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Guidelines for the safe provision of anaesthesia in magnetic resonance imaging units 2019: Guidelines from the Association of Anaesthetists and the Neuro Anaesthesia and Critical Care Society of Great Britain and Ireland

Authors: Wilson SR et al.

Summary: With an increasing number of units providing anaesthesia for MRI and increasing complexities and numbers of interventions performed within this environment, the Association of Anaesthetists and the Neuro Anaesthesia and Critical Care Society of Great Britain and Ireland recognised the need for guidelines in this area. Their newly published guidelines reinforce the safety aspects of providing anaesthesia in the magnetic resonance environment, and acknowledge that for many anaesthetists this is an unfamiliar site in which to deliver anaesthesia.

Comment: (Dr Sachin Hansraj) This article from the Association of Anaesthetists and the Neuro Anaesthesia Critical Care Society of Great Britain looks at the best practice relating to anaesthesia in the MRI environment. Immediately apparent in this piece, is that with advances in medicine and technology, this topic will need constant updating. MRI sedations are increasing in number and often used for patients who are critically ill, children, claustrophobic, cognitively impaired or even intraoperatively. Hazards within the anaesthetic-MRI environment are obscure and numerous and as such, the authors recommend health care facilities specifically provide anaesthetic training in this remote area and suggest high levels of seniority in the environment. Hazards pertaining to patient safety are excellently detailed with focus on pacemakers, defibrillators, neurostimulators, shunts, ocular, orthopaedic and breast implantable devices. The devices above can be inactivated, reprogrammed, converted to asynchronous modes or even dislodged leading to tissue damage and haemorrhage. Anaesthetists and staff need to research whether particular devices are MRI safe, MRI conditional or MRI unsafe with specific reference to their health facility’s MRI and its magnetic field strength, measured in Tesla (T). More and more devices are becoming safer with MRIs 0.5-3 T and this will only improve with time. Burns and helium escape are two often overlooked hazards within the MRI environment. MRI radiofrequency heating is an event in which patients can be burned by any conductive materials left on the patient’s skin. Commonly caused by ECG leads and pulse oximeters, clinicians need to be aware of the MRI safety of these devices. Anaesthetists also need to be aware of the ‘quench protocol’, whereby the MRI suite fails to appropriately vent rapidly expanding helium gas, resulting in the need to urgently evacuate to safety. The design, layout and workflow of an MRI suite are of utmost importance from an anaesthetic point of view. As such, it is recommended that hospitals have anaesthetic input on the design of the suite to ensure adequate space for machines, piped gas and line-of-sight monitoring. Most importantly, hospitals need to devise protocols for emergency procedures and cardiac arrests in this environment, as this will often lead to the introduction of multiple staff whom may not be versed in the dangers of the MRI environment. Lastly, certain hospitals have a field of intraoperative MRI and this most often pertains to neurosurgical intervention, helping improve accuracy, improve tumour bulk removal, and reducing the need for post procedure GA sedation imaging. Metal operating tools, the high number of patient transfers and dangers of the MRI environment. Lastly, certain hospitals have a field of intraoperative MRI and this most often pertains to neurosurgical intervention, helping improve accuracy, improve tumour bulk removal, and reducing the need for post procedure GA sedation imaging. Metal operating tools, the high number of patient transfers and dangers of the MRI environment.

Reference: Anaesthesia 2019;74(5):638-50

Abstract
A comparative study of fractionated versus single dose injection for spinal anesthesia during cesarean section in patients with pregnancy-induced hypertension

Authors: Nugroho AM et al.

