

Combined Local Anesthesia – General Anesthesia (CLAGA) : Is it time for a real Surgeon- Anesthesiologist partnership?

Joseph Eldor, MD

Department of Anesthesia, Kaplan Medical Center, Rehovot, Israel

In two groups, each of 50 patients undergoing oral surgery, effects of combining lidocaine nerve block with halothane general anaesthesia were studied. Local blockade of surgical stimuli reduced markedly the incidence of cardiac dysrhythmias occurred during halothane anaesthesia. Recovery was faster and post-operative analgesia was enhanced (1).

Knee arthroscopy is one of most commonly performed day-case orthopaedic procedures, thus consuming huge medical resources. The aim of the present questionnaire survey was to study knee arthroscopy routines and practice (2).

An electronic web-based survey including questions around pre-, per- and postoperative routines for elective knee arthroscopy was sent to all orthopaedic units associated to the Swedish Arthroscopic Society (n = 60).

Responses covering 37 centres out of 60 (response rate 62%) were returned. Preoperative radiograph routines varied considerable between centres; conventional radiograph varied between 5 and 100% and preoperative MRI between 5 and 80% of patients. General anaesthesia was the preferred intra-operative technique used in all centres (median 79% of patients), local anaesthesia with or without light sedation was used in all 28 out of the 37 centres responding (median 10% of cases) and spinal anaesthesia was used in 15 centres (median 5% of cases). Intra-articular local anaesthesia was provided in all but one of centres. Perioperative administration of oral NSAIDs was common (31 out 37), 6 centres (all teaching hospitals) did not routinely give pre- or postoperative NSAID. Analgesic prescription was provided on a regular base in 18 (49%) of centres; an NSAID being the most commonly prescribed. All but one centre provided written information and instruction at discharge. Referral to physiotherapy, prescribed sick leave and scheduled follow-up in the outpatient clinic diverged considerably.

Routines and practice associated to elective knee arthroscopy differed; however, no clear differences in practice were seen between teaching centres, general or local hospitals apart from a lower usage of NSAID for perioperative analgesia. There is an obvious room for further standardisation in the routine handling of patients undergoing elective arthroscopy of the knee (2).

Denti et al. (3) tested the effectiveness of different intra-articular analgesics and of pre-emptive intra-articular analgesia for arthroscopy-assisted anterior cruciate ligament reconstruction (ACLR) and for operative knee arthroscopy. Eighty-two patients underwent operative knee arthroscopy under selective subarachnoid anaesthesia (group A), and 60 patients underwent arthroscopy-assisted ACLR under general anaesthesia (group B). Patients were randomly assigned to intra-articular analgesic treatment as follows. Group A: 1, morphine 2 mg; 2, preoperative morphine

2 mg; 3, morphine 5 mg; 4, preoperative morphine 5 mg; 5, bupivacaine 0.25% 20 ml; 6, bupivacaine 0.25% 20 ml + morphine 2 mg; 7, saline solution 20 ml. Group B: 1, morphine 2 mg; 2, morphine 5 mg; 3, preoperative morphine 5 mg; 4, bupivacaine 0.25% 20 ml; 5, bupivacaine 0.25% 20 ml + morphine 2 mg; 6, saline solution 20 ml. All opioids were diluted in 20 ml of saline solution. After postoperative administration the tourniquet was left in place for 10 min. After preoperative administration the intra-articular surgical procedure was delayed for about 5-10 min. In the postoperative period were recorded: total consumption of ketoprofen given i.v. on demand as rescue analgesic treatment; pain scores before surgery and at 1st, 3rd, 6th, 12th and 24th h; occurrence of local anaesthetic or opioid side-effects. Group A (operative knee arthroscopy): all morphine groups (A1, A2, A3, A4) and the bupivacaine group (A5) did not require ketoprofen postoperatively ($P < 0.01$ vs both groups A6 and A7). Pain scores did not differ significantly among groups. The percentage of patients reporting higher pain scores than before surgery was larger in control group A7 and in bupivacaine groups A5, A6 (83%, 40%, 60%, respectively) and lower in morphine groups A1, A2, A3, A4 (25%, 16%, 27%, 23%, respectively). Group B (ACLR): total consumption of ketoprofen was lowest in groups B2 and B3 ($P < 0.001$ vs all other treatments and vs control group). The percentage of patients who did not require any rescue analgesic was 60% in group B3, 50% in group B2, 32% in group B5 and 0% in all other groups. No-side effects occurred in any patient. Intra-articular analgesia is safe and effective for arthroscopic knee surgery. Morphine provides a better pain control both in operative knee arthroscopy patients and in ACLR. A 2 mg dose is adequate for operative knee arthroscopy but not for ACLR, where higher dosages are required (5 mg). Pre-emptive intra-articular morphine provides better analgesia than postoperative administration.

