Welcome to issue 18 of Anaesthesia Research Review.

As some of you are aware, I was recently given the opportunity in Dunedin to talk about what’s been happening in the anaesthesia ‘literature’ (apologies to the bard) in the last year. This review probably continues to reflect the frequency with which papers concerning regional anaesthesia appear. I have not included any of what have unluckily been called ‘database trawls’ concerning orthopaedic outcomes on this occasion. However, I would recommend an article (Br J Anaesth 2013;111[4]:532–4) that, whilst written by someone who undertakes such studies, presents a good overview of the strengths and weaknesses of this type of ‘research’. For those interested in alternatives to epidural for truncal analgesia there are a couple of papers that may be of interest.

Monitoring of consciousness also seems to have been the subject of several papers, and I sense that there is a growing awareness (no pun intended) that the subject is a lot more complex than us rank-and-file anaesthetists suspected and that BIS is not the complete answer. One of the papers reviewed here looked at the isolated forearm – something I have never used other than as part of anaesthesia for ECT, and then not to demonstrate wakefulness!

There follow a handful of assorted studies with a couple of suggestions from yours truly for future research projects – including a database trawl!! If that is not enough and you want some lighter reading, I strongly recommend an article by Raj Haridas about ‘humbug’ (Anaesthesia 2013;118[6]:1014–22). Then again, if it is more current ‘humbug’ that appeals, try the cover story in The Economist of October 19.

Good reading, a Merry Christmas and Happy New Year.

Kind regards,
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Postoperative pain relief after total hip arthroplasty: a randomized, double-blind comparison between intrathecal morphine and local infiltration analgesia

Authors: Kuchálik J et al.

Summary: This noninferiority trial randomised patients undergoing THA to postoperative intrathecal morphine 0.1mg or perirarticular ropivacaine 300mg, ketorolac 30mg and adrenaline (epinephrine) 0.5mg (total volume 151.5mL), with saline (morphine group) or a further 150mg, 30mg and 0.1mg of each respective perirarticular agent administered after 24 hours.

No between-group difference was seen for rescue morphine consumption during 0–24 hours, but the local anaesthetic group used a median of 3mg less than the morphine group during 24–48 hours (p<0.01) as well as significantly less paracetamol (acetaminophen) and tramadol. Resting pain scores were lower in the morphine group at 8 hours (p<0.01), but standing and mobilisation pain scores were lower in the local anaesthetic group during 24–48 hours (p<0.01). The local anaesthetic group also had significantly less pruritus, nausea and vomiting.

Comment: Many studies looking at postoperative pain have differences in methodology that make comparisons with earlier work difficult and may limit applicability to our own practice. In this instance both groups received spinal anaesthesia with 17.5mg of bupivacaine 0.5% (‘solid’ dose!) so there is no regional/general anaesthesia comparison here. The analgesic benefit of the local anaesthetic group was seemingly dependent on the presence of a wound catheter and a ‘top-up’ 24 hours postoperatively – a technique which, in my experience, is relatively unpopular. That being said, the characteristic side effects of intrathecal morphine were seen significantly more in that group despite a dose of only 0.1mg. One of the challenges for us is knowing what our patients (often in retrospect) will regard as a desirable outcome – is a bit more pain/IV morphine better than pruritus and nausea? For those wanting more insight into ‘patient satisfaction’, a recent review by Heidegger et al. is worth reading (Anaesthesia 2013;68[11]:1195–72).


Abstract

2014 Combined AACA and ASURA
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Recovery after total intravenous general anaesthesia or spinal anaesthesia for total knee arthroplasty

Authors: Harsten A et al.

Summary: Patients undergoing fast-track TKA (n=120) were randomised to receive spinal anaesthesia with intrathecal bupivacaine or general anaesthesia with a target controlled infusion of propofol and remifentanil. Compared with spinal anaesthesia, general anaesthesia was associated with: i) a significantly shorter length of hospital stay (primary outcome; 46 vs. 52h; p<0.001); ii) significantly less nausea and vomiting (p<0.05) and dizziness (p=0.05); iii) significantly higher pain scores during the first 2 postoperative hours, but lower scores >6 postoperative hours; iv) significantly fewer PCA doses and less morphine; v) significantly quicker ambulation recovery; and vi) a significantly lower likelihood of a patient request for change in anaesthesia method in the event of a subsequent procedure.