Summary: This single blind RCT aimed to compare changes in mean arterial pressure (MAP), ephedrine requirement and sensory blockade between fractionated-dose (FD) and single-dose (SD) spinal anesthesia in 42 obstetric patients with pregnancy-induced hypertension (gestational hypertension or pre-eclampsia) undergoing semi-emergency or emergency cesarean section. Group characteristics and baseline blood pressures were similar allowing for an appropriate comparison. Patients were randomised to receive either FD or SD 2.5 mL of 10 mg hyperbaric bupivacaine 0.5% and fentanyl 25 µg intrathecally. The SD group received the total dose over 10 minutes while the FD group received an initial 1.5 mL followed by the remaining 1 mL after a 90 second interval. There was no significant drop in MAP between the two groups over the initial 15 minutes of the operation. There was also no difference between total ephedrine requirement (10 mg in the FD group vs 15 mg in the SD group) or level of sensory block between the two groups.

Comment: (Dr Matthew Greber) Split dosing of intrathecal anaesthetic has been shown to reduce hypotension and improve patient satisfaction in normotensive and healthy obstetric patients undergoing a caesarean section. However, its utility in pregnancy-induced hypertension has not previously been explored. This article aimed to elucidate if use of an FD versus an SD technique for spinal anaesthesia in patients with pregnancy-induced hypertension served any haemodynamic advantage. They utilised a moderately powered sample size of 42 patients similar to other recent studies. Each group had comparable characteristics including grade of hypertensive comorbidities, previous antihypertensive treatment and baseline BP. Confining conditions including chronic hypertension, pulmonary oedema, cerebrovascular disease, type-2 diabetes mellitus, and gestational diabetes were appropriately excluded. A robust protocol was established to ensure administration of the doses were conducted in the same position (sitting), via the same technique, via standard dosing and with equal times in the upright position post dosing (90 sec), to ensure the similar distribution of anaesthetic. No difference between the groups and strict protocols allowed for comparisons of the groups. The paper states it achieved a single blind RCT, although how randomisation was achieved and enforced is not discussed. Furthermore, one potential confounder not recorded was the administration dosage and frequency of anxiolytics (midazolam) and analgesics (fentanyl) prior to baseline BP measurement and whether this was equal between groups. As acknowledged by the article, it was also difficult to fully exclude certain confounders such as duration and severity of pre-eclampsia, the amount of fluid volume or anti-hypertensive required, or undiagnosed chronic hypertension. It would have also been interesting to continue monitoring MAP and other parameters such as heart rate over the entire length of the operation.

There was a trend towards a higher MAP in the FD group. However, there was no statistical significance between the two groups over the initial 15 minutes, suggesting generally equal haemodynamic stability in both groups. Furthermore, the absolute drop in BP in those with severe pre-eclampsia was less precipitous compared to studies on normal patients due to systemic vasosconstriction maintaining vascular tone. Ephedrine dose and level of sensory block over the length of the operations was also not significant, re-enforcing these findings. It should be noted that ANZCA guidelines suggest using phenylephrine over ephedrine to reduce the incidence of delayed-onset tachyphylaxis and fetal acidosis, although no complications were noted in this study. APGR scores were also similar between groups, although more robust indicators of utero-placental flow (i.e. umbilical lactate and gases) may have provided a more valuable insight. As reducing MAP is a primary treatment goal in pre-eclamptic emergencies, any reduction without complications should be considered advantageous. For obstetric patients with pregnancy-induced hypertension undergoing caesarean section, an FD of spinal anaesthetic does not provide any significant advantages over SD delivery and has no impact on complications for the mother or the fetus. This would suggest that an SD is the preferable method given that expedient delivery is the primary goal, with secondary benefits of reduced technical dosing and patient discomfort.


Intraoperative hyperoxia does not reduce postoperative pain: Subanalysis of an alternating cohort trial

Authors: Cohen B et al.

