

The background of the entire image is a photograph of stone steps, likely made of granite or a similar material, arranged in a series of parallel rows that recede into the distance. The lighting is bright, creating strong shadows and highlights on the surfaces of the stones.

European Conference on

Paediatric Anaesthesia

Best Oral Presentations

BO1. AN ANALYSIS OF CRITICAL INCIDENTS RELATING TO PAEDIATRIC ANAESTHESIA FROM THE UK NATIONAL REPORTING AND LEARNING SYSTEM IN 2007

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Introduction and Aim

Reporting of critical incidents and near misses is a key to improving patient safety. The UK the National Patient Safety Agency has set up the National Reporting and Learning System to collect incident data from the entire National Health Service. We aimed to perform the first analysis of the incidents relating to paediatric anaesthesia.

Methods

The NPSA provided us with a Microsoft Excel™ spreadsheet containing anonymised patient safety incidents from the year 2007, selected from the NRLS database by these criteria: (1) Patient age < 16 years (2) Location given as operating theatre, anaesthetic room, recovery room or intensive care unit (3) Specialty listed as anaesthetics or 'surgical specialties'. Incidents are categorised within the database using the NPSA's own taxonomies of incident type and level of harm and usually contain a free text description of the event. We screened these free text entries to identify those relevant to anaesthesia and analysed these in further detail.

Results and Discussion

The spreadsheet contained 1422 reports. We considered 372 to be 'anaesthetic' incidents. Only 87 was the specialty given as 'anaesthesia', the remaining 285 having been reported under 'surgical specialties'. The distribution of childrens' ages was: under 28 days 6. 2%; 1month to 1year 7%; 1 to 4yrs 17. 5%; 4 to 11yrs 38. 7%; and 11 to 16yrs 30. 6%.

Incident Category (from NRLS)	Number (%)	Degree of harm				
		None	Low	Mod	Severe	Death
Treatment and procedure	110 (29.5)	69	31	8	0	2
Medication	74 (19.9)	48	21	5	0	0
Medical equipment	65 (17.5)	52	10	3	0	0
Consent, communication, confidentiality	24 (6.5)	13	9	2	0	0
All other categories	99 (26.6)	63	26	5	4	1

The most common specific incidents were a prolonged wait in the anaesthetic room before induction (31 incidents) and double dosing of medication involving anaesthetists as one of the caregivers involved(28). All these resulted in low or no harm. There were 41 incidents relating to airway and respiration, of which 7 were cases of regurgitation +/- aspiration and 5 were laryngospasm. Additionally lack of equipment accounted for 32 incidents, 16 related to venous cannulation, 16 to pressure areas or new skin marks under anaesthesia, 9 to dental damage and 4 to circulation problems. There were also two cases of malignant hyperpyrexia and one unintentional awareness under general anaesthesia. Two of the three deaths occurred in terminally ill children. The third was described as an 'unexpected death' in recovery of a child with muscular dystrophy. No details were given.

The problems mentioned above offer some useful learning, though the incidents are less specific to anaesthesia than in a previous survey [1]. Further, classification by reporting clinicians and categorisation by the NPSA mean that scrutiny of the free text is necessary. Not only is this time-consuming, it is also insufficient for the detailed analysis of more serious incidents.

Conclusions

Incidents relating to paediatric anaesthesia are being reported in the UK NRLS. The role of the system is likely to be to complement local reporting and discussion of paediatric anaesthetic incidents.

Reference

1 Tay CLM et al. Critical incidents in paediatric anaesthesia: an audit of 10 000 anaesthetics in Singapore. *Paed Anaes* 2001; 6: 711-8.

Acknowledgement

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BO2. EFFECT OF DEXMEDETOMIDINE SEDATION ON THE ELECTROENCEPHALOGRAM (EEG) OF CHILDREN AND RESEMBLANCE TO STAGE II OF NON-REM SLEEP

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Background

Dexmedetomidine is a highly selective α_2 adrenoreceptor agonist with effects useful for induction of sedation and immobility for children undergoing radiological imaging studies. Although dexmedetomidine has been described as inducing a cardiovascular and respiratory state similar to natural sleep, its effect on the EEG and similarity to natural sleep has never been described in children. We examined the effects of dexmedetomidine sedation on EEG background and epileptiform activity in children.