Comment: As opposed to the previous study looking at TKA (versus THA), this one compared the effects of intraoperative techniques – general anaesthesia versus regional (spinal) anaesthesia, but without intrathecal opioid. All patients received ~150mL of ropivacaine 0.2% into the wound during closure and the same perioperative analgesic protocol (paracetamol [acetaminophen], celecoxib, PCA and oral oxycodone). Some of the differences seen are not surprising (more orthostatic dysfunction in the spinal anaesthesia group and because of the near 3-fold increased use of morphine postoperatively, more postoperative nausea and vomiting). What is unexplained is why the spinal anaesthesia group had so much more pain. Two comments provide some insight into possible differences between our own and the health system in which the study was undertaken ‘patients met the PACU discharge criteria on arrival. Thus, many TKA patients can bypass PACU and go directly to the ward…’ and ‘…subjects… were able to walk 5 m after 6 h’: However despite the general anaesthesia group reaching criteria for discharge earlier, there was no difference seen in the time until actual departure from hospital, largely for ‘organisational’ reasons – sound familiar? Of interest is the investigators’ measurement of patient satisfaction and future choice of anaesthetic technique. Whilst the result was not unexpected (general anaesthesia preferred – probably because of the ‘unusual’ pain and consequent side effects seen in the spinal anaesthesia group), the inclusion of this as an ‘outcome’ reinforces the increasing importance of this as a factor to be considered. Needless to say this study was not powered to look at less common adverse outcomes that have been increasing importance of this as a factor to be considered. Needless to say this study was not powered to look at less common adverse outcomes that have been


Serratus plane block: a novel ultrasound-guided thoracic wall nerve block

Authors: Blanco R et al.

Summary: This research investigated a novel ultrasound-guided serratus block at two different levels in the midaxillary line for hemithorax paravertebral anaesthesia in four female volunteers. An effective block with paravertebral anesthesia lasting 750–840 minutes with no adverse events was seen in all four volunteers. It was noted that these preliminary findings need confirmation with a clinical trial.

Comment: Arguably this study sits on one of the lower tiers of ‘evidence’, as it was undertaken on four subjects, and there was neither a ‘control’ group nor any apparent blinding when the spread or duration of the blocks was assessed. That being said, the injection of local anaesthetic superficial to serratus appears relatively simple and provided a more consistent, longer lasting loss of sensation. An accompanying editorial (Anaesthesia 2013;68(1):1103–6) provides a good review of regional techniques to provide analgesia for hemithoracic surgery, and notwithstanding the authors apparent preference for paravertebral block suggests that further investigation of serratus block is warranted. Setting aside the eventual clinical role of the technique, this study is of interest because of the investigation of local anaesthetic spread possible in such volunteer studies.


Reference: Anaesthesia Research Review

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Now Fully funded under section H of the Hospital Medicines List (HML).*
Duration of analgesic effectiveness after the posterior and lateral transversus abdominis plane block techniques for transverse lower abdominal incisions

Authors: Abdallah FW et al.

Summary: This meta-analysis of 12 RCTs on TAP blocks in 641 patients undergoing lower abdominal transverse incision surgery found that compared with control procedures, TAP block using the posterior technique (four RCTs), but not lateral technique (eight RCTs), was associated with significant reductions in morphine consumption of 9.1mg during postoperative 12–24 hours and 5mg during postoperative 24–48 hours, as well as reductions in rest pain scores at 24, 36 and 48 hours, and dynamic pain scores at 12, 24, 36 and 48 hours.

Comment: This study also investigated nerve block for ‘truncal analgesia’, albeit using bilateral, ‘single-shot’ TAP blocks for lower transverse abdominal incisions. In principle, this study ranks above the previous one in the hierarchy of evidence. However, in attempting to determine if one block was better than the other, the authors found that no study had directly compared them, and that the localisation techniques used had differed with ultrasound being used much more in the performance of the lateral block. Given that ‘block failure’ due to ‘misplacement’ of the local anaesthetic is less likely when ultrasound is used (?), anatomical factors affecting the spread and the relative proximity of the paravertebral space were suggested to explain the differences in the two techniques. Despite its relative popularity, the efficacy of bilateral lateral TAP block in this setting, beyond the initial postoperative12 hours, is underwhelming, and arguably its continued use needs to be based on a demonstration that it is at least equivalent to a posterior block. Although chronic postsurgical pain was not being examined part of this analysis, it was noted that pre-incisional posterior TAP block was reported to reduce its incidence.