Summary: This Ohio-based prospective alternating cohort trial tested the hypothesis that intraoperative hyperoxegenation reduces acute postoperative pain and opioid consumption for patients undergoing general anaesthesia (GA) for colorectal surgery. Patients received either 30% (n = 2287) or 80% (n = 2415) intraoperative oxygen and were then assessed for average pain score and opioid consumption during the initial 2 hours post operation (primary endpoint), and the subsequent 24 hours (secondary outcome). No significant difference in average pain score or opioid consumption (-0.01; 97.5% CI -0.18 to 0.16, p = 0.45 and 0.0; 97.5% CI 0-0, p = 0.82, respectively) in the initial 2 hours, or during 2 to 26 hours post operation (0.01; 97.5% CI -0.12 to 0.14, p = 0.57 and 0; 97.5% CI -2.66 to 1.33, p = 0.32, respectively) were seen when comparing the superiority of 80% to 30% oxygen.

Comment: (Dr Daniel Kim) Cohen et al., explores an interesting hypothesis by jumping off previous literature that found improved oxygenation and perfusion of surgical wounds reduces lactate concentrations, local acidoisis, and may subsequently reduce postoperative pain. Patient cohorts were determined by 2-week alternations between intraoperative FiO2 of 30% and 80% for a period of 59 months. This resembles a cluster randomisation rather than a true individual randomisation. To minimise bias, results were analysed for confounding characteristics using descriptive statistics and compared using absolute standardised differences, with the end result of no significant variation between the two experimental arms across a long list of observed confounders. Clinicians were still instructed to provide adequate oxygen to maintain saturations above 95%, and allowed to increase the FiO2 up to 100% for induction and emergence of anaesthesia. This, in conjunction with uncontrolled oxygen supplementation postoperatively, leaves the paper open to criticism for failing to control these factors, particularly during emergence and postoperative recovery where higher FiO2 could mask potential variation in outcomes. Overall, the paper showed no statistical difference in superiority of 80% FiO2 to 30% FiO2, outlined above in the summary), and further confirmed non-inferiority of 80% FiO2 to 30% in both pain score and opioid consumption in the first two hours (-0.01; 97.5% CI -0.16 to 0.14, p < 0.001 and 0.00; 97.5% CI 0.00 to 0.00, p < 0.001, respectively), and the subsequent 24 hours post operation (0.01; 97.5% CI -0.10 to 0.12, p < 0.001 and 0; 97.5% CI -2.33 to 1.33, p < 0.001, respectively). It may be that the benefit of intraoperative hyperoxia in reducing surgical wound hypoxia and acidosis may be insufficient for a clinical effect in pain.


Abstract
oxycodone IR 10mg. Secondary endpoint. Primary endpoint was met.

vomiting (nominal p<0.001 for all events); PALEXIA™ and significantly lower incidence of constipation, nausea and vomiting (nominal p<0.001 for all events); PALEXIA® IR 50mg vs. oxycodone IR 10mg. Secondary endpoint. Primary endpoint was met.

*Analgesia not solely derived from opioid agonism. *S8 analgesic. †Non-inferior efficacy (5-day sum of pain intensity difference) and significantly lower incidence of constipation, nausea and vomiting (nominal p<0.001 for all events); PALEXIA® IR 50mg vs. oxycodone IR 10mg. Secondary endpoint. Primary endpoint was met.

