puerto rican population-based cohort study

Osmar Creagh-Bandera¹, Hector Torres¹, Karines Rivera¹, Cesar Hernandez-Arroyo¹ and David Warner²

¹ of Anesthesiology, University of Puerto Rico-School of Medicine, San Juan Puerto Rico, ² Department of Anesthesiology, Mayo Clinic Rochester

Introduction: Autism Spectrum Disorder (ASD) is characterized by impaired social interaction and communication, and by restricted and repetitive behavior, that begins before a child is three years old.(1) Researchers have shown that prevalence rates in the U.S. may be as high as 91 in 10,000. As many as 1.5 million people in U.S. may have some form of autism.(2) A number of studies have examined the effects of early exposure to anesthesia on brain development and subsequent impairment in neurocognitive function; yet, little is known about the possible effects of anesthetic agents on social-behavioral functioning.

Objectives: To identify if children who had previous exposure to anesthesia either during their developing brain years or later are at risk of developing autism and its severe form of the disease.

Methods: Data was obtained from structured interviews administered to a sample of 514 parents/guardians distributed in two groups: ASD = 262 children diagnosed with this condition and Non-ASD: 253 children (siblings of ASD group) without diagnosis (95% confidence interval) that freely decided to participate and agreed to a consent form. Variables studied include: demographics, diagnosis and severity of ASD, exposure to anesthesia, and age of exposure. Children less than 2 years of age are considered to have developing brain. Data was analyzed using Chi-square or Fisher exact test.

Results: In contrast to non-ASD group, most of the children within ASD group were male, 74% (n = 193, p = 0.0001). Of the 262 ASD patients, 99 had exposure to anesthetics before their diagnosis while in Non-ASD population, 110 had exposure to anesthesia, demonstrating no statistically significant association between both groups (p = 0.2091). Out of 99 ASD patients exposed to anesthesia prior to their diagnosis, 72 were exposed before age 2. When compared to the 110 Non-ASD patients exposed to anesthesia, 86 had exposure during this developing brain period, which indicates no statistically significant association (p = 0.4207). In addition, most of the ASD children exposed to anesthesia before diagnosis were diagnosed with mild degree of the disease when compared to ASD children without any previous exposure to anesthesia (p = 0.9700). When the exposure occurred before age 2, ASD children developed mild form of the disease as compared with ASD children without any previous exposure to anesthesia (p = 0.1699).

Conclusions: Early exposure to anesthesia in children, including during the brain development period, does not increase the probability to develop neither ASD nor severe form of the disease.

References

- 1 O'Brien G, Pearson J. Autism and learning disability. *Autism* 2004; 8:125–40.
- 2 Shattuck PT, Durkin M, Maenner M, et al. Timing of identification among children with an autism spectrum disorder: findings from a population-based surveillance study. *J Am Acad Child Adolesc Psychiatry* 2009; 48:474–83.

Paper No: 291.00

Assessment of postoperative vomiting in retinoblastoma patients and their siblings undergoing eye exams under anesthesia

Pascal Owusu-Agyemang, Elizabeth Rebello, Radha Arunkumar, Joseph Ruiz and Dan Gombos

University of Texas M.D. Anderson Cancer Center

Introduction: Post operative vomiting (POV) in children is one of the leading causes of delayed discharge and readmission to the hospital. Most pediatric patients cannot voice a feeling of nausea and risk factors have been associated with POV (1).

Objectives: The purpose of this study was to evaluate the incidence of emesis in the PACU in pediatric patients undergoing eye exams of minimal stimulation under anesthesia.

Methods: We analyzed data from ophthalmologic procedures that did not involve a surgical incision, laser, and cryotherapy from our Automated Anesthesia Information System. Between January 2006 and July 2010 we found 76 patients with a diagnosis of or need for screening for retinoblastoma. Our endpoint was administration of an antiemetic or the documentation of emesis in the PACU. Descriptive statistics were used in data analysis.

Results: Sixty-three percent of patients received prophylactic anti-emetics: 40/76 (53%) received ondansetron alone, 6/76 (8%) received both ondansetron and dexamethasone, and 2/76 (2.6%) patients received dexamethasone alone. The overall incidence of emesis in this study group was 1.3% (1/76 patients). The incidence of emesis in the group of patients receiving anti-emetics and those not receiving anti-emetics was 0% and 3% respectively

Conclusion: In our study where identified risk factors were present but with essentially no surgical stimulation the incidence of POV in the PACU was lower than the baseline of 9% with no risk factors². However, the discomfort associated with POV may justify prophylactic anti-emetic administration.

Reference

- 1 Gan TJ, et al. Society for Ambulatory Anesthesia Guidelines for the Management of Postoperative Nausea and Vomiting. *Anesthesia & Analgesia* 2007;105(6), 1615–1628.

Paper No: 295.00

The Comparison of Intravenous Magnesium Sulfate and Lidocaine to Prevent Laryngospasm after Tonsillectomy and/or Adenoidectomy

Elaheh Allahyary and Shoja-ul-hagh Taregh

Introduction: Complications following extubation remain an important risk factor in anesthesia. Laryngospasm is the

most common cause of upper airway obstruction after tracheal extubation. It is particularly frequent in children after oropharyngeal surgeries like adenotonsillectomy (1-2). Several studies focused on prevention of laryngospasm (3-7). The role of lidocaine in preventing post extubation laryngospasm and stridor has been contemplated by previous researches (3). Magnesium, the fourth most common cation in the body, has been the recent focus of much clinical and scholarly interest.

Objectives: In this study we sought to assess the hypothesis that magnesium sulfate will reduce the incidence of post extubation laryngospasm and to compare it with intravenous lidocaine.

Methods: 185 children with ASA physical status I and II, aged 3-16 years, scheduled to undergo elective tonsillectomy and/or adenoidectomy under standard general anesthesia were enrolled in this double blinded study. All patients randomly entered to three groups to receive equal volumes of medication or placebo at two distinct times, first 2 minutes after intubation and second, just before extubation. The patients received normal saline and lidocaine 1 mg.kg⁻¹ in lidocaine group, magnesium sulfate 15mg.kg⁻¹ and normal saline in magnesium group and normal saline in both mentioned times in control group. Deep extubation was carried out in all the patients at the end of operation and the incidence of laryngospasm were observed and recorded until the time of discharge from the post anesthesia care unit.

Results: Both magnesium and lidocaine groups revealed less laryngospasm than the control group (PV = 0.008 and 0.001 respectively), and no difference was found between magnesium and lidocaine groups regarding laryngospasm (PV = 0.493). The plasma magnesium concentrations were significantly higher in magnesium group than two another groups (PV = 0.0001), but were not more than 2.5 mmol.l⁻¹.

Conclusions: Magnesium sulfate can reduce the incidence of post operative laryngospasm as well as intravenous lidocaine in pediatric patients undergoing adenotonsillectomy surgery.

References

- 1 Asai T, Koga K, Vaughan RS. Respiratory complications associated with tracheal intubation and extubation. *Br J Anesth* 1998; **80**: 767-775.
- 2 Haghberg C, Georgi R, Krier C. Complications of managing the airway. *Best Practice & Research Clinical Anesthesiology* 2005; **19**(4): 641-659.
- 3 Staffel JG, Weissler MC, Tyler EP, et al. The prevention of post-operative stridor and laryngospasm with topical lidocaine. *Arch Otolaryngol Head Neck Surg* 1991; **117**: 1123-1128.
- 4 Kumar Batra Y, Ivanova M, Shujat Ali S, et al. The efficacy of a sub-hypnotic dose of propofol in preventing laryngospasm following tonsillectomy and adenoidectomy in children. *Pediatric Anesthesia* 2005; **15**: 1094-1098.
- 5 Schulz-Stubner S, Wettmann G, Reyle-Hahn SM, et al. Magnesium as part of balanced general anesthesia with propofol, remifentanyl and mivacurium: a double-blind, randomized prospective study in 50 patients. *Eur J Anaesthesiol* 2001; **18**(11): 723-729.

6 Okayama H, Aikawa T, Okayama M, et al. Bronchodilating effect of intravenous magnesium sulfate in bronchial asthma. *Ann Emerg Med* 2000; **36**(3): 181-190.

7 Rowe BH, Bretzlaff JA, Bourdon C, et al. Intravenous magnesium sulfate treatment for acute asthma in the emergency department: A systemic review of the literature. *Ann Emerg Med* 2001; **37**(5): 552-553.

Paper No: 312.00

Risk of laryngospasm and bronchospasm with the Layngeal mask airway compared to endotracheal intubation in neonates less than six months of age: A retrospective study of 4,173 patients

Sameh Nour and patrick Ross

Phil Tsai Children's Hospital of Los Angeles

Intoduction: Though the laryngeal mask airway (LMA) has been validated as an effective means of providing ventilation during neonatal resuscitation (1), the routine use of LMAs for elective surgery in infants remains controversial.

Objective: To date, there have been no studies comparing the frequency of airway complications with LMA versus endotracheal intubation (ETT) in neonates undergoing elective surgery.

Methods: We performed a retrospective analysis to determine the incidence of laryngospasm and bronchospasm with LMA and ETT in infants less than 6 months of age. All the anesthetic records from June 2003 to June 2010 at Childrens Hospital Los Angeles were screened. After inclusion and exclusion criteria were applied, a total of 4,173 cases remained for analysis. Data extracted included demographic information, case information, written comments, and the use of medications common in the treatment of laryngospasm and bronchospasm. Vecuronium 0.1 mg/ Kg was administered for endotracheal intubation for the ETT group. Three independent investigators reviewed records which had yielded positive results. Comparison of categorical data between ETT and LMA groups was made using the chi-square test or Fishers exact test if data contained sample sizes less than six. Analysis of continuous data between the two groups was made with the Wilcoxon rank-sum test.

Results: Of 4,173 total cases, 3,418 anesthetics were administered using an ETT, while 755 cases utilized a LMA. The LMA group was found to be older, heavier, and healthier than the ETT group. The incidence of laryngospasm was 1.7% in the LMA group and 0.7% in the ETT group ($p < 0.05$), and the incidence of bronchospasm was 0.4% in the LMA group and 0.5% in the ETT group ($p < 0.05$) which is not statistically significant. Our study is the first to compare the incidence of airway complications with LMA versus ETT in the neonatal population. The increased risk of

laryngospasm when using LMAs in neonates may be secondary to difficulty with proper positioning of smaller sized LMAs (2).

Conclusion: Though overall complication rates are low, the results from this study suggest that the anesthesiologist should have a heightened awareness to possible intraoperative problems when LMAs are used in small infants.

References

- 1 Grein AJ, Weiner GM. Laryngeal mask airway versus bag-mask ventilation or endotracheal intubation for neonatal resuscitation. *Cochrane Database Syst Rev.* 2005 Apr **18**;(2):CD003314.
- 2 Von Ungern-Sternberg BS, Wallace CJ, Sticks S, Erb TO, Chambers NA. Fiberoptic assessment of paediatric sized laryngeal mask airways. *Anaesth Intensive Care.* 2010 Jan; **38**(1):50–4.

Paper No: 351.00

The induction of anesthesia with sevoflurane in pediatric neurosurgical patients with intracranial hypertension

Irina Savvina, Nathalia Lesteva, Anna Petrova and Olga Pilat

Introduction and objectives: The choice of anesthetic is important to provide stable intracranial pressure and auto regulation of brain circulation during changing of system homodynamic and PaCO₂ and prevent seizures.

Methods: We have analyzed the induction of anesthesia in 34 neurosurgical patients with intracranial hypertension (14 patients aged 1-12 months with hydrocephaly, 20 patients from 1 to 15 years with brain tumors of different localization including posterior cranial fossa and also with hydrocephaly). The induction of anesthesia started with sevoflurane (8%) before the venous catheterization. MAC of sevoflurane was reached in 30-40 sec. Then all the patients received fentanyl (5 mcg/kg), clonidine (1,4mcg/kg), and Rocuronium bromide (0,6mg/kg) which was followed by orotracheal intubation.

Results: No patients developed coughing and psychomotor excitement. We observed no cases of increasing blood pressure during intubation. Total anesthesia was provided by fentanyl (2, 5 mcg/kg), clonidine (0,5mcg/kg), sevoflurane 2, 5 vol. %. The condition of the brain was stable and comfortable for surgeons.

Conclusions: The method of bolus induction of anesthesia with sevoflurane (8%) together with fentanyl (5 mcg/kg) and clonidine (1,4mcg/kg) and non-depolarizing myorelaxant could prevent undesirable effects (coughing and psychomotor excitement) which lead to increasing of intracranial pressure and could provide level of neurovegetative stabilization deep enough to escape the increasing of blood pressure during intubation. The decreasing of arterial blood pressure after the induction of anesthesia (about 25% from preoperative level) do not cause harmful effects on the intraoperative condition of the brain.

Paper No: 383.00

Subclavian vein cannulation in neonates and children: analysis of 272 patients

Reza Aminnezhad¹, Yashar Nasiri Moghaddam¹, Alireza Mahdavi², Sajjad Razavi³ and Roza Alikhani⁴

¹ Resident of Anesthesiology, Mofid Pediatric Hospital, Tehran, Iran, ² Anesthesiologist, Mofid Pediatric Hospital, Tehran, Iran,

³ Anesthesiologist and Director of the Pediatric Intensive,

⁴ Resident of Psychiatry, Tehran University of Medical

Introduction and Objectives: The cannulation of a central vein allows administration of large volumes of fluids in short times and at high osmolarities for rehydration, volume replacement, chemotherapy and parenteral nutrition. Percutaneous central venous line insertion has replaced peripheral venous cutdown as the primary mode of short term venous access in children.

Methods: 272 subclavian vein cannulations in neonates and children up to 8 years old were analyzed regarding successful first attempt for catheterization and early complication rates after the procedure retrospectively.

Results: We had 84 newborn patients (first 28 days of life) in our study population. In this group, 54 cannulations (64.2%) were successful in first attempt, 1 patient (1.2%) were complicated with pneumothorax, in 24 cases (28.5%) guide wires became ruined and only in 4 cases (4.8%) attempts to cannulation were failed. Appropriate size venous cannulas were not accessible, so arterial lines were applied in all neonates. In the remaining 188 patients, 1 month to 8 years old, only 1 attempt to cannulation of subclavian vein (0.5%) was failed and in 172 cases (91.4%) cannulation performed successfully at first attempt.

Discussion and Conclusion: Cannulation of central vein in neonates and children in a skilled hand, would be performed with great success rate and low early complications.

Paper No: 385.00

Spanish Video in Anesthesia as an Uncertainty and Anxiety Reducer Tool in Spanish Speaking Parents

Alberto de Armendi¹, Stephen Gillaspay², Mohanad Shukry¹, Marte Martinez¹ and Jorge Cure¹

¹ The University of Oklahoma Health Sciences Center, Department of Anesthesiology, ² The University of Oklahoma Health Sciences Center

Introduction: Parents experience anxiety when their children undergo anesthesia. Lack of risk information prior to surgery create parental stress and anxiety. 1 Parental uncertainty is associated with anxiety. 2 Prior anesthesia knowledge

should reduce parental anxiety. Our study shows that Hispanic parents who viewed a Pre-Anesthesia Spanish video have decreased anxiety.

Objective: We hypothesize that showing parents a Spanish video on the risks and benefits of anesthesia within two weeks prior to surgery will reduce parental anxiety.

Methods: Subjects were randomized into two study groups: 1) viewing the Pre-Anesthesia Spanish video or 2) not viewing the video. Both groups completed, before and again after viewing the videos, a Parent Perception of Uncertainty in Illness Scale (PPUS), a State Trait Anxiety Inventory Test (STAIT Y1, Y2) and the Amsterdam Preoperative Anxiety and Information Scale (APAIS). Parents repeated the same three tests before the operation on the day of the surgery. Parents also completed a satisfaction questionnaire after surgery.

Results: APAIS scores generally decreased in the parents exposed to the video. A significant statistical interaction indicates that the PPUS scores of those who watched the video changed in a different direction after intervention than did the scores in the control group. Separate within-group analyses do not yet show significant change over time, however, the divergence of responses is interesting. STAIT scores may be increasing more for the standard care group.

Conclusions: Hispanic parents who viewed a Pre-Anesthesia Spanish video had lower APAIS scores and lower anesthesia anxiety scores.