Local and regional anesthetic procedures are an integral part of daily dermatological practice. Safe and effective analgesia in skin and soft tissues is crucial for otherwise painful diagnostic or therapeutic interventions. Tumescence local anesthesia allows for pain-free interventions that previously had to be done by using general anesthesia. Older patients with multiple co-morbidities are especially suited for local anesthetic procedures, because they may significantly reduce surgical risks. For dermatologists, the knowledge of mode of action and toxicity of local anesthetics, as well as the emergency management of their potential complications, is essential (4).

The purpose of this study (5) was to demonstrate the suitability of local anesthesia in the pediatric age group for oculoplastic procedures. The authors present a case of frontalis sling surgery performed under local anesthesia in a 15-year-old boy with bilateral congenital ptosis. No significant technical difficulties were encountered during the procedure. Optimal intraoperative eyelid placement was facilitated by the patient's comfort and cooperation. For some selected children, local anesthesia is a good alternative to general anesthesia to obtain the best outcome.

Volatile anesthetics protect the heart against ischemia-reperfusion injury. As an adjunct to general anesthesia, local and regional application of bupivacaine is often used. However, systemic plasma levels of bupivacaine might be cardiodepressant and interfere with sevoflurane-induced cardioprotection. Effects of bupivacaine on

sevoflurane-induced cardioprotection were assessed (6) in isolated Langendorff-perfused rat hearts subjected to 35min of global ischemia followed by 60min reperfusion. Hearts (n=40) were randomized to different groups: 1. Control; 2. Bupivacaine: addition of 0.125 or 1.0µg/ml bupivacaine to the perfusate for 40min prior to ischemia-reperfusion; 3. Sevoflurane: preconditioning induced by three times 5-min episodes of sevoflurane (2.5vol.%) prior to ischemia-reperfusion; 4. Bupivacaine-sevoflurane: combined application of bupivacaine and sevoflurane. After ischemia-reperfusion, cardioprotection was assessed from infarct size and recovery of ventricular function, and phosphorylation levels of glycogen synthase kinase 3β (GSK3β) and 5'AMP activated protein kinase (AMPK) were determined. Infarct size was reduced in the sevoflurane and bupivacaine-sevoflurane groups (Sevo: 23±7% and Bupi-Sevo: 23±5% vs. Control: 59±6%, P<0.05). In the bupivacaine group infarct size was reduced as well (34±3%). In the sevoflurane and bupivacaine-sevoflurane groups the recovery of left ventricular function (+dP/dt) was improved (Sevo: 59±2% and Bupi-Sevo: 59±2% vs. Control: 47±3%, P<0.05), but not in the bupivacaine group (48±3%). AMPK and GSK3β phosphorylation were increased by sevoflurane but not by bupivacaine. Sevoflurane-induced cardioprotection was not affected by bupivacaine in the non-cardiotoxic range. Bupivacaine alone also reduced infarct size. Both anesthetics activated different signaling kinases, indicating the existence of different cardioprotective intracellular signaling cascades.

This sequential retrospective monocentric study compares the results between general and local anesthesia for carotid endarterectomy (CEA) (7).

Between November 2002 and October 2004, 428 CEAs were performed. Two groups were formed: group GA (general anesthesia): 219 patients operated under general anesthesia; group LA (local anesthesia): 209 patients operated under local anesthesia.

No mortality was found in both groups. After surgery, three strokes were detected in group GA and three in group LA (GA 1.36% vs. LA 1.43%, p = .9540); After CEA, there were three TIAs in GA group and none in LA group (GA 0.42% vs. LA 0%, p = .2634).