MINIMUM PRODUCT INFORMATION: PALEXIA® IR (tapentadol hydrochloride) INDICATION: Moderate to severe pain. CONTRAINDICATIONS: Known hypersensitivity to tapentadol or any component of PALEXIA IR; conditions in which mu-opioid receptor agonist activity is contraindicated e.g. significant respiratory depression and acute or severe bronchial asthma or hypoxemia confirmed or suspected para-aural tension pneumo-nia, acute intoxication with alcohol or other sedative/hypnotics, central acting anxiolytics or psychotropic drugs; patients who are receiving MAO inhibitors or who have taken them within the last 14 days. PRECAUTIONS: Monitor for signs of abuse and addiction; repeated administration may lead to tolerance; withdrawal symptoms could occur after abrupt discontinuation; not recommended in patients with increased intracranial pressure, impaired consciousness, or coma and severe renal or severe hepatic impairment, caution in patients with impaired respiratory function, patients with head injury brain haemorrhages, a history of fractures or any condition that increases risk of seizures, severe renal impairment, moderate or severe hepatic impairment or binary tract disease, including acute pancreatitis. Use in pregnancy (Category C). Should not be used during breastfeeding. Not recommended for children <18 years old. May impair ability to drive or operate machinery. INTERACTIONS: Care should be taken when combining with mixed opioid agonist/antagonists or partial mu-opioid agonists; additve CNS depression with concomitant administration of other mu-opioid receptor agonist, anxiolytics, general anaesthetics, phenothiazines, other tranquilisers, sedatives, hypnotics or other CNS depressants (including alcohol and ILI drugs); reduction of dose of one or both agents should be considered; contraindicated in patients who are receiving MAO inhibitors or who have taken them within the last 14 days; isolated case reports of serotonin syndrome when used in combination with serotonergic drugs (see full PI), ADVERSE EFFECTS: Very common (≥1/10): dizziness, somnolence, headache, nausea, vomiting. Common (≥1/100 to <1/10): Decreased appetite, anxiety, confusional state, hallucinations, sleep disorder. Uncommon (≥1/1000 to <1/100): abdominal pain, abdominal distension, abnormal dreams, tremor, flushing, constipation, diarrhoea, dyspepsia, dry mouth, pruritus, hyperhidrosis, rash, urticaria, arthralgia, fatigue, feeling of body temperature change. DOSAGE AND ADMINISTRATION: To be taken orally, whole with sufficient liquid, approximately every 4 to 6 hours, with or without food. Usual recommended dose 50 to 100 mg every 4 to 6 hours and should be adjusted to maintain adequate analgesia with acceptable tolerability. Total daily dose >600 mg not recommended. Discontinuation of treatment: taper dose gradually to prevent symptoms of withdrawal. Renal impairment: not recommended in severe renal impairment. Hepatic impairment: initiate at 50mg every 8 hours (maximum three doses in 24 hours) in moderate hepatic impairment; not recommended in severe hepatic impairment. Elderly patients more likely to have decreased renal and hepatic function – care in dose selection. Not recommended for use in children <18 years old. Based on approved product information dated 27 March 2017. References: 1. PALEXIA® IR Approved Product Information. 2. Schug S. ANZCA Bulletin 2018 Not all opioids are the same. 3. Trends In Pain Med Res (Coch 2014). 30(7):578–584. 4. Pergolizzi et al. NEMA Research Group. Naples, Florida, USA 2017: 5. Hartrick C et al. Curr Med Res Opin 2009; 31(2):260–271. 6. PALEXIA® IR is a trademark of Grünenthal Pty Ltd and distributed by Seqirus (Australia) Pty Ltd under licence from Grünenthal Pty Ltd. Seqirus (Australia) Pty Ltd ABN 66 120 398 067, 63 Popular Road Parkville, Victoria 3052. www.sequius.com.au. Medical Information: 1800 164 855. Seqirus™ is a trademark of Seqirus LAX and its affiliates. Date of preparation: February 2019. SEQ/PALX/0219/0585. 15004.

Before prescribing, please review the Product Information available at www.sequius.com.au/PBS Information: This product is not listed on the PBS.
Association of neuraxial anesthesia with postoperative venous thromboembolism after noncardiac surgery: A propensity-matched analysis of ACS-NSQIP database

Authors: Turan A et al.