References

- 1 Zeev N, Kain MD, Shu Ming Wang, Lisa A, Caramico MD, Maura Hofstadter, Linda C, Mayes MD Parental Desire for Perioperative Information and Informed Consent: A Two-Phase Study. *Anesthesia & Analgesia* 1997; **84**:299–306.
- 2 Hoff AL, Mullins LL, Gillaspie SR, Page MC, Van Pelt JC, Chaney JM An Intervention to Decrease Uncertainty and Distress Among Parents of Children Newly Diagnosed With Diabetes. *Families, Systems, & Health* 2005; **23**:329–342.
- 3 Cassady JF, Wysocki TT, Miller KM, Cancel DD, Izenberg N Use of a Preanesthetic Video for Facilitation of Parental Education and Anxiolysis Before Pediatric Ambulatory Surgery. *Anesthesia & Analgesia* 1999; **88**:246–250.

Paper No: 417.00

Effect of 1.5% solution of succinic acid - "reamberin" on the antioxidant activity of plasma in post-anesthesia period in children

Vladimir Lazarev, Leonyd Thsylin,
Irina Khelinskaya and Gennady Klebanov

RSMU, Moscow, Russia RSMU, Moscow, Russia RSMU, Moscow, Russia Department of Pediatric Anesthesiology and Intensive Care Russian State Medical University, Moscow, Russia

Introduction: Hypoxia is not a rare complication of intra- and postoperative periods. It is an important component of the free radical oxidation activation. For the prevention and reduction of oxidative stress study and application of topical agents with antioxidant properties include a salt of succinic acid (succinate). One of the preparations containing succinate, a 1.5% solution for infusion "Reamberin", produced by OOO "NTFF" POLYSAN" Russia, consisting of active substances - sodium salt of N-metilglyukaminovaya succinic acid and trace elements.

Objectives: The drug was originally registered "Reamberin" in Russia in 1999, then - registered and successfully applied in Ukraine, Belarus, Kazakhstan, Georgia, Uzbekistan, Laos, Vietnam, Kombodzhe, Burma. More than 30 million patients were treated with this drug for 12 years. The study of the antioxidant activity of 1.5% solution for infusion "Reamberin" in serum in children in post-anesthesia period using the method of chemiluminescence. This is 3b phase of clinical trial of the drug has received approval of the local ethics committee.

Methods: Eleven children aged 6-14 years operated under general intravenous anesthesia (fentanyl+propofol+rocuronium bromid) were included into the study. "Reamberin" was administered for 2 min at the dose of 4 ml / kg 10 min before applying the last stitch on the skin. Antioxidant activity of serum was determined before the "Reamberin", 2-3 min and 10 min after its introduction by the chemiluminescence method (HL).

Results: Application of 0.5 ml of "Reamberin", 1.0 ml and 1.5 ml in vitro was accompanied by dose-dependent increase of the antioxidant activity of the drug. For 2-3 minutes after the "Reamberin" introduction duration of the latent period (T/T0) HL declining in all the patients, that characterized the ability of the intercept free radicals and eliminate them from the system. The intensity of the slow luminescence (I/I0) (amplitude HL) remained practically unchanged. This indicated not highly active interception of free radicals in the system. At 10 minutes after drug administration T/T0 HL in 9 patients returned to their original performance or increased. In 1 patient T/T0 HL continued to decline. Taking the values of estimated parameters before the "Reamberin" 100%, after its introduction, to get T/T0 - $85,46 \pm 15,3$ ($p < 0.05$) and $103,94 \pm 19,5$ ($p < 0.05$), and for I/I0 - $100,8 \pm 12,9$ and $99,42 \pm 12,2$, respectively, 2-3 and 10 minutes. These results suggest that the main effect of "Reamberin" on the parameters of HL, accompanying the peroxidation of membrane lipids of liposomes is presented by the change of T/T0, which is influenced by the concentration of Fe^{2+} [6].

Conclusions: Solution "Reamberin" has dose-dependent short antioxidant effect due to oxidation of the catalytically active ferrous ions and inhibiting the initiation stage of free radical reactions of lipid peroxidation in serum in children in post-anesthesia period.

Paper No: 420.00**Incidence of convulsive movements during inhalation induction with sevoflurane**

Dagoberto Ojeda¹, Patricia Cisternas¹,
Fernando Yévenes², Ricardo Bartel² and
Carlos Alarcón¹

¹ Clínica Dávila, Santiago, Chile, ² Facultad de Medicina
Universidad de Los Andes

Introduction: Mask induction with sevoflurane has been associated with epileptiform changes of the EEG and sometimes localized and generalized tonic-clonic movements (1,2,3). Haga (4) reported a 6% incidence of convulsions during induction with sevoflurane in children.

Objectives: To determine the incidence rate of convulsive movements during the induction of anesthesia with sevoflurane and its associated factors.

Methods: From March 1st to July 31st 2011, we asked the anesthesiologists of our institution to watch the occurrence of tonic-clonic movements during sevoflurane induction, after the loss of eyelash reflex and before the injection of intravenous drugs. The sample size was calculated in 400 patients to obtain a 95% confidence interval with an error lesser than 2.5%.

Results: We obtain data from 404 patients with a median age of 4 years old (range 2 days to 16 years old), predominantly males (62%) and ASA physical status I (80%). The maximal vaporizer concentrations of sevoflurane reached were 8% (median). The incidence rate of convulsions was 3.5%, they occurred at normoxemia and hypercapnia, were mostly localized (13 de 14 cases) and more frequent in females (Odds ratio = 3.1; 95% CI = 1.01-9.39, p = 0.047). The incidence rate of convulsive movements during induction with sevoflurane was 3.5%; 95% CI: 1.9 - 5.8%.

Conclusions: The incidence rate of convulsions during mask induction with sevoflurane was 3.5% and associated to female sex.

References

- 1 Yli-Hankala A, et al. Epileptiform electroencephalogram during mask induction of anesthesia with Sevoflurane. *Anesthesiology* 1999, **91**: 1596–1603.
- 2 Vakkuri A, et al. Sevoflurane mask induction of anesthesia is associated with epileptiform EEG in children. *Acta Anaesthesiol Scand* 2001; **45**:805–11.
- 3 Vakkuri A, et al. Epileptiform EEG during Sevoflurane mask induction: effect of delaying the onset of hyperventilation. *Acta anaesth Scand* 2000, **44**:713–9.
- 4 Haga S, et al. Anesthetic induction of children with high concentrations of Sevoflurane. *Masui* 1992, **41**: 1951–5. (Article in Japanese, only English abstract).

Paper No: 437.00**Application sugammadex in children**

Vladimir Lazarev¹, Leonyd Tsypin², Pavel Rossaus²,
Vladimir Kochkin³ and Pavel Negoda³

¹ Department Children's Anesthesiology and Intensive Care. Russian State Medical University, Moscow, Russia, ² Department Children's Anesthesiology and Intensive, ³ Department of Anesthesiology and Resuscitation

Introduction: Used to date anticholinesterase drugs does not possess a yield sufficient effectiveness in postoperative residual curarization (PORC). The appearance of selectively-binding relaxant drug, sugammadex, should be able to solve this problem. Experience of using this drug in children is not sufficient.

Objective: Evaluate the selective relaxant first-binding drug, sugammadex clinical efficacy in children.

Methods: We examined 30 children aged 3 to 15 years (weight 14–45 kg, height 97–166 cm) with oncology in ASA II–III. Induction of anesthesia was performed i.v. bolus - propofol 2.5mg/kg, fentanyl 5mcg/kg, rocuronium 0.6mg/kg, maintaining a constant anesthetic i.v. infusion - propofol 6mg/kg/h, fentanyl 3,0mg/kg/h, rocuronium 0.6mg/kg/h. Duration of anesthesia 120–165 min. Fentanyl was discontinued for 20–30 minutes until the introduction of anesthesia sugammadex 4mg/kg administered on the basis of TOF in 10 patients, PTS 1–2, and 2mg/kg, T2, in 20 patients with the simultaneous termination of administration of propofol and rocuronium. Evaluated arterial BP, HR, SatO2, etCO2, NMB (TOF-Watch SX), the sedation depth (A-2000XP (Aspect Medical)).

Results: After the introduction of sugammadex 4mg/kg in 2 cases the value of TOF has increased to 100% after 45 seconds, in 4 cases - up to 99% after 75 seconds and in 4 children was greater than 90% after 1,5 minutes. In this group the mean of restoration of neuromuscular conduction to the level of TOF 90% or more occurred in 75 seconds. The recovery of neuromuscular conductivity to a level more than 90% showed an average of 115 seconds after sugammadex 2mg/kg introduction. The dynamics of BIS-index indicated the change rate of 26.5% in its increase direction in the 1st minute of the level before the introduction of sugammadex further to 46% on the 3d and 67.7% in the 5th minute. By this time, all the patients recovered consciousness, and the BIS-index was higher 80. Hemodynamic data did not undergo significant changes after the introduction of sugammadex. EtCO2 values and SatO2 testified about the adequacy of spontaneous ventilation is 120 seconds from the moment of sugammadex introduction in all patients. There were no adverse effects when using this drug. In neither case violations were fixed within 2 hours after sugammadex administration, which could be due to PORC.

Conclusion: Sugammadex 2mg/kg and 4mg/kg in children provides an effective and rapid elimination of neuromuscular block in the values of TOF T2 and PTS 1-2 respectively.

Paper No: 453.00

Secondary spread of caudal blockade as assessed by ultrasonography

Marit Lundblad, Staffan Eksborg and Per-Arne Lonnqvist

Dept of Physiology & Pharmacology, Section of Dept of Women's and Children's Health, Karolinska Dept of Paediatric Anaesthesia & Intensive Care, Karolinska University Hospital, Stockholm, Sweden

Introduction: Redistribution and secondary spread following the initial injection of local anaesthetics (LA) are important factors that contribute to the final spread of caudal blockade in children. However, to date these phenomena has yet not been studied in detail.

Objectives: The aim of this observational study was to define patterns of secondary spread and redistribution of a caudal block by means of real-time ultrasonography scanning and cutaneous testing.

Methods: Ultrasound assessment of LA spread within the caudal-epidural space as well as epidural pressure was followed during 15 minutes after initial injection (1.5 ml kg⁻¹, ropivacaine 0.2 %) in 16 infants having elective inguinal hernia repair. At 15 minutes post-injection cutaneous testing was also performed to assess the cranial dermatomal level of the block (at end-tidal sevoflurane 2.5 %).

Results: Ultrasound-assessed cranial spread was Th10 and Th8 at 0 and 15 minutes, respectively, and sensory level at 15 minutes was Th4. The caudal injection was initially found to compress the terminal part of the dural sac, later followed by a partial reexpansion as epidural pressure was returning towards pre-injection values. An intrasegmental redistribution from the dorsal to the ventral compartment of the epidural space was also observed.

Discussion and Conclusion: Two separate patterns of secondary spread of caudal blockade could be observed; horizontal intrasegmental redistribution and longitudinal cranial spread. The bi-directional movement of cerebrospinal fluid observed (coined "the CSF rebound mechanism") does explain a major part of the difference between the initial ultrasound assessed cranial level and the final level determined by cutaneous testing.

References

- 1 Lundblad M, Lonnqvist P-A, Eksborg S, Marhofer P. Segmental distribution of high-volume caudal anesthesia in neonates, infants, and toddlers as assessed by ultrasonography. *Pediatr Anesth* 2011; **21**:121-17.
- 2 Brenner L, Marhofer P, Kettner SC, Willschke H, Machata A-M, Al-Zoraiqi U, Lundblad M, Lonnqvist P-A. Ultrasound assessment of cranial spread during caudal blockade in children: the effect

of different volumes of local anaesthetics. *Br J Anaesth* 2011; **107**(2): 229-35.

- 3 Thomas ML, Roebuck D, Yule C, Howard RF: The effect of volume of local anesthetic on the anatomic spread of caudal block in children aged 1-7 years. *Pediatr Anesth* 2010; **20**: 1017-21.
- 4 Stienstra R, Dahan A, Alhadi BZ, van Kleef JW, Burm AG: Mechanisms of action of an epidural topup in combined spinal epidural anesthesia. *Anesth Analg* 1996; **83**:382-6.

Paper No: 460.00

Comparison of two different methods of anaesthesia in children undergoing MRI

Niels Anker Pedersen¹, Karsten Skovgaard Olsen¹, Lene Kilmoose¹, Anne Gert Jensen¹ and Anne Gert Jensen²

¹Dept. of Anesthesiology, Glostrup Hospital, University of Copenhagen, DK-2600 Glostrup, Denmark, ²Dept. of Radiology, Glostrup Hospital, University of

Introduction: MRI in children has to be performed either under deep sedation or under general anaesthesia. Although many different methods of anaesthesia have been described comparative studies are scarce.

Objective: The goal of our study was to compare anaesthesia with Sevoflurane (group S) and anaesthesia with Remifentanyl plus Propofol (group PR).

Method: 120 children aged 1 - 10 years, ASA physical status 1-2, were randomized to one of the 2 groups. The child's behavior before and after the anaesthesia, vital parameters, parents' satisfaction (with the induction and the immediate recovery period), the length of the stay in the recovery room and in the children's ward were registered. The children in the S group received Sevoflurane (1.3 MAC), had a laryngeal mask placed and were breathing spontaneously. MAC, end-tidal Sevoflurane, end-tidal CO₂ and respiratory rate were monitored. The PR group received an infusion of Propofol 50 mcg/kg/min and Remifentanyl 0.06 mcg/kg/min and were breathing spontaneously too. A bi-nasal catheter was placed for administration of oxygen and monitoring end-tidal CO₂ and respiratory rate.

Results: No patients were excluded. The children in the S group were more agitated at arrival to the MR room and more children in the PR group had more than one attempt of iv cannulation. Apart from this the 2 groups were comparable. In the PR group 15 children received one or more boluses of Propofol (and the infusion rate was increased) due to movements and in 8 others the infusion rate was increased due to insufficient anaesthesia. In the S group the Sevoflurane concentration was increased due to insufficient anaesthesia (changes in vital parameters) in 12 children. In the first 30 min in the recovery room more children were awake in the PR group than in the S group and in the first 45 min the children in the PR group had a better behavioral score than children in the S group. At 90 min more

children in the S group than in the PR group were still in the recovery room and the children in the PR group were discharged earlier from hospital. Regarding parent satisfaction there was no difference between the two groups. No serious complications were experienced.

Conclusion: The Sevoflurane anaesthesia was the most reliable regime during the MRI. However, the Propofol/Remifentanyl anaesthesia gave a significantly shorter hospital stay and a higher (better) behavioral score after the anaesthesia.

Paper No: 537.00

Usage of α 1-adrenoreceptor antagonist urapidil for hemodynamic management during cardiopulmonary bypass in neonates

Nikolay Karakhalis, Alexander Skopets, Alex Shadrin, Elena Pavlenko and Svetlana Peresada

Krasnodar Regional Clinical Hospital #1, Krasnodar

Introduction: It is well known that the main problem hemodynamic management neonates during CPB is high level of SVR due to imperfection their vasoregulatory mechanisms. That is why there is a necessity to additional cooling for decreasing flow of CPB. Different kinds of vasodilators are employed to prevent high arterial pressure during CPB. The potent vasodilator Sodium Nitroprusside has same limitation due to its possibility to increase intracranial pressure. Many others medicines have mainly venodilatatory properties that results to the retention of water (that's why they can not be used in neonates for these purpose). Moreover intavenous anesthetics do not completely attenuate the stress response of surgery and CPB [1].

Objectives: The aim of this study was to assess the effectiveness α 1-adrenoreceptor antagonist Urapidil [2] to hemodynamic management during CPB.

Methods: We compared two groups of neonates undergoing cardiac surgery with hypothermic CPB. Mean age was 5.8 ± 2.1 days, BSA $0.21 \pm 0.02 \text{ m}^2$, $t_{\text{a}}\text{C}$ during CPB $-27.2 \pm 1.5^\circ\text{C}$, time of ischemia was $65.8 \pm 4.5 \text{ min}$, time CPB $-84 \pm 4 \text{ min}$; MUF had performed in 15% cases. In both groups anesthesia was induced with Sevoflurane® 1.7-2.1 MAC, rocuronium bromid 0.5-0.7 mg kg⁻¹; maintenance of anesthesia was 1.5-2.1 MAC Sevoflurane®; maintenance of anesthesia during CPB (200 ml/kg/min Terumo® Advanced Perfusion System 1) was 1.0-1.3 MAC Sevoflurane® and continuous infusion of Fentanyl 3-10 $\mu\text{g kg}^{-1}\text{h}^{-1}$; Volatile anesthetic was delivered into oxygenator in composition of gas mixture. We used antegrade cardioplegia Custodiol® 40 ml/kg. In Urapidil group (n = 20) we used single bolus of α 1-adrenoreceptor antagonist in dosage 1 mg/kg at the beginning of CPB to maintain perfusion pressure within 35 mmHg. In control group (n = 25) it had achieved by

continuous infusion of Sodium Nitroprusside and by additional boluses of Fentanyl. We assessed the necessity and duration of inotrope therapy in postperfusion period, necessity in additional boluses of Fentanyl or increases of its dosage, determined the intraoperative BIS, hemodynamic profile, oxygen delivery and consumption, biochemical tests such as intra- and postoperative levels of glucose, lactate; extent of capillary leakage, time respiratory support, length of stay in the ICU.