Methods

Selected EEG samples from 16 consecutive pediatric patients undergoing dexmedetomidine sedation for nuclear medicine scanning as candidates for epilepsy surgery were studied. All children underwent continuous EEG monitoring throughout the multiple-day hospital admissions, including during administration of dexmedetomidine sedation. Because, based on adult data, EEG background during dexmedetomidine sedation resembles onset of stage II (spindle) of non REM sleep, EEG samples during sedation were compared to comparable samples of stage II of non REM sleep: a sample following the appearance of the second sleep spindle during dexmedetomidine sedation was compared to a sample following the appearance of the second sleep spindle during natural sleep. RMS EEG power in the delta, theta, alpha, beta, and total power bandwidths were compared on a patient by patient basis. Likewise, the frequency of EEG spikes in each dexmedetomidine sample was compared to a corresponding sample in each patient during natural sleep.

Results

Visual analysis of the EEG during dexmedetomidine sedation showed a pattern consistent with stage II of non REM sleep. In comparing EEG samples during dexmedetomidine sedation to natural sleep samples obtained during the same admission, no significant differences were found in slow wave (delta and theta) or midrange (alpha) frequencies. A 44% increase in fast activity (beta) was statistically significant ($p = 0.05$, Student's paired t-test). A 26% average increase in spike frequency was seen in sedation samples compared to natural sleep samples ($p = 0.01$, Student's paired t-test). No new spike foci were noted during dexmedetomidine sedation.

Conclusion

The EEG of children undergoing dexmedetomidine sedation resembles onset of stage II of non REM sleep. EEG power analysis during dexmedetomidine sedation showed a mild increase in fast activity and a modest increase in spike frequency when compared to naturally-occurring stage II of non REM sleep. These features make dexmedetomidine a uniquely attractive agent for inducing a natural sleep-like state as well as for performing concurrent diagnostic EEG studies in children for whom such tracings cannot be performed in the awake state.

BO3. PREDICTION AND PREVENTION OF RESPIRATORY COMPLICATIONS IN PAEDIATRIC ANAESTHESIA

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Introduction

Respiratory adverse events (RAE) remain one of the major causes of morbidity and mortality in paediatric anaesthesia. Asthma, bronchial hyper-reactivity, upper respiratory tract infection and passive smoking are known and common risk factors. Identification of children at high risk for perioperative respiratory complications is crucial for the choice of the optimal anaesthetic management and for the prevention of the RAE.

Methods

We aimed to investigate potential additional risk factors from the patients history and characterising their correlation with the anaesthesia management and the occurrence of RAE (bronchospasm, laryngospasm, desaturation <95%, airway obstruction, coughing and stridor). We used questionnaires focusing on 1) detailed family and medical history 2) anaesthetic management and 3) any potential problems in the perioperative period. All children undergoing anaesthesia (elective or emergency) in our institution were prospectively assessed over a 12 month period.

Results

Questionnaires of 9297 children (of a total of 10496) were available for analysis. Table 1 depicts the risk factors that were associated with laryngospasm. While a recent cold within the last 2 weeks prior to anaesthesia was associated with the highest risk for respiratory complications, a cold within the last 2-4 weeks seemed to have a protective effect against respiratory complications compared with children who did not have a recent cold. Furthermore, symptoms associated with the cold had a major impact on the incidence of respiratory complications.

The results of the univariate analyses indicate the presence of additional perioperative respiratory risk factors: exercise induced wheeze, night cough, eczema, a family history of asthma and/or hay fever that were all associated with a higher risk for perioperative RAE. Bronchospasm, laryngospasm and desaturation were significantly more common 1) in premedicated children; 2) in children with inhalational induction vs i. v. induction and 3) with desflurane used for maintenance of anaesthesia. Perioperative respiratory complications occurred less during face mask anaesthesia than during either laryngeal mask airway or endotracheal intubation (the latter being associated with the highest risk).

