Ambulatory Surgery 1994; **2**: 113–117

Literature Review

Selected abstracts from the current literature

Propofol anaesthesia reduces early postoperative emesis after paediatric strabismus surgery

EJ Reimer, CJ Montgomery, JC Bevan, PM Merrick, D Blackstock and V Popovic

Can J Anaesth 1993; **40**(10): 927–33

Propofol anaesthesia may reduce postoperative emesis. The purpose of this study was to compare the incidence of emesis after propofol anaesthesia with and without nitrous oxide, compared with thiopentone and halothane anaesthesia, in hospital and up to 24 hr postoperatively, in outpatient paediatric patients after strabismus surgery. Seventy-five ASA class I or II, unpremedicated patients, aged 2-12 yr were randomly assigned to one of three groups: Thiopentone, 6.0 mg kg^{-1} i.v. induction followed by halothane and N_2O/O_2 for maintenance (T/H); propofol for induction, followed by propofol and oxygen for maintenance (P/O_2); and propofol for i.v. induction, followed by propofol infusion and N_2O/O_2 for maintenance (P/N_2O). All received vecuronium, controlled ventilation, and acetaminophen pr. Morphine was given as needed for postoperative analgesia. There were no differences in age, weight, number of eye muscles operated upon, duration of anaesthesia or surgery. The P/N_2O group (255 ± 80 μg kg^{-1} x min^{-1}) received less propofol than the P/O_2 group (344 ± 60 μg kg-1 x min-1) ($P < or = 0.0001$) and had shorter extubation ($P < 0.001$) and recovery ($P < 0.01$) times. Emesis in the hospital, in both the P/N_2O (4.0%) and P/O_2 group (4.0%) was less than in the T/H group (32%) ($P < 0.01$). Antiemetics were required in four patients in the T/H group (16.0%). Overall emesis after surgery was not different among the groups: T/H (48%), P/O_2 (28%) and P/N_2O (42%).

The use of propofol anaesthesia with and without N2O decreased only early emesis. This supports the concept of a short-acting, specific antiemetic effect of propofol.

Comparison of ketorolac and opioid analgesics in postoperative ACL reconstruction outpatient pain control

DA McGuire, K Sanders and SD Hendricks

Arthroscopy 1993; **9**(6): 653–61

Pain control is an important postoperative consideration with any surgical procedure. Technological and procedural improvements have contributed to the reduction in both the degree of surgical difficulty and the postsurgical complications associated with intricate surgeries. As a result, certain surgeries have potential for being performed on an outpatient basis, dependent upon appropriate pain-management regimens and the degree of potential for postoperative complications. Arthroscopic anterior cruciate ligament (ACL) reconstruction is a common procedure. Because of the reduction in invasiveness that arthroscopy provides, outpatient surgery is now routinely employed for ACL patients. The arguments against ACL outpatient surgery have included the reluctance to use ambulatory, indwelling, intravenous pain-pump delivery systems for opioid pain medication.

The purpose of this study was to determine the efficacy of a ketorolac tromethamine used for the management of the postoperative pain produced as a result of outpatient ACL reconstruction. When the ketorolac pain management regimen is compared in this setting with meperidine or morphine, pain control is as good as, or in some cases better than, either of the opioid drugs. Additionally, the adverse side effects associated with opioid drugs are significantly reduced at a substantially lower direct cost to the patient.

Use of mivacurium during laparoscopic surgery: effect of reversal drugs on postoperative recovery