Results: In Urapidil group the lactate level was $4.2 \pm 2.3 \text{ mmol/l}$ vs. $6.15 \pm 2.2 \text{ mmol/l}$ ($p > 0.05$); glucose level was higher in control group $9.3 \pm 2.4 \text{ mmol/l}$ vs. $5.6 \pm 1.5 \text{ mmol/l}$ ($p < 0.05$). Time of respiratory support and length of stay in the ICU were lower in Urapidil group. Myocardial insufficiency was observed in both groups; delayed osteosynthesis was performed in 15% in each group.

Conclusion: Our results indicate that use of Urapidil during cardiopulmonary bypass permits easily achieve and maintain the target level of perfusion pressure and, to avoid increasing dosage of Fentanyl, reduce of time of respiratory support, length of stay in ICU. Usage Urapidil permits to avoid additional cooling during CPB and to perform same surgical repair in normothermia. Usage of Urapidil can be useful for hemodynamic management during CPB in neonates.

References

- 1 Gruber EM, Laussen PC, Casta A Stress response in infants undergoing cardiac surgery: A randomized study of fentanyl bolus, fentanyl infusion and, fentanyl-midazolam infusion. *Anesth Analg.* 2001;92:882-890.
- 2 Damage A.G. The mechanism of the sympathoinhibitory action of urapidil: role of 5-HT_{1A} receptors. *Br. J. Pharmacol.* 1991; 102(4): 998-1002.

Paper No: 555.00

Trapezius squeeze test as an indicator for depth of anaesthesia for lma insertion in children

Sarla Hooda and Kiranpreet Kaur

Pt. BDS Sharma PGIMS, Rohtak, India Pt. BDS Sharma PGIMS, Rohtak, India

Introduction: Clinical tests like loss of verbal contact, eyelash reflex, corneal reflex, jaw relaxation etc are usually practised to assess the depth of anaesthesia. "Trapezius squeeze test" (TST) is another such clinical test. It is a simple test to perform in which one to two inches of trapezius muscle is held and squeezed in full thickness and response is evaluated in the form of toe / body movement.

Objectives: To assess the efficacy of trapezius squeeze test to indicate adequate depth of anaesthesia for LMA insertion in anaesthetised spontaneously breathing children.

Material & Methods: One hundred paediatric patients between 3-5 years of age, scheduled to undergo elective surgery were included in this study. We evaluated negative trapezius squeeze test as an indicator for optimal anaesthesia depth for LMA insertion in anaesthetised spontaneously breathing children. Anaesthesia was induced using 4% sevoflurane in oxygen. As the child lost the verbal contact or loss of body movement, TST was performed. Test was repeated every 15 seconds till it became negative. When child lost response to trapezius squeeze, a well lubricated, appropriate size LMA was inserted.

Results: Mean time for Trapezius Squeeze test to become negative in our study was 271.80 ± 55.8 seconds and ease of insertion was excellent in 91 and acceptable in 9 patients. LMA was successfully inserted in first attempt in 96% patients. No marked hemodynamic changes occurred in any child.

Conclusions: Negative trapezius squeeze test is a reliable end point which when used for placement of LMA in spontaneously breathing children provides excellent conditions for LMA placement in majority of the patients without any untoward effects.

References

- 1 Chang CH, Chang DJ, Kwon HH, Na SH, Shin YS. Optimal condition for LMA insertion can be determined by Trapezius squeezing test in children. *J Clin Anesth*. 2008 Mar; **20**(2):99–102.
- 2 Zbinden AM, Maggiorini M, Felix SP, Lauber R, Thompson DA, Minder CE. Anaesthetic depth defined using multiple noxious stimuli during isoflurane/ oxygen anesthesia. *Anesthesiology* 1994; **80**(2): 253–60.
- 3 Becker KE. Plasma levels of thiopental necessary for anesthesia: *Anesthesiology* 1978; **49**: 192–6.

Paper No: 610.00

Assessment of acute postoperative pain in the pediatric population of a high complexity general hospital. Hospital Universitario Hernando Mocaleano Perdomo de Neiva – Colombia

Daniel Rivera Tocancipá,
Constanza Ramos Lizcano, Natalia Vargas Alarcon
and Adriana Perea Rodriguez

Anesthesiologist, Coordinator Postgraduate Anesthesiology and Resuscitation, Universidad Surcolombiana, Neiva, Colombia
Student Xth Semester, Medicine Program

Introduction: Post surgery pain can be severe and its physical and psychological consequences can lengthen and worsen the basic illness. In our hospital there are no studies concerning the intensity and management of postoperative pain in

children. Improvement programs can be implemented once the situation is identified.

Objectives: Describe postoperative pain intensity, medication and analgesic techniques used in post surgery children, so as to set the bases for the “Clinical Pediatric pain” program.

Method: Observation study of a suitable cohort of children under 13 years of age, carried out between October 2010 and February 2011. Observations in three instances: entering the Post anesthesia Care Unit (UCPA), leaving the UCPA and at 24 postoperative hours. Pain intensity was recorded by means of the Analog Visual Scale (EVA); numeric scale in patients over 7 years old and EVA of the face in younger children, recording the medication and analgesia techniques employed. The analysis was done using the Epi-info 3.5.1.

Results: Of the 175 children undergoing interventions, from 1 month to 12 years of age, average 6 years, a 23.7% recorded moderate to severe pain on entering the UCPA, 19% on leaving the UCPA, and an 11.2% after 24 hours. AINES (69.2%) were the analgesics most commonly used, the most frequent were Dipirone (98.3%), followed by opiates (23.1%), Tramal was the most frequent (41%), followed by morphine (33.3%). All the patients were under basic general anesthesia. As transitional anesthesia in surgery rooms, an 8.1% received multimodal anesthesia, 24.4% local infiltration, 2.0% plexus blocking and 1.2% peridural blocking. No records of pain intensity were found in the clinical history of any patient. The highest pain frequency was found in children below 2 years of age, with 35.7%, 50.3% and 28.6% of pain perception on the three instances assessed. The specialties showing most interventions were Pediatric Surgery (44.6%), Orthopedics (24.6%) and Plastic Surgery (21.7%), for 91% of procedures.

Discussion and Conclusions: The management of postoperative pain in children is not adequate, as shown by the high occurrence of moderate to severe pain, under consumption of opiates (Morphine), and low transitional anesthesia percentage, especially multimode anesthesia. It is necessary to implement a Clinic for the Management of Postoperative Pain in Children; this should include the use of pain assessment instruments, relevant for children under 2 years of age, whose pain intensity is perceived as being higher. It is necessary to record pain evolution in clinical histories.

Keywords: Postoperative pain; Pain in Children; Analgesia

References

- 1 Berde C, Sethna N. Analgesics for the treatment of pain in children. *The New England Journal of Medicine*, 2002; **347**: 1094–1103.
- 2 Brislin RP, Rose JB. Pediatric Acute Pain Management. *Anesthesiology Clinics of North America*, 2005; **23**:789–814.
- 3 Verghese ST, Hannallah RS. Postoperative Pain Management in Children. *Anesthesiology Clinics of North America*, 2005; **23**:163–184.
- 4 Reyes Duque Gustavo. Anesthesiology Pediatric: Management of postoperative pain in pediatric surgery. Colombian Society of Pediatric Surgery. 2003.

Paper No: 611.00**Pleuropulmonar pediatric surgery mortality at the high complexity general hospitalcenter of Neiva – Colombia –2010**

Daniel Rivera Tocancipá

Anesthesiologist, Training in Pediatric Anesthesia, Coordinator Postgraduate Anesthesiology and Resuscitation, University Andrés Balleiro Resident II Anesthesiology and Resuscitation

Introduction: At present thorax pathological surgery in children covers a wide spectrum; it includes infectious diseases, congenital conditions, trauma and cancer. This is possible thanks to scientific progress (risk stratification, surgical techniques, anesthesiology techniques, pain management and ICU management) and technological advances video thoracoscopy, bronchial blocking and mechanical ventilation. The Hospital Universitario Hernando Moncaleano Perdomo de Neiva is an institution that takes care of all kinds of pathologies and patients (General Hospital) with limited economic resources. As pleuropulmonary surgery is carried out in children it is therefore important to know our mortality statistics. The 2010 databases were revised to gather basic epidemiology data of the pediatric patients who had undergone thoracic surgery on lung and pleura, as a basis to improve care and carry out further research.

Objectives: Determine mortality on day 28 and basic epidemiological aspects of patients of less than 12 years of age undergoing thorax surgery at the HOSPITAL UNIVERSITARIO DE NEIVA HERNANDO MONCALEANO PERDOMO, of Neiva-Colombia, during the period from January 1st to December 31st, 2010.

Method: Retrospective observation study taking into account as secondary data sources the operating theater records, the statistics service and the hospital mortality records. The analysis was done using Epi-info 3.2. Lung and pleura procedures were considered. Surgery on esophagus, trachea or persistent arterial ducts was not considered, due to deficiencies in the records.

Results: There were 24 pleuropulmonary pediatric surgery interventions during 2010: 92% of them (22 patients) were programmed and 8% (2 patients) were emergencies. The male/female ratio was 3:1. One patient (4.16%) died. Three procedures (12.5%) were endoscopic and 21 (87.5%) open (Thoracotomy). Five patients were taken to the Standard Post-Anesthesia Care Unit (20.8%) and 19 (79.2%) were taken to the Pediatric Intensive Care Unit. The most frequent procedure was lobectomy by thoracotomy (50%); most interventions were done in children 1 to 5 years old (54.16%).

Conclusions: Lung and pleura pediatric surgery shows high mortality (4.2%) and falls within that reported in the literature, it is much lower than that reported for the adult population (between 15% and 23%). Most of these procedures are carried out on patients having lung infection sequelae. Deficiencies were found in the hospital databases with

under recording of activities, limiting the studies and epidemiological decision making.

References

- 1 Systematic classification of morbidity and mortality after thoracic surgery. Seely AJ, Ivanovic J, Threder J, Al-Hussaini A, Al-Shehab D, Ramsay T, Gilbert S, Maziak DE, Shamji FM, Sundaresan RS. *Ann Thorac Surg.* 2010 Sep;**90**(3):936-42; discussion 942. Department of Surgery, Division of Thoracic Surgery, University of Ottawa, the Ottawa Hospital, Ottawa, Ontario, Canada.
- 2 Valoración del riesgo quirúrgico en cirugía de tórax. Parámetros del riesgo quirúrgico. (Assessment of surgical risk in thoracic surgery. Surgical Risk Parameters.) Y.W. Pun. *Servicio de Cirugía Torácica. Hospital Universitario de la Princesa. Madrid. España. Arch Bronconeumol* 2004;**40** (Supl 5):33-7
- 3 An update on anesthesia for thoracoscopic surgery. Gregor y W. Fischer and Edmond Cohen *Current Opinion in Anaesthesiology* 2010, **23**:7-11.

Paper No: 624.00**Resuscitation with Lipid or with Epinephrine in Levobupivacaine-Induced Cardiac Toxicity in Piglets**

Mathilde De Queiroz¹, Ossam Rhondali¹, Olivia Leveneur², Henri Musard¹ and Dominique Chassard¹

¹ Department of Pediatric Anesthesiology, Hôpital mère enfant, 69500 Bron, France, ² Veterinary Technician, Veterinary School, University

Introduction: Lipid emulsion infusions are increasingly used in the treatment of local anesthetics cardiac toxicity. A newborn piglet model was developed to evaluate the effect of lipid and epinephrine during cardiac arrest following levobupivacaine cardiac toxicity.

Methods: Thirty-three anesthetized, instrumented newborn pigs received levobupivacaine (2.5mg/ml) at the rate of 200 ml/h until collapse appeared. Collapse was defined by a decrease of the baseline MAP by 50% persisting for 15 consecutive seconds. The piglets underwent external cardiac massage and ventilation in oxygen in addition to study drugs.

Control group (CG): no additional drug, Lipid Group (LIP): lipid alone with an initial bolus of 4 ml/kg over 1 min followed by a continuous perfusion at the rate of 0.25 ml.kg⁻¹.min⁻¹.

Epinephrine Group (EPI): bolus of epinephrine 10 µg/kg every 3 min, Group EPI-LIP (combination of EPI+LIP). The resuscitation went on during 30 min or until the recovery of an efficient and stable cardiac activity defined by MAP upper than initial MAP, and normal sinus rhythm for 30 min.

Results: Survival rates were 1/7 in CG, 7/9 in LIP, 6/7 in EPI and 10/10 in EPI-LIP, respectively. The mortality was statistically different between CG and other groups but not significant between CG, LIP and EPI-LIP group. In the group EPI, the

mean dose of epinephrine was 45.7 $\mu\text{g/kg}$ and 12.7 $\mu\text{g/kg}$ in the group EPI-LIP ($P < 0.001$). For survivors, the number of ECG abnormalities was 0 in LIP group, 14 in EPI group and 17 in EPI-LIP group ($P < 0.05$).

Conclusions: Lipid emulsions and epinephrine have a comparable efficacy on survival rate in this model of levobupivacaine-induced cardiac toxicity. However, epinephrine alone or its combination with lipid was associated with rhythmic or conduction cardiac disturbances.

References

- 1 Ludot H, Tharin JY, Belouadah M, Mazoit JX, Malinovsky JM. Successful resuscitation after ropivacaine and lidocaine-induced ventricular arrhythmia following posterior lumbar plexus block in a child. *Anesth Analg*. 2008;**106**(5):1572–4
- 2 Hiller DB, Gregorio GD, Ripper R, Kelly K, Massad M, Edelman L, Edelman G, Feinstein DL, Weinberg GL. Epinephrine impairs lipid resuscitation from bupivacaine overdose: a threshold effect. *Anesthesiology*. 2009 Sep;**111**(3):498–505.

Paper No: 663.00

Sodium Nitroprusside Is Not Associated with Metabolic Acidosis During Intraoperative Infusion in Children

Greg Hammer¹, David Drover¹, Sara Connolly¹, Carol Cohane¹ and Scott Schulman²

¹ Stanford University, Stanford, CA, USA ² Duke University, Durham, NC, USA

Introduction: Sodium nitroprusside (SNP) is a potent vasodilator with a rapid onset and offset. Due to its relative ease of titration, SNP may be a useful adjunct for the induction and maintenance of deliberate hypotension during major surgery. The metabolism of SNP results in the liberation of cyanide ions (CN⁻). Cyanide toxicity includes metabolic acidosis caused by interference with cellular energy metabolism. Data are limited confirming the relationship between SNP and metabolic acidosis during anesthesia. Nevertheless, the concern of toxicity has limited the use of SNP.

Objective: We performed a retrospective case-control study to determine whether the intraoperative use of SNP is associated with an increase in the incidence of metabolic acidosis in children.

Methods: Data from 179 children undergoing craniofacial and spinal fusion surgery between 2005 and 2010 at Lucile Packard Children's Hospital at Stanford were reviewed. Records from 60 patients who received SNP (Treatment Group) as part of a multicenter study (NO1-HD-4-3386) were compared with records from 119 patients who did not receive SNP (Control Group). Metabolic acidosis was defined as serum bicarbonate (HCO_3) < 18.5 mEq/L and/or

administration of HCO_3 during anesthesia. The sample size in the Control Group was selected to achieve 80% power when testing noninferiority in the proportion of SNP patients with metabolic acidosis.

Results: Demographics, estimated blood loss, and total fluids administered in the two groups were similar. 19 (SE 32%) and 35 (SE 37%) children in the treatment and control groups, respectively, experienced metabolic acidosis. The 95% confidence interval for the difference between these proportions is (-21%, 11%).

Conclusion: The use of SNP has been limited because of the assumed association with metabolic acidosis. We found that administration of SNP for deliberate hypotension during major surgery is not associated with an increase in the incidence of metabolic acidosis.