The morbi-mortality was not influenced by the type of anesthesia used for carotid surgery. No statistical difference was detected in the perioperative neurological and cardiopulmonary complication rates between GA and LA.

To compare minimally invasive parathyroidectomy (MIP) under local anesthesia (MIPULA) to minimally invasive parathyroidectomy performed under general anesthesia (MIPUGA) in terms of postoperative pain, postanesthetic side effects, patient satisfaction, and overall outcome a prospective comparative cohort study was done (8).

Consecutive consenting patients presenting to a single surgeon's practice were enrolled into MIPULA or MIPUGA groups if inclusion criteria were satisfied. A standard anesthesia and surgical protocol was followed for all included patients.

Subjective outcome measurements (pain, overall satisfaction, and other variables) were achieved through questionnaires. Objective outcomes were also measured.

Seventy-four patients were enrolled: 58 in the MIPULA group and 16 in the MIPUGA group. Operative time and hospital stay were significantly shorter in the MIPULA group. Subjectively, the MIPULA group was significantly more ready for discharge versus the MIPUGA group. No significant difference in overall satisfaction between groups was noted. Biochemical cure and conversion (MIPULA to general anesthesia open exploration) rates for the cohort were 100% and 4%, respectively.

MIPULA confers significantly shorter operative time and hospital stay with no significant difference in subjective postoperative pain, patient satisfaction, overall outcome, or cure rate when compared to MIPUGA. Provided that appropriate preoperative localization and surgical experience are present, MIPULA can be offered to patients as a safe and reasonable alternative to MIPUGA.

The discovery of local anesthesia revolutionized urologic surgery. Gordetsky et al. (9) investigated the evolution of intraurethral anesthesia in urologic surgery beginning in 1884.

A review of the literature was performed, reviewing the history of local anesthesia for urologic surgery, with a specific emphasis on intraurethral anesthesia. Using the University of Rochester libraries catalog "Voyager," a search was performed reviewing the primary literature published on intraurethral anesthesia beginning from 1884 through 2009. Also reviewed published literature in Ovid Med and PubMed for articles relevant to the topic of intraurethral anesthesia. The search terms were intraurethral, cocaine, lidocaine, and anesthesia.

In the 1840s, it was demonstrated that ether, nitrous oxide, and chloroform could prevent the pain of surgery, resulting in a dramatic increase in surgery. At Massachusetts General Hospital between 1845 and 1847, surgeries increased 2.5-fold. Four decades later, it was demonstrated that cocaine allowed for adequate analgesia without the side effects of general anesthesia, resulting in a dramatic increase in urologic surgery. Cocaine was gradually replaced as an intraurethral anesthetic as safer local anesthetics, such as lidocaine, became introduced. Modern studies show conflicting results over the efficacy and ideal administration of intraurethral anesthetics.

Local anesthesia was rapidly accepted by urologists around the world and used in a wide variety of urologic surgeries, contributing to the acceptance of anesthesia and a revolution of the practice of surgery. To this day, intraurethral anesthesia continues to be a widely used and effective technique in urology, although the ideal method of use is largely left up to individual preference.

Sentinel lymph node excision (SLNE) for the detection of regional nodal metastases and staging of malignant melanoma has resulted in some controversies in international discussions, as it is a cost-intensive surgical intervention with potentially significant morbidity. The present retrospective study seeks to clarify the

effectiveness and reliability of SLNE performed under tumescent local anaesthesia (TLA) and whether SLNE performed under TLA can reduce costs and morbidity (10). Therefore, the study is a comparison of SLNE performed under TLA and general anaesthesia (GA). Retrospectively analysed data from 300 patients with primary malignant melanoma with a Breslow index of ≥ 1.0 mm. Altogether, 211 (70.3%) patients underwent SLNE under TLA and 89 (29.7%) patients underwent SLNE under GA. A total of 637 sentinel lymph nodes (SLN) were removed. In the TLA group 1.98 SLN/patient and in the GA group 2.46 SLN/patient were removed (median value). Seventy patients (23.3%) had a positive SLN. No major complications occurred. The costs for SLNE were significantly less for the SLNE in a procedures room performed under TLA (mean euro 30.64) compared with SLNE in an operating room under GA (mean euro 326.14, $P < 0.0001$). SLNE performed under TLA is safe, reliable, and cost-efficient and could become the new gold standard in sentinel lymph node diagnostic procedures.