Y Ding, B Fredman and PF White

Anesth Analg 1994; **78**(3): 450–4

We studied the influence of mivacurium on the recovery profile following outpatient laparoscopic tubal ligation in 60 healthy, nonpregnant women. After administration of midazolam 2 mg intravenously (i.v.), anesthesia was induced with fentanyl, 2 μg/kg, and thiopental, 4 mg/kg i.v. When the patient became unresponsive (loss of eyelid reflex), either succinylcholine 1 mg/kg, i.v. (Group I), or mivacurium 0.2 mg/kg i.v. (Groups II and III), was administered to facilitate tracheal intubation. Anesthesia was maintained with isoflurane (0.5%-2% inspired concentration) in combination with 67% N_2O in oxygen. Muscle relaxation was maintained in all three groups with intermittent bolus doses of mivacurium, 2-4 mg, i.v. In Group III, residual neuromuscular block was reversed with a combination of neostigmine, 2.5 mg, and glycopyrrolate, 0.5 mg, i.v., at the end of the operation. In the postanesthesia care unit (PACU), patients in Group III had a significantly increased incidence of postoperative nausea and vomiting compared to Group II. The use of succinylcholine (versus mivacurium) was also associated with more frequent postoperative nausea and vomiting. However, these emetic sequelae did not delay postoperative recovery times. In addition, a comparable number of patients in each treatment group required analgesic medication for postoperative pain. Although patients who received succinylcholine complained of significantly more neck pain during the 24-h period after discharge, nausea, vomiting, and shoulder pain were similar in all three groups during this period.

We conclude that neostigmine and glycopyrrolate may contribute to the development of postoperative emesis when used for reversal of residual neuromuscular block.

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Are discharge criteria changing?

F Chung

J Clin Anesth 1993; **5**(6 Suppl 1): 64S–68S

The safe and expeditious conduct of ambulatory surgical care can succeed only by careful selection of patients and surgical procedures, appropriate intraoperative and postoperative anesthesia care, and prudent and timely discharge of patients. Practical discharge criteria or a postanesthesia discharge scoring system should be implemented in every ambulatory surgery center to ensure safe recovery and discharge after anesthesia.

The PADSS is simple, practical, and easy to remember. It provides an uniform assessment of all patients, it may have added medicolegal value, and it establishes a routine of repeated reevaluation of home readiness. We recommend using the postanesthesia recovery score (Aldrete score) to evaluate the initial recovery of the patient. Once the Aldrete score is met, home readiness can be evaluated by the PADSS or modified PADSS. If the patient satisfies the criteria of the PADSS or modified PADSS, he or she can be discharged home. At the Toronto Hospital, we have discharged 30,000 patients home safely with the PADSS. However, any discharge criteria scoring system must be used with common sense and clinical judgment. Home readiness does not mean street fitness. Further studies on adverse outcomes after discharge and the return to normal function (e.g., work readiness) are warranted.

Recovery characteristics of desflurane versus halothane for maintenance of anesthesia in pediatric ambulatory patients

PJ Davis, IT Cohen, FX Jr McGowan and K Latta

Anesthesiology 1994; **80**(2): 298–302

Desflurane is a new potent, inhaled anesthetic agent with low blood-gas solubility that should allow for the rapid induction of and emergence from anesthesia. However, its extreme pungency makes desflurane unacceptable for induction of anesthesia in children.

This study was undertaken to determine the airway properties of desflurane administered by mask after anesthetic induction with halothane and nitrous oxide, and to compare the emergence and recovery properties of minimum alveolar concentration (MAC)-equivalent concentrations of desflurane or halothane in nitrous oxide in pediatric patients undergoing ambulatory surgery. Forty-five children undergoing ambulatory surgery for inguinal hernia repair, orchiopexy, and/or circumcision were randomized into two groups. Both groups were premedicated with intranasal midazolam and given halothane and nitrous oxide by mask to induce anesthesia. A caudal block was placed in children in both groups after anesthetic induction. For maintenance of anesthesia, group I patients (n = 22) were switched over to desflurane (1 MAC) and nitrous oxide, and group II patients (n = 23) continued to receive halothane (1 MAC) and nitrous oxide. All patients breathed spontaneously throughout the entire procedure, and all anesthetics were terminated abruptly at the conclusion of surgery. Recovery indicators (time to first response, length of time in the recovery room and length of time in the hospital) and the quality of the anesthetic emergence were assessed by a nurse blinded to each patient's anesthetic. This observer was present with the patient throughout his or her ambulatory hospitalization and continuously assessed the recovery indicators according to preset criteria. The groups did not differ with respect to age, weight, or dose of midazolam.

