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39 / Could audiovisual aid prior to induction of a child decrease the state anxiety of the accompanying Dutch-speaking parent?

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State anxiety of the accompanying parents is a major factor in how anxious children will be at induction of anaesthesia (1). The present study was designed to test whether audiovisual aid prior to induction decreases state anxiety of Dutch-speaking parents.

Materials and Methods After approval by the local Ethics Committee, 120 parents entered the randomised, controlled and blinded study, with the following inclusion criteria: children's age > 6 months, good Dutch comprehension, day care surgery, ASA I & II. After providing general information to parents, we measured the trait and state anxiety of the accompanying parent, using Spielberger's State-Trait Anxiety Inventory (STAI) [T1]. According to the randomization, the intervention group was exposed to a short film (3 min.) just prior to induction in the holding area. This audiovisual aid depicts the journey of a little boy and his friend Mr. Dragon to 'Greenland', a metaphor for our operating theatre. Disregarding the fact the film was viewed, every parent was exposed to a second measurement of the state anxiety by using the STAI [T2]. Hereafter, the accompanying parent entered the operating theatre and was present at induction of his/her child. When the parent had left the theatre, a third measurement of state anxiety was performed by using STAI [T3]. Both the parent and the attending anaesthesiologist were requested to evaluate the child's anxiety at induction by using a Visual Analogue Scale (VAS_{parent} and VAS_{anaesthesiologist}). The attending anaesthesiologist also had to fill in the Induction Compliance Checklist (ICC)(2).

Results and discussion Clinical and demographic data were comparable in both groups. At T2 and T3 anxiety of the parents (STAI) differed significantly (Mann-Whitney test at T2: $p=0.0077$ & T3: $p=0.024$) as shown in figure 1. There was no difference between the child's anxiety VAS scores of the parents in the viewing and non-viewing groups. Although there was a firm correlation between the ICC and the VAS_{anaesthesiologist} ($r = 0.8477$; $p < 0.0001$), only a weak correlation between the ICC and the VAS_{parent} ($r = 0.4942$; $p < 0.0001$) could be demonstrated. These correlation coefficients differed significantly ($Z = 5.4023$; $p < 0.0001$).

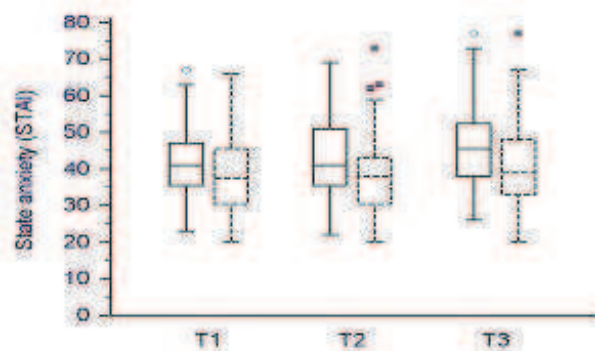




Figure 1. Box-and-whisker plots of state anxiety scores represent interquartile ranges and outliers at T1, T2 and T3 indicating significant differences (* $p < 0.05$) at T2 and T3 between control (full line) and intervention group (dashed line).

Conclusion Audiovisual aid significantly decreases state anxiety in accompanying parents. Assessment of the child's anxiety is clearly more appropriate when done by professionals than by parents.

References 1. Watson AT, Visram A. Paediatric Anaesth. 2003; 13(3):188-204. 2. Kain ZN, Mayes LC, Wang SM et al. Anesthesiology. 1998; 89(5):1147-56.



40/ Audit of Postoperative Vomiting (POV) in Children at the Royal Belfast Hospital for Sick Children (RBHSC)

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Introduction Postoperative vomiting is a major cause of morbidity in children. The Association of Paediatric Anaesthetists of Great Britain and Ireland (APAGBI) set up a POV Guidelines group in 2008 that issued their final recommendations in Spring 2009. We audited anaesthetic management of POV in RBHSC from Sept to October 2008 in accordance with these guidelines;

1. To inform the RBHSC Anaesthetic Department of the introduction of these guidelines.
2. To discover if current practice for management of POV was best practice according to the APAGBI POV guidelines.
3. To provide feedback of the results of this audit to the staff in the RBHSC in order to reduce the incidence of POV in children in the future.

These are the methods, results, discussion and conclusions of our findings.

Methods 232 children out of 733 children presenting for surgery between September 2008 and October 2008 were audited for POV. The data was then entered into an excel worksheet for simple statistical analysis and reporting. The anaesthetic data was compared to the recommendations of the APAGBI Guidelines for POV in Children

Results 27 patients experienced POV.; 19 patients were day procedure patients. More male patients than female patients experienced POV. (21 vs 6). Out of the 27 patients who experienced POV only 2 were high risk as defined by the POV guidelines. They received prophylactic ondansetron & dexamethasone as single agents but not in combination therapy. Both high risk patients received opiates, 1 of the 2 received a regional (ilioinguinal) block. None of these children received TIVA maintenance. In total 44 patients out of 232 surveyed received regional or local anaesthesia.

- 231 patients were maintained on nitrous oxide.
- 8 patients were paralysed appropriately during their anaesthesia.
- 14 female patients were aged 11 years or older, 2 suffered POV, one was given prophylactic dexamethasone and the other received no prophylactic antiemetics.

Discussion In comparison to the Audit Standard 100% compliance was not attained however the majority of recommendations of the APAGBI guidelines on the Prevention of POV in children were adhered to.

Conclusions

- Greater awareness of the existence of the APAGBI POV guidelines should be made to the consultant, trainee anaesthetists, nursing and recovery staff in the RBHSC.



- There are a number of the APAGBI POV recommendations that need highlighting in order to reduce the incidence of POV to <10%, the current rate of POV in RBHSC.
- Dimenhydrinate was recommended by the APAGBI but it is not licensed in the United Kingdom. Authorities should make representation to the Medicines and Healthcare Regulatory Authority (MHRA) to licence this product.

References

APAGBI Guidelines on the Prevention of POV in Children 2009



59/ PREOPERATIVE CONDITIONS AS PREDICTORS OF ICU TRANSFER AFTER INTERVENTIONAL CARDIOLOGY IN CHILDREN WITH CONGENITAL HEART DISEASE

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Introduction: The aim of this study is to investigate possible correlation between the event of ICU transfer of paediatric patients after interventional cardiology and three preoperative conditions of those patients: age, congenital heart disease and catheterisation procedure.

Methods: Retrospective study of all cardiac interventional catheterisations performed in the Children's Hospital Doce de Octubre (Madrid) from June 2008 to December 2009. A total of 263 patients were treated, being neonates 27 of them, who were removed from the study because they must be always transferred to ICU. Moreover, 6 patients went to the operating room due to emergencies appeared during the catheterisation (2 of them were neonates). The rest of patients (232), have been classified following three different preoperative conditions. Depending on the severity of their congenital heart disease in: group A (ASD, VSD and PDA), with 97 patients (41.8%); and group B (HLHS, TGA, Fallot, pulmonary atresia, aortic stenosis, atrioventricular canal defects,...), with 135 patients (52.8%). Depending on the type of catheterisation in: diagnosis, with 78 patients (33.6%); or interventional (balloon angioplasty, closure of arterial ducts and atrial and ventricular septal defects, coil embolisations, stents,...), with 154 patients (66.4%). With the third criteria, the age, in: children younger than 2 years, with 70 patients (30.2%); and children with 2 years or older, 162 patients (69.8%). Analysing the three criteria separately, it has been investigated if the incidence of ICU transfer in these groups is significantly different from the incidence on the total sample. The Pearson's Chi-square Test has been used for evaluating the statistical significance.

Results: From the sample of 232 patients, 55 were transferred to the ICU (23.7%). According to the congenital heart disease, 45 patients from group B were transferred to ICU after the catheterisation (33.3%). According to the catheterisation procedure, 38 patients that had interventional catheterisation were transferred to the ICU (24.7%). Finally, regarding the age, 31 children below 2 years went to ICU after the intervention (44.3%). Comparative results can be seen in figure 1.

Conclusions: The most significant preoperative criterion as predictor of the ICU transfer after a catheterisation procedure appears to be the age ($p < 0.0001$). The congenital heart disease also implies a significant variation in the incidence of ICU transfer ($p < 0.0034$). But the results seem to indicate that the catheterisation procedure does not have an impact in the probability of going to the ICU ($p < 0.78$). Therefore, children below 2 years old have to be considered as most probable candidates to need intensive care after an interventional cardiology procedure, without discarding other preoperative conditions.



77 / The effect of various depths of isoflurane anaesthesia on plasma cyclic GMP concentrations and BIS in children.

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Introduction: The glutamate-nitric oxide-cyclic GMP pathway is potentially a major target for general anaesthetic agents. Volatile anaesthetic agents have been shown to reduce cerebral cyclic GMP concentration in animal studies. It has also previously been demonstrated that plasma propofol and cyclic GMP concentrations are inversely correlated in children. (1) This study hypothesized that plasma cyclic GMP concentration and bispectral index (BIS) are also inversely correlated to end-tidal isoflurane concentrations in children.

