1. Impact of caudal block on postoperative complications in children undergoing tubularised incised plate urethroplasty for hypospadias repair: a retrospective cohort study

Kim MH, Im YJ, Kil HK,Han SW**,** Joe YE & Lee JH

Anaesthesia 2016; **71**(7): 773-778

Caudal block may cause penile engorgement during hypospadias repair. This study looked at caudal blockade and complications after tubularised incised plate (TIP) urethroplasty. It is a retrospective review of records of patients, less than 8 years old, undergoing primary TIP urethroplasty under general anaesthesia at a tertiary medical centre, over 5 years. There was a single paediatric urologist with standardised protocolised surgical management. Follow up was for 6 months. 342 patients were included for analysis. Caudal block was associated with significantly lower intra-operative and post-operative fentanyl doses. The following independent risk factors for complications after TIP urethroplasty were identified: surgical duration; caudal block; and mid-shaft and proximal hypospadias type. Caudal block was associated with a 2.1-fold increased risk of postoperative complications (odds ratio (OR): 2.08, 95% CI: 1.14-3.81, p = 0.018). Intra-operative penile engorgement may increase the tension on the surgical sutures and thus may be associated with urethral fistula formation. Decision to perform caudal block was made at the anaesthetist's discretion so there is a risk of selection bias. Anaesthetic management may have differed between patients who did and did not receive caudal block. The underlying mechanism, which increases the risk of surgical complications, was not identified.

2. Anesthetic management of 877 pediatric patients undergoing muscle biopsy for neuromuscular disorders: a 20-year review

Shapiro F, Athiraman U, Clendenin DJ, Hoagland M & Sethna NF.

Paediatric Anaesthesia 2016; **26**(7): 710-721.

This retrospective study examines the anaesthetic management of 877 consecutive muscle biopsies for childhood neuromuscular disorders (NMD), their susceptibility to rhabdomyolysis and malignant hyperthermia (MH) and pre- and postoperative diagnoses. 84.2% of patients did not receive volatile agents. 46.6% were diagnosed with a specific neuromuscular disease (NMD), while 53.4% had no diagnosis. None of the 877 patients exhibited signs or symptoms of anaesthesia-induced muscle injury (MH, rhabdomyolysis, cardiac arrhythmias or arrest). There were no incidences of postoperative deterioration of muscle weakness (tachypnoea, pneumonia, or prolonged ileus) or admissions for deterioration of respiratory, cardiac, metabolic, or mental status changes. Many muscular dystrophies and myopathies are now diagnosed by gene studies rather than tissue biopsies. The relatively low yield of definitive

tissue diagnoses (46.6%) is important in choosing anaesthetic management. Anaesthesia-induced acute rhabdomyolysis is more common than MH in patients with NMD. Broad associations, often made from single case reports involving life-threatening complications, have led some to advocate avoiding volatile agents and succinylcholine in all suspected cases of NMD. For others, this is not warranted due to lack of evidence, value of volatile anaesthetics and potential disadvantages of alternative techniques. Some of these cases were managed with volatile agents without negative sequelae. It is also noted that exclusive use of TIVA does not completely eliminate the risk of MH. There is probably very low incidence of hyperkalaemia or MH in patients suspected of NMDs undergoing muscle biopsy. Increased awareness of anaesthesia-related concerns with potential NMD directs management along safe pathways.