Paper No: 688.00

The triangle made with the real sacral hiatus and PSISs is equilateral in children?

Jeong-Rim Lee, Seung-Ho Choi and Yang-Sik Shin

Department of Anesthesiology and Pain Medicine, Yonsei University College of Medicine

Introduction: Caudal block is common regional block in pediatric anesthesia. The equilateral triangle located between sacral hiatus and posterior superior iliac spines (PSISs) is used in determining the location of the sacral hiatus as the conventional method. In this study, we assessed if the triangle made with the real site of sacral hiatus confirmed by ultrasonography and two PSIS is equilateral in children.

Objective: To confirm if the triangle made with real sacral hiatus and PSISs is equilateral in children and if the shape of triangle is changed according to age.

Method: Children aged 0-72 months scheduled for undergoing inguinal herniorrhaphy under general anesthesia with caudal block were enrolled. After induction of general anesthesia, the patients were placed in the left lateral decubitus position with full flexion of the hip joint for caudal block. The real site of sacral hiatus was confirmed by ultrasonography. The triangle between the real site of sacral hiatus and PSISs was drawn and then the angle of sacral hiatus in the triangle was measured.

Results: The distribution of the angle of sacral hiatus in triangle between the real site of sacral hiatus and PSISs was shown in Figure 1. The coefficients of Pearson's correlation among age, weight, and height with the distribution of the angle were -0.440, -0.445 and -0.434 ($p < 0.001$).

Conclusions: The triangle located between the sacral hiatus and PSISs was not an equilateral triangle in pediatric patients.

Paper No: 703.00**Anaesthetic management of scoliosis surgery in patients with Fontan circulation**

Fernando Domínguez, Clara Gallego Ismael, Acevedo Jesús Burgos and María Soledad Asuero

Introduction: Idiopathic scoliosis occurs in 2-3% of the general population (1). The association between congenital heart disease (CHD) and scoliosis is well studied (2,3). The Fontan procedure is the final stage to palliate a variety of complex cardiac congenital defects with functional single ventricles. The survival rates in these children have improved in the last two decades, so more patients with univentricular functional heart require scoliosis surgery.

Objectives: To present our experience with the anaesthetic management and perioperative care in patients with spinal scoliosis and a Fontan physiology.

Methods: We reviewed the medical records of seven patients with univentricular heart who had undergone surgical treatment for spinal deformity. Data were abstracted regarding cardiac history, major Cobb angle, type of spinal fusion, American Society of Anesthesiologists (ASA) score, New York Heart Association (NYHA) score, presence of cyanosis, cardiac and neurologic monitoring, anesthesia time, operative blood loss, transfusion requirements, perioperative complications, postoperative ventilation time, perioperative inotropic support, intensive care unit (ICU) stay and mortality.

Results: Mean age at surgery was 15 years 3 months, mean Cobb angle was 68°. The types of CHD were: 4 single ventricle, 2 double outlet ventricle with transposition of great vessels, and 1 pulmonary atresia. None of them had open fenestrations. Four patients were cyanotic. ASA score was III in six patients and IV in one. NYHA score ranged between I and III. All patients were instrumented with segmental instrumentation and allograft by posterior procedures. Spinal cord monitoring was used in all patients. Transoesophageal echocardiography was used in five patients. Anaesthesia time, postoperative ventilation time and ICU stay were respectively: 440 minutes (range 330 – 540); 7,1 hours (range 2 – 17); and 3,8 days (range 2 – 9). Perioperative mean blood loss was 2291ml (range 1000 – 2900). All patients were treated with antifibrinolytic drugs. Perioperative blood salvage was used in four patients. Transfusion requirements were: packed red blood cells 3,5 units (range 1-5); fresh frozen plasma 350 ml (range 0 – 800); platelet concentrates 67 ml (range 0 – 400). Perioperative complications were: 1 atrial fibrillation, 1 low cardiac output with pulmonary hypertension and 1 left pulmonary artery thrombosis. Three patients needed perioperative inotropic support. One patient died intraoperatively as a result of ventricular dysfunction that progressed to cardiac arrest.

Conclusions: Anaesthetic management and operative treatment of scoliosis in these patients may be successful. The priority is to maintain sufficient intravascular volume for

adequate pulmonary blood flow and cardiac output. However, complications are frequent and significant.

References

- 1 Canale St, Jones L, Azar FM, et al. Campbell's Operative Orthopedics, 10th edn. St Louis, Mo: Mosby, 2003.
- 2 Kawakami N, Mimatsu K, Deguchi M, et al. Scoliosis and congenital heart disease. *Spine* 1995; **20**: 1252–1255.
- 3 Taggart NW, Shaughnessy WJ, Stans AA, et al. Outcomes of spinal fusion in children with congenital heart disease. *J Pediatr Orthop* 2010; **30**: 670–675.

Paper No: 731.00**Incidence of unplanned extubation in pediatric intensive care unit patients: a retrospective descriptive study**

Reza Aminnezhad, Sajad Razavi, Roza Alikhani and Mahshid Talebian

PICU Nursing Manager, Mofid Pediatric Hospital, Resident of Psychiatry, Tehran University of Medical Anesthesiologist and Director of the Pediatric Intensive Resident of Anesthesiology, Mofid Pediatric Hospital, Tehran, Iran

Introduction and Objectives: Unplanned extubation (UE) is an infrequent but a potentially harmful complication in pediatric intensive care unit (PICU) patients. We planned this study to evaluate the incidence of UE in our PICU patients and to find out possible factors which may impact on UE.

Methods: We studied the documents of patients who were admitted in a university based PICU with 10 beds in a 1 year period from Jan 2009 to Jan 2010. Factors reviewed included: age, gender, use of cuffed or un-cuffed endotracheal tube (ETT), use of restraints and or sedation, route and duration of intubation, time of day, patient mental state, care of ETT in the last 12 hours, any movement or change of position and mode of ventilatory assist at the time of UE.

Results: 59 UE occurred in 3023 patient-days, 238 intubations and 1631 intubated patient-days. This represents UE rate of 1.95% per patient-day and 3.6% per intubated patient-day. Average age of patients in whom UE had been occurred was 28.5 ± 38.7 (1-156) months. UE were more prevalent in boys than girls (41 vs. 18). UE was more likely with un-cuffed ETT than cuffed ones (50 vs. 9). Restraints were applied in 20 patients (33.9%). Sedative drugs were administered in 41 patients (76%). All of UE were reported in orotracheally intubated patients (100%). Time distribution was as follows: in 28 patients 8:00 pm- 8:00 am and in 31 8:00 am- 8:00 pm. At the time of UE, 7 patients were unconscious, 9 were lethargic, 28 were agitated and 10 were calm and sedated and at that time 1 had low, 40 had moderate and 15 had lots of secretions. In all cases of UE ETT suctioning was performed in intervals of more than 2 hours in 12 hours leading to UE. In 23 cases, patient movement and in 16 cases, changing his/her position by nursing staff

resulted in UE. UE was less likely in patients assisted with T-piece than whom under mechanical ventilation (1 vs. 50). **Conclusions:** In our study, patient age less than 2 years, male sex, use of un-cuffed ETT, agitation, irregular or low frequency ETT suctioning, patients movement and mechanical ventilation are more likely associated with UE. Use of sedative by itself is not a protective measure. Nasotracheal intubation may prevent from UE. Low amount of secretions may have protective value.

Paper No: 749.00

Anesthetic management for thymectomy in a patient with Myasthenia Gravis

Mariana Ivon Ciancio¹, Fernández Villayandre¹, Hernán Colman², Miren Madariaga³ and Maximiliano Ago⁴

¹ Residente 3° año Hospital de Niños Víctor J. Vilela. Rosario. Santa Fe. Argentina, ² Anestesiólogo del Hospital de Niños Víctor J. Vilela, ³ Jefa del Servicio de Anestesiología del Hospital de, ⁴ Cirujano Cardiovascular del Hospital de Niños Víctor

Objectives: Case report about anesthetic management for a patient with Myasthenia Gravis

Introduction: Myasthenia Gravis (MG) is an autoimmune disease with IgG antibodies against acetylcholine (Ach) postsynaptic receptors at the neuromuscular junction, attaining a prevalence of 1/20000 individuals. These patients are at risk of developing postoperative respiratory failure due to the muscle weakness and the superimposed surgical stress, posing an important challenge in both intraoperative management and postoperative analgesia.

Case Study: A 13 years old female patient, ASA III, bearing a 10 months evolution MG, with a respiratory failure associated with pneumonia and sepsis was admitted to the ICU for mechanical ventilatory support during 4 days. Diagnose was confirmed at discharge with Edrophonium Test and Ach Antibody Receptor test and a treatment with pyridostigmine 180mg/day and prednisone 20mg/day was indicated. Thymectomy was considered due to the rapid progression and treatment resistance. Plasmapheresis cycles were performed 5 days previous to surgery. Forced Residual Capacity yielded normal values. Pyridostigmine was suppressed 6h prior to surgery. Steroid was not interrupted, and the inhibition of the hypothalamic-pituitary-adrenal axis was supplemented intraoperative with hydrocortisone 150mg. No premedication was administered. General anesthesia was induced with 8% sevoflurane, fentanyl 100ug and remifentanyl 0.5ug/kg/min by a continuous infusion pump. After testing palpebral reflex, ventilation with Mapleson C was established and 5 min endotracheal intubation was performed. Anesthesia was maintained with 3% sevoflurane and remifentanyl 0.5ug/kg/min. No muscle relaxants were used. Cardiovascular parameters and oxymetry were monitored. Tramadol 50mg was supplied. Postoperative extubation at 0 score (Leventhal Scale) was without complication. Postoperative analgesia

was controlled due to higher sensitivity and risk of respiratory depression caused by opioids. After confirming normal ventilatory capacity (Aldrete 10/10, Chips 0 and Ramsay 2) the patient was transferred to the ICU.

Supplementary Data MG is an autoimmune disorder with decreased number of Ach receptors, thus rising the sensitivity to nondespoling muscle relaxants. Excessive curarization and absence of monitoring predispose the onset of ventilatory failure, and a prolonged ICU stay. Recent studies have confirmed the possibility of performing general anesthesia without using muscle relaxants, as in the case presented.

Comments and Discussion: Pharmacological advances in anesthesia permitted us a successful management of a MG critical patient without using neuromuscular blocking agents and achieving extubation without complications.

Keywords: Thymectomy; Myasthenia gravis; Anesthetic management

References

- 1 "Anesthesia for thymectomy in children with myasthenia gravis" Review Article. White, M; Stoddart, P. *Pediatric Anesthesia* 2004;**14**:625–635.

Paper No: 792.00

Anesthetic management of a giant mesenchymal liver hamartoma in a 2-years old child

Carina Montedonico¹, Stefanía Pereira¹, Graciela Zunini¹, Alicia Mntano¹, Luis Rojas² and Karina Rando²

¹ Cátedra de Anestesiología- Facultad de Medicina – UDELAR- Uruguay, ² Servicio de Trasplante Hepático Hospital Garrahan

Introduction: Even though Mesenchymal Hamatoma of the liver is the second most common benign liver tumor in children, it is rare. It typically presents in the first 2 years of life. Even though spontaneous remissions are possible and surgical resection is the treatment of choice. When the size of the tumor is big surgery might be very difficult and transplantation might be a useful adjunct. Treatment of these tumors should be concentrated in centers with expertise(1). Anesthetic management need to be planned carefully. Intraoperative problems are frequent and postoperative analgesia is a challenge.

Objectives: 1-Describe the multidisciplinary team work during diagnosis and treatment of a giant liver Hamartoma. 2-Discuss, intraoperative monitoring, fluid replacement, analgesia and possible complications. 3-Present a brief review of the literature.

Patient and methods: A 2-year old boy, 13 kg weigh presented with abdominal distension and respiratory symptoms. Ultrasound, Computed Tomography (CT), and magnetic

resonance imaging (MRI) of the abdomen were suggestive of a mesenchymal hamartoma of segments V and VI of the liver. With the mentorship of a trained pediatric liver surgeon and the participation of pediatricians and anesthesiologists the team plan the procedure.

Results: An 8 hour surgery was performed; dissection of the retro hepatic cava vein was difficult but without mayor complications. General anesthesia was induced with Sevoflurane and maintenance was with Fentanyl and Isoflurane. Central venous pressure and arterial blood pressure was monitored invasively. During the dissection of the suprahepatic veins, central venous pressure was reduced to 4-6 mm Hg to reduce bleeding. Even though, the patient required massive transfusion with plasma, red blood cells and platelets. Intravenous morphine was used as analgesia and the patient was extubated at the end of the surgery, discharged from the hospital at the 6th postoperative day. Clinical follow-up for twenty months were without complications.

Conclusions: Surgical treatment of giant liver tumors is feasible and safe when a trained team or working interdisciplinary with a non experienced teams mentored by experts.

Reference

- 1 Tannuri AC. Surgical treatment of hepatic tumors in children: lessons learned from liver transplantation. *J Pediatr-Surg*-2009; **44**: 2083-7.

Paper No: 829.00

Separation of Onphalopagus Conjoined twins: Anaesthetic management

Mariana Ivon Ciancio¹, César Mariano Dománico², José Ignacio Menchaca³, Lisandro Angel Vettorello⁴ and Horacio Norberto Bonchini⁴

¹ Residente 3° año del Servicio de Anestesia, Analgesia y Reanimación del Hospital Escuela Eva Perón (HEEP). Granadero Baigorria, ² Residente 2° año del Servicio de Anestesia, Analgesia, ³ Residente 1° año del Servicio de Anestesia, Analgesia, ⁴ Anestesiólogo del Servicio de Anestesia, Analgesia y

Objective: Report a case about anesthetic management in separation of onphalopagus conjoined twins.

Introduction: Conjoined twins are monozygotic and mono-chorionic individuals, namely genetically identical and of the same sex, that develop united by different anatomical regions but generally identical regarding the pair. The incidence is 1: 50,000.

Case report: A pair of male onphalopagus conjoined twins were delivered by cesarean at 34 weeks of gestational age. They weighed 3.725 kg each one. The right-sided baby was identified as Twin1 and the left one Twin2. Apgar scores were 7/9 and 5/8 for Twin2 respectively. Orotracheal intubation was performed to proceed to reanimation since they presented bradycardia and respiratory distress. Magnetic

resonance at 32 weeks showed no anomalies in fetus 1, fetus 2 showed ventriculomegaly, hydrocephalus, cervical lordosis, decreased lung volumes, gastric agenesis with few intestinal loops and right kidney hypoplasia. Decision to surgical separation was taken at 48h life delivery with the participation of two teams of anesthesiologists provided with their anesthesia machines and multiparametric monitors. Both twins were intubated and due to hemodynamic instability dopamine 10-20ug/kg/min was supplied by infusion pump. Anesthesia induction was performed with midazolam 0.1mg, fentanyl 4mcg, vecuronium 0.2mg. The same drugs were used for maintenance. Parenteral hydration with saline 30ml/min was administered by a volumetric pump. Arterial blood pressure (BP) and heart rate (HR) were: 65/40mmHg and 150-160 beats/min, for both twins respectively. Ligature of shared intestinal loops and liver generated serious hemodynamic impairment of Twin2 (HR 84, BP 30/15 and asystolia) leading to death despite CPR maneuvers and transfusion of 35ml Red Blood cells and dobutamine 25ug/kg/min. Twin1 was intubated, and stabilized within the following parameters: BP 74/40mmHg, HR152, remaining in ICU. Extubated after a week of surgery, was discharged five months later.

Supporting data Symmetrical conjoined twins that have a minimal area of juncture are due to surgery, such as onphalopagus twins that share liver and jejunum.

Comments and Discussion: The anesthetic management of conjoined twins is a surgical challenge due to the high complexity procedures. Successful management of conjoined twins relies on close communication and cooperation of all members of the multidisciplinary team.

Keywords: Onphalopagus conjoined twins; anaesthetic management

References

- 1 Anesthetic management for separation of craniopagus twins. W.Q. Huang, J.Y. Fang, L.C. Xiao, X.P. Jiang, J.H. Xia, X. Feng and N. Jiang. *Acta Anaesthesiol Scand* 2004; **48**: 919-921.
- 2 Anaesthetic management of total craniopagus twins for magnetic resonance imaging and cerebral angiography. A. Parameswari, M. Vakamudi, V. Raghupathy and R. Siddhartha. *British Journal of Anaesthesia* 2010; **105** (3): 368-70.