Methods: With local ethics committee approval and written parental consent a total of seven healthy children aged 1-5 years requiring general anaesthesia for lower body surgical procedures were enrolled. Following inhalation or intravenous induction, tracheal intubation patients were ventilated with air/oxygen ($FiO_2=0.3$) and the respiratory rate adjusted to yield an endtidal CO_2 concentration of 35 mmHg. Caudal epidural analgesia was performed with 0.25% plain bupivacaine 1.0 ml/kg. Anaesthesia was maintained by using a mixture of isoflurane/air mixture to achieve and maintain end-tidal isoflurane concentrations of 2.5%, 2.0% and 1.5% for 15 minutes each, respectively. Samples for plasma cyclic GMP concentrations were collected in an EDTA tube at the end of each 15 min period, stored on ice and spun at 2000 g at 4°C within 30 min to separate plasma and stored at -80°C until analysis. Cyclic GMP was measured using an enzyme immunoassay system (Biotrak, Amersham, UK). A BIS electrode was applied and the BIS values were recorded at the time of blood sampling. Normovolemia, normotension and normothermia were maintained. Data were analyzed using Friedman analysis of variance and Wilcoxon signed ranks test as appropriate. $P<0.05$ was accepted as significant.

Results: Seven patients with an average age and weight of 19.0 (± 8.8) months and 11.8(± 3.1) kg, respectively were studied. The average BIS values ($\pm SD$) were 11.5 (± 8), 41.8 (± 11.5) and 43.2(± 10) at 2.5%, 2.0% and 1.5% end-tidal isoflurane concentrations. Blood samples were obtained for all patients and plasma cyclic GMP concentrations were 0.1 (0.01) nmol/L with no differences noted between end-tidal isoflurane concentrations.

Discussion: This study did not find an inverse proportional relationship between different depth of isoflurane anesthesia and plasma cyclic GMP concentrations in children. This is in contrast to results obtained for propofol in an identical patient population and may indicate an alternative regulation of plasma cyclic GMP concentration during isoflurane anaesthesia.

References:

1. Anesth Analg 2007; 105:616



78 / A randomized controlled trial to reduce postoperative pain in children undergoing tonsillectomy using around-the-clock analgesic administration by written versus verbal discharge instructions to parents.

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Introduction: Parents are expected to alleviate their children's pain at home after day surgery. But there is likely a considerable variability in the type and amount of information disclosed to parents for postoperative pain control. Lack of this however may probably result in poor pain control and increased morbidity. The aim of the present study was to determine the effectiveness of around-the-clock (ATC) analgesic administration by written versus verbal discharge instructions to parents in reducing postoperative pain in children undergoing outpatient tonsillectomy.

Material and Methods: Children aged between 2 and 7 years, undergoing tonsillectomy were enrolled in this prospective randomized controlled study. Children already taking regular analgesia and those who experienced postoperative bleeding were excluded. Perioperative anesthesia care and analgesic treatment were standardized. All subjects were randomly assigned into two groups; in group V (n= 114) the parents received verbal whereas in group W (n= 119) they received written discharge instructions to control their child's pain. Both groups received the instructions at outpatient clinic as well as after completion of surgery. Postoperative analgesic treatment included paracetamol, ibuprofen and tramadol and was provided to all cases before discharge. Pain was evaluated using a validated pain scale and recorded every 15 min during the 1st hour en then every 60 min postoperatively until being discharged. Parents completed a medication log, and recorded the severity of pain intensity using Parents' Postoperative Pain Measure scales (PPPM) including 15 items for the consecutive 3 postoperative days. Based on PPPM scores, the children were identified as those with minor (0-7) and major (7-15) behavioral changes.

Results: During the in-patient period, there was no significant difference in analgesic administration or pain intensity scores between the 2 ATC groups at the various time points measured. At home, children in the group W received more analgesics than those in the group V (p< 0.001) and they had also lower pain scores compared to children in the group V from day 1 to day 3 postoperatively (table).

Time of assessment Postoperatively	Group W (n= 119)	Group V (n= 114)	p value	Odds ratio [95% CI]
Day 0	3.1 ± 0.8	3.2 ± 0.5	0.6	1
Day 1	3.8 ± 1.5	6.9 ± 1.0	0.001	1.8 [1.2- 2.3]
Day 2	3.2 ± 0.9	5.8 ± 1.6	0.009	1.5 [1.4-1.7]
Day 3	2.2 ± 0.4	4.5 ± 2.5	0.01	1.3 [1.1- 1.6]

Table. PPPM scores (mean ± SD) for the study groups

Conclusion: ATC scheduled dosing of analgesics is more effective in reducing postoperative pain following tonsillectomy in children when administered using written compared to verbal discharge instructions to parents.



24 / Pediatric I-GEL laryngeal mask. Clinical and radiological evaluation

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The I-GEL LMA (IG-LMA) is a new supraglottic device with a non inflatable cuff. The fitting of the cuff is achieved by mirroring pharyngeal structures, so it's critical to know how deep we must introduce the cuff to properly face the pharynx. The aim of this study was to evaluate the clinical performance of this new device in pediatric patients and to find the proper introduction depth of the pediatric IG-LMA looking for some predictive values.

Materials and Methods: After approval of the Ethic Committee, 60 patients ASA I-II were enrolled in this prospective, non-randomized, double blind, clinical study. Patient's age ranged from 6 to 87 ($35,42 \pm 21,33$) months and weights from 6 to 25 kg ($13,56 \pm 4,76$), and they were scheduled for MRI scan for other clinical reasons. After an inhalational induction, an IG-LMA was inserted according to manufacturer's recommendations. Clinical parameters (leak pressure, introduction attempts, and gastric drainage tube introduction) were recorded. Using the MRI image, we evaluate the flexion of the head, and the angle between the cuff and the cervical spine. We also measured the distance from the base of epiglottis to the teeth-line following the contour of the IG-LMA (distance 1) as introduction depth value, and the distance from the thyroid cartilage to the chin (distance 2) as a predictive value.

Results: Clinical data obtained from our study were similar to other supraglottic devices used in pediatrics. Leak pressure was evaluated as good ($25,71 \pm 3,37$ cm H₂O), with a first introduction success rate of 97% (100% at second attempt). Two patients presented difficulties with the drainage tube introduction due to poor lubrication. It is well known that flexion of the head modifies clinical parameters. The angle between the cuff and the cervical spine seemed to be less sharp than in other devices. Large sizes present more sharp angles than small ones. MRI imaging also provided us with two important measurements, distance 1 and 2. Distance 1 represents the proper introduction depth for the cuff to face the pharynx and to avoid dislodgement of the device, even in the face of no clinical symptoms. Distance 2 was measured as a predictive value ($p < 0,001$) for introduction depth, finding a better statistical correlation value ($r=0,84$) than age ($r=0,79$) or weight ($r=0,71$). Proper introduction depth was found to be 1,31 times Distance 2 ($p < 0,001$), with best statistical significance than age ($p=0,016$). Weight failed as a predictive value for introduction depth.

Conclusion: IG-LMA offers a good performance profile for everyday anesthesia in pediatric patients. Proper introduction depth of iG-LMA is critical for optimal performance. Our study show that the simple measure of the distance from thyroid cartilage to chin can offer a very good predictive value for proper introduction depth, better than age or weight.



Session Friday 9:00-10:30

Quality and Audit



72/ Training in Paediatric Anaesthesia. A Ten-Year Review of Logbooks

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Introduction. Our school of anaesthesia provides the opportunity for trainees to achieve their intermediate and higher training in paediatric anaesthesia at a large tertiary referral centre. The three-month module is dedicated to paediatrics. The Royal College of Anaesthetists (RCOA) recommend that by the time of CCT, the anaesthetic trainee should be competent in the perioperative management of children over three years old for elective and emergency surgery and paediatric resuscitation(1). The New Deal, the European Working Time Directive (EWTD) and Modernising Medical Careers have led to extensive changes in working hours and the structure of anaesthetic training. We therefore wished to evaluate the impact of these changes on training on paediatric anaesthesia in our institution over the past decade.

Methods. All trainees in our institution have annual training reviews and are required to provide documentation of their anaesthetic caseload. We conducted a retrospective review of trainee's paper logbooks spanning 1997-2010. We recorded the total number of paediatric and neonatal cases completed during their training module in our tertiary referral centre. We also conducted an e-mail survey of trainees, who undertook their module, following the implementation of the EWTD 48 hour week and evaluated their paediatric anaesthetic experience.

Results. We have reviewed 104/220 logbooks. The remainder were incomplete or unavailable. There was a decline in the total number of paediatric cases over the decade (Table 1). The majority of trainees completed their intermediate training in their third year. There was seasonal variation in the total numbers undertaken, with fewer cases achieved during the winter months. Neonatal case exposure appears to have remained the same. We surveyed all anaesthetic trainees who had completed their paediatric module after August 2009. We had a 45% response rate. The average number of paediatric cases undertaken was 153. Forty percent of trainees had attended less than 5 resuscitation calls. 30 % of had performed 6-10 intubations of the under one year old.

Conclusions. Over the past decade, there has been almost a 25% decrease in the total number of paediatric cases undertaken by anaesthetic trainees in our institution since 2000. This is in keeping with other studies (2). With changes in the working time, exposure to cases has substantially decreased. Initiatives to improve trainees' experience have included the opportunity to spend time in our institution's paediatric critical care unit, out of program training in other centers in the UK or abroad and the use of simulation training.

References

1 The CCT in anaesthesia 3, intermediate level Competency based a manual for trainees and trainers. Edition 1. January 2007

2 Fernandez E, Williams G Training and the European Working Time Directive. A 7 year review of paediatric anaesthetic trainee caseload data. 2009 BJA 103(40): 566-9



68/ PREVALENCE, CO-MORBIDITIES AND ECONOMICAL ASPECTS OF OVERWEIGHT AND OBESITY IN CHILDREN UNDERGOING GENERAL ANAESTHESIA

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Introduction: The incidence of overweight and obesity in children is increasing in alarming rates. Up to now there are less data disposable, based on retrospective studies (i.e. 1, 2) and one prospective study (3) held in the US. The intention of the present study was to analyse the rate of overweight and obesity in children presenting for general anaesthesia in a university hospital in Germany and to determine coherences with co-morbidities, time of anaesthesia and length of stay at the hospital.