3. Introduction of a paediatric anaesthesia comic information leaflet reduced preoperative anxiety in children

Kassai B, Rabilloud M, Dantony E, Grousson S, Revol O, Malik S, Ginhoux T, Touil N, Chassard D & Pereira de Souza Neto E

British Journal of Anaesthesia 2016; **117**(1): 95-102

50–75% of children undergoing surgery develop preoperative anxiety. This correlates with poor clinical recovery and complications that can persist up to six months. Anaesthesia has been cited as the most anxiety-provoking element preoperatively. This was a multicentre, open-label, parallel-group randomised trial conducted in Lyon, France (three sites), involving 6 - 17 year olds. Baseline anxiety levels and levels of understanding were evaluated. The control group received verbal information, as usually given by the anaesthetist during the pre-anaesthesia consultation. The intervention group received similar oral information in addition to the comic information leaflet sent to their home a few days before hospitalization. 111 children completed the study. 90% found the leaflet useful and 86% found it comforting. Among parents, 93.5% found it useful and 91.3% comforting. In the intervention group, the mean anxiety score was decreased and in the control group it increased. This difference was statistically significant (P=0.002) and persisted on the day of hospitalisation. The benefit was not affected by Verbal Comprehension Index, or the level of parents' and children's trait anxiety. Children enrolled at the neurosurgery centre, who had a higher anxiety score at baseline, probably benefited more. Subgroup analyses did not show an influence of age, a history of surgery, or chronic disease on the anxiety score.

4. Could acupuncture be an adequate alternative to dexamethasone in paediatric tonsillectomy?

Moeen SM

Pediatric Anesthesia 2016; **26**(8): 807–814

A prospective randomised double blind study comparing dexamethasone to acupuncture in reducing the incidence and severity of postoperative vomiting (POV) (retching or vomiting) in 120 children (ASA 1-3), aged 2-8 years, undergoing tonsillectomy with or without adenoidectomy. Exclusions: any child with a history of motion sickness, past POV or premedication. Standardised anaesthetic technique: induction with 8% Sevoflurane in oxygen, fentanyl 2mcg/kg, paracetamol 15mg/kg, no neuromuscular blocker, and awake extubation. Standardised surgical technique: dissection with or without electrocoagulation. Study groups randomised to IV dexamethasone 0.15mg/kg plus sham acupuncture at induction, or 2ml NaCl 0.9% IV plus acupuncture at P6 bilaterally and CV13. One anaesthetist provided the standardised anaesthetic, whilst another anaesthetist provided the randomised antiemetic prophylaxis and acupuncture or sham acupuncture. The POV was evaluated at three time points: early (0-6 h), late (6-24 h) and total (0-24 h). The postoperative pain scores were recorded at 30 min, 2, 6, 12, 18 and 24 h. Results: no statistically significant difference between the 2 techniques for POV; a statistically significant but not clinically significant late analgesic benefit using dexamethasone. Note an editorial accompanies the article.

5. Sugammadex for reversal of rocuronium-induced neuromuscular blockade in pediatric patients. A systematic review and meta-analysis

Won YJ1, Lim BG, Lee DK, Kim H, Kong MH, Lee IO

Medicine 2016; **95**(34):e4678

The first meta-analysis of sugammadex in the pediatric population. The main message: sugammadex is effective in reversing rocuronium-induced neuromuscular blockade in paediatric patients, but more robust data is required to support this. 6 trials were included, 253 patients ranging from 2 years to 18 years. 129 patients received 2 mg/kg or 4 mg/kg of sugammadex. 124 control cases received placebo or neostigmine. Primary outcome: time to train of four (TOF) ratio >0.9, secondary outcomes: time to extubation and the incidence of adverse events. There were significantly shortened times to TOF >0.9 and to extubation, and no significant difference between vomiting, airway spasm, desaturation, or cardiovascular complications. Response to muscle relaxants and reversal agents varies with age due to dynamic pharmacokinetic and pharmacodynamic profiles, and there have been worries regarding risk of adverse events with sugammadex in the paediatric population. This paper

demonstrated some evidence to allay these concerns, but the data is limited and of generally poor quality (lack of blinding, high bias, incomplete outcome data). This paper did not address sugammadex action in rapid reversal of muscle relaxant from profound neuromuscular block. The European Medicines Agency maintains sugammadex is only suitable in 2-17 year olds at 2 mg/kg, and is not recommended for rapid recovery.