Table: Odds ratio (95% confidence interval) for perioperative laryngospasm

	Current cold	Cold < 2 wks	Cold 2 < 4 wks
Overall	3. 2 (2. 4-4. 2), p=0. 005	4. 3 (3. 3-5. 7), p<0. 001	0. 4 (0. 2-0. 8), p<0. 001
Clear runny nose	2. 0 (1. 5-2. 8), p<0. 001	2. 1 (1. 5-3. 0), p<0. 001	1. 1 (0. 6-2. 0), p = 0. 67
Green runny nose	5. 0 (3. 2-7. 9), p<0. 001	8. 2 (5. 5-12), p<0. 001	0. 1 (0. 0-0. 6), p= 0. 02
Dry cough	2. 3 (1. 5-3. 3), p<0. 001	2. 2 (1. 4-3. 6), p<0. 001	0. 5 (0. 2-1. 3), p= 0. 15
Moist cough	4. 3 (3. 1-6. 0), p<0. 001	7. 9 (3. 7-11), p <0. 001	0. 1 (0. 0-0. 6), p=0. 01
Fever	2. 5 (1. 1-5. 4), p=0. 024	6. 3 (3. 8-11), p<0. 001	0. 6(0. 2-1. 5), p=0. 26
Episodes last 12 months	1-3	4-12	>12
Wheezing	1. 6 (1. 2-2. 3), p=0. 005	3. 1 (2. 1 -4. 7), p<0. 001	3. 4 (2. 0-6. 1), p<0. 001
Wheezing during exercise	3. 5 (2. 7-4. 6), p<0. 001	Dry cough at night	4. 2 (3. 3-5. 3), p<0. 001
	Mother	Father	Mother & Father
Passive Smoking	3. 5 (2. 2-5. 4), p<0. 001	0. 6 (0. 3-1. 2), p = 0. 158	4. 7 (3. 1-7. 0), p<0. 001
Induction	Sevoflurane vs. Propofol i. v.		3. 5 (2. 7-4. 4), p<0. 001
Maintenance	Isoflurane	Desflurane	Propofol
Agent vs Sevoflurane	0. 9 (0. 6-1. 2), p=0. 305	2. 3 (1. 5-3. 4), p<0. 001	0. 4 (0. 3-0. 6), p<0. 001
	LMA vs Face mask	ETT vs Face mask	LMA vs ETT
Airway management	8. 2 (2. 6-26), p<0. 001	15. 4 (4. 9-49), p<0. 001	0. 5 (0. 4-0. 7), p<0. 001

Conclusions

These preliminary results indicate that beside the known risk factors such as recent cold, bronchial hyperresponsiveness, other features obtained from the family and medical history contribute to identify high risk children for the occurrence of RAE. Furthermore, the anaesthesia management may precipitate the incidence of these complications. Therefore, decreasing anaesthesia morbidity requires a better selection of the patient and a stratified anaesthesia management in order to prevent the occurrence of perioperative RAE

BO4. CLINICAL STUDY ON PRACTICAL BLOOD VESSEL IMAGING SYSTEM FOR EFFICIENT VESSEL PUNCTURECuper N.⁽¹⁾, Verdaasdonk R.⁽¹⁾, Kalkman C.⁽²⁾, Malagon I.⁽²⁾, De Roode R.⁽¹⁾, Septer E.⁽³⁾*Medical Technology & Clinical Physics, University Medical Center Utrecht, Utrecht, Netherlands⁽¹⁾;**Dept. of Anesthesiology, University Medical Center Utrecht, Utrecht, Netherlands⁽²⁾;**Clinical Haematological Laboratory, University Medical Center Utrecht, Utrecht, Netherlands⁽³⁾**n. j. cuper@umcutrecht.nl***Introduction**

Puncturing a vein or artery for blood withdrawal or placement of intravascular cannulas can be cumbersome. In neonates it is further complicated by the vessel size and fat padding tissues in some skin areas. Multiple puncture attempts take a lot of valuable (OR) time. In a pilot on placement of arterial lines in babies of 0 – 3 years of age, we found mean time spend on the procedure to be 10 minutes with a maximum of 40 minutes. Our department has developed a practical vein viewing system. It is based on the physical principle of infrared (IR) transillumination. The device helps to visualize vessels underneath the skin to facilitate the puncture procedure. In contrast to commercial systems available, it is easy to use, small, flexible and relatively low cost, . With the help of the system, it is hoped that finding a vessel will become easier and the procedure will become more time efficient.