Paper No: 846.00

5% lidocaine patch could reduce needle pain but not rocuronium-induced withdrawal in children

Sang-Wook Shin, Ji-Uk Yoon, Hyeon-Jung Lee and Hae-Kyu Kim

Introduction: Intravenous catheter insertion before induction of general anesthesia is a challenge especially for children, and some drugs cause pain and discomfort during

intravenous injection. Local anesthetics may reduce this kind of complications. We postulated that a pretreatment with 5% lidocaine patch to the injection site could reduce both venipuncture pain and rocuronium-induced withdrawal.

Objectives: The purpose of this study was to examine the analgesic effect of 5% lidocaine patch compared with placebo patch during venipuncture and rocuronium injection in children.

Methods: Seventy-two pediatric patients (4–15 yr) were allocated into two groups in a randomized, double-blinded way. Group A was pretreated with 5% lidocaine patch and group B was done with placebo patch on venipuncture site. Pain during venipuncture needle insertion was measured by FLACC scores (Faces, Legs, Activity, Cry and Consolability) and withdrawal movement during injection of rocuronium was evaluated by a 4-point scale (1: no response, 2: movement at the wrist only, 3: movement involving the arm only, and 4: movement in more than one extremity or generalized response). Grade 4 was regarded as generalized movement.

Results: The FLACC score during venipuncture was significantly lower in Group A than in group B ($p < 0.001$). The overall withdrawal movement on injection of rocuronium occurred 92.5% in group A and 84.4% in group B. The incidence of generalized movement was 45% and 53.1% respectively. The withdrawal movements did not show significant differences between groups.

Conclusions: Pretreatment with a 5% lidocaine patch to the venipuncture site could be a safe, effective, and simple method to reduce needle insertion pain in children, but this method may not prevent rocuronium injection withdrawal movement during the induction of anesthesia.

Paper No: 851.00

Anesthetic management in interventional cardiac catheterization for congenital heart disease

Toshihiro Yorozya, Sonoko Fujii and Takumi Nagaro

Department of Anesthesiology & Resuscitology, Ehime University Hospital

Introduction: Recently, pediatric cardiac catheterization is shifting toward therapeutic, trans-catheter interventions. In interventional cardiology, for prolonged procedures and complex interventions, or in critically ill status, general anesthesia is recommended and required.

Objectives: The aim of the study was to review the outcomes of general anesthesia for interventional and diagnostic cardiac catheterization in pediatric patients in our institution.

Methods: We retrospectively examined 315 cases of interventional and diagnostic cardiac catheterization for

congenital heart disease performed with general anesthesia between January 2008 and July 2011.

Results: One hundred and eighty-five patients (from 0 to 25 years of age) underwent interventional procedures and 130 patients (from 0 to 25 years of age) underwent diagnostic catheterization. All patients were anesthetized with inhalation of sevoflurane, 2–10 mcg/kg of fentanyl, and muscle relaxants. Mechanical controlled ventilation with endotracheal intubation was performed using room air except the cases required oxygen therapy. Normal blood gases and acid-base status were maintained, particularly when calculating shunt fractions. Means (SD) of anesthesia duration for interventional cardiology and diagnostic catheterization were 245.4 (84.9) and 212.2 (62.0) minutes, respectively. Adverse hemodynamic collapse, which may be caused by myocardial ischemia, occurred in 2 cases during interventional procedures. In one case of two, extracorporeal circulatory assist was needed and the patient was transferred to intensive care unit. The catheter-related complication occurred in 1 case, which was the injury of subclavian artery. The patient was transferred to the operating room for surgical repair. In the patients who had pulmonary artery hypertension (PH) associated with congenital heart disease, there were no incidents of critical PH crisis during anesthetic induction, maintenance, and emergence.

Conclusions: While planning the general anesthesia for cardiac catheterization, we should understand the underlying pathophysiology, the purpose of the procedures, and anesthesia-induced changes in hemodynamic parameters. The cardiac and respiratory effects of the drugs and technique chosen should avoid distortion of hemodynamic measurements. The drug combination of sevoflurane and fentanyl may be the preferred method to achieve the stable hemodynamic condition and to prevent PH crisis during interventional cardiac catheterization. However, recent concerns about the effects of general anesthetics on the developing brain should be considered in infants. In case of rapid deterioration of the cardiovascular status, drugs for resuscitation have to be readily available and should be prepared in appropriate dose for each patient before anesthesia.

Reference

- 1 Hollinger, et al. Cardiac catheterization laboratory: Catheterization, interventional cardiology, and ablation techniques for children. *International Anesthesiology Clinics* 2009; 47:63–99.

Paper No: 868.00

A Perioperative Audit of the Paediatric Cochlear Implant Program at the Singapore General Hospital

Pierre Ip Yam¹, Priscilla Phoon¹ and Adrian Kan²

¹ Department of Anaesthesiology, Singapore General,

² Department of Anaesthesiology, Singapore General Hospital, Duke-NUS Medical School

Introduction: Cochlear implantation in children is an established procedure for treating irreversible hearing loss. The procedure itself is time-consuming, expensive and challenging. Objectives: The aim of the study was to surface anaesthetic issues involved in the perioperative management of such patients in a predominantly adult tertiary general hospital.

Methods: We conducted a retrospective clinical audit of 184 paediatric (age < 12) cochlear implantation cases. All those cases were operated by the same surgeon in Singapore General Hospital during the period from 1997 to 2010. Both unilateral and bilateral implantation procedures for children were included in this study.

Results: 184 procedures were performed on 173 patients under general anaesthesia. The average age (mean [sd, range]) at the time of surgery was 3.7 [2.6, 0.7-11] years. Inhalational anaesthesia was the more popular choice for induction (66.3%) as compared to intravenous agents (33.7%) with the most popular inhalational and intravenous agents being sevoflurane and propofol respectively. Patients were intubated and ventilated using inhalationals. Analgesia consisted of local anaesthetic infiltration supplemented by narcotics. The mean duration of the unilateral and bilateral implantation procedures were 3.2 [1.0, 1.2-6.5] hrs and 4.7 [0.8, 4-6] hrs respectively. There were 2 induction complications (1 episode of laryngospasm and 1 case of difficult IV access) and there were 2 cases of intra-operative tachycardia. The most common post-operative complication was pain which was reported in 97.8% (180) of the procedures, followed by nausea and vomiting which was reported in 10.3% (19) of the procedures. Fifteen patients (8.1%) required additional analgesia in the post-anaesthetic care unit. In the ward, 14 patients (7.6%) required stronger analgesia in addition to paracetamol. Peak paracetamol requirement (22.9 [16.6] mg/kg) was on the first post-operative day. Nausea and vomiting was reported in 10.3% (19) of the procedures. The correlation between increasing age and post-operative nausea and vomiting was statistically significant ($p < 0.05$) as was the association between age and analgesic requirements. The average duration of hospital stay was 3.2 [1.0, 1-6] days. Mean age at time of surgery as well as duration of unilateral implantation procedures decreased over time. A trend towards same day admissions (SDA) was also noted.

Conclusion: Cochlear implantation in paediatric patients is a relatively safe procedure involving few complications.

Keywords: Paediatric Cochlear Implantation; Anaesthetic Outcomes; Clinical Audit

Paper No: 919.00

I-GEL (Supraglottic Airway Device) in pediatric ophthalmic anesthesiology

Pavel Rylov and Sergey Bersenev

IRTC Eye Microsurgery, Ekaterinburg Center, Ekaterinburg, Russia, 620149

Use of supraglottic airway devices is the most safe method to provide patency of respiratory tract meeting the requirements of modern outpatient anesthesiology. In our clinic we use I-GEL in adults since 2007, but pediatric I-GEL devices have become commercially available only since 2010. Aim of our paper is to perform an analysis of I-GEL in pediatric outpatient anesthesiology. We have performed a prospective study of 32 anesthesia cases in children using I-GEL. Age of the children was from 4 to 14 years (mean, 7.2 ± 3.0 years). Surgery included scleroplastic operations in 30 children, levatoroplasty in 1 patient and corneal grafting in 1 patient. In 15 children I-GEL airway devices size 2.0 and in 17 children – size 2.5 were used. In 25 children induction was performed with Sevoflurane and anesthesia was supported with Sevoflurane. In 7 children older than 7 years induction was performed with Propofol and anesthesia was supported with Sevoflurane. Artificial pulmonary ventilation was performed with BLEASE respirator in SIMV mode. Ventilation parameters were controlled with Capnomac Ultima Datex monitor. All the measurements were performed at MAC of 1.2-1.4. In all the children inspiratory and expiratory volumes were measured; escape volume was also calculated. After measuring in 10 consecutive respiratory cycles mean values of these volumes were calculated in all the children. Besides, in all the children escape percent was calculated as follows: $\text{escape percent} = \text{escape volume} \times 100\% / \text{inspiratory volume}$. For control the same indicators have been calculated with 1 liter bag attached to the respiratory contour and inspiratory volume pre-established at 200 ml. I-GEL were introduced in all the children without technical problems – at first attempt in 31 case and in 1 case size 2.5 airway device was exchanged for size 2.0 due to auscultatory defined escape. In all the children adequate ventilation and oxygenation were performed during anesthesia. ($p\text{CO}_2$ – 32 to 41 mm H₂O, SpO_2 – 99%). Auscultatory air escape was defined in 3 cases. According to gas monitor air escape value was from 2 to 70 ml (mean, 18.9 ± 3.4) which made 2 to 20% of respiratory volume (mean escape percent 8.3 ± 3.8). In control measurements with 1 liter bag attached to the respiratory contour and pre-established respiratory volume of 200 ml air escape made from 1 to 40 ml (mean, 17.5 ± 4.8 ml) or 2 to 20% of respiratory volume (mean escape percent 7.7 ± 2.6). So, there was no statistically significant difference between data achieved during anesthesia and control measurements. In other words, use of I-GEL for artificial pulmonary ventilation in children provides insignificant loss of breathing mixture which does not significantly differ from loss during ventilation of a bag attached to the respiratory contour speaking in favor of sufficient airtightness of these airway devices. In all the children airway devices were removed at the background of adequate spontaneous breathing. No blood remnants were found on airway devices after removal. No complications during anesthesia were marked.

Conclusion: I-GEL supraglottic airway device sizes 2.0–2.5 are effective and safe air ducts and may be recommended, alongside with laryngeal masks, for providing respiratory

tract patency and artificial pulmonary ventilation during planned outpatient operations in children.

Paper No: 934.00

Fibreoptic intubation using the retromolar space in a paediatric patient with severe trismus and bilateral nasal stenoses

Angela Truong and Dam-Thuy Truong

The University of Texas M.D. Anderson Cancer Center, Department of Anesthesiology and Perioperative Medicine, Houston, Texas

Introduction: In patients with restricted mouth opening, intubation can usually be achieved by the nasal route. Unfortunately, in some patients, nasal intubation is contraindicated because of concomitant nasal pathology or coagulopathy.

Objectives: We present a case of a paediatric patient with severe trismus and bilateral nasal stenoses who required anaesthesia for segmental mandibulectomy. To obviate the need for tracheostomy and its potential complications, 2,3 airway control was achieved using the retromolar space as an access for flexible fibreoptic orotracheal intubation.

Methods: A 21 kg, 125 cm 8-year-old boy with right mandibular rhabdomyosarcoma presented for mandibulectomy. He had previously undergone radiotherapy with tumor resection and plastics reconstruction with a scapular osteocutaneous flap. Due to overgrowth of the bone flap, he had severe mandibular asymmetry with chin deviation towards the left, worsening malocclusion and severe trismus with an interincisor distance of less than 5 mm. General anaesthesia was induced with propofol 40 mg and fentanyl 30 mcg IV. The patient was ventilated by bag and mask without difficulty. Rocuronium 10 mg IV was given. Resistance was encountered during attempts to pass a paediatric bronchoscope through both right and left nares. The fibreoptic scope was then inserted into the left retromolar space. The epiglottis and glottis were identified. A 5.0 mm ID tracheal tube was guided over the bronchoscope for successful intubation. Surgery proceeded uneventfully. The patient was extubated and transferred to the post anaesthesia care unit in good condition.

Results: An awake fibreoptic intubation was not chosen due to the patient's young age, inability to cooperate, and anticipated difficulty in airway topicalization.⁴ Severe trismus precluded the insertion of a rigid laryngoscope intraorally. Because of the risk of epistaxis in a patient with restricted mouth opening, nasal fibreoptic intubation attempts were quickly abandoned once difficulty in inserting the scope was encountered. Fibreoptic oral intubation through the retromolar space was performed. Located between the last molar and the ascending ramus of the mandible, the retromolar space has been used to anchor tracheal tubes after maxillofacial surgery in children.⁵ Based on measurements of a 3-dimensional reconstruction model created from a computed tomography scan of the patient's face obtained

preoperatively, the left retromolar space was deemed large enough to accommodate a 5.0 mm ID tracheal tube.

Conclusions: Flexible fibreoptic retromolar intubation in a paediatric patient has never been reported. This technique offered an invaluable solution to manage a formidable paediatric airway challenge.

References

- 1 Holzapfel L. Nasal vs oral intubation. *Minerva Anesthesiol* 2003; **69**: 348–52.
- 2 Durbin CG Jr. Early complications of tracheostomy. *Respir Care* 2005; **50**:511–5.
- 3 Epstein SK. Late complications of tracheostomy. *Respir Care* 2005; **50**:542–9.
- 4 Xue FS, Luo MP, Xu YC, and Liao X. Airway anesthesia for awake fiberoptic intubation in management of pediatric difficult airways. *Paediatr Anaesth* 2008; **18**: 1264–5.
- 5 Arora S, Rattan V, Bhardwaj N. An evaluation of the retromolar space for oral tracheal tube placement for maxillofacial surgery in children. *Anesth Analg* 2006; **103**: 1122–5.

Paper No: 987.00

Safety and efficacy of spinal anaesthesia for pyloromyotomy in neonates with pyloric stenosis

Raul Eduardo Fernandez, Eduardo Halac, OliviaPatricia Villarreal and Victor Nievas

Introduction: Pyloric stenosis usually affects male neonates between 17–25 days of life. Girls are sometimes affected. Supraumbilical pyloromyotomy under general anaesthesia is the usual procedure for relieving pyloric obstruction. We propose the Ramstedt right extramucosal supraumbilical pyloromyotomy under spinal anaesthesia. Somri has published a series involving 25 cases. In 23 cases, excellent results were achieved.

Objectives: To compare the safety margins and analgesic efficacy of spinal anaesthesia in neonate pyloromyotomy.

Methods: Neonates diagnosed as having pyloric stenosis were given spinal anaesthesia. They all had a clinical pyloric obstruction diagnosis proven by ultrasound without any associated malformations. Spinal anaesthesia with appropriate pencil-shaped needles (25G x 25 mm) was carried out (with neonates in the sitting position) using isobaric bupivacaine 0.5%, 0.8mg/kg. Vital signs were monitored at baseline and from then on, every 5 minutes to complete a period of 30 minutes Results Thirty neonates with a mean age of 23 days (18–25) were studied. Baseline vital signs were similar in all patients. Sensory levels achieved ranged between T3–T5 thoracic segments within 5–7 minutes after the spinal puncture. The analgesic effect lasted 50–60 minutes, allowing enough time for the surgical procedure. Surgeons agreed that this procedure provided the proper surgical time and they found no complications during the surgical interval.

Conclusions: Ramstedt right extramucosal supraumbilical pyloromyotomy under spinal anaesthesia avoids the need for intubation and short-time mechanical ventilation; these procedures, occasionally, are fraught with either minor or major complications. Spinal anaesthesia for simple surgical procedures such as pyloromyotomy for pyloric stenosis offers effective anesthetic levels for surgeons without needing airway manipulation. The procedure was well tolerated and accepted by both the surgical and paediatric team. Spinal anaesthesia for pyloromyotomy arises as a valid option.

References

- 1 Somri M, Gaitini LA, Vaida SJ, Malatzkey S, Sabo E, Yudashkin M, Tome R. The effectiveness and safety of spinal anesthesia in the pyloromyotomy procedure. *Paediatr Anaesth* 2003; **13**(1): 32–7.
- 2 Kachko L, Simhi E, Freud E, Dlugy E, Katz J. Impact of spinal anesthesia for open pyloromyotomy on operating room time. *J Pediatr Surg*. 2009; **44**(10):1942–6.
- 3 Kachko L, Sanko E, Freud E, Katz J. Spinal anesthesia in a child with Brachmann-de Lange (Cornelia de Lange) syndrome. *J Anesth*. 2010; **24**(6):942–4.
- 4 Williams RK, Adams DC, Black IH. While we wait. *Anesth Analg* 2011; **112**:1239–1241.
- 5 Williams RK, Adams DC, Aladjem EC. The Safety and efficacy of Spinal Anesthesia for surgery in infants: The Vermont Infant Spinal Registry. *Anesth Analg* 2006; **102**:67–71.