Although group I (desflurane) had a longer anesthesia time (52 ± 12 min vs. 42 ± 10 min), their time to first response (9.5 ± 6.8 min vs. 20.9 ± 14.7 min) and their recovery room time (21 ± 10.7 min vs. 29 ± 14.6 min) were less than those in group II (halothane). There was a trend for patient emergence from desflurane anesthesia to be associated with a higher incidence of emergence delirium (50% vs. 21%).

The two groups were similar with respect to overall duration of postoperative ambulatory hospitalization. In children premedicated with intranasal midazolam, desflurane maintenance anesthesia allows for a faster recovery. However, depending on the institution's criteria for ambulatory surgical patient discharge, desflurane may or may not affect the overall hospitalization time.

Anxiety, relaxation and anaesthesia for day-case surgery

D Markland and L Hardy

Br J Clin Psychol 1993; **32**(4): 493–504

It is recognized that pre-operative anxiety can have adverse effects on the course and outcome of surgery and there is a considerable amount of research into the influences of interventions for pre-operative anxiety on a number of post-operative variables. However, little attention has been paid to the potential influences of treatments on intra-operative variables, most notably on the facilitation of anaesthesia.

The present study examined the impact of a brief relaxation procedure on anaesthesia in comparison to attention-control and no-treatment control procedures. A sample of 21 patients were randomly assigned to one of the three conditions. It was found that the relaxation treatment significantly reduced pre-operative anxiety as measured by the state scale of the State-Trait Anxiety Inventory (Spielberger, 1983). This reduction was reflected in physiological indicators of anxiety.

Both the relaxation group and the attention-control group required significantly less time to induce anaesthesia and less of the anaesthetic agent used to maintain anaesthesia. The relaxation group also scored significantly lower than the no-treatment control group on an anaesthetist's rating of difficulty of maintenance of anaesthesia. Whilst the relaxation treatment appeared to have no advantages over the attention-control procedure in anaesthetic requirements, the latter did not reduce anxiety and showed no benefit over the no-treatment control condition in terms of an anaesthetist's rating of difficulty of maintenance of anaesthesia. Following recovery, the relaxation group reported more favourable perceptions of treatment than the attention-control subjects.

Impact of newer drugs and techniques on the quality of ambulatory anesthesia

PF White and I Smith

J Clin Anesth 1993; **5**(6 Suppl 1): 3S–13S

Recent pharmacologic and technologic advances in anesthesia and surgery allow outpatients with complex medical problems to undergo a wide variety of diagnostic and surgical procedures on an ambulatory basis. Increasingly, however, anesthesia practitioners, as well as pharmacy and therapeutic committees, are demanding proof that a new, more costly drug or medical device is superior to existing products in achieving its desired effect, is associated with fewer adverse effects, enhances efficiency, and reduces health care costs. The new field of pharmacoeconomics has emphasized the importance of cost-effectiveness analyses that consider both direct and indirect costs of newer drugs and therapeutic modalities. As new biomedical technology is introduced to facilitate the perioperative management of patients (e.g., computerized anesthesia information management systems), evidence that these systems enhance our ability to continue to provide high-quality, cost-effective health care will assume increasing importance. Limitations in health care resources necessitate a careful reevaluation of our clinical practices with respect to choice of drugs, supplies, equipment, and even discharge criteria. Ambulatory anesthesia and surgery will continue to increase because of the potential cost savings for patients undergoing elective operations on an outpatient basis. However, the challenge we face will be to continue to provide high-quality anesthesia care at a reduced cost. A careful examination of commonly accepted (but unproven) clinical practice patterns will be necessary to meet this challenge.

Outpatient transurethral incision of the prostate under local anesthesia: operative results, patient security and cost effectiveness

J Hugosson, S Bergdahl, L Norlen and T Ortengren

Scand J Urol Nephrol 1993; **27**(3): 381–5

Thirty patients with small and medium-sized obstructive prostates were operated by transurethral incision of the prostate (TUIP) under local anesthesia as an outpatient procedure. All patients except one tolerated this manoeuvre without any complications or discomfort. The obstructive symptoms were relieved in all patients; however, 6 patients had lasting irritative symptoms, 2 of whom were cured after TURP. The costs of TUIP was calculated to be one sixth of that of TURP. During one year follow-up 5 patients were found to have prostate cancer despite careful rectal examination and PSA measurement preoperatively. In conclusion, TUIP may be carried out as safely and cost-effectively as an outpatient procedure and is beneficial in patients with predominantly obstructive symptoms. However, careful investigations concerning possible prostate cancer must be undertaken in this group of patients with small but symptomatic prostates.