Methods

An initial study was performed in young children to find the baseline results for comparison with the use of the vessel viewing system measuring failure rate and time of manipulation underneath the skin, which is the most painful part of the procedure. In a prospective observational study the system was used in 45 patients, 0 – 6 years of age, during blood withdrawal procedures. The time duration of needle manipulation was divided in two groups. Patient characteristics such as age, skin color and baby fat were registered. Responses from the technicians are also evaluated. A one-tailed z-test was used for statistics.

Results

In the baseline study the failure rate (i. e. percentage of procedures where more than one puncture was necessary to gain blood) was 13 % in children of 0 – 6 years of age. With the use of the vessel viewing system, the failure rate reduced significantly to 2 %. Percentage of procedures with extended time of needle manipulation (longer then 15 s) decreased from 21 % to 7 %. Parameters like presence of baby fat and dark skin color did not show significant results due to the small group. The technicians reported a high degree of satisfaction and used the system on special request in 11 patients known to be difficult to puncture outside the study population (the estimated failure rate of 100 % dropped to 27 %).

Discussion and Conclusions

The system proved to be effective in the procedure of blood withdrawal. Pain and trauma were decreased and the technicians found it flexible and easy to use. A feasibility study was performed on the use of the system for the procedure of arterial line placement. The system was able to visualize the arteries and guide the anesthetist in puncturing the artery, especially if no tactile information (i. e pulse) was available. An extensive study on this subject is ongoing.



BO5. MIDAZOLAM-CAUDAL ADDITIVE IN CHILDREN**Pekovic-Zrnić V. , Tatić M. , Uram-Benka A.***Institute for Child and Youth Health Care of Vojvodina, 21000 Novi Sad, Vojvodina, Serbia**vpekovic@yahoo.com***Introduction**

Pediatric regional anesthesia has gone through significant development with advances in pharmacology and block techniques. Caudal epidural anesthesia in combination with general anesthesia provide safe, reliable and efficient analgesia/anesthesia for general pediatric surgical patient in: lower abdominal and extremity surgery, newborn and premature infants, neuromuscular disease and malignant hyperthermia. The main disadvantage of this technique is the short duration of action after a single injection of local anaesthetic solution. The use caudal catheters to administer repeated doses or infusions of local anaesthetic solutions is not popular because of concerns about infections and complications. These technique can be modified to extend analgesia into the postoperative period with the addition a variety of agents (epinephrine, opioids, ketamine, clonidine, midazolam, tramadol . . .).

The aim of our study was to evaluate caudal epidural anesthesia after a single injection of local anaesthetic solution 0, 25% bupivacain 2, 5 mg. kg⁻¹ and after addition of midazolam 50 microg. kg⁻¹.

Methods

Randomized prospective study including 60 patients ASA group I-II, age 1-7, having elective surgery of short duration (mean 45+/-10 minutes). After premedication with midazolam 0, 5 mg. kg⁻¹ per os, anesthesia was induced with propofol 3 mg. kg⁻¹ iv. An infusion of propofol at 5-10 mg. kg⁻¹ /h in O₂/air mixture began immediately after induction. Neuromuscular blockade for intubation was rocuronium 0, 5-0, 7 mg. kg⁻¹ iv. Monitoring includes NIBP, ECG, SaO₂, end-tidal CO₂, neuromuscular blockade and temperature. The whole study group (60) was divided in two equals parts of 30 patients.