Paper No: 1002.0

Ultrasound-guided axillary vein access in neonates: an alternative approach for central venous catheterization

Gonzalo Rivera, Maria José Cordero, Silvana Cavallieri, Mauricio Campos, Sandra Benavides and Marta Cornejo

Hospital de Niños Luis Calvo Mackenna, Santiago, Chile

Introduction: Previously, has been reported the use of ultrasound (US) in catheterization of the internal jugular vein (IJV), the subclavian vein (SCV) and the brachiocephalic vein in children 1–3. However, these studies are mainly developed in children older than neonates. Cannulation of central vessels in neonates is more difficult than the same procedure in older children and adults. On the other hand, neonates offer a unique advantage in terms of visualization with US techniques.

Objective: We undertook this current study to describe the technique and to evaluate the results of the US-guided approach to the axillary vein (AV) in neonates.

Methods: We scheduled 67 neonates in a period of 7 months. The scan was performed using a Sonosite M-Turbo (Bothell, WA, USA) with its linear probe (13 – 6 Mhz - HFL38x). Patients were located in a slight Trendelenburg position with a rolled towel under their shoulders. The arm of the same side was

abducted in 70°–90° approximately, for improving the visualization of the AV. The scan was performed first in the neck and then the probe was moved downward following the IJV toward its junction with the SCV. At this point, we obtained the picture of the SCV interrupted by the acoustic shadow of the clavicle (Pirotte). Next, the probe was moved laterally over the surface of the pectoral muscle in the infra-clavicular area following the AV. The puncture was done in plane near to the lateral border of the pectoral major muscle reaching the AV as distal as possible always under real-time US visualization. Side of puncture, number of attempts, redirection the guidewire. Were registered. All patients were followed for 7 days after the procedure to observe any relevant condition.

Results: In all patients the procedure was successful. In 66% the AV was punctured at the first attempt (25.5% two attempts, 8.5% three attempts). In 63.8% movements to redirect the guidewire were needed. No arterial puncture, and no pneumothorax were registered. A moderate shoulder swelling was presented in 14% three days after the procedure. In those cases the CVC was withdrawn and patients were followed clinically and with US. No thrombus or other complication was detected by US in any patient. No patients evidenced signs of infection or sepsis related with CVC.

Conclusion: The US-guided approach to the AV in neonates constitutes a feasible technique and may represent an attractive alternative. This real-time technique is safe and useful, providing some advantages over more traditional approaches, such as the possibility to do the puncture in plane.

References

- 1 Hosokawa Koji, et al. A Randomized Trial of Ultrasound Image-based Skin Surface Marking versus Real-time Ultrasound-guided Internal Jugular Vein Catheterization in Infants. *Anesthesiology* 2007; **107**:720 – 4.
- 2 Pirotte T, Veyckemans F. Ultrasound-guided subclavian vein cannulation in infants and children: a novel approach. *Br J Anaesth* 2007; **98**:509–14.
- 3 C. Breschan, et al. Size of internal jugular vs subclavian vein in small infants: an observational, anatomical evaluation with ultrasound. *British Journal of Anaesthesia* Page 1 of 6 doi:10.1093/bja/aeq123.

Paper No: 1100.0

Dog Bites in Pediatric Patients

Roberto Carlos Coll Loha, Soledad Agasso, Nadal Fernando, Cuartara Gustavo, Javier Martinez, Rimolo Ilse and Adriana Consoli

Introduction: Dog bites are a frequent problem in the health care practice in our community. There are cases of severe injuries, even followed by death. Severe cases affect the areas of head and neck, and the anesthesiological considerations are very important.

Goals: Know the epidemiological characteristics and peri-operative complications of the patients with dog bites in our care center.

Materials and Methods: Type of study: Retrospective, descriptive. Out of a total of 127 children with dog bites, 38 cases which entered the emergency operating room from May 2008 to May 2011 were analyzed. Variables such as age, gender, weight, place of the bite, ASA classification, difficulty in the airway operation, surgical time, complications, requirements of mechanical ventilation and postoperative intensive care and hospitalization time. The statistical analysis was performed with the measures of central tendency.

Results: The results were the following. Average age 5 years old, gender male 70% of the cases, weight 23 kg, place of bite: Head and neck in 70%, ASA III 29% and ASA IV 8%. Surgical time 90 minutes average. The delay in a patient waking up was associated to benzodiazepines and morphinan derivatives and the sinus tachycardia of 2 patients suffering from hypovolemia. A case of severe hypovolemia derived in two episodes of intraoperative cardiac arrest. Although there are no incidents registered in the air way handling, 3 patients required mechanical ventilation and postoperative intensive care due to the potential compromise of the airways (due to neck injuries) and hemodynamic compromise, and one of them was hospitalized 120 days, and death after 5 months in another center.

Discussion: Dog bites represent an important social and assistance problem. Current situation calls for a review and an analysis. Patient treatment is interdisciplinary. The role of the anesthesiologist is essential regarding the airways handling, ventilation and hypovolemia, and extends to post-operative care with pain management.

Conclusions: In children, in particular the youngest, head and neck are frequently injured, and the role of the anesthesiologist is essential. We think it is extremely important that all the people involved commit and be aware about the prevention of this type of trauma, such as animal owners, parents, governmental authorities and sanitary personnel.

Keywords: Dog bite; pediatrics; trauma; complications

References

- 1 Mendez Gallart R, Gómez Tellado M, Somoza Argibay I y cols. Dog bites. *An. Esp. Pediatr.* 2002; **56**: 425–429.
- 2 Schwartzman Sergio D, Pacin Mirta B. Injury for dog bite in children. *Arch. arg. pediatr* 2005.v. 103 n. 5. Buenos Aires Sep. /Oct. 2005.
- 3 Menéndez Cuevo A. y cols. Airways handling in the polytraumatized children. *Bol. Pediatr.* 2008; **48**: 80–88.

Paper No: 1101.0

Effects of Ondansetron on Sevoflurane Induced Paediatric Emergence Agitation

Ozlem Erden, Ozge Koner, Sibel Temur, Ferdi Menda and Sevgi Bilgen

Yeditepe University Anesthesiology Department

Introduction: Prevalence of sevoflurane induced emergence agitation in paediatric patients is high(1,2). Ondansetron has been shown to reduce delirium after cardiac surgery in adults(3).

Objectives: To evaluate the effects of ondansetron on sevoflurane induced emergence agitation in paediatric patients undergoing infraumbilical surgery with caudal block.

Methods: Forty 2-7 year-old children were assigned to two groups. Study group consisted of 20 children receiving perioperative ondansetron (0,1 mg/kg iv), control group consisted of 20 children receiving placebo. All children were premedicated with 0,5 mg/kg oral midazolam. Emergence agitation score (PAED), induction quality, parental separation, sedation and pain scores were evaluated at postoperative 10, 20, 30, 60, 120, 180 mins.

Results: Demographic data and anaesthesia, operation times were similar among the groups. Agitation ($p > 0,05$), pain scores($p > 0,05$) were identical among the groups during the study period. Induction quality, parental separation, sedation scores were also similar among the groups.

Conclusion: Perioperative prophylactic use of ondansetron did not reduce the sevoflurane-induced emergence agitation in paediatric patients.

References

- 1 Galinkin JL, et al. *Anesthesiology* 2000; **93**:1378–83.
- 2 Cravero J, et al. *Paediatr Anaesth* 2000; **10**:419–24.
- 3 Bayindir O, et al. *J Cardiothorac Vasc Anesth* 2000; **14**:288–92.

Paper No: 1122.0

Case report: a ten year old boy with pheochromocytoma

Ana Nobre, Filipa Aguiar and Teresa Rocha

Introduction: Pheochromocytoma tumors are rare in children. Although well described for the adult population, they are poorly characterized for the pediatric population. We present a case report of a child with a pheochromocytoma, reviewing the most frequent tumor's manifestations, diagnostic methods, preoperative and intraoperative management and follow-up techniques.

Case report: A ten year old boy was diagnosed with bilateral papillary edema in an ophthalmologic routine examination. He was referred to his assistant pediatric doctor for evaluation, who diagnosed him with hypertension. He had symptoms of headache, sweating and palpitations for three years. He was submitted to a variety of laboratory and imaging tests, which led to the diagnosis of a pheochromocytoma in the left adrenal gland. An excision of the tumor was planned. The child underwent preoperative blockade with phenoxybenzamine 10 mg bid and propranolol 10 mg tid for 2 weeks, normalizing the tensional values. The child was submitted to left adrenalectomy under combined anesthesia. A general anesthesia was administered with

Midazolam 3 mg, Alfentanil 0.6 mg, Propofol 50 mg and Cisatracurium 10 mg. The trachea was intubated with a 6.5 cuffed endotracheal tube and anesthesia was maintained with sevoflurane and a mixture of 30/70 N2O/O2. A lumbar epidural catheter was placed, with administration of Ropivacaine 50 mg and Sufentanil 4 µg. An arterial line and a central venous line were placed for monitoring blood pressure and fluid status intraoperatively. Serial arterial blood samples were taken and due to a hemoglobin value of 8.4 g/dL, one unit of packed red blood cells was administered. During surgery there were blood pressure swings, with maximal values of 220/100 mmHg. We used esmolol boluses (total 50 mg) and a perfusion of sodium nitropruside (total 10 mg) to control hypertension. Excision of the tumor resulted in no hypotension. The surgery had duration of 4 hours. The child was transferred to the ICU, where he stayed for 3 days, with no relevant intercurrents. He was discharged home after 7 days, clinically well, with controlled tension values and with indications to go to a Pediatric Oncology consultation and do long term follow-up catecholamine measurements.

Conclusion: Pheochromocytoma is a rare but important tumor in children. Appropriate evaluation and management are essential for a favorable outcome.

References

- 1 Ross, J. – Pheochromocytoma special considerations in children – Urologic Clinics of North America, vol 27, issue 3; 2000.
- 2 Reddy, V. et al – Twenty-five-years surgical experience with pheochromocytoma in children – The American Surgeon, vol 66, n°12; 2000.
- 3 Beltsevich, D. et al – Pheochromocytoma surgery: epidemiologic peculiarities in children – World Journal of Surgery, vol 28; 2004.
- 4 Pham, T. et al – Pheochromocytoma and Paraganglioma in children: a review of medical and surgical management at a tertiary care center – Pediatrics; vol 118, n°3; 2006.
- 5 Ludwig, A. et al – Recent advances in the diagnosis and treatment of pheochromocytoma in children – The American Journal of Surgery, vol 194, 2007.
- 6 Kohane, D. et al – Case 16-2005: A Nine-Year-Old Girl with Headaches and Hypertension – The New England Journal of Medicine, vol 352;21; 2005.
- 7 Wagespack, S. et al – A Current Review of the Etiology, Diagnosis, and Treatment of Pediatric Pheochromocytoma and Paraganglioma – The Journal of Clinical Endocrinology & Metabolism, vol. 95 no. 5 2010.
- 8 Hack, H. et al – The perioperative management of children with phaeochromocytoma – Paediatric Anaesthesia, vol 10; 2000.

Paper No: 1123.0

A meta-analysis of 175 cases at Emergency Paediatric and Surgical Centre in Goderich, Sierra Leone

Paolo Grosso

Director of Emergency Dept. Policlinico di Monza (Monza, ITALY);
NGO EMERGENCY Board of Anaesthesia and Critical Care Sandro Contini – Dept. of Surgical Sciences, University of Parma

Introduction: Sierra Leone is among the world's poorest countries (ranked 217/227 - GDP p/c 900\$). Caustic soda is used for the home making of soap (source of income) and is often ingested by children. A programme dedicated to the management of oesophageal corrosive injuries was established in 2005 in Goderich-Freetown by the Italian NGO EMERGENCY.

Objective: This experience offers the opportunity to identify the therapeutic approach of corrosive ingestions in developing countries. The goal of Anaesthesia Services is to face the multiple challenges of this paediatric population and the unusual surgery procedure with low anaesthesia technologies, poor pharmacological availability, low family compliance. -Which kind of anaesthesia? -Severe malnutrition: a morbidity factor? -Airway management with upper airways involvement and anatomical deformity? -Repeated dilations requiring multiple anaesthesia in short span of time, is it dangerous?

Methods: Our Hospital was supplied in 2005 with fiberoptic endoscopes and dilatation devices (balloon dilators and bougies) for the treatment of children presenting corrosive ingestions. For Anesthesia we chose OT intubation and manual ventilation with Alothane, induction with Ketamine, muscle relaxation with Vecuronium.

Results: In 5 years 175 children (mean age 5 years, range 13 months/15 years) were admitted: -Patients receiving dilations: 77.7% -Perforations and death rate: 4.5% -One cardiac arrest during the dilatation procedure -In 6 patients (3.4%) intubation was not possible due to severe caustic damage of the upper airways Five deaths occurred: one during pneumatic dilatation, one after 8 months, 3 patients became severely malnourished and died during dilatation program.

Discussion: We observed two perforations and deaths during balloon dilatation. We supposed due to the contemporary transmural high pressure of the balloons (endotracheal tube and dilatator). We believe that bougie dilatation should be preferred in these settings. Babies are hypersecretive: we premedicate them with atropine, antibiotics and antisecretory compounds. Children nutritional status is a major concern: feeding by NGtube is valuable in the short term, for long periods a gastrostomy is more effective to improve nutritional status before and after dilatation.

Conclusion: Anatomical deformities of the upper airways are to be expected and evaluated prior to anaesthesia. Severe malnutrition is a per-operative morbidity factor: nutrition by gastrostomy should anticipate dilations. Ketamine is the first choice anaesthetic and, with Vecuronium, should be managed with care to the low protein pool of these malnourished babies. Alothane is safe and with a wide therapeutic index. Short span of time for repetitive surgical procedures has not increased per-operative morbidity.

References

- 1 S. Contini MD, C. Scarpignato MD, DSc, FAcG, A. Rossi MD, PhD, G. Strada MD.: Features and management of children's oesophageal corrosive lesions in sierra leone. lessons from a 175 consecutive patients. 2010.
- 2 Contini S, Garatti M, Swarray-Deen A, et al. Corrosive oesophageal stricture in children: outcomes after timely or delayed dilatation. *Dig Liver Dis* 2009; **41**: 263–68.
- 3 CIA. The World Factbook. 2010.

Paper No: 1138.0

Pediatric I-Gel use in 100 children

Jose Antonio López Gil¹, Pablo Cuesta²,
Mario Jimenez¹ and José María Berrotaran¹

¹ Hospital General Universitario Alicante. Spain, ² Complejo Hospitalario Universitario Albacete. Spain

Introduction and Objectives of Study: The I-GEL LMA is a supraglottic device with a non-inflatable cuff that adapts to the hypopharyngeal anatomy and has been recently introduced in pediatric practice. The aim of this study is to describe insertion characteristics and airway seal in pediatric population.

Material and Methods: A total of 100 children under 30kg were prospectively enrolled. We excluded prematures or neonates below 3 kg, or with lung disease, difficult airway or risk factors for regurgitation. Standard monitoring and pre-oxygenation was performed. Iv (propofol 3-5 mg/kg, fentanyl 2mcg/kg and atropine if needed) or inhalational induction and iv canalization was performed. We did not use neuromuscular blocking agents before inserting the I-Gel. Trapezium squeezing test was carry out to guarantee adequate depth of anesthesia. I-gel was inserted according to manufacturer's recommendations with a lubricated gastric tube previously inserted down the drainage tube. Correct insertion was assessed by proper chest expansion, the presence of CO₂ wave on the capnograph and absence of audible leak and gastric insufflations. Children were ventilated with VCV: VT: 8ml/kg and respiratory rate to obtain ETCO₂ between 30-40 mmHg. We collected: insertion time, easy of gastric tube placement, leak pressure peak and plateau pressures and ETCO₂ with this ventilatory parameters and airway-related complications.

