The Mallampati criteria are a better indicator for prediction of a difficult airway than the IDS scale.

**Background:** Obesity occurs worldwide; morbid obesity is referred to as body mass index (BMI) >40 kg/m2. Anesthesia providers have to be prepared to take care of the morbidly obese.

**Objective:** To evaluate the intubation difficulty scale (IDS) in obese and non-obese patients.

**Design:** Prospective study.

**Participants/Methods:** 204 ASA I, II, and III patients aged >18 years undergoing elective surgery. Airway examination included Mallampati class (MPC) without phonation, thyromental distance, head and neck mobility, width of mouth opening, absence or presence of buck teeth, and mandibular recession. Patients’ height, weight, BMI, age, gender, ASA, surgical procedures, and morbidities were recorded. The patients were induced and intubated with a standard endotracheal tube using a Macintosh 3 blade. The intubation was evaluated according to the 7 variables of IDS -- N1: number of additional intubations on the first attempt was zero; N2: additional operators; N3: alternative intubation techniques; N4: glottic exposure by Cormack and Lehane score, grade 1 being 0; N5: lifting force applied during laryngoscopy, normal being 0; N6: application of external laryngeal pressure; and N7: position of vocal cords - abduction being 0 and adduction being 1. For every additional aberration of the normal, 1 point is added to the score: score 0 - easy intubation; 1-5 - slight difficulty; and >5 - moderate/major difficulty. Level of SaO2 was recorded, and total scores were added.

**Results:** Of the 204 patients, 105 had BMI >30 kg/m2, while 99 had <30 kg/m2. Obese patients were younger with a higher incidence of hypertension and diabetes mellitus. IDS score was higher in the obese (2.29 vs 1.26 in the non-obese). Average BMI of IDS 0 was 30.0, IDS 1-5 was 32.0, and IDS >5 was 44.4. Intubation duration was 45.1 seconds compared to 36.8 in the non-obese. Lowest saturation was 97%. The factors that increased IDS score included limited glottic exposure, increased lifting force needed during laryngoscopy, and need to apply external laryngeal pressure.

**Discussion:** The increased lifting force was attributed to the narrow airway, increased fat accumulation, short neck, large tongue, and limited cervical spine mobility. A limitation of the study was that face mask ventilation was not assessed. Only the intubation scores, duration, and drop in saturation were recorded; therefore, the IDS was inferior to actual assessment of difficulty. But, it provided a retrospective analysis of assessing airway and difficult intubation in the obese. The IDS score of >5 was similar to MPC of 3-4, thereby implying that MPC 3-4 suggests difficult intubation and one should be alert and ready for it.

**Conclusions:** Difficult intubation was more prevalent among obese than non-obese patients, but intubation duration and lowest SaO2 levels during intubation were not. Moreover, the modified Mallampati test was found to be a moderately good (60%) predictor of difficult intubation among obese patients.

**Reviewer's Comments:** The Mallampati criteria are a better and easier predictor of a difficult airway in the obese. Although the IDS was similar to the Mallampati, it gave a retrospective analysis of a difficult intubation. (Reviewer-Sunita Goel, MD).

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Keywords: Difficult Airways, Intubation Difficulty Scale, Mallampati Criteria

Print Tag: Refer to original journal article
Regional anesthesia does not increase turnover time and can be safely used in ambulatory surgeries.

**Background:** Regional anesthesia (RA) has been shown to have many advantages in ambulatory surgery; despite this, it is not commonly used because of presumed increased turnover time.

**Objective:** To compare the anesthesia turnover time between regional and general anesthesia.

**Methods:** IRB approval was obtained for the study. A block room model was started a month prior to the study. Cases were divided into 3 groups: group 1 -- general anesthesia (GA); group 2 -- nerve block in the block room (RA); group 3 - intravenous regional anesthesia (IVRA) or field blocks in the OR (LA). Peripheral nerve blocks of the brachial plexus were carried out in the block room with standard ASA monitoring.

**Results:** In 1 year, 344 upper extremity cases were performed. The combined GA/nerve block cases were excluded; the remaining 229 cases were eligible for the study. Demographic data were comparable in all 3 groups. Mean surgery duration was 70 minutes in both the GA and RA groups, but 19 minutes in the LA group. The anesthesia set-up time was 28 minutes in the block room compared to 32 minutes in the OR for GA, while for the LA group it was 25 minutes, and this was statistically significantly lower.