Health outcomes and costs are both important when deciding whether general (GA) or local (LA) anaesthesia should be used during carotid endarterectomy. The aim of this study was to assess the cost-effectiveness of carotid endarterectomy under LA or GA in patients with symptomatic or asymptomatic carotid stenosis for whom surgery was advised (11).

Using patient-level data from a large, multinational, randomized controlled trial (GALA Trial) time free from stroke, myocardial infarction or death, and costs incurred were evaluated. The cost-effectiveness outcome was incremental cost per day free from an event, within a time horizon of 30 days.

A patient undergoing carotid endarterectomy under LA incurred fewer costs (mean difference pound 178) and had a slightly longer event-free survival (difference 0.16 days, but the 95 per cent confidence limits around this estimate were wide) compared with a patient who had GA. Existing uncertainty did not have a significant impact on the decision to adopt LA, over a wide range of willingness-to-pay values.

If cost-effectiveness was considered in the decision to adopt GA or LA for carotid endarterectomy, given the evidence provided by this study, LA is likely to be the favoured treatment for patients for whom either anaesthetic approach is clinically appropriate.

Delivery by caesarean section (CS) is becoming more frequent. Childbirth is an emotion-filled event, and the mother needs to bond with her baby as early as possible. Any intervention that leads to improvement in pain relief is worthy of investigation. Local anaesthetics have been employed as an adjunct to other methods of postoperative pain relief, but reports on the effectiveness of this strategy are conflicting. This review (12) attempted to assess the effects of local anaesthetic agent wound infiltration and/or abdominal nerve blocks on pain after CS and the mother's well-being and interaction with her baby. Searched the Cochrane Pregnancy and Childbirth Group's Trials Register (April 2009). The selection criteria were randomised controlled trials of local analgesia during CS to reduce pain afterwards. Twenty studies (1 150 women) were included. Women who had wound infiltration

after CS performed under regional analgesia had a decrease in morphine consumption at 24 hours compared with placebo (morphine dose -1.70 mg; 95% confidence interval (CI) -2.75 to -0.94). Women who had wound infiltration and peritoneal spraying with local anaesthetic after CS under general anaesthesia (1 study, 100 participants) had a reduced need for opioid rescue (risk ratio (RR) 0.51; 95% CI 0.38 to 0.69). The numerical pain score (0 -10) within the first hour was also reduced (mean difference (MD) -1.46; 95% CI -2.60 to -0.32). Women with regional analgesia who had local anaesthetic and non-steroidal anti-inflammatory cocktail wound infiltration consumed less morphine (1 study, 60 participants; MD -7.40 mg; 95% CI -9.58 to -5.22) compared with those who had local anaesthetic control. Women who had regional analgesia with abdominal nerve blocks had decreased opioid consumption (4 studies, 175 participants; MD -25.80 mg; 95% CI -50.39 to -5.37). For outcome in terms of the visual analogue pain score (0 - 10) over 24 hours, no advantage was demonstrated in the single study of 50 participants who had wound infiltration with a mixture of local analgesia and narcotics versus local analgesia. Local anaesthetic infiltration and abdominal nerve blocks as adjuncts to regional analgesia and general anaesthesia are of benefit in CS by reducing opioid consumption. Non-steroidal anti-inflammatory drugs may provide additional pain relief.

Although it is clear that regional analgesia in association with general anaesthesia substantially reduces postoperative pain, the benefits in terms of overall perioperative outcome are less evident. The aim of this nonsystematic review (13) was to evaluate the effect on middle and long-term postoperative outcomes of adding regional perioperative analgesia to general anaesthesia. This study is based mostly on systematic reviews, large epidemiological studies and large or high-quality randomized controlled trials that were selected and evaluated by the author. The endpoints that are discussed are perioperative morbidity, cancer recurrence, chronic postoperative pain, postoperative rehabilitation and risk of neurologic damage. Epidural analgesia may have a favourable but very small effect on perioperative morbidity. The influence of other regional anaesthetic techniques on perioperative morbidity is unclear. Preliminary data suggest that regional analgesia might reduce the incidence of cancer recurrence. However, adequately powered randomized controlled trials are lacking. The sparse literature available suggests that regional analgesia may prevent the development of chronic postoperative pain. Rehabilitation in the immediate postoperative period is possibly improved, but the advantages in the long term remain unclear. Permanent neurological damage is extremely rare. In conclusion, while the risk of permanent neurologic damage remains extremely low, evidence suggests that regional analgesia may improve relevant outcomes in the long term. The effect size is mostly small or the number-needed-to-treat is high. However, considering the importance of the outcomes of interest, even minor improvement probably has substantial clinical relevance.