Methods: A prospective observational study was conducted from December 2008 to August 2009 including 580 children aged 2-18 years, ASA I-III, presenting for elective paediatric or ENT surgery and after permission of the local ethic committee and written informed consent of the parents. Items documented in questionnaires included: co-morbidities, total anaesthesia time, time of induction, of emergence of anaesthesia, in anaesthetic recovery room; length of stay (in-patient=LOS-I) (in days), length of stay (out-patient=LOS-O) (in minutes). Using BMI-percentile (P) children were divided into three groups: normal weight (P<90), overweight (P >90< 97), obese (P>97) (German limit values (4)). Statistics: *Pearson's chi-square-test*, *Kruskal-Wallis-Test*, data are presented as mean±SEM, or percent of weight group, significance p<0.05.

Results: Data of 504 children were available for analyses, aged 7.9±4.5 years. Overall 7.9% were overweight and 6.9% were obese. Obese children were significantly (p = 0.008) more often chosen for in-patient treatment (77.1%) than normal weight (51.7%) or overweight children (62.5%). 71.4% of the obese children suffered from at least one co-morbidity (p<0.05) and 51.4% of them suffered from pulmonary or airway related diseases (p<0.05). Time of anaesthesia was longer in obese children (119 ± 63min) compared to normal (83 ± 59min) and overweight (88 ± 49min) children (p = 0.000), however time of induction and emergence were not different in the three groups. No significant difference in the length of stay, whether for in-patient or out-patient children, was found.

Conclusion: Compared to studies from the US (3) we observed a lower prevalence of overweight and obesity according to the lower prevalence in Germany. The prevalence of overweight and obesity is higher in in-patient children, which may be caused by the increasing knowledge about perioperative complication in this patients and lead to the decision for in-patient treatment. The longer total time of anaesthesia in obese children reflected the longer surgical procedures since time of induction and emergence were not different. The in-patient treatment and the longer surgical procedures make the perioperative care potentially more expensive in obese children.

References: 1) Nafiu OO et al. *Paediatr Anaesth.* 2007;17:426-30. 2) Nafiu OO et al. *Int J Pediatr Otorhinolaryngol.* 2009;73:89-95. 3) Tait AR et al. *Anesthesiology.* 2008;108:375-80. 4) Kromeyer-Hauschild K et al. *Monatsschrift Kinderheilkunde* 2001;149:807-18.



29/Perioperative respiratory events in under- and overweight children undergoing general anesthesia

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Introduction: It is known, that already in children obesity is an increasing health issue and may be a risk factor for perioperative complications regarding airway-management. Until now, data are available from few retrospective (i.e.1,2,3) and one prospective study (4) from the USA. The aim of this study was to analyse the rate of overweight in children presenting for general anesthesia in an German university hospital and the incidence of perioperative respiratory adverse events relating to their body weight.

Methods: After permission of the local ethic committee and written informed consent of the parents, we did a prospective observational study from December 2008 until August 2009. 580 children, ASA I-III, 2-18 years scheduled for elective paediatric and ENT surgery were included. Following items were enquired on questionnaires: Mallampati-Score, difficult mask-ventilation attended with use of airway facility, Cormack-Lehane-Score (C/L), difficult laryngoscopy, number of intubation-trials, desaturation>10% of starting value, occurrence of cough and airway obstruction. Based on their BMI-percentile (P) the children were assigned to three groups (German limit values (5)): underweight ($P \leq 10$), normal weight ($10 < P < 90$), overweight including obese ($P \geq 90$). Statistics: Fisher's exact test; data are presented as mean±SEM, or percent of weight group.

Results: Data of 504 children were available for analyses, aged 7.9 ± 4.5 years. Mallampati-Score>II and postoperative coughing were most frequent in overweight children ($p < 0.05$). We did not record any difference in airway obstruction, desaturation and difficult mask-ventilation. It is noticeable that difficult laryngoscopy, C/LIII and intubation trials>1 were most often in underweight children without statistical significance. (see table)

	underweight n=73	normal weight n=356	overweight n=76	p- value
Mallampati				0.022
I	51.7%	57.7%	34.8%	
II	35%	31.3%	44.9%	
III	13.3%	9.8%	17.4%	
IV		1.3%	2.9%	
difficult mask-ventilation + airway facilities	14.3%	13.2%	19.2%	0.395
Cormack-Lehane				0.24
I	77.3%	79.2%	72.7%	
II	15.9%	18.2%	27.3%	
III	6.8%	2.6%	0%	
difficult laryngoscopy	9,5%	1%	2.3%	0.09
intubation trials>1	12.2%	8.6%	4.7%	0.09
cough	8.9%	6.2%	14.9%	0.023
airway-obstruction	4.2%	2.3%	4.1%	0.426
desaturation>10%	10.1%	5.6%	9.5%	0.21



Conclusion: Our data show low incidences of respiratory adverse events in overweight/obese children compared to normal weight, which is in contrast to other studies (2,3,4). This can be explained by: 1. skilled anaesthesiologists performing pediatric anesthesia in our institution; 2. increasing knowledge about obese children makes the anesthetists more vigilant for potential adverse events and reduces complications by anticipation; 3. less obese children than in the US; 4. observational bias. Additionally attention should be also given to underweight patients who need particular care and should not underestimate.

Reference: 1)Setzer N, Saade E. Paediatr Anaesth. 2007;17:321-6. 2)Nafiu OO et al. Paediatr Anaesth. 2007;17:426-30. 3)Nafiu OO et al. Int J Pediatr Otorhinolaryngol. 2009;73:89-95. 4)Tait AR et al. Anesthesiology. 2008;108:375-80. 5)Kromeyer-Hauschild K et al. Monatsschrift Kinderheilkunde 2001;149:807-18.



44/ Preoperative anxiety in elective paediatric day case surgery

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Background. Anxiety in children prior to surgery has been associated with post-operative maladaptive behaviours[i]. Effective methods of anxiolysis include psychological preparation for theatre, parental presence at induction and pharmacological modalities[ii].

Aim This audit assessed the current use of anxiolytic methods used in our centre, and the incidence of preoperative anxiety using the modified Yale Paediatric Anxiety Scale (mYPAS)[iii].

Methods Children between the ages of 2 and 12 years attending for elective day surgery over one month were included. Admitting nurses recorded non-pharmacological anxiolytic interventions and mYPAS. The anaesthetist recorded sedative premedication and mYPAS at induction of anaesthesia. A high anxiety state was defined as an mYPAS score of > 30ⁱⁱⁱ.

Results Complete data sets were collected for 71 children. Anxiolytic methods included visit by a play specialist (51), parental presence at induction (70) and sedative premedication (16).

Thirty two children (45%) had mYPAS >30 on admission and 42 (59%) had mYPAS > 30 at induction.

10/32 children with mYPAS >30 on admission received a sedative premedication, 8 remained anxious prior to induction.

Discussion Anxiety at induction of anaesthesia in 59% of children is higher than observed in other centres[iv]. A number of interventions may need to be targeted at this hospital, including efficient use of pre-admission screening and preparation, and maximal use of play specialists. Prescription of sedative premedication must be individually tailored and optimally timed prior to induction of anaesthesia.

References

- 1. [i] Anesth Analg 1999;88:1042-7
- 2. [ii] Anesth Analg 2001;93:98-105
- 3. [iii] Anesth Analg 1997;85:783-8
- 4. [iv] Paediatric Anaesthesia 2006; 16: 919-927



41/ Audit of Pre-operative fasting times at the Royal Belfast Hospital for Sick Children

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Introduction. Fasting times are required prior to general and regional anaesthesia in order to minimise the risk of aspiration of gastric contents during the perioperative period. However, in children prolonged fasting times can lead to dangerous fluctuations in blood glucose with resulting perioperative morbidity leading to delayed discharge. Recent fasting guidelines have adopted a more liberal fasting regime as opposed to the standard "nil by mouth from midnight" policy. A recent Cochrane review concluded - There was no evidence to suggest a shortened fluid fast results in an increased risk of aspiration, regurgitation or related morbidity compared with the standard 'nil by mouth from midnight' fasting policy. Permitting patients to drink water preoperatively resulted in significantly lower gastric volumes. Clinicians should be encouraged to appraise this evidence for themselves and when necessary adjust any remaining standard fasting policies (nil-by-mouth from midnight) for patients that are not considered 'at-risk' during anaesthesia. The aim of this audit was to determine if the shortened fasting times using the 2-4-6 hour rule were adhered to.

Standard of Best Practice

- Consumption of clear fluids up to 2 hours prior to surgery
- Consumption of breast milk up to 4 hours prior to surgery
- Consumption of cow's milk, formula milk and solid food up to 6 hours prior to surgery

Results-Fasting times

The Mean, Median and mode fasting time for solids and fluids were 12h56, 12h00, 6h35 and 7h34, 05h13, 4h00 respectively. Only three infants received breast milk at 5h00, 6h25 and 14h50 prior to their surgery. The last infant was on intravenous fluids awaiting a laparotomy

Discussion The fasting times for all categories of food were within the recommended guidelines issued by our institution. However the audit has demonstrated that since the majority of surgical cases were ambulatory cases, parents are fasting their children longer than is necessary in the perioperative period.