**Discussion:** This study shows that anesthesia-controlled time for RA was shorter than for GA, suggesting that the turnover time is unaffected by anesthesia technique and depends greatly on factors other than the choice of anesthesia. Preparing the OR, equipment sterilization, and paperwork are all factors contributing to the increased turnover time between cases. Certain blocks like IVRA and LA injections, though having the shortest time, could only be used in cases of limited duration, and should be considered, depending on the site and duration of surgery and tourniquet placement. The use of the block room decreased the anesthesia OR time compared to the block being given in the OR. Limitations of this study were its retrospective nature and it lacked randomization with a small sample size, though it was statistically significant.

**Conclusions:** This study does show that regional anesthesia does not affect the surgical or turnover time and may gain more acceptance in outpatient surgery.

**Reviewer's Comments:** This is an interesting study showing that regional anesthesia did not increase the turnover times and a large number of cases as well as training residents can be done if a dedicated block room could be used. (Reviewer-Sunita Goel, MD).

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Keywords: Regional Anesthesia, General Anesthesia, Ambulatory Surgery, Turnover Time

Print Tag: Refer to original journal article
Ultrasound guidance is an alternative to nerve stimulators for interscalene blocks.

**Background:** Interscalene blocks (ISB) have been performed in the past using nerve stimulators and with ultrasound guidance, though not much data are available with the use of ultrasounds.

**Objective:** To corroborate data of outcomes in 200 patients where single and continuous ISBs were performed.

**Methods:** After review board approval, 200 patients received single or continuous ISB. All blocks were performed by anesthesia residents. Patients with pre-existing sensory or motor deficits were excluded. Deficits were monitored 48 hours after the single shot or 24 hours after the continuous technique and further followed at 7 to 14 days. Patients were premedicated with IV midazolam or fentanyl for sedation. Heart rate and SaO\textsubscript{2} were recorded. Success of the block was defined by sensory and motor changes in the distribution of the brachial plexus. Light touch, temperature, and motor strength were assessed in the PACU. Pain was reported using the visual analog scale. The total opioid requirement was recorded. General anesthesia (GA) was given with propofol and remifentanil. Catheter failure was when the patient had postoperative pain without sensory changes in the upper limbs. Patients received acetaminophen with oxycodone or hydrocodone for breakthrough pain.

**Results:** 200 patient records were studied; 47 patients had single injections, while 153 had continuous catheters. Thirteen (6%) patients had paresthesia despite the residents’ attempt to avoid brachial plexus, and 2 (1%) had vessel puncture. In the PACU, 99% of patients reported a pain score of ≤2, and 81% reported a pain score of 0; 19% of patients required opioids in the PACU. One had secondary catheter failure, and had sensory block for 16 hours with analgesia and complained of pain thereafter. Two patients had persistent sensory deficit, 1 had decreased sensation over the ipsilateral ear for 16 weeks, and the other had decreased sensation over the thumb and index finger for 12 weeks.

**Discussion:** This study mainly used an out-of-plane approach with slowly injecting 1 to 2 mL of local anaesthetic as the needle advanced. Here, the interscalene space was approached through the middle scalene muscle. This was for 2 reasons--as ultrasound shows a true space between the middle scalene and brachial plexus that can be easily expanded and also avoids the phrenic nerve. Compared to other studies, 100% had sensory and motor changes consistent with block of the upper trunk. Overall, 99% had pain scores of ≤2 in the recovery room. In this study, 6% had needle paraesthesia during block placement, 1% had vascular puncture, and 1% had neurologic deficit--although there was a lack of control group in the study. In conclusion, this technique was successful and can be used effectively.

**Reviewer's Comments:** The ultrasound technique is a viable alternative to the nerve stimulator technique as it can be performed successfully as and when needed. (Reviewer-Sunita Goel, MD).

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Keywords: Interscalene Blocks, Ultrasound Guidance, Postoperative Analgesia

Print Tag: Refer to original journal article
Hyponatremia in SAH is most likely due to salt wasting and can be prevented by high sodium and water intake.

**Background:** Hyponatremia occurs in 30% of patients with subarachnoid hemorrhage (SAH) and is associated with a poorer prognosis. Mechanisms include either the syndrome of inappropriate antidiuretic hormone secretion (SIADH) or cerebral salt wasting syndrome (CSW). SIADH is treated with fluid and sodium restriction, while CSW is treated with large sodium intake.

**Objective:** To test whether high sodium intake can prevent hyponatremia and hypovolemia and to evaluate the role of natriuretic hormones in the development of hyponatremia in the setting of SAH.