References

1. A. Rashad, A. El-Attar. Cardiac dysrhythmias during oral surgery: effect of combined local and general anaesthesia. *British Journal of Oral and Maxillofacial Surgery*, Volume 28, Issue 2, April 1990, Pages 102-104.

2. Brattwall M, Jacobson E, Forssblad M, Jakobsson J. Knee arthroscopy routines and practice. *Knee Surg Sports Traumatol Arthrosc.* 2010 Sep 21.
3. Denti M, Randelli P, Bigoni M, Vitale G, Marino MR, Fraschini N. Pre- and postoperative intra-articular analgesia for arthroscopic surgery of the knee and arthroscopy-assisted anterior cruciate ligament reconstruction. A double-blind randomized, prospective study. *Knee Surg Sports Traumatol Arthrosc.* 1997;5(4):206-12.
4. Wetzig T, Averbek M, Simon JC, Kendler M. Local anesthesia in dermatology. *J Dtsch Dermatol Ges.* 2010 Sep 21.
5. William J, Abbott J, Kipioti A, Reuser T. Local Anesthesia: A Feasible Option for Pediatric Frontalis Sling Surgery. *J Pediatr Ophthalmol Strabismus.* 2010 May 28:1-2.
6. Bouwman RA, Vreden MJ, Hamdani N, Wassenaar LE, Smeding L, Loer SA, Stienen GJ, Lamberts RR. Effect of bupivacaine on sevoflurane-induced preconditioning in isolated rat hearts. *Eur J Pharmacol.* 2010 Sep 8.
7. Ferrero E, Ferri M, Viazzo A, Ferrero M, Gaggiano A, Berardi G, Pecchio A, Piazza S, Cumbo P, Nessi F. Carotid Endarterectomy: Comparison Between General Anesthesia and Local Anesthesia. Revision of Our Experience With 428 Consecutive Cases. *Ann Vasc Surg.* 2010 Aug 26.
8. Chau JK, Hoy M, Tsui B, Harris JR. Minimally invasive parathyroidectomy under local anesthesia: patient satisfaction and overall outcome. *J Otolaryngol Head Neck Surg.* 2010 Aug;39(4):361-9.
9. Gordetsky J, Bendana E, O'Brien J, Rabinowitz R. (Almost) Painless Surgery: A Historical Review of the Evolution of Intraurethral Anesthesia in Urology. *Urology.* 2010 Jun 3.
10. Stoffels I, Dissemond J, Körber A, Hillen U, Poeppel T, Schadendorf D, Klode J. Reliability and cost-effectiveness of sentinel lymph node excision under local anaesthesia versus general anaesthesia for malignant melanoma: a retrospective analysis in 300 patients with malignant melanoma AJCC Stages I and II. *J Eur Acad Dermatol Venereol.* 2010 Jul 6.
11. Gomes M, Soares MO, Dumville JC, Lewis SC, Torgerson DJ, Bodenham AR, Gough MJ, Warlow CP; GALA Collaborative Group. Cost-effectiveness analysis of general anaesthesia versus local anaesthesia for carotid surgery (GALA Trial). *Br J Surg.* 2010 Aug;97(8):1218-25.
12. Bamigboye AA, Hofmeyr GJ. Caesarean section wound infiltration with local anaesthesia for postoperative pain relief - any benefit? *S Afr Med J.* 2010 May 4;100(5):313-9.
13. Curatolo M. Adding regional analgesia to general anaesthesia: increase of risk or improved outcome? *Eur J Anaesthesiol.* 2010 Jul;27(7):586-91.