Day case management in adjustable suture squint surgery

AJ Luff, RJ Morris and AC Wainwright

Eye 1993; **7**(5): 694–6

Day case adjustable suture squint surgery is limited by patient cooperation in the early post-operative period. Nausea is common and may be exacerbated by adjustment. To facilitate early adjustment, in 37 consecutive patients anaesthesia was induced with propofol and the airway maintained with a laryngeal mask. Before and after adjustment patients recorded their level of nausea on a visual analogue scale (1 = no nausea, 10 = vomiting). The mean age of the group was 31.9 years with 20 men and 17 women. Adjustment was performed at a mean time of 4.9 hours after surgery. On the analogue scale of nausea the mean score was 1.54 pre-adjustment and 1.73 post-adjustment. Only 1 patient was given a post-operative anti-emetic. All patients were sufficiently alert to adjust without difficulty and were discharged the same day. The use of a laryngeal mask and induction of anaesthesia with propofol in adjustable suture squint surgery facilitates early adjustment and thus day case management.

Preoperative intravenous diclofenac for postoperative pain prevention in outpatients

T Hyrkas, P Ylipaavalniemi, VJ Oikarinen and I Paakkari

Br J Oral Maxillofac Surg 1993; **31**(6); 351–4

Fifty patients undergoing a standard removal of an impacted lower third molar were given a single dose of 75 mg sodium diclofenac or saline (placebo) intravenously before operation, on a double-blind basis. Pain was measured postoperatively by means of a visual analogue scale hourly for the first 8 h and during the first and second days after operation. Administration of diclofenac resulted in greater pain relief than administration of placebo for the first 3 h after surgery, whereafter the treatments did not differ.

The results suggest that intravenous preoperative diclofenac may be useful in some clinical situations but generally it probably offers little benefit over the corresponding oral treatment.

Antiemetic efficacy of prophylactic ondansetron in laparoscopic surgery: randomized, double-blind comparison with metoclopramide

JH Raphael and AC Norton

BJA 1993; **71**(6): 845–8

In a randomized, double-blind study, we have compared the prophylactic antiemetic efficacy of ondansetron with that of metoclopramide in 123 patients undergoing general anaesthesia for day-case gynaecological laparoscopic surgery. The patients received either i.v. ondansetron 4 mg or metoclopramide 10 mg immediately before a standard anaesthetic.

The number of patients with no nausea or vomiting in the ondansteron group was 50 (82%) compared with 29 (47%) in the metoclopramide group ($P < 0.001$). In those patients with a previous history of postoperative nausea and vomiting, nausea was less severe in those receiving ondansetron compared with those receiving metoclopramide ($P < 0.05$). We conclude that preoperative prophylactic administration of i.v. ondansetron was superior to metoclopramide in preventing nausea and vomiting after general anaesthesia for day-case gynaecological laparoscopic surgery.

Nausea: the most important factor determining length of stay after ambulatory anaesthesia. A comparative study of isoflurane and/or propofol techniques

G Green and L Jonsson

Acta Anaesthesiol Scand 1993; **37**(8): 742–6

Speed of recovery and length of stay in hospital were studied in 95 ambulatory patients undergoing laparoscopy or arthroscopy. The patients were divided into three groups regarding maintenance of anaesthesia. Group A (n = 32) received isoflurane 0.7% end-tidally, group B (n = 31) propofol infusion for 25 min and thereafter isoflurane, and group C (n = 32) received an infusion of propofol throughout the procedure. Recovery was assessed by a combination of the Maddox-Wing, the Choice Reaction Time test and p-deletion. The awakening period was somewhat shorter in group A, but psychomotor recovery was somewhat slower compared to groups B and C. The length of stay in hospital depended on whether the patient was nauseated or not. In group A, 44% suffered from nausea requiring medical intervention compared to 13% and 19% in groups B and C, respectively.