**Design:** Prospective observational clinical study.

**Participants:** Adult patients with SAH secondary to ruptured aneurysm and who were expected to be in the ICU at least 10 days. Patients with renal failure, cardiac disease, or on diuretics, ACEI, or corticosteroids were excluded.

**Methods:** All patients were managed according to a standard protocol that included surgical clipping or coiling of the aneurysm, ventricular drainage for hydrocephalus, nimodipine infusion, mechanical ventilation, and sedation. Sodium administration included 2 L normal saline the first day and then adjusted for natriuresis. Measurements included total blood volume, renal function, and hormonal levels, which were obtained during the four 3-day periods of the 12-day study time.

**Results:** Over a 2-year period, 19 patients participated in the study. None of the patients developed hyponatremia (Na <135 mEq/L). There was an increase in sodium excretion and positive water balance, but a decrease in total blood volume (TBV). Antidiuretic hormone (ADH) and aldosterone concentrations were normal, while renin and angiotensin were increased in the second period followed by a decrease. Natriuretic peptides varied according to the presence of myocardial damage determined by cardiac TnI, and their concentrations did not correlate with urinary sodium excretion. Favorable outcome occurred in 47% of patients.

**Conclusions:** Hyponatremia in SAH is most likely due to salt wasting and can be prevented by high sodium and water intake. The decrease of TBV reflecting salt wasting is in agreement with results of previous studies and excludes SIADH. Suggested mechanisms of this phenomenon are increased sympathetic nervous system activity, activation of the renin-angiotensin system, and increased natriuretic peptides. The effect of Na management on the outcome could not be assessed because of the observational design and the lack of power of this study.

**Reviewer's Comments:** Differentiation between the 2 causes of hyponatremia, SIADH versus CSW is critical, as the therapy is different. SIADH is associated with high urine osmolarity (>100 mOsm/L), while salt wasting has lower urine osmolarity (<100 mOsm/L). The former is treated with sodium and water restriction and addressing the underlying condition, while the latter requires isotonic or hypertonic saline administration, depending on the severity. This study provides support for using high intake of normal saline to prevent hyponatremia after SAH. The resulting hypervolemia may further assist in the prevention of cerebral vasospasm. (Reviewer: Ioanna Apostolidou, MD).

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Keywords: Hyponatremia, Subarachnoid Hemorrhage, Salt Wasting Syndrome

Print Tag: Refer to original journal article
Complications from peripheral vascular cannulations may lead to claims and significant payments.

**Background:** Complications of peripheral IV and arterial line cannulations include local or systemic infection, extravasation injuries, air embolism, thrombophlebitis, and vascular insufficiency. Although rare, they can be sources of anesthesia liability.

**Objective:** To analyze anesthesia liability associated with peripheral vascular catheterization and to compare it with the liability profile of other malpractice claims.

**Design:** Retrospective observation study.

**Methods:** The goals of the American Society of Anesthesiologists (ASA) Closed Claims Project were to identify major areas of loss in anesthesia. The anesthesia-related injury is graded according to severity from 0 (no injury) to 9 (death). Data collected from claims related to peripheral vascular catheterization included: type of complication, presence of drug or fluid extravasation, demographics, severity of injury, amount of payment. Payments were expressed in dollars adjusted to 2007 dollars using the Consumer Price Index.

**Results:** Between 1975 and 2000, 149 injuries from 6894 claims were related to peripheral vascular cannulation (2.1%). Intravenous catheters caused the majority of injuries (91%). From the 127 IV injuries, 35 were skin slough/necroses, 22 swelling/inflammations/infections, 22 nerve damage, 20 fasciotomy scars from compartment syndrome, 10 air embolisms, and 4 burns from hot compresses. About half of the complications were caused by drug or fluid extravasation. Thiopental, vasopressors, and calcium caused skin slough. Among other miscellaneous complications was hand ischemia resulting in finger amputation in a patient with vasculitis given cold IV fluids. When compared to other non-IV claims, IV claims caused temporary non-disabling injury with no difference in demographics and physical characteristics of the patients. Thirteen claims (9%) were related to arterial cannulation (7 involving radial artery). Death and brain damage occurred in 2 claims related to retroperitoneal hemorrhage from iliac artery puncture. Monetary compensation involved half of the catheter-related claims (median $47,000) and was smaller than the other anesthesia claims (median $215,000). Claims involving permanent brain damage from air embolism resulted in higher payments, up to $12,500,000.