Summary: This retrospective match-paired cohort study, undertaken using the American College of Surgeons National Surgical Quality Improvement Program database (2011-15), tested the hypothesis that neuraxial anesthesia reduces the incidence of 30-day VTE in adults recovering from orthopaedic surgery. A total of 72,887 patients that had orthopaedic surgeries longer than 1 hour under neuroaxial blockade (i.e. spinal or epidural anaesthesia) were matched with 72,887 out of a total of 207,170 patients who underwent orthopaedic surgery under GA in the same time period. The neuroaxial blockade cohort exhibited reduced odds of 30-day VTE (OR 0.85; 95% CI 0.78-0.95, p = 0.002), with an NNT of 500. The odds of 30-day readmission were also reduced by neuraxial anaesthesia (OR 0.90; 98.3% CI 0.85-0.95, p < 0.001), corresponding to an NNT of 250. 30-day mortality did not differ were also reduced by neuraxial anaesthesia (OR 0.90; 95% CI 0.85-0.95, p = 0.002), with an NNT of 500. The odds of 30-day readmission, the authors recommend neuraxial blockade for high-risk patients undergoing orthopaedic surgery.

Comment: (Dr Raﬁd Karim) The cohort size analysed in this retrospective study is certainly impressive and provides the power required to prove statistical benefit in VTE rates. The authors themselves acknowledge that the retrospective database limited the ability of the study to compare some very pertinent VTE risk factors between groups – hormone treatment, antiplatelet and anticoagulant therapy, and VTE prophylaxis adherence. Though the cohort analysis showed no difference in ASA, functional health, and comorbidities between groups, there is no measure of severity of comorbidities other than ASA. This leaves a possibility of the neuroaxial cohort having more severe disease (thus not being chosen for GA), which would predispose them towards more VTEs, thereby blunting the protective effect of neuroaxial blockade. Nevertheless, an NNT of 500 for neuroaxial blockade compares well to the NNT of 471 for prophylactic enoxaparin shown by Montero Ruiz F et al. Thromb Res. 2011, and the latter is a routine hospital recommendation for surgical inpatients. While the authors exercised caution in their recommendations, given the potential benefit in VTE rates, early discharges, and reduced readmissions, neuroaxial blockade certainly warrants strong consideration for routine use in orthopaedic surgeries. The study question also renders itself to further rigorous assessment through prospective cohort studies or RCTs, though the number of subjects required may be difﬁcult to recruit without a multicentre effort.


Abstract

Anesthetic technique and cancer outcomes: a meta-analysis of total intravenous versus volatile anesthesia

Authors: Yap A et al.

Summary: Metastatic disease recurrence of cancer is a major cause of death worldwide despite advances in modern medicine. It is known that anaesthetic techniques have varying effects on innate and cellular immunity, activation of adrenergic inflammatory pathways, and activation of cancer promoting cellular signalling pathways. As such, these effects may have an impact on long-term cancer outcome. This systematic review and meta-analysis included 10 comparative studies examining the effect of inhalational volatile anaesthesia (VA) and propofol-based total intravenous anaesthesia (TIVA) on cancer outcomes. Six studies examined the effect of anaesthetic agent type on recurrence-free survival following breast, oesophageal, and non-small cell lung cancer (n = 7868), and eight studies (n = 18,778) explored the effect of anaesthetic agent type on overall survival (OS). Initial analysis revealed that the use of TIVA was associated with improved recurrence-free survival across all cancer types (pooled HR 0.78; 95% CI 0.65-0.94; p < 0.01), however, subsequent analysis (Yap A et al. Can J Anaesthesia 2019) discounting one of the included studies due to an error with that study, revealed an HR of 0.79 (95% CI 0.62-1.0, p = 0.05), indicating a borderline protective effect with an acceptable inconsistency score (I² = 40%; p = 0.16). The use of TIVA was associated with improved OS (pooled HR 0.76; 95% CI 0.63-0.92; p < 0.01).