6. Predictors of unanticipated admission following ambulatory surgery in the pediatric population: a retrospective case–control study

Whippey A, Kostandoff G, Ma HK, Cheng J, Thabane L & Paul J

Pediatric Anesthesia 2016; **26 (8)**: 831–837

Case control study looking at the predictors and reasons for unanticipated admission after ambulatory surgery in a tertiary paediatric single centre in Canada. Data from 2005 to 2012, children >60 weeks post conceptual age up to 18 years old. Unanticipated postoperative admissions up to 24hrs from the time of surgery were included and compared to a random control group. There was a 0.97% unanticipated admission rate in 21957 ambulatory surgical cases (less than the adult population of 2.67%). 47% of these were anaesthesia related, most commonly postoperative hypoxia (33%), inadequate pain control (23%), and PONV (20%). 34% were surgery related, most commonly structural injury (25%), inadequate pain control post discharge (19%), and bleeding (16%). Characteristics predictive of admission included age <2 years; ASA class≥3; surgery longer than 1 h; completion of surgery after 3 pm; obstructive sleep apnoea; orthopaedic surgery; dental surgery; ear, nose, and throat surgery; and the occurrence of intraoperative events (laryngospasm most common).

7. Cuffed endotracheal tubes in neonates and infants undergoing cardiac surgery are not associated with airway complications

DeMichele J, Vajaria N, Wang H, Sweeney DM, Powers KS, Cholette JM

Journal of Clinical Anesthesia 2016; **33**: 422-427

This retrospective single-centre study (2008-2013), was set up to determine the incidence of post-operative airway complications in infants <5.0 kg undergoing cardiac surgery intubated with MicroCuff® endotracheal tubes (ETTs). The primary outcome was development of tracheal stenosis and/or reintubation for stridor. Secondary outcomes were variables contributing to post-extubation stridor and exclusions included infants with a tracheostomy, airway anomalies, and death prior to initial extubation. They performed logistic regression analysis evaluating the association between clinical risk factors and the incidence of post-

extubation stridor. 208 infants where recruited; 12 subjects were excluded (death prior to extubation). Results showed no infant developed tracheal stenosis and incidence of any stridor was 20.9% (95% CI, 15.8%-27.1%) with severe stridor in 2 cases (1%) requiring reintubation. Age at surgery, weight, duration of intubation, dexamethasone use, and ETT size were not significantly associated with post-extubation stridor. Presence of comorbidity was significantly associated with stridor (P = .01). They concluded that MicroCuff® ETTs in infants <5.0 kg undergoing cardiac surgery were associated with a low incidence of severe post-extubation stridor. Cuffed ETTs allow for improved control of ventilation/oxygenation and decreased risk of aspiration and should be considered for use in this high-risk population.

Further reading:

Sathyamoorthy M, Lerman J, Asariparampil R, Penman AD, Lakshminrusimha S. Stridor in neonates after the use of the MicroCuff® and uncuffed tracheal tubes: a retrospective review. *Anesth Analg*. 2015; 121: 1321–1324

8. Use of cuffed tracheal tubes in neonates, infants and children: A practice survey of members of the Society of Pediatric Anesthesia

Sathyamoorthy M, Lerman J, Okhomina VI, Penman AD

Journal of Clinical Anesthesia 2016; **33**: 266–272

This snapshot survey (Dec 2013 - Feb 2014) aimed to characterize the current practice patterns with cuffed tracheal tubes (CTT) in neonates, infants, and children among members of the Society of Pediatric Anesthesia (SPA).