**Conclusions:** Peripheral vascular catheters may cause complications that can result in financial liability. Related claims comprise 2% of all anesthesia claims. Half of them are associated with extravasation of drug or fluid. This study revealed the mechanisms of complications from peripheral cannulations, their severity, and their impact on payment.

**Reviewer’s Comments:** More than 25 million patients have peripheral intravenous (IV) catheters placed each year in U.S. hospitals. Infusion therapy is believed to account for one third of all nosocomial bacteremias. The findings of this study, based on the ASA Closed Claims Project, provide an insight into the severity of these complications and their liability consequences. For example, a simple swelling/inflammation/infection may result in a few thousand dollars in payment versus an air embolism that could cost millions of dollars. (Reviewer-Ioanna Apostolidou, MD).

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Keywords: Peripheral IV Catheter, Arterial Line, Complications

Print Tag: Refer to original journal article
**Background:** Theoretical advantages of ultrasound (US) over the nerve stimulator technique (NS) for interscalene block include lower chance of intraneural injection and nerve injury. A recent systemic review of randomized trials reported that both techniques have similar efficacy when performed by a skillful anesthesiologist.

**Objective:** To determine whether the incidence of postoperative neurological complication is less in ultrasound when compared to the nerve stimulator technique for interscalene block.

**Design:** Randomized clinical trial.

**Participants/Methods:** 230 adult patients scheduled to undergo outpatient shoulder surgery with an interscalene block were randomized to US or NS technique using a 5-cm, 22-g insulated needle. In the NS, a motor response using a current between 0.2 and 0.5 mA indicated a correct needle placement. In the US, a 10 to 13 MHz transducer was placed at the interscalene area to visualize the brachial plexus. Mepivacaine 1.5% with 1:300,000 epinephrine and NaCO$_3$ 45 to 65 mL was used for the block. Time to complete the block and number of needle passes were measured. Sensory and motor neurologic assessment was performed prior to and after the block and graded from 0 to 2. Patients had neurological evaluations by telephone at 1 week and at 4 to 6 weeks follow-up. Symptoms were graded based on severity. Power analysis was performed to detect a difference (4% to 16%) between the 2 groups.

**Results:** Demographics were similar between groups. The number of needle passes was less (median, 1 vs 3) and motor block at the biceps was stronger in the US group as compared to the NS group. There was no difference in the time to do the block and in success rate of the block. Likewise, there was no difference in the incidence of postoperative neurologic symptoms at 1 week (8% US vs 11% NS) and at late follow-up (6% US vs 7% NS), as well as in their severity.

**Conclusions:** Ultrasound reduced the number of needle passes needed to perform interscalene block and enhanced motor block at the 5-minute assessment; however, the authors did not observe significant differences in block failures, patient satisfaction or incidence, and severity of postoperative neurological symptoms. One of the study limitations, which the authors acknowledged, is that they use neurological symptoms as a surrogate outcome for nerve injury. It is a subjective end point and its exact association with actual pathology is unknown.

**Reviewer's Comments:** Interscalene block has a high success rate when performed by an experienced anesthesiologist, regardless of the method used. The argument against the US technique is equipment cost and required training. (Reviewer-Ioanna Apostolidou, MD).

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**Keywords:** Interscalene Block, Ultrasound, Nerve Stimulator, Neurological Complications

Print Tag: Refer to original journal article
Stimulating Catheter Location Key Factor in Successful Popliteal Sciatic Block

A Randomized, Observer-Blinded Determination of the Median Effective Volume of Local Anesthetic Required to Anesthetize the Sciatic Nerve in the Popliteal Fossa for Stimulating and Nonstimulating Perineural Catheters.

Paqueron X, Narchi P, et al:

The median effective volume of local anesthetic needed for successful popliteal sciatic block in 50% of patients is greatly reduced with the use of a stimulating catheter.

Objective: To compare the volume of local anesthetic needed for stimulating catheters versus non-stimulating catheters to produce successful popliteal sciatic blockade.

Participants: Adult patients scheduled to undergo unilateral hallux valgus repair.