Comment: (Professor André van Zundert) More than 60% of all patients with cancer undergo one or more surgical interventions for removal of tumours. The combination of tissue trauma, surgical manipulation of the cancer and degree of surgical trauma (surgical extent, blood transfusion, hypothermia) and its impact on the central stress response system, i.e. the hypothalamic pituitary adrenal axis, can result in impairment of the patient’s local and cellular immunity with consequent local-regional occurrence of the cancer and metastasis. Specifically, natural killer cell function, essential for clearance of tumour cells, is impaired. Yap et al., undertook a meta-analysis of over 21,000 cancer patients with multiple cancer types and found evidence supporting the hypothesis that the choice of anaesthetic drug may influence patient outcome after cancer surgery. TIVA, contrary to VA, is associated with improved recurrence-free survival and OS outcome across numerous cancer types. In vitro studies show that different VAs result in an increased expression of cellular mediators that promote cancer cell proliferation, resistance of apoptosis by tumour cells, a propensity to invasion and migration of tumour cells, basement membrane degradation, increased angiogenesis and impaired immune cell number and function of natural killer cells. On the other hand, in vitro studies show that propofol has no effect on natural killer cell activity and even reduces key regulators in the response to tumour growth. Furthermore, it has been postulated that regional anaesthesia also might reduce the incidence of cancer recurrence after surgery, whereas GA (e.g. inhalation anaesthesia with VAs) would contribute to the vulnerability in the perioperative period. Although a large body of retrospective evidence in various cancers (e.g. prostate, breast, gastrointestinal, head and neck, genital-urologic neoplasms) has yielded positive results and demonstrated improved cancer outcomes if regional anaesthesia techniques were applied during surgery, numerous conflicting outcomes demonstrating inconclusive results about the impact of regional anaesthesia on cancer recurrence in patients was demonstrated (Sekandarzad MW et al. Curr Opin Anaesthesiol. 2017; Sekandarzad MW et al. Anesth Analg. 2017). It is intriguing to speculate whether the choice of anaesthetic technique might translate into clinical beneﬁts (i.e. prolonged survival after cancer surgery). However, to think that we, as anaesthetists, can make a difference in relation to cancer outcomes many years after a single, relatively short, unimodal intervention in this complex multifactorial oncological setting, may remain oversimplified. Reduction of acute postoperative pain, prevention of progression to chronic postsurgical pain and hopefully improved OS, even at the expense of no difference in relation to reduced cancer recurrence, are highly desirable outcome endpoints. Preventing the pathophysiologic effects of pain and neuroendocrine stress response should be an essential part of balanced anaesthesia, with propofol in a critical role.


Abstract
Volatile anaesthetics versus total intravenous anaesthesia for cardiac surgery

Authors: Landoni G et al.

Summary: The MYRIAD trial, a pragmatic, multicentre, single-blinded, RCT examined patients undergoing elective CABG under VA (desflurane, isoflurane or sevoflurane) or TIVA. It was carried out over 36 centres, in 13 countries, with a total of 2709 patients assigned to the VA group and 2691 to the TIVA group. The trial was stopped due to futility at the time of the second interim analysis. There was no significant difference between the VA and TIVA groups in death from any cause at 1 year (2.8% vs 3%, respectively, RR 0.94; 95% CI 0.69-1.29, p = 0.71, n = 5353) or at 30 days (1.4% vs 1.3%, respectively, RR 1.11; 95% CI 0.70-1.76, n = 5398).

Comment: (Dr Sofia Padhy) The ischaemic pre-conditioning effects of VA have long been suspected and debated (especially in the realm of cardiac anaesthesia), after evidence of ischaemic pre-conditioning in animal models. The MYRIAD trial was a well-planned, suitably powered, and organised RCT looking at significant endpoints comparing outcomes of CABG surgery (including on-pump and off-pump) using VA versus TIVA. Randomisation occurred across the cohort, stratified according to the centre. The attending anaesthetists were aware of the allocation type, given the nature of the intervention. Patient demographics and clinical characteristics at baseline were well matched between the two groups. The main difference in intraoperative characteristics, as expected, was VA use. The type of VA permitted for use was not restricted, allowing a choice of sevoflurane, desflurane or isoflurane. Of note, the trial recommended but did not require implementation of three specific strategies: maintenance of at least 1.0 MAC for a minimum of 30 minutes, discontinuation of VA at least 15 min prior to bypass, and at least three wash-in/wash-out periods. All three VA strategies were used in only 9.9% of VA cases, with at least one of the strategies used in 97.4% of VA cases. Another consideration is that IV hypnotics were used for the majority of inductions regardless of maintenance technique (89.1% VA group and 99.9% TIVA group). This is understandable given the pragmatic nature of the trial, aimed at replicating the real-life environment. However, as declared by the authors, propofol during induction of anaesthesia has been shown to attenuate the potential beneficial effect of VA. Along this thought process, opioids (which could also have pre-conditioning cardio-protective effects) were administered in all the cases, which may have potentially masked the effect of VA. Overall, the trial conclusion was fair, considering current cardiac anaesthesia clinical practice.