Conclusion. Better information surrounding perioperative fasting times should be made available to parents in order to minimise the fasting period and hence distress to children in the pre-operative period



54/ DEEP SEDATION FOR INTERVENTIONAL CARDIAC CATHETERIZATION IN SPONTANEOUSLY BREATHING CHILDREN

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Introduction: Deep sedation is frequently used for diagnostic cardiac catheterization, but this technique seems not to be in regular use for interventional procedures. The aim of this retrospective study was to evaluate the safety and efficacy of our schedule of deep sedation in the spontaneously breathing patient for interventional cardiac catheterization in children.

Method: Patients aged 6 months -18 years scheduled for interventional cardiac catheterization using the groin as puncture site were included. Excluded were patients with unstable circulation and severe cyanosis. All patients were fastened for 4-6 hours, allowing clear fluids up to two hours before procedure. Standard oral or rectal premedication with midazolam was performed. For induction of sedation midazolam (0,1-0,2mg/kg), piritramid (0,1mg/kg) and propofol (2-3mg/kg) were administered to obtain a Ramsey Score of 6. Deep sedation was maintained with continuous propofol infusion 4-6mg/kg/h and an additional bolus of Propofol (1mg/kg) was allowed if necessary. All patients were breathing spontaneously with an oropharyngeal airway or a TEE probe in place. Heart rate, non invasive arterial blood pressure, pulse oxymetry (SaO₂) and end tidal CO₂ using a special nasal probe were monitored throughout the procedure. Success rate, adverse events and additional drug administrations were recorded.

Results: Forty-five patients with interventional procedures were included (details see table 1)

Table 1.

n = 45	Type of interventional procedure
12	Closure of patent ductus arteriosus (coil or plug)
13	Closure of atrial septal defects
7	Stent implantations
9	Dilatation of pulmonary stenosis or coarctation of the aorta
2	Coil embolization of aortopulmonary collaterals
2	Removal of dislocated venous catheters

The median age was 5,45years (range: 1-18years), the median weight was 18kg (range: 8-64kg) and the median duration of sedation was 125min (range: 70-250min). All interventional procedures were completed successfully and an additional TEE was performed in 15 patients (33,3%). Eleven children (24,4%) needed a propofol bolus and adjustment of the propofol infusion due to movements. Ten patients (22,2%) received an additional analgesic drug. In 40 children (88,9%) there were no clinically relevant changes of hemodynamic and respiratory parameters compared with baseline levels. In one child SaO₂ declined rapidly to a level of 10% below baseline and 2 more patients needed short time oxygen supplementation due to a drop of SaO₂ of more than 5% of baseline levels. Another one showed an increased heart rate for more than 20% of preinduction levels and one patient presented with a short period of arrhythmias. There were no further adverse events or complications recorded.



Discussion: According to our findings deep sedation with midazolam, propofol and piritramid is a safe and efficient approach for interventional cardiac catheterization in spontaneously breathing children with congenital heart disease.

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61/Factors influencing blood loss and allogeneic blood transfusion in craniosynostosis surgery: a retrospective study.

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Objective: Craniosynostotic corrections are associated with large amounts of blood loss and high transfusion rates. We investigated factors influencing perioperative blood loss and transfusion practice in craniosynostotic corrections, in order to improve current blood management policy.

Methods: All consecutive craniosynostotic corrections (open technique) from January 2003 to October 2009 in infants in a university children's hospital were retrospectively reviewed. The primary endpoint was the receipt of an allogeneic blood transfusion during or after surgery. Data were acquired from routine pre-, intra- and postoperative electronic patients' charts. There was no strict blood transfusion protocol during the study period.

Results: 44 patients were operated using open surgical techniques. The mean estimated blood loss during surgery was 55 mL/kg. In 42 out of 44 patients Packed Cells were administered during or after the operation with a mean amount of 38 mL/kg. The median amount of different donors was 2. There was a significant decrease in blood loss ($r=0.34$, $p=0.001$) and allogeneic blood transfusions ($r=0.24$, $p=0.001$) in time. Longer duration of surgery ($r=0.66$, $p<0,001$) and lower weight ($r=0.12$ $p=0.019$) were correlated with significantly more blood transfused. More blood loss was correlated with a longer duration of admission ($r=0.44$ $p<0.001$).

Conclusions: The craniosynostotic corrections are associated with large amounts of blood loss. The amount of blood transfusions is high but has decreased significantly in the last six years in our hospital; probably due to improved surgical and anaesthetic techniques. However, there is still room for improvement of the current perioperative management.



42/Arterial catheterization in neonates and infants with weight 10kg or less for cardiac surgery- Schneider arterial lines Registry.

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Background: Young age and cardiac surgery (CS) are risk factors for complications, associated with arterial catheterization (AC). Since 2000, all data concerning AC in CS patients have been prospectively recorded. The aim of the study was to examine the prevalence and complications associated with AC in CS patients with bodyweight ≤ 10 kg.

Methods: Retrospective analysis of the files of the patients from 2000 to 2010. Patients were divided into 3 groups according to bodyweight: group 1 (< 3.0 kg), group 2 (3.0-4.9 kg) and group 3 (5.0-10 kg). Findings are presented as means (SD).

Results: The study included 963 patients: 136 in group 1, 474 in group 2 and 353 in group 3. The majority of patients had AC on the right side (47.9% in the upper part of the body). Radial artery insertion was more successful with increasing body weight. Brachial or axillar AC was used in 262 patients and was more common in groups 1 and 2 compared to group 3 (18.4% and 22.4% vs 12.4%; 18.4% and 11.1% vs. 2.6% respectively) Femoral AC was more frequent in patients < 5 kg (36.0% and 32.7% vs. 19.3%). The duration of AC in group 3 (3.86 ± 3.33) was significantly shorter than in group 1 (7.08 ± 5.92). Complications occurred in 53 (5.5%) patients: 1 thrombosis with successful thrombectomy, 13 transient vasospasms, 29 malfunctions and 10 displacements.

Conclusions: AC in patients with body weight ≤ 10 kg is a safe procedure. Cannulation of brachial or axillar arteries seems to be a safe alternative even in very small patients undergoing CS.



73/ Neonatal Postoperative Nurse Controlled Analgesia (NCA) regime on a busy tertiary referral neonatal unit – Are we getting it right?

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Introduction. Post operative pain in neonates can be challenging. Most neonatal NCAs are based on older infants. Opioid infusions in neonates are less predictable due to metabolic variability (1). Continuous morphine and intermittent infusion have both been used (2). In our institution, we have combined a continuous infusion with nurse-controlled boluses (Table 1). The aim of this study was to look at the efficacy and safety of this regime and also determine the reliability of current neonatal pain scoring methods.

Methods. We conducted a retrospective audit of all neonates requiring postoperative NCAs between 2008-2009. The audit outcomes included demographics age, weight, gestational age and post conceptional age. We also calculated the surgical severity scores (SSS) (3), duration of NCA usage, total morphine consumption (mcg/kg/hr). Secondary outcomes included adverse events and peri-operative adjunctive analgesia. Inclusion criteria included all babies who were less than 55 weeks post conception age. Exclusion criteria were neonates who remained ventilated or those who had epidurals. Using linear regression we aim to identify the relationship between morphine consumption and gestational age, SSS and perioperative adjunctive analgesia. We also survey the staff about the triggers used to initiate the bolus.

Results. Preliminary results are presented for 23 neonates. The median age was 27 days (IQR 3-38). The post conceptional age was 37+2 weeks (37-41) and a median weight of 2.77kgs (IQR 2.2-2.9). The median morphine requirement was 6.3mcg1/kg/hr (IQR 4.11-9.26) Two babies who needed naloxone. The range of surgical severity scores were 7.5-17.5. Sixteen patients had caudals.

Conclusions. Initial analysis suggests that there is variability of morphine consumption unrelated to gestational age or SSS. The rate of adverse event was 10%. There was disparity in neonatal pain assessments.

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Oral session Friday 11:00-12:30

Locoregional anaesthesia



79/ OUR EXPERIENCE WITH VERTICAL INFRACLAVICULAR PLEXUS BLOCK IN CHILDREN

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Introduction: Regional analgesia under light general anaesthesia plays an important and improved role in paediatric anaesthesia. Vertical Infraclavicular Plexus Block (VIP) was introduced in 1995 (1) as a method based on anatomical research. We also started to use VIP in children since then. The success was very variable and not stable. In 2006 we decided to standardise this technique based on the experiences of our most successfully anaesthesiologist. Since then our success rate has increased significantly. We want to present our experiences in 156 patients, because we believe, that VIP is an excellent and save technique also in children.

Methods: 156 patients (age range 5 months to 18 years) scheduled for upper limb surgery received a VIP block under light general anaesthesia or sedation using 0.6 ml/kg body weight mepivacaine 1 % + 0.3 ml/kg bw bupivacaine 0.5%. A subset of 51 patients received additionally 1 µg/kg bw clonidine. We used a nerve stimulator because sonography was not yet available. We evaluated a number of data, e.g.:

- - number of attempts
- - time to perform the block
- - incidence of complications
- - duration of motoric blockade
- - distance between the jugular fossa and the point of successfully stimulation with 0.3 mA

Results: In 154 patients we performed successfully the VIP block. Only in 2 cases we had no success, because the anaesthesiologist had always given a muscle relaxant. In the 154 patients the block was effective for surgery. The pain score (VAS, KUSS) was < 3 at the end of surgery without additional analgesics in all patients. Neither a pneumothorax nor an inadvertent puncture of major vessels was observed. During the evaluation we found, that the distance between jugular fossa and point of successfully stimulation seems to have a correlation. Our data suggest even a linear relationship to the variable height. We compared our data with data from an anthropologic collection. The data from that collection show the same linear correlation. The distance from jugular fossa to the anticipated successfully stimulation point could be calculated with this formula: Distance = 0,05*height + 0,5 cm. Using a variation of + 0,5 cm the point will be found in more than 95 %. The quality of the blockade was sufficient for surgery. The duration of the blockade as postoperative analgesia was highly variable, independent from the quality of stimulation and the dosage of the local anaesthetic; in some cases we were not very satisfied. Now we add 1 - 2 µg/kg clonidine to prolong the time of analgesia.