Methods: Patients were randomized to receive either a stimulating or non-stimulating catheter. Popliteal sciatic blockade was performed utilizing neurostimulation specifically searching for a tibial nerve response at 0.3 to 0.5 mA. In the stimulating catheter group, appropriate motor response was maintained during advancement of the catheter until 5 cm beyond the needle tip was achieved. If the desired motor response could not be maintained, repositioning of the catheter was done until the desired motor response was once again achieved. In the non-stimulating catheter group, once the appropriate motor response was elicited with the needle, the catheter was blindly advanced 5 cm beyond the needle tip. The initial bolus dose of local anesthetic for each group was 20 mL of 1.5% mepivacaine. An up-down allocation method was used to determine the median effective volume needed to produce successful sciatic blockade in 50% of patients. Motor and sensory block were assessed at 15, 30, and 45 minutes following placement. If a patient had a successful block at 45 minutes, the next patient had the initial bolus volume decreased by 2 mL. Conversely, if a patient had a failed block at 45 minutes, the next patient had the initial bolus volume increased by 2 mL. A saphenous nerve block was performed in all patients.

Interventions: Patients with incomplete motor and/or sensory block at 45 minutes received an additional 10 mL 1.5% mepivacaine. If inadequate block still persisted 15 minutes later, the patient received a distal ankle block or underwent general anesthesia for surgery.

Results: The stimulating group required approximately 60 seconds more on average for placement, and a median of 7 catheter repositionings compared to the non-stimulating catheter group. However, the stimulating group was found to have a median effective volume of 2.7 mL 1.5% mepivacaine to achieve successful sciatic block in 50% of patients. The non-stimulating group required a median effective volume of 16.7 mL local anesthetic. There were no differences in time to onset of motor or sensory block between groups.

Conclusions: The use of stimulating catheters for popliteal sciatic block was associated with a significant reduction in the median effective volume of local anesthetic needed to produce successful blockade in 50% of patients.

Reviewer’s Comments: It is hard to believe that a successful popliteal sciatic block can occur with only 3 mL of local anesthetic administered. It does appear from this particular study that location of the stimulating catheter associated with a specific motor response is the key factor. (Reviewer-Michelle L. Schlunt, MD).

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Keywords: Stimulating Catheters, Popliteal Sciatic Block, Local Anesthetic

Print Tag: Refer to original journal article
Use of stimulating catheters appears to provide improved analgesia for continuous femoral nerve blockade depending on the motor response elicited by the stimulating catheter and the minimum stimulus needed for a motor response.

**Objective:** To observe the possible locations where a continuous femoral nerve catheter could end up, and to see if the varying sites of motor response had an effect on postoperative pain relief.

**Participants:** 33 adult patients scheduled to undergo total knee arthroplasty were evaluated. The average age of the study population was 74 years.

**Methods:** All patients underwent placement of a continuous femoral nerve block utilizing a stimulating catheter. Upon elicitation of patellar snap at <0.5 mA, the stimulating catheter was blindly advanced 3 to 5 cm past the needle tip. There was no stimulation attempted via the catheter. This was followed by single-shot blockade of the obturator and sciatic nerves. Prior to activation of the continuous catheter with 5 mL 0.2% ropivacaine, the stimulating catheter was assessed to record the minimum stimulus required to elicit a motor response as well as the location of the motor response. Motor responses were grouped into 1 of 4 categories: patellar/quadriceps, pectineus/iliopsoas muscles, sartorius/vastus medialis muscles, and no response at >5 mA stimulation. Postoperatively, pain scores and motor/sensory blockade were assessed starting 30 minutes after extubation and every 30 minutes following up to 120 minutes.

**Interventions:** Patients with a pain score >40 received a bolus of 5 mL 0.2% ropivacaine up to a maximum of 3 boluses. Following this, intravenous morphine was given to decrease the pain score to zero.

**Results:** The sites of motor response elicited by the stimulating catheter were as follows: 48% patellar, 18% sartorius/vastus medialis, 12% pectineus/iliopsoas, and 22% with no motor response at >5 mA stimulation. Patients were further divided into 1 of 2 groups: those requiring ≤1 mA for motor response and those requiring >1 mA for motor response. Blockade of the obturator and sciatic nerves was equally successful in both groups. The group requiring >1 mA for motor response required significantly more postoperative ropivacaine boluses and morphine supplementation. This group also had a significantly lower percentage of patellar/quadriceps stimulation. At the first 30-minute evaluation, the >1 mA group had less motor and sensory blockade, but this difference was no longer significant at 120 minutes.

**Conclusions:** Use of stimulating catheters appears to provide improved analgesia for continuous femoral nerve blockade depending on the motor response elicited by the stimulating catheter and the minimum stimulus needed for a motor response.

**Reviewer's Comments:** I find it amazing that, in 5 of the 7 catheters placed that did not elicit any motor response with >5 mA stimulation still provided postoperative pain relief with pain scores of zero. Perhaps in the future with better imaging modalities, we may have a definitive answer for this seemingly unexpected outcome. (Reviewer-Michelle L. Schlunt, MD).