The ability of bispectral index to detect intra-operative wakefulness during isoflurane/air anaesthesia, compared with the isolated forearm technique

Author: Russell IF

Summary: These researchers used a BIS range of 55–60 to guide isoflurane/air administration (along with atracurium) in 34 women undergoing major gynaecological surgery, with intraoperative responsiveness (isolated forearm technique) used to assess whether BIS predicted/identified the patients’ appropriate hand movements in response to commands. BIS had sensitivity and specificity for detecting responses to commands of 53% and 69%, respectively, and a positive predictive value of 5%. The median BIS associated with intraoperative response was significantly lower than with postprocedural eye opening (60 vs. 77; p=2.25 × 10−8), while end-tidal isoflurane concentration was significantly greater (0.3 vs. 0.2; p=7.36 × 10−8). BIS values for responses were not consistent among women who exhibited >1 intraoperative response. None of the women recalled the procedure or the recorded commands, and only one reported dreaming.

Comment: At the recent Dunedin ASM, Jamie Skeigh showed an ‘impressive’ video clip of what is being described here. The isolated forearm technique, despite being around for 55 years, has not been used much, but recently has been the subject of recent editorials (Anaesthesia 2013;68[7]:677–83) largely because it seems able to differentiate between ‘awareness with recall’ and what is described in this study as ‘intraoperative wakefulness’. The discussion accompanying this study provides an enormous amount of information regarding our current knowledge concerning the intraoperative monitoring of ‘consciousness’, but does not tell us what the significance of intraoperative wakefulness is. Citing a similarly small study, the author said intraoperative wakefulness assessed using the isolated forearm technique appears associated with neither implicit nor explicit recall, and suggested that such “wakefulness” may occur at an “early level of consciousness where no encoding or retrieval into long-term memory occurs”. It remains to be seen if the isolated forearm technique use increases, but in the meantime there is perhaps another reason to avoid complete NMB when it is not required, accepting that this may add further complexity to interpretation of the BIS. For those searching for another clue in this puzzle, a recent study (Anaesthesia 2013;68[11]:1141–7) demonstrated different levels of intraoperative prolactin levels and recall with no apparent difference in BIS scores, and noted a possible role of prolactin and cortisol in memory formation.


Abstract
Impact of bispectral index for monitoring propofol/remifentanil anaesthesia

Authors: Bresil P et al.

Summary: Patients scheduled for ear, nose and throat surgery (n=157) were stratified by age group and type of operation, and randomised to receive total IV anaesthesia with propofol and remifentanil guided by BIS or according to conventional clinical practice in this RCT. Compared with the control group, children aged 1–3 years from the BIS group were extubated longer (p=0.04), and those aged 12–17 years required higher maintenance propofol infusion rates (p=0.02); no significant between-group differences were seen in the 4–11-year and 18- to 65-year age groups.

Comment: In this study, BIS was investigated simply to determine if it could reduce drug doses and time to eye opening following total IV anaesthesia for ear, nose and throat surgery. None of the subjects in this study received NMBs nor, other than recording the BIS value, was there any attempt to assess consciousness levels other than by observing motor responses to stimuli and time to ‘waking’. Given the difficulties surrounding BIS interpretation in younger children and when there may be significant amounts of facial electromyographic activity, the results are perhaps not surprising. Despite the shortcomings of the study, it suggests that total IV anaesthesia per se is not a reason to use BIS.

Abstract

The stability of a sulphite-free epidural analgesic solution containing fentanyl, bupivacaine, and adrenaline

Authors: Brustugun J et al.

Summary: These authors reported on a sulphite-free epidural infusion solution of adrenaline (epinephrine) 2 μg/mL, fentanyl 2 μg/mL, bupivacaine 1 mg/mL and dextrose 0.9% stored at 2–8°C for 4.5 months. At the end of the storage period, the solution contained 97.5% adrenaline, 100.9% bupivacaine and 102.6% fentanyl, the pH was maintained between 4.76 and 4.79, it remained clear, and its weight was 99.9% of its initial weight. Stability was maintained at room temperature for 7 days. In addition, an 11-fold more potent concentration remained >90% stable during 9 months of storage at 2–8°C.

Comment: With the advent of ropivacaine and levobupivacaine, there has been less need for adrenaline to be added to local anaesthetic solutions, although there are still reasons, one of which is cited here, why it may add benefit. For many anaesthetists, equal to the risk of allergy is that of possible sulphite neurotoxicity when commercially prepared adrenaline-containing local anaesthetic solutions are injected into the neuraxis. Thus a solution containing an effective stabilising substance that is thought to be non-neurotoxic (US FDA approved for epidural injection at concentrations several hundred-fold greater than the one used in this study) has obvious appeal. A study looking at the growth of micro-organisms in the solution described here and similar ones without stabiliser would be of interest.