Abstract

A comparison of the analgesic efficacy of local infiltration analgesia vs. intrathecal morphine after total knee replacement

Authors: McCarthy O et al.

Summary: This RCT tested whether local infiltration analgesia (LIA) provided better pain relief post total knee replacement compared to intrathecal morphine. Forty-three patients were enrolled and randomised to receive either spinal anaesthesia with intrathecal bupivacaine plus morphine 0.3 mg (control group) or bupivacaine only spinal anaesthesia followed by intraoperative infiltration with levobupivacaine 2mg/kg and adrenaline 0.5mg diluted to a volume of 100 mL with 0.9% saline (intervention group). The intervention group also received a further bolus of 15 mL of levobupivacaine 0.5% via an intra-articular catheter on the first postoperative day. The primary outcome assessed was Visual Analogue Scale (VAS) 0-100 pain scores at rest and on passive flexion to 30° at 24 hours. Mean VAS pain scores were significantly lower in the intervention group compared to the control group at rest at 24 hours (16.43 vs 37.2, \( p = 0.029 \)) and upon movement at 24 and 48 hours (39.1 vs 57.0, \( p = 0.037 \) and 25.9 vs 40.5, \( p = 0.028 \), respectively).

Comment: (Dr Srey Neth Loch) Knee joint arthroplasty is a commonly performed procedure that relieves debilitating joint pain and improves quality of life for many patients. However, surgery to replace a weight-bearing joint involves significant trauma to bones, muscles and surrounding tissues, resulting in a painful postoperative recovery period. An important part of an anaesthetist’s role is to provide patients with effective pain relief to facilitate early mobilisation and participation in physiotherapy. Importantly, poorly managed postoperative pain may increase the incidence of developing chronic pain. Research to date has shown that LIA is a simple, effective and safe adjuncts to intrathecal morphine. Patients included in this study were adequately matched for background and perioperative characteristics such as age, sex, weight, ASA physical status, and duration of operation. The authors were also mindful to standardise usage of paracetamol, NSAIDs and morphine patient-controlled analgesia. Nonetheless, there are some limitations to the study that should be kept in mind when interpreting the results. Patients were not blinded which might have affected their response to the subjective measurement of overall satisfaction scores. In addition, the LIA group received a ‘top-up’ bolus of levobupivacaine on day 1 post op. This introduces a potential confounding factor of additional local anaesthetic prolonging the analgesic duration, thereby leading to lower pain scores at 24 and 48 hours. These factors, along with a small sample size, limit the validity and generalisability of the results. Whilst McCarthy et al., reported no increase in infection rates associated with the indwelling wound catheter, the potential risk of infection should be considered against the analgesic benefit. In summary, the results of this study show that LIA provides better pain relief compared to intrathecal morphine. Perhaps, a systematic literature review looking at comparable studies would be useful in terms of consolidating evidence to support LIA and its efficacy over intrathecal morphine for analgesic control post joint replacement surgeries.


Abstract

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Programmed intermittent bolus infusion versus continuous infusion of 0.2% levobupivacaine after ultrasound-guided thoracic paravertebral block for video-assisted thoracoscopic surgery

Authors: Taketa Y et al.