Conclusions: VIP was easy to perform, effective and free of major complications.



15 /Spinal Anesthesia in Neonates and Infants with Congenital Heart Diseases for Non-Cardiac Surgery

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Background: Non-Cardiac Surgery (NCS) is associated with a twofold increase in mortality in neonates and infants with Congenital Heart Diseases (CHD), and anesthetic management is challenging. Spinal anesthesia (SA) may be a safe and effective alternative to general anesthesia for suitable NCS in those patients. The aim of the study was to assess safety and efficacy of SA in neonates and infants with CHD undergoing NCS at a tertiary pediatric medical center.

Methods: Retrospective analysis of the files of neonates and infants with CHD who underwent NCS under SA during the last 10 years. Patients with PDA were excluded. The surgeon assessed his/her satisfaction with SA (anesthesia quality grade AQG), using a 0-10 scale at the end of the surgery. Findings are presented as means (SD).

Results: The files of 42 patients were analyzed. Nine children (21.4%) were prematurely born. Two patients (4.8%) had right-to-left shunts and 9(21.4%) had pulmonary hypertension. Nineteen patients (45.2%) had extracardiac malformations. Appropriate SA with plain bupivacaine 0.5% (mean dose 0.73 ± 0.1 mg/kg) was accomplished in all patients (in 73.8% - from the first attempt). Sixteen patients (38.1%) required intraoperative IV sedation, usually with midazolam 0.1mg/kg. Mild hypotension ($25.8 \pm 2.7\%$ from the baseline MAP) was recorded in 5(11.9%) patients. Bradycardia (97 bpm) was observed in 1 patient. High SA, need for inotropic support or mechanical ventilation intra/postoperatively was not documented. Mean AQG was 9.53.

Conclusions: SA is a feasible, safe and effective method of anesthesia in infants with CHD undergoing NCS, suitable for this technique.



80/ SPINAL ANAESTHESIA FOR PYLOROMYOTOMY (WEBER-RAMSTEDT) : OUR EXPERIENCES IN 40 CASES

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Introduction Spinal anaesthesia (SA) is a well established procedure for infants younger than 52 weeks of post-conceptual age undergoing subumbilical surgery. Infants with hypertrophic pyloric stenosis are a challenge for every anaesthesiologist, even in personnel trained in paediatric anaesthesia, because

- - the obvious an ileus situation; an aspiration of gastric content must be expected.
- - most of this children are hypotrophic with hypokalemia, hypochloremia, alkalosis, and hypovolemia
- - the infants are younger than 52 weeks of post-conceptual age

The standard surgery is the pyloromyotomy by Weber-Ramstedt. A general anaesthesia with rapid-sequence induction or awake intubation is recommended to prevent aspiration. Inspired by a paper by Williams and Abajian from 1997 about use of SA for ligation of ductus arteriosus we started to use SA for pyloromyotomy. It guarantees a sufficient analgesia with active protective reflexes.

Method: Since 1995 we used SA in more than 800 cases in infants younger than 52 weeks of post-conceptual age, since 2002 in 58 of them for pyloromyotomy. We performed SA with 1 mg/kg body weight bupivacaine (0.5 % isobaric) with adrenalin.

Results: In 57 of 58 patients the spinal block in the awake infant was successful. Only in one case we had to change to intubation anaesthesia. In all 57 successfully cases SA was effective for surgery.

Conclusions: SA is an alternative way to perform anaesthesia for pyloromyotomy by Weber-Ramstedt. It is safe and sufficient.



71/The efficacy of caudal and epidural anaesthesia in peri-operative pain management in children

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Background. Caudal and epidural anaesthesia have proven to be effective methods in providing postoperative analgesia in children, with a relatively low incidence of major complications.

Objective. To evaluate the success of epidural blockades performed on children.

Methods. Observational cohort study in children who intra-operatively received either a single shot caudal (SSC) single shot epidural (SSE) or caudal or epidural catheter (CEC) placement during the period 8 December 2009 to 29 January 2010. Data regarding patient characteristics, pain at post-operative recovery room (PACU) and ward (FLACC, VAS / Faces), duration of epidural infusion, additional analgesic requirements, side-effects, complications and reasons for discontinuation were collected up to three days post-operatively.

Results. In 80 out of 140 epidurals performed (median age SSC 6 y, SSE 10 y and CEC 7 y) in the inclusion period, almost complete data could be obtained. 3/39 in SSC-group, 4/16 in SSE-group and 14/24 in CEC group (NS) required additional opioids during surgery. According to child 65/74 (88%) and to nurse 70/74 (95 %) patients had pain-scores < 4 at admission to the PACU. There was no significant difference between groups. 9/80 children (2/40 SSC, 3/15 SSE, and 4/21 CEC) received additional analgesics at the PACU because of pain. All children left the PACU with low pain intensity ratings (< 4). Pain intensity ratings in children with an epidural catheter observed during admission to the clinical ward were low. No major complications were seen.

Conclusion. Single shot epidural and continuous epidural analgesia provide adequate postoperative pain control in most children following urological, orthopaedic and general surgery.



33/ Risk-benefit ratio of morphine supplemented caudal anesthesia – observational clinical results

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Caudal anesthesia (CA) is a daily used procedure in newborns and children. In children older than one year additional clonidine prolongs duration of CA without causing relevant additional motor blockade. In specific situations morphine is used to improve efficiency of CA (1,2). Because of expected cardiorespiratory side-effects, pruritus, urinary retention and morphine-induced higher incidence of perioperative vomiting, specific observational care is needed when using morphine as adjuvant for CA. But how often do these negative side effects occur and how severe are they?

Aim of this retrospective study was to evaluate morphine-supplemented CA used during a 12 month period regarding cardiopulmonary and gastrointestinal side-effects.

In the upper named time period 25 children aged 3-79 months (mean value 8.7 ± 4.4 SD) ASA class I-III met criteria for morphine supplemented CA. After implementing standardized general anesthesia all patients received CA using weight-adapted dose of 0.75 ml per kg of ropivacaine 0.2% and 25 µg morphine per kg. Anesthesia was maintained with sevoflurane and fentanyl or in case of preoperatively already intubated children with fentanyl and midazolam. If possible children were extubated immediately at the end of surgery. 11 children were transferred to the normal ward after 4 hours observation in the recovery room, the other 14 children to the pediatric intensive care unit. The children shifted on normal ward were monitored continuously using pulse oximetry and electrocardiography during the first 24 hours.

23 children underwent intraabdominal surgery, one hypospadias- and one with bilateral hip-dysplasia correction. Of the 25 children 21 got extubated immediately after surgery, 2 during the first 12 hours postoperatively and 2 had to stay intubated and ventilated for more than 6 days (535 and 154 hours). Of the 21 immediately extubated patients only one needed supplementary oxygen over night without severe respiratory complications. 3 children showed delayed oral feeding (2 with gastric retention and 1 with paralytic ileus). 12 patients showed postoperative nausea and vomiting (48 %). 10 patients needed no additional intravenous opioids postoperative, 13 children received piritramid when needed, 2 were long-time sedated with fentanyl.

Respiratory complications were rare, prolonged oxygen demand occurred only in one case. This also applies for severe gastrointestinal side-effects aside a relative high incidence of postoperative vomiting.

In conclusion, especially regarding the high percentage of children that needed no further opioids postoperatively, addition of morphine in the used dosage to CA showed a positive risk-benefit-ratio if adequate postoperative observation can be guaranteed.

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85/ Analgesic effect of clonidine added to bupivacaine in saphenous/sciatic nerve blocks for elective foot surgery in children

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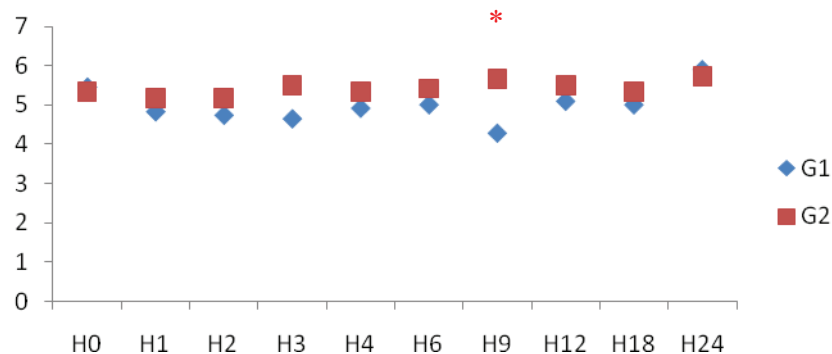
Introduction this study was to evaluate the effect of clonidine added to bupivacaine in saphenous / sciatic nerve blocks for foot surgery in children.