Abstract

Dental injury after conventional direct laryngoscopy

Authors: Mourão J et al.

Summary: This prospective observational study of 536 adults who had undergone classic direct laryngoscopy for tracheal intubation reported dental damage affecting 147 maxillary and 15 mandibular teeth in 25% of the patients. The most common damage was enamel fracture. Significant risk factors for dental injury included the interincisor gap in tooth number 21 (odds ratio 2.5 [95% CI 1.0, 5.9]) and the teeth in 25% of the patients. The most common damage was enamel fracture. Significant risk factors for dental injury were: i) age (odds ratio 0.98 [95% CI 0.97, 0.99]); ii) otolaryngology surgery (2.92 [1.08, 7.95]); and iii) NMB use (3.49 [1.50–8.11]). There was no association between difficult BMV and dental intubation (which had an incidence of 1.2%).

Comment: Whilst factors likely to give rise to airway problems in children are well described, those associated with unexpected difficult BMV have not been studied before. Disappointingly, only 484 cases were ‘studied’ over a 3-year period and there is no detailed information on exactly when or by whom the difficulties were encountered. That being said, non-specialist paediatric anaesthetists are likely to meet this patient population, and so the heterogeneity of the practitioners in this study is representative of the real world. The criteria that defined difficult BMV were similar to those used in adult studies; i.e. >2 of the following during BMV: i) application of continuous positive airway pressure 5cm H2O; ii) required use of oral/nasal airway; iii) need for 2-person ventilation; iv) desaturation <95%; and v) unanticipated need to increase FiO2 (inspired fraction of oxygen). Children with any of the following were excluded: congenital craniofacial malformations, C-spine instability or a prior history of difficult BMV (those with a history of obstructive sleep apnoea were included). There was only a ‘trend’ towards difficult BMV in children with obstructive sleep apnoea and/or those who were overweight. Whilst an association with (younger) age and otolaryngological surgery are not unexpected, the link with the use of NMBs is, in the adult literature there have been several studies suggesting NMBs can make BMV easier, and it may be that this study points to a difficult BMV in children being of a different aetiology, with it less often being associated with glottic closure. Articles and correspondence over the last 2–3 years have discussed the issue of NMBs and difficult BMV in adults [6, 8]. A meta-analysis [3, 513–313–7] and Anaesthesia 2011;66[8]:519–31] – perhaps the subject will now be further investigated in paediatrics.

Abstract

The influence of timing on the effectiveness of epidural blood patches in parturients

Authors: KoKo M et al.

Summary: This research reviewed the use of 151 EBPs received by 129 parturients over 13 years for postdural puncture headache following spinal (n=49), epidural (n=47) or spinal-epidural (n=33) blocks. The procedure yielded a success rate of 89%, and 76% resulted in permanent relief overall. Permanent relief with the first procedure occurred in 86% of parturients who received it at >48 hours, compared with 65% and 50% in those who received it at 24–48 hours and <24 hours, respectively (p=0.003). Five parturients underwent a second procedure due to incomplete relief and another 17 for recurrent symptoms; complete symptom resolution was seen in all these parturients.

Comment: Albeit a retrospective review, this serves to confirm what others (including Michael Pach from Perth) have shown regarding the relationship between timing and success of EBP. The authors acknowledged some of the potential shortcomings arising from the lack of randomisation and were able to rule out some; e.g. the possibility that more severe headaches were patched earlier and were more likely to recur because of their severity than the timing of the EBP. Interestingly they noted, as others have done, that obesity appears to protect against dural puncture headache and to increase the likelihood of success of an EBP. I imagine the case mix in some NZ obstetric anaesthesia databases would allow this possible association to be verified!

Abstract

Incidence of difficult bag-mask ventilation in children

Authors: Valois-Gomez T et al.

Summary: These researchers sought to expand the scientific knowledge of paediatric difficult BMV in a prospective observational cohort of children aged 0–8 years undergoing elective surgery in which the procedure was necessary. Unexpected difficult BMV was seen in 6.8% in a sample of 484 children, compared with an expected incidence of difficult airway among screened children (n=4865) of 0.5%. A logistic regression analysis revealed the following independent predictors of difficult BMV: i) age (odds ratio 0.98 [95% CI 0.97, 0.99]); ii) otolaryngology surgery (2.92 [1.08, 7.95]); and iii) NMB use (3.49 [1.50–8.11]). There was no association between difficult BMV and difficult intubation (which had an incidence of 1.2%).

Abstract

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