The stay in hospital was 235 ± 90 min (mean ± standard deviation) in group A compared to 184 ± 56 min and 197 ± 55 min in groups B and C, respectively. The non-nauseated patients in group A had a stay in hospital of 188 ± 55 min compared to 184 ± 52 and 184 ± 37 in the non-nauseated patients in groups B and C, respectively. In total, the nauseated patients (n = 24) stayed 267 ± 95 min compared to 185 ± 47 min for the non-nauseated patients (n = 71), $P < 0.001$. We found nausea to be the most important factor determining length of stay after ambulatory anaesthesia.

Pharmacokinetics and effects of i.m. alfentanil as premedication for day-case ophthalmic surgery in elderly patients

M Virkkila, T Ali-Melkkila, H Soini and J Kanto

BJA 1993 Oct; **71**(4): 507–11

We have studied the pharmacokinetics and effects of i.m. alfentanil as premedication for peribulbar block in 90 patients undergoing elective day-case cataract surgery. We compared alfentanil 12.5 $\mu g\,kg^{-1}$ injected into the deltoid (n = 30) or gluteal muscle (n = 30) 15 min before the peribulbar block, and placebo (n = 30). The alfentanil concentrations were significantly greater in the deltoid group during the study and the mean peak concentration occurred more rapidly in this group. Only alfentanil injected into the deltoid muscle reduced pain (assessed with a visual analogue scale (VAS)) associated with the peribulbar block. A mild sedative effect (VAS) was found in both alfentanil groups. We conclude that i.m. alfentanil appears to be a suitable premedicant for short, painful procedures because it has a short duration of action and is not associated with any clinically significant side effects.

Pain on injection of propofol: modification by nitroglycerin

D Wilkinson, M Anderson and IS Gauntlett

Anesth-Analg 1993; **77**(6): 1139–42

The effect of applying nitroglycerin or placebo ointment to the back of the hand before venipuncture and injection of propofol was investigated in 60 ASA physical status I unpremedicated women. Eighteen patients (67%) pretreated with nitroglycerin experienced no pain compared with 10 (33%) in the placebo group. Eleven in the placebo group experienced moderate or severe pain during injection compared with only one in the active group. The time of onset of pain in more than half the subjects occurred 10 s or longer after commencement of injection, and, in more than half the patients, the site at which pain was felt was above the injection site (with three subjects experiencing it in the shoulder). No patient had a headache or experienced postural hypotension. We conclude that nitroglycerin ointment applied to the back of the hand before injection reduces the incidence of painful injection with propofol.

Patient evaluation of four different combinations of intravenous anaesthetics for short outpatient procedures

J Jakobsson, E Oddby and K Rane

Anaesthesia 1993; **48**(11): 1005–7

We studied 200 female patients (ASA group 1) scheduled for termination of pregnancy under general anaesthesia. The patients were randomly allocated to receive one of four anaesthetic combinations;

1) propofol in combination with ketamine 20 mg,
2) propofol in combination with fentanyl 0.1 mg,
3) thiopentone in combination with fentanyl 0.1 mg,
4) methohexitone in combination with fentanyl 0.1 mg.

All patients were breathing oxygen in nitrous oxide 1:2. Patients' self assessments of per- and postoperative course and time to discharge were compared. No patient's response suggested light anaesthesia, but dreams were frequently experienced during anaesthesia especially among the propofol-ketamine combination (29 out of 50). Time to discharge was shortest for the groups of patients given propofol; the mean time was 93 and 96 min for the ketamine and fentanyl groups respectively. During the recovery period significantly more

patients experienced pain in the ketamine-propofol group. Complaints of nausea were seen in only 15 patients, and seven patients noted psycho-mimetic side effects during recovery, without any differences between the groups.

All four combinations tested offered good conditions for short outpatient procedures. However, the propofol-fentanyl combination was found to offer the best quality of anaesthesia as assessed by the patients themselves.