Of the 805 (28% of the 2901 members) responses, 91.9% were from North America, 2.6% Europe and 5.5% other. 83% were fellowship trained, 82% practiced paediatric anaesthesia >50% of the time, and 65% practiced in academic centres. The following results were obtained: 85% used CTT >50% of the time in children >2 years and 60% used CTT in full-term neonates >50% of the time. 29% reported always using CTT, whereas 5% reported never. Those in practice <5 years, who were fellowship trained or in academic practice used CTT more often in neonates compared with those in practice >20 years, not fellowship trained or in private practice (P< .0001, P= .0003 and P= .0005, respectively). The most common reason for avoiding CTT was concern about post-extubation stridor (39%). Almost 70% of respondents accept the TT if it passes the subglottis without resistance and has a leak at 15 to 20 cmH_2O. Despite TT cuff pressure measurement being recommended, >60% of respondents do not do this. Overall concluding a majority of SPA members routinely use CTT in neonates, infants and children.

Further reading:

Boerboom SL, Muthukrishnan SM, De Graaff JC, Jonker G. Cuffed or uncuffed endotracheal tubes in pediatric anesthesia: a survey of current practice in the United Kingdom and The Netherlands. *Paediatr Anaesth* 2015; **25**: 431–432.

Survey of 845 members of the Association of Paediatric Anaesthetists of Great Britain and Ireland and 235 members of the Section of Paediatric Anaesthesia in the Netherlands (response rate of 34%), found only 33.5% British and 47.3% Dutch members used neonatal cuffed endotracheal tubes.

9. Paediatric difficult airway management: what every anaesthetist should know!

Jagannathan N, Sohn L, Fiadjoe JE.

British Journal of Anaesthesia 2016; **117** Suppl 1:i3-i5.

Response letter:

Second generation supraglottic airway devices are as effective and likely to be safer in children

Fiona E Kelly

British Journal of Anaesthesia published online June 10, 2016

The editorial by Jagannathan et al, discusses the reduction of airway management related morbidity and mortality in anaesthetised children. Experience from their multicentre study of 1018 children with difficult airways in 13 paediatric centres leads them to explore three important points:

(i) the contributing factors for severe complications in this population;

(ii) the important role of the supraglottic airway (SGA) in managing these patients; and

(iii) the ideal method of invasive airway access when oxygenation is compromised.

Kelly reminds us of the fourth National Audit Project (NAP4). NAP4 found aspiration to be the most common cause of death following an anaesthetic airway complication, with first generation SGAs often implicated. Kelly wrote to emphasise that second generation SGAs should be available for both routine and rescue airway management as advised by NAP4.

10. Intraoperative complications in pediatric neurosurgery: review of 1807 cases

van Lindert E, Arts S, Block LM, Hendriks MP, Tielens L, van Bilsen M, Delye H

Journal of Neurosurgery: Pediatrics 2016; **18** (3): 363-371

Complications after pediatric neurosurgical procedures (30 days) are relatively frequent (16-20%). Very little is published on intraoperative complications.

A clinical complication registration database of all paediatric neurosurgical procedures carried out (Jan 2004 - July, 2012) in a single centre in the Netherlands was analysed. 1807 procedures were performed on patients under 17 years old. 64 intraoperative complications occurred in 62 patients (3.5% of procedures) with an intraoperative mortality of 0.17% (n = 3). 78% of the complications (n = 50) were related to the neurosurgical procedures, most commonly in cerebrovascular surgery (7.7%) and tumour surgery (7.4%). 22 % (n = 14) of complications were related to anaesthesia: cardiovascular/haemodynamic (n=3): including arrhythmia resulting in death, hypothermia (n=2), hypoxaemia (n=2) due to tracheomalacia, respiratory (n=4) including laryngospasm, atelectasis and aspiration, allergic (n=1), misc. (n=1). Overall the intraoperative anaesthetic complication rate was 0.8%. This falls below figures quoted in paediatric literature for intraoperative anaesthetic complications across all surgeries and within neurosurgery. The authors conclude there may be underreporting of cardiovascular and respiratory complications, as definitions were not strictly defined before starting registration.

Compiled by Dr Victoria Ferrier, Dr Beki Baytug and Dr Baljit S Phull

Edited by Dr Natasha Woodman