Results and Discussion: There were 51,4% males with a median age and weight of 2,7 +/- 1 years old and 13,5+/-6,1 kg. I-Gel size 2 was the most commonly used (65,7%), the I-Gel size 1 in 17,1%, the I-Gel size 1,5 in 14,3%, and the I-Gel size 2,5 in 2,9%. Insertion was successful at the first attempt in 95% of the patients. 5 cases required intubation. One was changed by another size. The mean time for successful insertion was 14,4+/- 4,4seg. The mean leak pressure was 25,1+/-6 cmH₂O. The mean positive pressure needed to achieve a tidal volume of 8 ml/kg was 14,8 +/- 3 cmH₂O, with a plateau pressure of 10,8 +/- 2,6

cmH₂O. Gastric tube placement was easy achieved in all cases. No episode of desaturation (SpO₂ < 90%), bronchospasm or laryngospasm. was recorded.

Conclusion: Ease of insertion and the values of airway leak pressure found in I-gel allow for effective ventilation in almost all cases. The I-gel seems to be safe for pediatric population and a reasonable alternative to airway management.

References

- 1 L. Beylacq, The I-gel a single-use supraglottic airway device with a non-inflatable cuff and an esophageal vent: an observational study in children. *Acta*.
- 2 Soh CR, Ng ASB. Laryngeal mask airway insertion in paediatric anaesthesia: comparison between the reverse and standard techniques. *Anaesth Intensive Care* 2001; **29**: 515–519.
- 3 Chul Ho Chang, Optimal conditions for Laryngeal Mask Airway insertion in children can be determined by the trapezius squeezing test. *Journal of Clinical Anesthesia* (2008) **20**: 99–102.

Paper No: 1171.0

Efficacy of thromboelastography-guided administration of fibrinogen in paediatric cardiopulmonary bypass surgery

Daciano Gaona¹, Maria Dolores Carceles¹,
Luis Lopez-Fuentes², Vicente Roques¹ and
Luis Falcon¹

¹ Hospital Universitario Virgen de la Arrixaca, Murcia, Spain,

² Hospital Universitario Los Arcos del Mar Menor.

Introduction: Suitable levels of fibrinogen are necessary for a satisfactory hemostasis. The coagulopathy associated to paediatric cardiopulmonary bypass (CPB) is very complex and is accompanied by hypothermia, hemodilution, platelets impaired, excessive fibrinolysis and high consumption of coagulation factors.

Objectives: The aim of the study is to review the effectiveness of fibrinogen administration to recover baseline levels and decrease postoperative bleeding. Methods After ethical committee approval and informed consent, we prospectively studied 40 children undergoing CPB, between 27 days to 5 years old and weights 4-15 kgs. Clinicians were blinded to the hemostatic assays above routine use, i.e., TEG (R) (Thromboelastography). Exclusion criteria included the following: basal coagulopathy, previous anticoagulants treatment, redo cardiac surgery, extended CPB (> 120minutes) and cyanotic congenital defect. TEG (R) and standard coagulation test were performed immediately after blood sampling. Blood for TEG (R) profiles was collected at 3 time points: immediately before CPB, end of CPB before separation (rewarming complete, before protamine administration) and after separation from CPB (after protamine administration).

Results: After administration of fibrinogen in the postoperative period, it reached normal state and there was only

excessive bleeding and coagulation impaired in TEG (R) in one case, associated with low plasmatic fibrinogen levels and alteration of EXTEM that improved with the administration of blood products (fibrinogen and coagulation factors). Discussion As previously described by Rahe-Mayer N et al. in aneurysm surgery we observed in pediatric CPB that correction of plasmatic levels of fibrinogen may be associated to a satisfactory hemostasis and a postoperative bleeding reduced. TEG(R) is a useful technique to assess the requirements of blood products in the children undergoing CPB.

Conclusions: Administration of fibrinogen was effective to increase fibrinogen plasmatic levels and contributed to correct the bleeding after CPB in pediatric cardiac surgery, associated to lower disturbances of coagulation state.

References

- 1 Eaton MP, Lannoli EM. Coagulation considerations for infants and children undergoing cardiopulmonary bypass. *Pediatric Anesthesia* 2011; **21**: 31–42.
- 2 Rahe-Mayer N, Solomon C, Winterhalter M, et al. Thromboelastometry-guided administration of fibrinogen concentrate for the treatment of excessive intraoperative bleeding in thoracoabdominal aortic aneurysm surgery. *J. Thorac. Cardiovasc. Surg.* 2009; **138**: 694–702.
- 3 Moganasundram S, Hunt BJ, Holton F, et al. The relationship among thromboelastography, hemostatic variables, and bleeding after cardiopulmonary bypass surgery in children. *Anesth. Analg.* 2010; **110**(4): 995–1002.

Paper No: 1217.0

Postoperative analgesia after caudal anaesthesia with Bupivacaine in children: Clonidine versus Tramadol

Abdessalem Kolsi, Leila Stambouli, Neji Stambouli, Mohamed Kahloul and Moez Louzi

Department of Anesthesiology and Intensive Care, Monastir University Hospital

Introduction: Caudal epidural blockade provides analgesia beyond the duration of surgery, a smooth recovery period and good postoperative pain control (1). Caudal Bupivacaine (2) has been widely used for years in children but the major problem was the limited duration of analgesia. Recent research has focused on trying to resolve this problem with the addition of various adjuncts. Clonidine was found to potentiate and prolong the analgesic effect of the local anaesthetic (3,4). Other authors have found similar effect with addition of Tramadol without producing significant adverse effects.(5,6,7,8).

Objectives: Our aim was to compare the analgesic effectiveness of Tramadol and Clonidine as additives to caudal Bupivacaine.

Methods: We examined in a prospective, randomized, double-blind study, 45 children aged 1 to 6 years, ASA I, who were scheduled to undergo urogenital surgery during the period January to July 2011.

Children were randomized to one of three study groups (n = 15) to receive the following in a single shot caudal administration before surgery: Group B: control group (Bupivacaine 0, 25%) 2, 5 mg/kg +saline, 2 mg/kg Tramadol Group BT or Clonidine 2 ug/kg Group BC. After wake up children were supervised each 2 hours during 24 hours to assess postoperative analgesia using paediatric objective pain score (OPS), supplement analgesic drug need, sedation using a 5-point scale and side effects.

Results: The OPS average score was significantly lower in Tramadol group (0,27; P = 0,002) and in Clonidine group (0,53; P = 0,026) than Bupivacaine group. The mean time to the first administration of postoperative rescue analgesia was 8,03 ± 8,5 hours in group B, 18,73 ± 7,8 hours in group BT (P = 0,007) and 13,07 ± 10,66 hours in group BC P > 0,05). The total taken dose of Paracetamol per Kg during the first day after surgery was significantly lower respectively in Tramadol-Bupivacaine group 7,2 ± 11,1 mg/kg (P = 0,004) and Clonidine –Bupivacaine group 12 ± 15 mg/kg (P = 0,04) than in the Bupivacaine group 25,4 ± 16,8 mg/kg.

The sedation scores were less than 2 in all patients. The incidence of nausea and vomiting wasn't significantly different among group.

Conclusion: Our results indicate that caudal Tramadol enhances the effects of Bupivacaine in terms of duration of postoperative analgesia. It gives more pain free period compared with Clonidine without increasing the incidence of adverse effects.

References

- 1 Dalens BJ. Regional anesthesia in children. In: Miller RD, ed. *Anesthesia*, 5th edn, volume 2. Philadelphia, PA: Churchill Livingstone Inc., 2000: 1549–1585.
- 2 De Beer DA, Thomas ML. Caudal additives in children – solutions or problems? *Br J Anaesth* 2003; **90**: 487–498.
- 3 Ansermino M, Basu R, Vandebeek C, Montgomery C. Nonopioid additives to local anaesthetics for caudal blockade in children: a systematic review. *Paediatr Anaesth* 2003; **13**:561–573
- 4 Schnabel A, Poepping DM, Kranke P, Pogatzki-Zahn EM, Zahn PK Efficacy and safety of caudal clonidine for pediatric anaesthesia: A quantitative systematic review of randomised controlled trials. Best Abstracts - Runner-up Session 1 (euroanesthesia congress 2011).
- 5 Lee CR, Mc Tavish D, Sorkin EM Tramadol. *Drugs* 1993; **46**:313–340
- 6 Senel AC, Akyol A, Dohman D, et al. Caudal bupivacaine-tramadol combination for postoperative analgesia in paediatric herniorrhaphy. *Acta Anaesth Scand* 2001; **45**:786–789.
- 7 Delilkan AE, Viyajan R. Epidural tramadol for postoperative pain relief. *Anaesthesia* 1993; **48**:328–331.
- 8 Meena Dota, Sambrita Mukherjee. Postoperative analgesia in children-comparative study between caudal Bupivacaine and bupivacaine and Tramadol. *Indian janesthesia* 2009; **53**(4):463-466.

Paper No: 1233.0**Ketofol (Ketamine/Propofol) vs Ketamin/Midazolam in babies for short-term orthopaedic procedures**

Jasminka Nancheva¹, Mirjana Shosholcheva²,
Milan Samardziski² and Daniela Gorgieva³

¹ University Hospital, St.'Naum Ohridski" Skopje, Clinic for orthopaedic surgery, Medical Faculty, ² University "St. Cyril and Methodij", Skopje, Macedonia Clinic for Orthopaedic Surgery, Medical Faculty, ³ University "St. Cyril and Methodij", Skopje, Macedonia

Introduction: Ketamine produces dissociative anaesthesia and extensive analgesia, which safely and effectively enables treatment for a wide variety of short, painful, surgical or critical care procedures.

Objectives: This study is designed to determine the differences of accommodation of ketamine dissociative effect and agitation in babies anaesthetized with ketamin/midazolam and ketamine/propofol combination for non-sanguineal hip reposition. **Methods:** With approval of Ethics Committee 41 babies (3-7 months), ASA I, with luxatio coxae congenita scheduled for non-sanguineal hip reposition under general anaesthesia. They were divided in two groups, Group A (n = 21) anaesthetized with Ketamine/Midazolam, and group B (n = 20) anaesthetized with Ketofol (Ketamine/Propofol) combination. All the patients were premedicated i.m. with Midazolam 0,15 mg kg⁻¹ and 0,015 mg kg⁻¹ Atropin. In Group A maintenance of anaesthesia was established with i.v. cocktail combination of Ketamine - Midazolam (1ml = 0,5 mg Midazolam + 10 mg Ketamine) 0,3 - 0,4 ml kg⁻¹. In Group B maintenance of anaesthesia was established with cocktail combination of i.v. Ketamine 0,3 - 0,4 mg kg⁻¹ and Propofol 0,2 mg kg⁻¹. The patients were monitored noninvasively (BP, pulse, SpO₂), and they were active oxygen supported during the intervention.

Results and Discussion: Seven (33,3%) babies from Group A showed unsatisfactory relaxation and agitation during the maintenance of anaesthesia. Growing the dose of Ketamine/Midazolam the excitation was the biggest. Propofol 0,5-1,0 mg kg⁻¹ accommodated this effect. The maintenance of anaesthesia at the babies from Ketofol group was significantly stable with satisfactory relaxation and without agitation compared with Group A.

Conclusion: The anaesthetic and analgesic properties of Ketofol, satisfactory relaxation, without agitation and antiemetic profile of this combination provides better conditions at the babies for short-term operative and nonoperative procedures compared with effect of ketamin/midazolam cocktail combination which is not always sufficient at the babies to accommodate ketamin agitation status and produced sometimes midazolam-delaying postoperative respiratory depression effect.

References

- 1 Rae Frances Bell. Ketamin for non-cancer pain (topical review). *Pain* (2009) 1-5.
- 2 Lin C, Durieux E. Ketamine and kids: an update. *Paediatric anaesthesia*, 2005; **15**: 91-97.
- 3 Koining H, Marhofer PS. (+)ketamine in paediatric anaesthesia. *Paediatric anaesthesia*, 2003 **13**: 185-187.

Paper No: 1249.0**A case of horner's syndrome after internal jugular venous catheterization in a child**

Celina Oliveira¹, Celina Gomes¹,
Filomena Farinha² and Fernanda Barros²

¹ Hospital de Braga, Braga, Portugal, ² Hospital de São João, Porto, Portugal

Introduction: Horner's Syndrome (HS) is characterized by a triad of miosis, ipsilateral ptosis and facial anhidrosis as a result of a lesion occurring at any given point of the oculosympathetic pathway between the hypothalamus and the eye(1). Although rare, there are, however, a few reports of this syndrome occurring in the sequence of the internal jugular vein catheterization(2).

Objectives: We report a case of HS postoperatively following IJV catheterization in a child.

Methods: Four years old subject, male gender, ASA physical status P3, weighing 19Kg, admitted for a cardiac septoplasty under general anesthesia due to a partial AV septal defect. After the induction, the child was positioned for right internal jugular catheterization with a Trendelenburg tilt without head rotation. Two attempts were undertaken with a medial approach, inadvertently puncturing the carotid artery, immediately followed by direct compression. The left jugular vein was then cannulated on a first attempt, using the same approach. Anesthesia maintenance and emergence went on without any events worthy of note.

Results: In the immediate postop period, the child presented with a smaller right pupillary diameter and ipsilateral partial ptosis. After a Pediatric Neurology consult, a normal head CT and a carotid Doppler exam with no abnormalities, the diagnosis of HS was considered and assumed, despite total clinical regression in a 3-week period.

Conclusion: The proximity between the cervical sympathetic pathway and the internal jugular vein may predispose it to lesions, either by direct needle trauma or owing to pressure exerted by an expanding local hematoma resultant from an inadvertent carotid artery puncture(1). In what it relates to the present clinical case, the findings, particularly the sudden onset, point to the HS being a result of the ipsilateral jugular vein catheterization, underlining that an ultrasound-guided puncture was not ensued due to a momentary lack of availability(2). This case report, therefore, emphasizes the importance of ultrasound monitoring and guidance of central venous cannulation.

References

- 1 *Journal of Clinical Anesthesia* 2008; **20**: 304–306.
- 2 *Pediatric Anesthesia* 2007; **17**:(4), 396–398.

Paper No: 1276.0

Propofol and sevoflurane tubeless anaesthesia for infant laryngeal laser surgery: case report

Mercês Lobo, Instituto Português, de Oncologia, Porto Portugal and Luciana Costa

Introduction: Infant laryngeal laser surgery is challenging for both the anaesthesiologist and the otolaryngologist. The small diameter of the airways, propensity of rapid desaturation and risk of airway fire (1) obliges close collaboration between teams. For neonates and small infants there are no laser safe tracheal tubes available (2). The choice of an adequate anesthetic technique is always difficult in this context. Several different methods have been described with multiple advantages and disadvantages.

Objectives: describe successful rarely described anesthetic approach in a rare surgery in the infant population.

Methods: Case report Infant 14 months, feminine, 8,9 kg, ASAIII was scheduled for correction of laryngo-tracheal fissure. His medical history was significant for laryngo-tracheal fissure, tracheoesophageal fistula, malformation of carina, tracheomalacia of the middle 1/3 of the main left bronchus, frequent respiratory infections and intertricular communication in spontaneous closure. His past surgical history included esophageal atresia correction on the second day of life. Anesthetic technique: ASA Standard II monitoring. Induction with sevoflurane 8%, maintaining spontaneous breathing. Direct laryngoscopy was performed, Cormack Lehane grade I visualization. A flexible metal endotracheal tube was positioned in the oropharynx directed to glottic structures. Hydrocortisone 25mg was administered. Maintenance was performed using propofol 1% at 3,56ml/h and sevoflurane with oxygen Fi 30%, fentanyl bolus total of 0,006 mg. At 1h15min of intervention a blood gas analysis was performed and no abnormal parameters were encountered. Fluid Therapy with normal saline 20 ml/h, glucose 5% 38 ml/h. Analgesy paracetamol 140 mg intravenous. Total duration of the procedure 2h 15minutes.

Results: The combination of a propofol perfusion and Sevoflurane during maintenance was able to accomplish an adequate anesthesia and optimal surgical field, with spontaneous breathing.

Discussion: Several different methods have been described with multiple advantages and disadvantages. Apart from the anesthetic technique chosen, clinical monitoring is vital in this context. Monitoring respiratory adequacy can be

challenging, as capnography is not possible, and the visibility of abdominal excursion limited. We used the television surgical monitor as part of the anaesthesia monitoring during the procedure as laryngospasm could have been visible before desaturation occurred and rapidly treated. Blood gas analysis may be helpful in procedures with more than 1 hour.