Pain relief following day-case diagnostic hysteroscopy-laparoscopy for infertility: a double-blind randomized trial with preoperative naproxen versus placebo

R van-Ee; DJ Hemrika and CT van-der-Linden

Obstet Gynecol 1993; **82**(6): 951–4

OBJECTIVE: To study the effects of preoperative naproxen on postoperative and post-discharge outcome and consumption of analgesics in patients undergoing diagnostic hysteroscopy and laparoscopy for infertility.
METHODS: A double-blind, placebo-controlled study was conducted in 60 healthy women scheduled for day-case hysteroscopy and laparoscopy. Subjects were randomized to receive either 500-mg naproxen suppositories (n = 30) or placebo (n = 30) preoperatively. Following discharge, each patient was given two naproxen suppositories for treatment of pain at home. Pain was scored on the Visual Analogue Scale, and the postoperative and post-discharge use of analgesics was determined, recorded, and analyzed.
RESULTS: Patients premedicated with naproxen had significantly less postoperative pain, showed more rapid ambulation, could be discharged earlier, and had less post-discharge pain. On the day after surgery, only six of 28 naproxen-treated patients needed analgesics, compared to 18 of 30 placebo patients. C
CONCLUSION: Day-case diagnostic hysteroscopy and laparoscopy for evaluation of infertility is potentially painful and stressful. Preoperative naproxen contributed to postoperative pain prevention, reduced hospital stay and consumption of analgesics, and shortened the period of post-discharge abdominal discomfort.

Analgesia after laparoscopic sterilisation. Effect of 2% lignocaine gel applied to Filshie clips

K Barclay, JP Calvert, SJ Catling, ND Edwards and A Rees

Anaesthesia 1994; **49**(1): 68–70

The authors performed a randomised controlled study in patients undergoing day case laparoscopic sterilisation to assess whether coating Filshie clips with 2% lignocaine gel prior to application to the Fallopian tubes would reduce postoperative pain. Sixty-two patients were studied, in 33 of whom the Filshie clips were coated in sterile 2% lignocaine gel.

Pain scores in the lignocaine gel group were significantly lower than in the control group at 1 h after return to the ward, but no differences were found immediately on return to the ward, or at discharge or at 24 h. There were no significant differences between the two groups in postoperative analgesic requirements or in side effects.

Transurethral nedle ablation (TUNA): safety, feasibility, and tolerance of a new office procedure for treatment of benign prostatic hyperplasia

CC Schulman, AR Zlotta, JS Rasor, L Hourriez, JC Noel and SD Edwards

Eur Urol 1993; **24**(3): 415–23

Many attempts have been made to develop a method for treating benign prostatic hyperplasia (BPH) that is minimally invasive, efficacious, and low cost. The transurethral needle ablation (TUNA) device has recently been developed to treat BPH by selectively ablating hyperplastic prostatic tissue.

A special catheter incorporates needles that deliver low-level radiofrequency power directly to a very localized area of the prostate. The needles have adjustable shields to protect the urethra if desired or necessary. It is positioned via transrectal ultrasound or direct vision.

A pilot study was performed in patients to evaluate TUNA feasibility via histopathological measurement of thermal lesion size and TUNA safety by:

1) monitoring urethral and rectal temperatures;
2) assessing the ability to localize lesions, and
3) determining patient tolerance of the procedure without anesthesia.

Twenty patients were treated using TUNA prior to scheduled retropubic prostatectomy. The surgical prostatic specimens were recovered from 1 day to 1 month after TUNA, were step-sectioned, and examined histologically. Patients were 68 years old on average with prostate weight varying from 14 to 88 g. The TUNA procedure averaged 27 min, 4 lesion treatments per prostate, and 4-15 W of power applied for 3 min. Proximal lesion temperature was about 40-50 °C with central lesion temperatures of about 80-100 °C. Urethral temperature averaged 37-42 °C and rectal temperature remained unchanged. Macroscopic examination of the specimens demonstrated localized lesions averaging 12 x 7 mm. Microscopic examination showed larger lesions of extensive coagulative necrosis averaging 30 x 15 mm. Specific immunohistochemical staining showed destruction of all tissue components.