Patients and Methods: After ethics committee approval and parental informed consent, we conducted a prospective, randomized, double-blinded study including children aged between 1 and 10 years, scheduled for unilateral elective foot surgery. Patients proposed for bilateral surgery; with contraindications: to inhalation induction, to regional anesthesia or with central or peripheral neuropathies were not included. Sevoflurane was used for induction and maintenance of anesthesia, associated to a saphenous/vastus medialis and sciatic (popliteal approach) nerve blocks. These blocks were performed after randomization using bupivacaine 0.25% (respectively 0.2 and 0.3 ml/kg) plus 1 mL of a solution containing either clonidine $1\mu\text{g.kg}^{-1}$ (G1) or normal saline solution (G2). CHEOPS was noted on the recovery then 1, 2, 3, 4, 6, 9, 12, 18 and 24 hours after surgery. If CHEOPS >7, the child received paracetamol 15 mg.kg^{-1} . Time to first requirement and the total doses of analgesic given were recorded. Heart rate (HR) and mean arterial pressure (MAP) were collected at baseline, after performing nerve blocks, at skin incision, and then every 10 minutes until the end of surgery. In the post operative period, we also noted Ramsay score and the duration of motor block. Chi-square and Student t-tests were used in statistical analysis; $p < 0.05$ was considered significant.

Results: Twenty three children were included (G1=11, G2=12). Demographic data were comparable between the groups. Ten patients required supplemental analgesics during the first 24 post operative hours (G1=G2=5, $p=1$). Time to first analgesic requirement was comparable between the groups (G1=516±280, G2=612±486 min, $p= 0.71$). CHEOPS was significantly higher in G2 compared to G1 at the 9th post operative hour.

Figure 1

Figure 1: post operative CHEOPS



*: $p = 0.008$



There was no significant difference between groups regarding intra operative HR and MAP and post operative Ramsay score. Motor block duration was also similar between groups (p=0.47).

Conclusion: Clonidine added to bupivacaine may not improve the quality of analgesia in saphenous / sciatic nerve blocks for foot surgery in children.



56/ AMETOP APPLICATION TIMES - CHANGING PRACTICE

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Introduction: Ametop® is a topical anaesthetic used to provide dermal analgesia for venepuncture and intravenous cannulation. Tetracaine, its active ingredient, can cause erythema and itching to the skin by the local release of 5-hydroxytryptamine and histamine. Prolonged application may lead to an increased incidence of sensitivity or allergy to the local anaesthetic. We present a cycle of auditing Ametop® use, analgesic and undesirable effects and subsequent introduction of guidelines. We also propose an alternative method of data collection and analysis to facilitate sustained changes in clinical practice.

Methods: We undertook 3 two-week audits of Ametop® application times, undesirable and analgesic effects in paediatric day-case patients. Questionnaires were completed by the anaesthetist for each child undergoing a general anaesthetic during the audit period. Initially, we used the Manufacturer's recommendations as our standard (45 minutes for intravenous cannulation). We then published local guidelines based on our findings, highlighting the importance of documenting Ametop application and removal times. Guidelines were amended after analysing the results of each consecutive audit.

Results: Documentation and adherence to the guidelines for Ametop® application times improved dramatically after introduction of guidelines. Interestingly, analgesic effects were more likely to be graded as 'moderate' or 'poor' with adherence to the 45 minute application time recommended by the Manufacturer. After consultation with nursing and anaesthetic staff the guidelines were amended to increase application time to 60 minutes. A further re-audit four months later showed application times and analgesic success had increased to almost the same levels seen in the first audit. Severe side effects were not observed. Quality of documentation improved throughout the audit process. The results are summarised in Table 1.

Table 1: Summary of results

	Audit 1	Re- audit 1	Re- audit 2
Forms completed	37	44	31
Application times	37 – 225 min (mean 111 min) 27%- 45 – 70 min	15 – 225 min (mean 58 min) 72% - 45 – 70 min	15 – 225 min (mean 99 min) 25% - 45 – 70 min
Side effects:			
Erythema	46%	43%	41%
Swelling	8%	9%	0%
Blistering	0%	0%	0%
Analgesic effect:			
Good	90%	69%	81%
Moderate	3%	11%	19%
Poor	7%	20%	0%

Discussion: Local anaesthetic cream improves the hospital experience in children undergoing general anaesthesia, and staff are familiar with its application. Occasional severe side effects have been observed, and an unknown number of children are labelled as 'allergic', having skin reactions to prolonged application. Good clinical governance requires that any drug



application should be appropriate and documented. Following the introduction of electronic prescribing, this audit process introduced modifications to the peri-operative care plans for this purpose.

We observed an initial improvement in application times in response to new guidelines, which was not sustained. High staff turnover and time pressures on a busy ward may have contributed to this.

Using continual data analysis and 'run charts' with graphical display of data alongside interventions with time allows frequent visual feedback. We propose this may be more effective in bringing sustained change to clinical practice.

Conclusion: Achieving sustained improvement in clinical practice requires appropriate guidelines and documentation methods as well as frequent feedback on performance and ongoing education, which is difficult to achieve with snapshot audits.



28/ MONITORING OF ASPIRIN-INDUCED PLATELET INHIBITION WITH IMPEDANCE AGGREGOMETRY IN INFANTS WITH SYSTEMIC-TO-PULMONARY -ARTERY SHUNTS

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Background. Aspirin is widely used for anti-thrombotic treatment after systemic-to-pulmonary artery shunt implantation in infants with congenital cyanotic heart diseases, but the treatment effect is rarely monitored, although there is an individual variation in response to aspirin. We investigate if impedance aggregometry, a new point of care method, can be used to monitor platelet inhibition in these children.

Methods. Fourteen children (median age 12 days, median weight 3.5 kg) treated with oral aspirin (5mg/kg) due to systemic-to-pulmonary artery shunts were included. Platelet impedance aggregometry (Multiplate) was analyzed after addition of arachidonic acid (ASPI-test, aspirin sensitive), thrombin receptor activating peptide (TRAP-test) and adenosine diphosphate (ADP-test), at five preset time points: before primary operation, before the first aspirin dose, five and 24 hours after the first aspirin dose, and 3-5 months later before stage II repair (Glenn procedure). An ASPI test <60 units was considered within therapeutic range.

Results. Aspirin reduced ASPI-test in all patients (from 103±21 to 35±13 units after five hours, $p<0.001$). 13/14 patients were in the therapeutic range after five hours and 12/14 after 24 hours. Three patients were lost to late follow-up. At this time point, 9/11 patients were in the therapeutic range (ASPI-test 50±30 units, $p<0.004$ vs baseline). A significant correlation between aspirin effect (reduction in ASPI-test) and patient weight was observed ($r=0.81$, $p<0.001$).

Conclusions Point of care impedance aggregometry can be used to monitor aspirin effect in children with systemic-to-pulmonary artery shunts and have the potential to improve the treatment. The effect of aspirin treatment is more pronounced in children with low weight even when the dose is adjusted for bodyweight.



69/ Remifentanil and fentanyl as a part of postoperative analgesia of newborns and infants in the intensive care unit

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Introduction: Paediatric anaesthetists are responsible for initiating suitable postoperative pain management. Inadequately controlled pain is a source of significant distress for patients and their families and can have a detrimental impact on the acute postoperative outcome.

Objective of this study was to determine which combination of analgetics and sedatives provides better analgo-sedation with better haemodynamic and a general stability for the critically ill newborns and infants.

Methods: In this study 40 patients up to one year of age, who have been hospitalized in the intensive care unit, have been analyzed. Most of them have been newborns with congenital anomalies requiring surgical treatment, and mechanical ventilation for a certain period of time. Patients have been divided into two groups depending on the applied drugs during analgo-sedation: Group R received remifentanil continually and midazolam in single doses. Group F received fentanyl continually and midazolam in single doses. In both groups of patients, the level of sedation has been monitored according to Ramsay's scale, the level of pain according to FLACC scale and basic cardiorespiratory parameters too. The level of sedation and pain have been analyzed during first 24 hours every 4 hours, and 48 hours after mechanical ventilation every 6 hours. Side effects of administered drugs have been noted and analyzed. The values have been compared between the tested groups.

Results: Analysing children distribution by age and sex there was no significant statistical difference ($p > 0,05$). Analysing achieved results we found a significant statistical difference in relation to average sedation degree values after mechanical ventilation (t-test, $p = 0,32322$, $p < 0,05$) between tested group. Patients who were receiving fentanyl and midazolam as analgo-sedation therapy were occasionally restless and anxious, i.e. the level of sedation was inadequate. The investigation determined that the better level of analgesia achieved by applying remifentanil. Between the groups there was a statistically significant difference in estimated level of pain (t test, $p = 0,027151$, $p < 0,05$). The average value of pain was lower in the group R. Between the examinations groups there was no statistically significant difference in the oscillations of pain (t test = $0,422469$, $p > 0,05$). Also better haemodynamic stability was achieved in group R which was statistical significant (t-test, $p = 3,81e-0,5$, $p < 0,05$). Analysing the side effects of analgo-sedation was noted that the number of side effects was greater in group F.

Conclusion: The combination of continuous remifentanil and single dose midazolam provides better analgesia and sedation and better haemodynamic stability in newborns and infants in the intensive care unit.

Key words: newborns, infants, pain, analgo-sedation, remifentanil, fentanyl



Oral session Saturday 9:00-10:30

Airway management



23/ FLEXIBLE ESOPHAGOGASTRODUODENOVideoscOPY THROUGH A MODIFIED ENDOSCOPIC MASK IN INFANTS AND YOUNG CHILDREN

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Introduction: The aim of this study was to describe our experience using a modified endoscopic mask (EM) as a conduit for the flexible esophagogastroduodenoscopy (EGD).