Conclusions: The major advantage of this technique was diminish the requirement of Fi sevoflurane, possibility decreasing pollutant environment. Propofol perfusion can be used in case of laryngospasm to deepen anesthesia due to its rapid onset of action independent from alveolar ventilation.

References

- 1 *Pediatric Anesthesia* **20**: 434–438
- 2 *Pediatric Anesthesia* **17**: 942–947.

Paper No: 1277.0

Pierre Robin sequence urgent tracheotomy: case report

Ana moreto¹, Mercês Lobo², Luis Cobrado¹ and Bessa Teresa¹

¹ Hospital de S. João, EPE, Porto, Portugal, ² Instituto Português de Oncologia, Porto, Portugal

Introduction: Pierre Robin sequence is a rare disorder with a high degree of anesthetic risk. Difficult airway should always be anticipated. (1,2)

Objectives: Report how we successfully approached this situation and discuss the different pathways we could have followed.

Methods: A 14 day premature neonate female, ASA IVE with Pierre Robin sequence was scheduled for urgent tracheotomy. His medical history was significant for respiratory distress admitted in the intensive care unit (ICU) since birth. Intubation was attempted several times without success; by senior Paediatric Intensivist, senior anesthesiologist, with direct laryngoscopy; and by ENT specialist using a rigid endoscope. At day 14 of life clinical situation deteriorated. Orotracheal intubation was attempted but with no success, resulting in a cardio respiratory arrest. She was brought to our hospital to perform an urgent tracheotomy.

On physical examination heart rate 185 beats/minute; respiratory rate 50 cycles/minute; oxygen saturation 98% (oxygen delivery 3–4 liters/min by nasal cannula); evident sternal and costal retraction, nasal flaring; micrognathia; cleft palate and global hypotonia. Respiratory auscultation with dispersed wheezes. From the perioperative assessment a difficult airway was anticipated. Airway approach was discussed between anesthesiologists and otolaryngologists. Difficult airway equipment ready and Adrenalin, atropine and ketamine prepared. The hospital neonatal fiberoptic was not available. Direct laryngoscopy would be not attempted, the airway was to be secured with I-gel mask size 1.

The newborn was transported to the operating room maintaining spontaneous breathing in lateral decubitus. Transferred to the table, in prone position, desaturation and bradycardia occurred with new cardiorespiratory arrest. Life support was initiated, and 1 mg ketamine IV administered; ventilation with facial mask was extremely difficult. Reversion was achieved. A I-gel mask 1 was inserted, manual ventilation kept with oxygen and sevoflurane. Surgery started. During tracheotomy the newborn suffered a new arrest, chest compressions started along with 1 mg ketamine plus 0.01 mg adrenaline intravenous. Reversal was achieved.

Results: The child recovered, surgery was accomplished with success. She left the ICU within four days, returning to the origin hospital

Discussion: Few reports are available reporting Pierre Robin sequence in urgent surgery to achieve success in emergency situations is critical to anticipate the problems, define a clear strategy, organize the team, prepare in an accessible way all the drugs and equipment.

Conclusions: I-gel Laryngeal mask presents as a valuable option in this scenario. Ketamine regarded as a second line drug prove to be a valid choice in an emergency situation.

References

- 1 *Paediatr Anaesth.* 2009 Apr;**19** (4):409–10.
- 2 *Acta Anaesthesiol Scand.* 2008 Oct;**52** (9):1307–8.

Paper No: 1284.0

Pharmacokinetics of oromucosal midazolam hydrochloride in children

S. Albrecht¹ and H Schwilden²

¹ University of Erlangen-Nuremberg L Krajnovic University of Erlangen-Nuremberg C Schneider University of Erlangen-Nuremberg, ² University of Erlangen-Nuremberg J Schüttler University of Erlangen-Nuremberg

Introduction: Midazolam, a benzodiazepine with a rapid onset and short duration of action, is a well-established pre-medication agent.^{1,2} When administered oromucosally, midazolam is rapidly absorbed across the mucous membranes into the bloodstream.³ Midazolam is primarily metabolised by hepatic cytochrome P450-3A4 isoenzyme to its metabolite, 1 hydroxy midazolam.

Objectives: To determine the pharmacokinetic (PK) profile of a single dose of midazolam hydrochloride administered oromucosally to children and adolescents aged 3 months to < 18 years requiring pre-medication before routine elective surgery. Safety was a secondary objective.

Methods: Midazolam hydrochloride solution (5 mg/ml) was administered at a dose of ~0.2 mg/kg (up to a maximum 10 mg). The protocol was approved by the Institutional Review Board and consent obtained from both parents. The PK profile for midazolam and 1 hydroxy midazolam was determined by mathematical modelling of the concentrations

measured in blood samples drawn from a venous cannula. Samples were taken as soon as possible post-dose and up to five further blood samples were taken during the following time windows: 20-30, 30-40, 40-50, 50-60, 60-120, 120-240, 240-360 and 360-480 min. Safety was evaluated from vital signs and adverse events (AEs), including oromucosal irritation.

Results: Fifty-three patients were enrolled and fifty completed the study. A total of 263 venous blood samples were analysed. Midazolam hydrochloride was absorbed rapidly, achieving a mean maximum concentration (C_{max}) of 73.2 ng/ml approximately 24 min after dosing; there was no significant correlation between C_{max} and age or weight. The mean area under the curve (AUC) for midazolam was 130.5 ng/ml·h; weak positive correlations between AUC and age ($r^2 = 0.55$) and weight ($r^2 = 0.48$) were observed. The distribution and elimination half-lives (t_{1/2}) of midazolam were 26.7 and 203.7 min, respectively. The metabolite 1 hydroxy midazolam was rapidly formed, with a C_{max} of 20.7 ng/ml reached at approximately 50 min; the mean t_{1/2} for 1-hydroxy midazolam was 19.9 min. Similar pharmacokinetic values have been previously reported for oromucosal midazolam in healthy adults (C_{max} 55.9 ng/ml; T_{max} 30 min; t_{1/2} 143 min).⁴ Two nausea-related AEs were considered to be related to the study medication. No serious AEs were reported. There were no reports of oromucosal irritation throughout the study period.

Conclusions: Buccal midazolam is rapidly absorbed and eliminated, even when compared with other application forms and other benzodiazepines, including diazepam.⁵ Pharmacokinetic parameters indicate that oromucosal midazolam hydrochloride is suitable to use when a rapid onset and recovery are required.

References

- 1 Pieri L *Br J Clin Pharmacol* 1983; **16**(Suppl 1):175–275.
- 2 Karl HW, et al. *Anesthesiology* 1993; **78**(5):885–891.
- 3 Scott RC, et al. *Epilepsia* 1998; **39**(3):290–294.
- 4 Schwagmeier R, et al. *Br J Clin Pharmacol* 1998; **46**(3):203–206.
- 5 Cloyd JC, et al. *Epilepsia* 1998; **39**(5):520–526.

Paper No: 1285.0

A Neonate with Pierre Robin Sequence and Stickler Syndrome

Cecilia Peña and Kallol Chaudhuri

Anesthesiology, Texas Tech University Health Science Center

Introduction: Cleft lip and palate are the most common craniofacial anomalies, occurring in 1/800 births. Of the greater than 150 conditions associated with cleft palate, Pierre Robin is amongst the most well-known. Robin sequence (RS) is characterized by the triad micrognathia, glossoptosis, and upper airway obstruction. Affected neonates may also

present with cleft palate, feeding problems, and reduced hearing. It is uncommon, occurring in 1/30,000 births and does not appear to be hereditary. Greater than 50% of infants with RS have an associated syndrome, of which more than 40 have been described. Stickler syndrome (SS), an autosomal dominant connective tissue disorder that may affect 1/10,000, has been found in 11-18%. It is associated with facial, ocular, auditory, and articular abnormalities. There appears to be an increased incidence of cardiac defects. Case History Term twenty-one day old male with RS and SS was scheduled to undergo nissen fundoplication. The neonate was born to a healthy 26 year old G4P2A1 mother and required mechanical ventilation shortly after birth. He was extubated one day later and placed on nasal canula after an unsuccessful CPAP trial. TTE at 10 days demonstrated fenestrated atrial septum with 2 small ASDs and globally depressed LV function. Patient was documented as a difficult intubation when induced for the placement of a g-tube on day 11, likely owing to small size and retrusion of the submental area. Patient was transported from NICU with nasopharyngeal airway and O₂ saturation of 98% on room air. He demonstrated mild respiratory distress, with visible retractions of the intercostals and subcostals. Obvious micrognathia and low set ears were noted. A cleft palate and thick, short tongue were visualized (fig). Pulmonary crackles and a murmur were auscultated. Following pre-oxygenation, slow IV induction with lidocaine and propofol was performed to maintain spontaneous ventilation. Once the oropharynx was cleared of copious secretions, intubation proceeded using a fiberoptic laryngoscope and 3.0 ETT. Patient was given rocuronium and inhalational agent for maintenance of anesthesia. Neonate was extubated in the OR after full consciousness was regained and he was transported to the NICU with blow-by oxygen.

Conclusion: Airway management in a patient with cleft palate can be a challenge. When a child presents to an anesthesiologist with RS, this challenge is compounded by the multiple congenital oral anomalies. Anticipating a difficult intubation is imperative to preclude unforeseen morbidity.

References

- 1 Breugem CC, Mink van der Molen AB. What is Pierre Robin sequence? *Journal of Plastic, Reconstructive and Anesthetic Surgery* 2009; **62**: 1555–58.
- 2 Evans KN, Sie KC, Hopper RA, et al. Robin Sequence: From Diagnosis to Development of an Effective Management Plan. *Pediatrics* 2011; **127**: 936–48.
- 3 Gunawardana RH. Difficult laryngoscopy in cleft lip and palate surgery. *Br J Anaesth* 1996; **76**:757–9.
- 4 Hatch DJ. Airway Management in cleft lip and palate surgery. *Br J Anaesth* 1996; **76**: 755–6.
- 5 Lansford, Michelle. Focus on the Physical Assessment of the Infant with Stickler Syndrome. *Advances in Neonatal Care* 2008; **8**: 308–14.

Paper No: 1296.0

Efficacy and safety of the reversal with sugammadex in deep neuromuscular blockade induced by rocuronium in pediatrics

Daciano Gaona¹, Maria Dolores Carceles¹, Gloria Veiga², Mariela Tedesco¹ and Pablo Motta³

¹ Hospital Universitario Virgen De La Arrixaca ² Hospital Universitario Santa Maria Del Rosell ³ Texas Children's Hospital

Introduction: Muscle relaxants have a long duration with the possibility of residual muscle relaxing and ventilatory problems after surgery. Sugammadex (Bridion(R), is the only antagonist able to encapsulate and fully eliminate the muscle relaxant to avoid residual effects and respiratory complications. Sugammadex reverses neuromuscular blockade at all depth levels, dose-dependent. At present, there are not enough clinical trials using sugammadex in paediatric population.

Objectives: The aim of current study is to compare the efficacy and safety of reversal with sugammadex versus neostigmine, in paediatric patients with deep blockade (No TOF and < 2PTC responses) induced by rocuronium.

Methods: Multicenter clinical trial, safety-assessor blinded study, phase III, prospective, randomized, parallel group, compared with conventional treatment, in dosage indication "out of technical label". With financial support by means of a Spanish Health Ministry grant, after ethics committees approval, and parents signed informed consent obtained; 30 patients 2-11 years scheduled for short length surgery under general anaesthesia and muscular relaxation with rocuronium 0.6 mg/kg. were enrolled. Patients were randomized included in two groups of 15 patients each one. Group I: EXPERIMENTAL.- Reversal from deep blockade (PTC < 2-3) with sugammadex 4 mg/kg. Group II: CONTROL.- Reversal from deep blockade (PTC > 2-3) with the conventional reverse treatment, neostigmine 0.05 mg/kg and atropine 0.025 mg/kg. In all patients neuromuscular function was monitored by acceleromyography (TOF-Watch (R)). We define response to treatment, as the fast recovery of neuromuscular function (T₄/T₁ > 0.9). The ventilatory support and anesthetic technique was maintained until recovery of neuromuscular function, with subsequent extubation. Main outcome variable was time from beginning of administration of sugammadex or neostigmine to reach a T₄/T₁ > 0.9. Statistical analysis with SPSS 17, using t-Student for independent samples, significance was reported at p < 0.05.

Results: The groups were similar in terms of demographic (age, weight), surgical (length of surgery), and relaxing effects (rocuronium onset, maximum blockade, etc.) with no statistically significant difference. Group I achieved

complete reversal (Time at T4/T1 > 0.9: 1.11 ± 0.3 min.), Group II (9.66 ± 1.2 min.), p < 0.05. Time at extubation, sugammadex (2.07 ± 0.5)min, neostigmine (14.19 ± 2.7)min, p < 0.05. No adverse effects were reported in group I. In group II, 3 cases lasted > 20 minutes, 3 cases of bradycardia (HR decreased > 20%).

Discussion: At present, there are not trials using sugammadex at high doses in deep blockade, in paediatric population. In our study we achieved a T4/T1 > 0.9 in less time (71 vs 115 seconds) than Tufanogullari et al. with a dose of 4 mg/kg in adults.

Conclusions: Sugammadex 4 mg/kg reverses effective and safety deep neuromuscular blockade induced by rocuronium in paediatric patients over 2 years, undergoing elective surgery. This preliminary data shown sugammadex as fast and secure alternative to standard reversal by neostigmine.

References

1 Tufanogullari B, Klein K, White PF. Use of sugammadex to reverse rocuronium-induced neuromuscular blockade. *Anesthesiology* 2001; ASA Abstract AIII.

2 Plaud B, Meretoja O, Hofmockel R, et al. Reversal of rocuronium-induced neuromuscular blockade with sugammadex in paediatric and adult surgical patients. *Anesthesiology* 2009; 110:289–94.

Paper No: 1307.0

Behaviour of nindex index during anesthesia on pediatric patients

Dres C. Lauder, A. M. Rodriguez, A. Sanchez, M. Olivera and M. Cerisola

Karadjian A. UDA Hospital Pereira Rossell. Universidad De La República. Montevideo-Uruguay.

Introduction: The NINDEX index is a way to measure the anesthetic depth based on the EEF, commercially available since 2008 [1]. The NINDEX algorithm develops from a development database composed by EEG registries classified according to the Kugler anesthetic depth scale. It evolves within a cyclic adjustment process, which results in consecu-

tive NINDEX versions developed over groups of data which are being more complete every day. The first and second versions of the NINDEX algorithm were developed based on adult patient registries. For the development of the 3.0 version, the development database was expanded by adding pediatric patient registries.

Objective: Evaluate the anesthetic depth and the NINDEX version 3.0 index behavior in pediatric population submitted to a deTIVA protocol. Methods A prospective observational study is done without specific therapeutic intervention in 32 pediatric patients from an average age of 7 ± 3 years old submitted to othorhinolaryngologic and general surgery with TIVA based on propofol and remifentanyl. The anesthetic induction is done with a propofol BOLO, followed by three stages of propofol infusion (according to the length of the surgery) in average 11, 8 and 6 mg/kg/h doses. The first two stages of infusion last between 10 and 11 minutes, and the third lasts until the end of the surgery. Reminfentanyl is used at 0,5 mg/kg/h during the entire procedure. The NINDEX-Notebook monitor is used with 3.0.14 software version and with ECG electrodes of SWAROMED trade name positioned according to developer's instructions. Data Processing A NINDEX chart of values is built during the following moments of every control:

- Before induction (PREIND)
- After induction (POSIND)
- At first infusion change (DOSIS2)
- At second infusion change (DOSIS3)
- At the end of the infusion(CIERRE)
- After awakening (DESPERTAR)

Results: Table number 1 shows the average and standard NINDEX detours at every considered instant and figure 1 shows the corresponding graphic showing in grey the NINDEX range recommended for pediatric patients.

Conclusions: The NINDEX index ended up being reliable and safe, allowing precocious detection of anesthetic awakening. Simple to use and requires no expensive supplies. References.

References

1 "Descripción de tecnología, monitor NINDEX", Controles S.A y Dr. D. Cibils, 29 de abril de 2009.

2 "NINDEX-Notebook, Manual de Usuario", Controles S.A y Dr. D. Cibils, 28 de abril de 2011.

Table 1

PREIND	PREIND	POSIND	DOSIS2	DOSIS3	CLOSURE AWAKENING NINDEX
98	1	36	10	61	9
66	9	72	7	90	4
Number of samples					
21	30	25	17	17	32