Summary: This RCT compared the analgesic effects of thoracic paravertebral block with a programmed intermittent bolus infusion (15 mL 0.2% levobupivacaine every 3 hours) versus a continuous infusion (5 mL/hour of 0.2% levobupivacaine), after an initial 15 mL bolus injection of 0.2% levobupivacaine; identical hourly amounts of local anaesthetics were administered in both groups. The study included 70 patients undergoing video-assisted thoracoscopic surgery and measured the amount of rescue fentanyl consumed within 24 hours after surgery (primary outcome) and postoperative pain scores, plasma concentrations of levobupivacaine and the number of dermatomes anaesthetised (secondary outcomes). At 20 hours after the start of the infusions, there was no difference in plasma levobupivacaine concentrations between the two groups. There was also no difference in outcome between the bolus and continuous infusion groups regarding postoperative consumption of target-controlled infusion fentanyl (6 μg/kg vs 5.5 μg/kg, respectively, p = 0.45) and postoperative pain scores within 24 hours. However, the number of dermatomes anaesthetised (pinprick and cold testing) was greater in the programmed intermittent bolus injection group.

Comment: (Professor André van Zundert) Postoperative pain relief is important for all patients undergoing surgery, whether it is minimally invasive surgery using video-assisted techniques, or major laparotomies or thoracotomies, requiring wider incisional access through the skin. Regional anaesthesia techniques are often used as they provide more optimal analgesic results, with opioid-sparing effects, as the latter may decrease recovery from the surgical trauma. Furthermore, painful intramuscular injections can be avoided. Epidural analgesic techniques were popular in the past, but due to central neuraxial effects (sympathetic blockade), nowadays one tends to use more continuous peripheral nerve blocks, such as the paravertebral block. Essential requirements for obtaining adequate multilevel analgesia via the paravertebral space are: a) the resultant sensory block needs to cover all dermatomes of the area of surgical trauma, but also to be able to incorporate multiple dermatomes; b) the technique should have minimal or no impact on the haemodynamic and respiratory systems; and c) anaesthetists need to have a thorough knowledge of the indications, the anatomy, the complications and the required monitoring of the applied block technique and knowledge about dosing, peak plasma concentrations and pharmacokinetics of local anaesthetics. Not all anaesthetists are skilled in performing ultrasound-guided thoracic paravertebral block whereby local anaesthetics are injected alongside the thoracic vertebrae, close to where spinal nerves emerge from the intervertebral foramen. The thoracic paravertebral space is a wedge-shaped space located on either side of the vertebral column and contains the intercostal (spinal) nerve, the dorsal ramus, intercostal vessels, rami communicantes, and anteriorly the sympathetic chain. The base is formed by the vertebral body, intervertebral disc, and the intervertebral foramen with its contents. The boundaries are the parietal pleura (anterolateral) and the transverse process and the superior costotransverse ligament (posterior). A 17- or 18-G Tuohy needle in inserted using ultrasound-guided thoracic paravertebral block by a paralaminar in-plane approach at the T4-T5 intercostal level and an epidural catheter is inserted in situ and tested with an appropriate test dose. Blockade of the thoracic paravertebral space produces unilateral, segmental, somatic, and sympathetic nerve blockade, which is effective for anaesthesia and in treating acute and chronic pain of unilateral origin from the chest and abdomen. Complications may arise from accidental puncture of the lung, the major vessels (aorta, vena cava), the oesophagus and the spinal canal. After the start of surgery, surgeons can ensure with the videoscope that the catheter tip does not protrude out of the paravertebral space. These authors did not find advantages of the programmed intermittent bolus technique over the continuous infusion technique in terms of postoperative requirement of target-controlled infusion fentanyl, while identical plasma concentrations of local anaesthetics were obtained. Nor were complications such as severe hypotension or local anaesthetic toxicity observed using the paravertebral blockade. The wider dermatome coverage of the paravertebral block by the programmed intermittent bolus technique may benefit some patient groups.


Abstract