Methods: 240 children age between 7 month - 10 years, undergoing diagnostic EGD under general inhalational anesthesia through a modified EM were included. This EM allows the passage of the flexible endoscope through silicone diaphragm valve and assisted manual mask ventilation when needed during the procedure. Complications or events such as desaturation, upper airway obstruction episodes. Ventilation was rated easy when spontaneous ventilation was uneventful ,difficult when signs of airway obstruction were noted and impossible when the entire external airway ventilation did not resolve the problem, and endotracheal tube insertion was required.

Results: 240 children (122 boys and 118 girls) participated in the study. Age range was 7-135 months (mean 60.7 months \pm 34.4). All patients maintained stable hemodynamic status throughout the procedure. Ventilation was regarded as satisfactory or easy in 230 patients. Nine patients had difficult ventilation which was resolved by applying external airway maneuvers. One patient requiring endotracheal intubation. No procedure related complications were noted.

Conclusions: Based on our results, EM appears reasonable to suggest as a first choice for EGD under general anesthesia in children. Endotracheal intubation should be reserved for cases in which airway problems occur during the procedure or in infants less than 7.



26/ CRYOEXTRACTION FOR FOREIGN BODY REMOVAL IN A CHILD

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A foreign body aspiration is dangerous.

Successful extraction depends on the type of foreign body (FB) aspirated, the location in the bronchial system, the experience of the physician and the instrumentation available.

Due to the small airway in children high skills and special equipment are mandatory.

We report on the management of a 17 months old boy who presented with aspiration of an apple piece. He presented with cough, inspiratory stridor and decreased breath sounds over the left lung. Plain chest radiography did not show the presence of a foreign body but hyperinflation of the left lung.

Our plan was to use the classic laryngeal mask as a safe airway device, flexible bronchoscopy and flexible cryoprobes. Anaesthesia induction with sevoflurane 6 Vol% and oxygen 100% was performed. We were able to maintain spontaneous ventilation. The epiglottis and the glottis were visualized by laryngoscopy and a vocal cord edema was found. After insertion of a laryngeal mask #2 the FB was visualized by bronchoscopy in the left main bronchus. It was frozen to the tip of the probe (ERBOKRYO® CA) and removed by pulling on the probe together with the bronchoscope. At the end of the procedure a fiberoptic examination was performed. The patient showed no subglottic or laryngeal edema and no signs of bronchospasm. The recovery was uneventful and he was discharged from the hospital on the third day.

Use of flexible cryoprobe can be recommended especially in children with foreign body aspiration of organic material.



47/ USE OF LARYNGEAL MASK AIRWAY IN LOW-BIRTH-WEIGHT EXPREMATURE INFANTS

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BACKGROUND. The use of the laryngeal mask airway (LMA) in newborns and children has been standardized throughout our daily practice. However in low-birth-weight (LBW) ex-premature infants (weight below 2500 grams), the use of the LMA is difficult because of the lack of experience and unavailable smaller sizes. In contrast, this group of infants are the most benefited from the use of the LMA since most of them suffer from diminished respiratory reserve and lung disease that is worsened with orotracheal intubation.

OBJECTIVE. To establish the use of the LMA as a method of choice for the management of the airway in LBW ex-premature infants.

METHODS. We reviewed the charts of all LBW infants who were scheduled for a minor surgical procedure (such as laser therapy for retinopathy of prematurity (ROP) or a inguinal hernia repair) from 2005 to 2009. We recorded the age at birth, post-conceptual age at the time of surgery, weight at birth, weight on the day of surgery and anesthetic induction technique. All patients were suffering from bronchopulmonary dysplasia at the time of surgery. In all patients, anesthesia induction was performed using an inhalation technique with sevoflurane and supplemented with an intravenous agent. Adequate anesthetic depth allowed the insertion of an LMA and the inflation of the cuff with one or two millilitres of air. Appropriate insertion and clinical effectiveness was assessed by manual ventilation and the achievement of an appropriate tidal volume and a - 20 cm of H₂O pressure leak. Spontaneous ventilation was maintained except in cases of apnea.

RESULTS. We studied a total of thirty-nine patients. All patients received an inhalational anesthetic with sevoflurane. Ten patients received an additional 2 mg/Kg of propofol and three patients received 3 mg/Kg of penthotal before LMA insertion. Our population had a mean gestational age of 26.5 weeks (23.2-34), mean gestational age at surgery of 39 weeks (33-42.3), mean birth weight of 851 grams (500-1390) and a mean weight at surgery of 1869 grams (1000-2500). Thirty-six patients (92%) were effectively ventilated with the LMA, without any incidences. In three instances, we were unable to use the LMA: in two patients (5,5%) we could not insert the LMA because of an inadequate anatomical fitting (the patients had an extremely low weight: 1000 and 1260 grams respectively) and in another patient (2.5%) ventilation was not adequate. These three patients were orotracheally intubated.

CONCLUSIONS. With a success rate of 92% in our study, we believe an LMA should be the method of choice to control the airway in LBW ex-premature infants undergoing minor surgical or diagnostic procedures. This avoids the need for orotracheal intubations and its associated complications in infants that suffer from diminished respiratory reserve and lung disease.



89/ COMPARISON OF TWO SUPRAGLOTTIC DEVICES IN AIRWAY MANAGEMENT IN PAEDIATRIC ANAESTHETIC PRACTICE: THE I-GEL® VERSUS LARYNGEAL MASK

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Background: the I-gel® is a new supraglottic device with soft contours which fits to the laryngeal anatomy without cuff inflation required. The aim of our study was to compare the i-gel® to laryngeal mask airway (LMA™) in paediatric airway management.

Methods: After ethics committee approval and parental informed consent, we conducted a prospective randomized study including children aged between 1 and 6 years, ASA I-II, scheduled for short-duration elective surgery under general anaesthesia. Children with previous or anticipated airway problems, increased risk of regurgitation or aspiration, ASA III and above and undergoing emergency surgery were not included. After premedication with intranasal midazolam (0.2 mg/kg), anesthesia was induced with sevoflurane 6% and propofol 2mg/kg. Patients were randomized in two groups: G1 (i-gel® group) or G2 (LMA group). The size of the supraglottic device (SGD), which was inserted by an experimented anaesthetist, was considered according to the weight. For each child, we collected demographic data, the ease in inserting SGD (number of attempts, necessity of Mandibular subluxation, cervical extension or changing the size, duration of insertion), leak fraction (LF), the occurrence of gastric inflation and complications during insertion and removal of the SGD. We also recorded ventilatory parameters during positive pressure ventilation (Maximal airway pressure Pmax and End tidal CO₂ (ETCO₂)) and satisfaction of the anaesthetists. Chi-square and t-student tests were used in statistical analysis. p<0.05 was considered significant.

Results: sixty children were enrolled (G1=30, G2=30). There were no significant differences in demographic characteristics, type and duration of surgery between the groups

Table 1: Efficiency and incidence of complications: Igel Vs LMA

	G1 n=30	G2 N=30	p
Need for multiple attempts to insert the SGD (N)	3	5	0.71
Need for SGD size change (N)	3	5	0.71
Necessity of mandibular subluxation, cervical extension (N)	5	5	1
Repositioning SGD	4	3	1
Duration of insertion (seconds)	13 ±15	19±15	0.17
Desaturation on insertion	0	1	1
Intra operative gastric Inflation	2	4	0.67



Coughing during removal (N)	1	1	1
Bronchospasm, laryngospasm	0	3	0.24
P max (cmH20)	19±5	18±5	0.59
ETCO2	30±4	30±5	0.84
Leak fraction (%)	6±8	4±7	0.33
Anaesthetist satisfaction (N)	27	23	0.17

N: Number, SGD: supraglottic device

Two patients develop incomplete laryngospasm on the removal of LMA.

Conclusion: This study showed that i-gel® is as effective and seems to be safe to a greater degree than LMA in pediatric patients undergoing short-duration elective surgery. These elements must be corroborated in larger series.



25/ FEASIBILITY OF I-GEL® USE IN INFANTS: A PROSPECTIVE OBSERVATIONAL SURVEY

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Introduction: Use of the LMA in children is widespread and popular both in elective and emergency situations. However, it has been associated with complications involving excessive pressure on mucous membranes, postoperative sore throat, leakage around the cuff and the need to limit and measure intracuff pressure. The i-gel® LMA (Intersurgical Ltd.) has been developed without the need to use an inflatable cuff and in an attempt to provide more anatomically based shape ⁽¹⁾. We present a prospective observational audit comparing the use of the i-gel® with a standard LMA (Marshall Products Ltd) in infants less than 10 kg undergoing anaesthesia.

Method: Children weighing less than 10 kg undergoing surgery are included. We have recorded the indication for surgery, insertion technique and number of attempts, cuff leak pressures, fixation technique, difficulties on insertion or removal, intraoperative airway problems and incidence of complications.

Discussion: The use of i-gel® in children greater than 30 kg has been studied by Beylacq and colleagues ⁽²⁾ who reported good insertion conditions with few complications, suggesting the i-gel® to be an efficient and safe device for paediatric airway management. The size 1.5 classic LMA has a significant complication rate and is inversely related to the age of the child ⁽³⁾. Our preliminary comparison of these variables in this audit enables us to confirm these findings in respect of the use of the i-gel® LMA in children weighing 5 - 10 kg.

Our data demonstrate the feasibility of use of the i-gel® in this group, however larger prospective studies will be required to detect a significant difference compared with the standard LMA.

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62/ CRITICAL ILLNESS MYOPATHY IN PEDIATRICS: A CASE REPORT

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GOAL: Critical illness myopathy is a common complication described in adult Intensive Care Units, but a rare condition in pediatric population. We report a case of acute myopathy in a child with tracheal stenosis and pulmonary artery sling after surgery.