Group 1 Caudal epidural block be used as a "single shot" technique with bupivacain 0, 25 % 2, 5 mg. kg⁻¹. Group 2. Caudal block be used as a "single shot" technique too with bupivacain 0, 25 % 2, 5 mg. kg⁻¹ with midazolam 50 microg. kg⁻¹.

Results

Haemodynamic data et all measuring points have been without significant differences in both methods caudal anesthesia. Five patients (16, 6%) in group 1 developed incomplete block. No undesirable side effects were observed. After a single injection of local anesthetic solution medium duration of analgesia is 7 h 10 minute (group 1). The combination of caudal midazolam and bupivacain significantly increased the duration of analgesia compared with bupivacain alone. A mean duration analgesia in this group is 20h 20 minute (group 2). This combination was not associated with prolonged sedation, respiratory depression or motor block.

Discussion

Caudal anesthesia is a safe method of anesthesia in pediatric patients. It can be used combined with general anesthesia as the sole local anesthetic agent or combined with midazolam. This combination provide significant prolonged postoperative analgesia without complications. It is a safe technique for intra-and postoperative analgesia in children.

BO6. ULTRASOUND ASSESSMENT OF CAUDAL EPIDURAL CATHETERS IN INFANTS: DO THEY MIGRATE ONCE POSITIONED?**Walker A. , Moriarty T. , Bagshaw O.***Birmingham Children's Hospital, Birmingham, United Kingdom**tony.moriarty@bch.nhs.uk***Introduction**

It is accepted that epidural catheters in adults can migrate in the epidural space, resulting in inadequate analgesia (1, 2). Therefore, usually only 4-5cm of catheter is left in the space. In neonates the caudal epidural catheter (CEC) is an effective method of analgesia, but requires a long length of catheter to be inserted into the space to reach the required dermatome. It is not known if catheter migration occurs in these patients, so the aim of the study was to determine if the CEC tip moved following insertion in a group of infants undergoing abdominal surgery.

Methods

Ethical approval was sought from the local and national Ethics Committees. They both declared that ethical approval was not required for the study. All infants who were to have CECs placed as part of their analgesic regimen were eligible for the study. The CEC was inserted by an anaesthetist after assessing the length of catheter needed and the optimal final tip position. At the end of the procedure one of the authors inspected the catheter tip position by ultrasound (SonoSite MicroMaxx®). The actual position of the tip was determined and marked on the patient's back. 24 hours later the position of the tip was reassessed to observe if there had been any movement.

Results

17 infants with a mean age of 5.6 weeks (range 1 day to 17 weeks) were studied. In two patients the CEC was removed before follow-up assessment. Both children had been comfortable, but were excluded from the analysis. In all but one of the remaining patients the catheter tip was easily seen. In that patient the CEC could be visualised in the longitudinal, but not transverse plane. All the infants had good analgesia and the tip of the CEC had not moved in any patient after 24 hours.

Discussion

Ultrasound scanning has been advocated to ensure accurate epidural catheter placement, but is still not routinely used (3). At present it is assumed that following insertion a CEC is correctly placed and that the tip stays in place. In infants with CECs it is not known if inadequate analgesia may be due to catheter migration. We have demonstrated in a number of patients, that once correctly positioned, the catheter tip does not move, and thus clinicians can have confidence in the technique.

Differentiation between pain and other causes of distress is notoriously difficult in this age group. Subsequently, we have used this technique in 3 patients who were distressed postoperatively. Inspection of the catheter tip position confirmed that the CEC had been placed too low. This allowed the children to be converted to morphine analgesia earlier than might have occurred otherwise.

References

1. Bishton IM, Martin PH, Vernon JM, Liu WH . Factors influencing epidural catheter migration. *Anaesthesia*. 1992 Jul;47(7):610-2.
2. Crosby ET. Epidural catheter migration during labour: an hypothesis for inadequate analgesia. *Can J Anaesth*. 1990 Oct;37(7):789-93.
3. Chawathe MS, Jones RM, Gildersleve CD, Harrison SK, Morris SJ, Eickmann C. Detection of epidural catheters with ultrasound in children. *Paediatr Anaesth*. 2003 Oct;13(8):681-4.