CLINICAL FEATURES: A 6-month-old boy diagnosed with hypothyroidism, cryptorchidism, hexadactilia, gastroesophageal reflux and recurrent respiratory infections treated chronically with inhaled budesonide underwent sliding tracheoplasty and reinsertion of pulmonary artery. The postoperative course was complicated by acute respiratory distress syndrome and septic shock requiring dopamine, furosemide, inhaled budesonide and nitric oxide. The child needed to be sedated with sevoflurane by AnaConDa dispositive, midazolam, remifentanyl and vecuronium infusions to support artificial ventilation. After stopping neuromuscular blockers and decreasing sedation, a failure to wean from artificial ventilation was observed. The patient developed a proximal weakness most prominent in lower extremities without involvement of facial musculature. Creatin kinase levels were normal and EMG demonstrates normal conduction velocities, reduced amplitudes and increased duration of the motor action potentials as corresponds to a myopathy, without features of polyneuropathy or demyelination and a lot of proximal spontaneous activity. Biopsy to confirm diagnosis was normal, without affection of any of the cellular organelle and with a regular distribution of ATP-asas, phosphorilases and COX. All these data are consistent with a critical illness myopathy. Four months after surgery, the patient's strength is practically normal with axial mild weakness and impossibility for autonomous sitting.

DISCUSSION: There is a reported incidence of myopathy in critically ill children of only 1,7%, certainly related to failure to recognize this clinical syndrome. Biopsy is the gold standard for establishing the diagnose and severity of muscle pathology, but is invasive and not performed in most cases. The pathogenesis of critical illness myopathy is still uncertain but some risk factors identified in adults may develop myopathy also in children, like sepsis, SIRS, prolonged ventilation and MOF. The role of corticosteroids and neuromuscular blocking agents is unclear and they may act as predisposing factors. Recovery is slow but usually complete after the resolution of the sepsis and the end of corticosteroid and neuromuscular blockers treatment.

CONCLUSION: Critical illness myopathy should be considered in children with high risk factors that develop an acute weakness. The use of corticosteroids and neuromuscular blocking agents should be carefully assessed in these patients in which it may be necessary to use neuromuscular monitoring and blockers such as benzyliisoquinoline in order to decrease the incidence of this entity in pediatrics. More studies are needed to determine incidence, etiology, natural history and prognosis of this disorder and evaluate strategies for its prevention and treatment in this subgroup of population.



4/ Nitric oxide and lipid peroxidation are increased and associated with decreased antioxidant enzyme activities in mechanical ventilated newborns with gastroschisis.

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BACKGROUND: Nitric oxide (NO) released in oxidative stress. Superoxide dismutase (SOD), glutathione peroxidase (GSHPx) and catalase (CAT) are antioxidant enzymes, mediating defense against oxidative stress. Excess NO and/or defective antioxidants cause lipid peroxidation, cellular dysfunction.

METHODS: NO and the catalytic activity of SOD, GSHPx and CAT were measured in a group of 17 patients with gastroschisis (10 boys, 7 girls; 7.2 days) and compared with age- and sex-matched healthy control subjects without gastroschisis (9 boys, 8 girls; 7.4 days). NO levels were measured in plasma, CAT in red blood cells (RBCs), and SOD and GSHPx in both plasma and RBCs.

RESULTS: All patients with gastroschisis had significantly ($p < 0.001$) higher plasma NO levels over control subjects (mean \pm SD, 47.50 \pm 8.8 vs. 24.2 \pm 3.0 micromol/l). On the other hand, SOD and GSHPx activities were significantly lower in both RBCs and plasma of patients with gastroschisis than in control subjects (RBCs-SOD, 3409.13 \pm 442.22 vs. 5032.12 \pm 383.18 U/g Hb, $p < 0.001$; plasma-SOD, 540.51 \pm 50.11 vs. 700.16 \pm 44.11 U/g protein, $p < 0.001$; RBCs-GSHPx, 603.12 \pm 40.42 vs. 782.10 \pm 45.12 U/g Hb, $p < 0.001$; plasma-GSHPx, 90.20 \pm 10.17 vs. 130.80 \pm 9.80 U/g protein, $p < 0.001$). RBCs-CAT levels were not different between groups (111.18 \pm 11.09 vs. 138.80 \pm 13.29 k/g Hb, $p = 0.811$).

CONCLUSIONS: This study demonstrated for the first time that NO, the most abundant free-radical in the body, might be implicated in the pathophysiology of gastroschisis.



83/ Oesophageal atresia and Tracheo Oesophageal Fistula(TOF) repair - anaesthetic challenge for changing surgical practice - a 5 year review

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Introduction : Thoracoscopic repair of tracheo-oesophageal fistula and oesophageal atresia is done in many centres since the first one in 1998(1). In the General Infirmary at Leeds, UK a new approach using thoracoscopic repair of the TOF is being done with High Frequency Oscillator Ventilation (HFOV) and the use of HFOV poses a new anaesthetic challenge in this prolonged procedure in a neonate. We did a retrospective analysis of 30 of the 43 TOF patient notes who had this surgery from 2005 to 2009.

Methods: Fortythree TOF repair operations were performed during the five year period. As some notes could not be retrieved only 30 patients were studied so far.

Gestational Age(wks)	< 30 wks = 3	30- 37 =10	37- 40 = 14	>42 = 2
Birthweight (kg)(2)	< 1.5 Kg = 6	1.5-2.5kg = 11	2.5 - 3kg = 5	3-4kg =7

Results: 34% had thoracoscopic procedure out of which 40% had to be converted to open thoracotomy due to ventilation difficulty or poor surgical conditions.

Airway endoscopy

Bronchoscopy	Number of Patients
Anaesthetists	8
Surgeons	11
None	11

66% of patients had arterial line and about 24% had femoral venous line. All patients who had HFOV had maintenance of anaesthesia using TIVA with oxygen in air, remifentanyl and propofol as there was no provision of anaesthetic vapour through the HFOV. The patients who had thoracoscopic work done with HFOV had longer procedure(average duration of 7hrs) resulting in higher PaCO₂ which improved to almost normal range once changed to conventional ventilation at end of procedure. None of the patients had blood transfusion.

Discussion :. Four of the eight children who had HFOV were extubated inspite of prolonged procedure. Our patient population clearly fall into two groups one with cardiac lesions who had conventional thoracotomy as they would not tolerate high PaCO₂ and the other group which did not have cardiac lesion and hence had thoracoscopic procedure.

Conclusion : In our institution all patients were sent to NICU even if they were extubated for overnight monitoring. There were few ventilation difficulties in theatre but no death occurred in theatre even in Spitz Group 3 patients(1). There is a learning curve for the surgeons to do thoracoscopic repair of TOF which poses a great challenge to the anaesthetists in this patient group.

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75/ The Anaesthetic Management of Vein of Galen Malformation in Neonates and Children: A Retrospective Case Series

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Introduction. The Vein of Galen malformation is rare. It is the only arteriovenous malformation which results in cardiac failure and pulmonary hypertension in the neonate. The treatment is radiological embolisation (1). Our institution is one of the few centres which offers this intervention. Prognosis in the neonates can be scored using the Lasjaunias scoring system(2). Older children can present with hydrocephalus. Some have required further embolisation and or radiological screening. We would like to describe the anaesthetic management of a series of primary and repeat embolisations for Vein of Galen.

Methods. We identified patients from the hospital database which records details of all children with arteriovenous malformations between 2005-2010. We collected demographic data, age of first embolisation and initial medical management. We collected data on the perioperative management and outcome.

Results. We identified 44 patients with Vein of Galen malformation who have received a total of 114 anaesthetic encounters. We have reviewed 12 patients who have received 20 anaesthetics. Seven patients received primary embolisation (Table 1). All the neonates had pulmonary hypertension and cardiac failure with structurally normal hearts except one. The duration of these primary interventions were between 45-300 minutes. All remained intubated and ventilated on intensive care postoperatively with meticulous attention to blood pressure control and in some cases requiring anti-hypertensives. Complications included bleeding. For the repeat embolisation and further imaging, the age range was 3 months to 9 years of age. The weight range included 5.3-23kg. All except one case received inhalational induction and maintained with sevoflurane. Lignocaine spray was used and all were intubated and ventilated with atracurium, Analgesia was provided with intravenous paracetamol and 1 mcg/kg fentanyl. Dexamethasone was also administered. Heparin was administered on the request of the radiologist. Routine monitoring was used for all these cases.

Table 1 Primary Embolisations

Number	Antenatal diagnosis	Post-conceptual age (weeks)	Age of intervention (days)	Weight (kg)	Presence of pulmonary hypertension and cardiac failure	Pre-op ventilation	Pre-op inotropes
1	yes	38	2	2.9	yes and large ASD	I+V* HFOV	Dobutamine/dopamine adrenaline
2	no	37+6	6	3.7	yes	I+V	
3	no	38+2	2	3.2	yes	I+V	milrinone/ noradrenaline
4	no	41+4	4	3.7	yes	I+V	



5	yes	39	42	2.6	no	no	
6	no	37+2	2	4	yes	I+V	milrinone/PGE2
7	no	52	98	5.3	no	no	

*I+V intubated and ventilated, HFOV High frequency oscillation ventilation , PGE2 prostaglandin E2

Conclusion. The management of Vein of Galen requires a multidisciplinary approach and can present complex anaesthetic problems especially in the neonates . Early aggressive medical management and early intervention in expert centres can improve success for primary interventions.

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