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Keywords: Stimulating Catheters; Continuous Femoral Nerve Block, Motor Response Sites

Print Tag: Refer to original journal article
The use of a continuous catheter placed at the iliac crest bone graft site provides effective postoperative pain relief in pediatric patients.

**Objective:** To evaluate the effectiveness and safety of a continuous catheter placed at the iliac crest bone graft site in pediatric patients.

**Participants:** Pediatric patients scheduled to undergo maxillary alveolar graft with iliac crest bone graft harvest were evaluated. The average age of the study population was 10 years.

**Methods:** 16 patients were taken in consecutive order. Premedication consisted of midazolam and atropine. All patients underwent an inhalational induction with sevoflurane followed by maintenance with sevoflurane in 50% nitrous oxide and oxygen. At the conclusion of surgery, the surgeon placed a multiorifice catheter at the site of iliac crest bone graft harvest. Following a negative test dose via the catheter, an initial bolus consisting of 0.2 to 0.4 mL/kg 0.2% ropivacaine was administered. A maximum volume of 15 mL was used. A continuous infusion of 0.2% ropivacaine running at 0.1 mL/kg per hour using a disposable elastomeric pump was then started and maintained for the 48-hour postoperative study period. All patients were placed on a scheduled regimen of intravenous paracetamol (acetaminophen) and rectal niflumic acid (a nonsteroidal anti-inflammatory drug). Pain scores were evaluated every 4 hours. For patients reporting pain scores >3, rescue analgesia was provided with intravenous nalbuphine up to 4 times daily. Three months after surgery, patients were evaluated for functional recovery and neuropathic chronic pain symptoms.

**Results:** During the 48-hour study period, the median pain score reported was zero. Approximately one third of the study patients did not require any rescue analgesia, and 44% required only a single dose of nalbuphine. There were no reports of inadvertent catheter removal or evidence of local anesthetic toxicity. One patient reported symptoms of neuropathic pain at the 3-month follow-up, but did not require any subsequent treatment.

**Conclusions:** The use of a continuous catheter at the iliac crest bone graft site provided excellent and safe postoperative pain relief associated with a low need for intravenous opioid rescue analgesia.

**Reviewer's Comments:** The use of regional anesthesia for postoperative pain relief in pediatric patients is becoming increasingly popular, especially now with the availability of appropriate sized regional needles and catheter sets. A simple technique such as described in this article can be easily incorporated into practice. I do believe it requires an organized Acute Pain Service to follow these patients daily. There were no reported catheter-related issues in this small study, but unfortunately these events do occur and require knowledgeable personnel such as those involved with an Acute Pain Service. This helps to insure speedy resolution to such problems, and increases the safety of these continuous catheters infusing on the ward. (Reviewer-Michelle L. Schlunt, MD).

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Keywords: Postoperative Analgesia, Ropivacaine, Bone Graft Site

Print Tag: Refer to original journal article
Massive transfusion resuscitation in blunt trauma is most effective in reducing mortality and derangements in coagulation when started early on admission and the volume ratio of FFP and platelets to packed red blood cells is 1:1.

**Objective:** To determine in trauma patients if early and aggressive implementation of a massive transfusion protocol (MTP) in which blood component administration approximating whole blood improves mortality and coagulation derangements compared to a pre-MTP era when restoration of blood loss is accomplished primarily with transfusion of packed red blood cells (PRBC) and crystalloid/colloid without adequate repletion of clotting factors.

**Design/Methods:** Outcome data were prospectively gathered for 1 year at a major trauma center following implementation of the MTP on admission in trauma patients. Massive transfusion was defined as ≥10 units of PRBC transfused in a 24-hour period. The MTP required the blood bank to deliver every 30 minutes a predesignated "package" of components with a ratio of PRBC:FFP:Platelets of 1:1:1. Mortality, coagulation, and transfusion data were also gathered retrospectively from a similar trauma patient group receiving massive transfusions for a 2-year period prior to implementation of the MTP.

**Results:** 84 patients received ≥10 PRBC in the first 24 hours of hospitalization in the 2 years prior to institution of the MTP and 73 patients in the first year of implementation of the MTP. The 2 groups had similar demographics and injury severity scores. In blunt trauma, patient mortality was significantly improved at 24 hours and 30 days post-admission in the MTP group compared to the pre-MTP group: 17% and 34% versus 36% and 55%, respectively. Mortality in the pre-MTP group was, for the most part, highest in patients in which the PRBC:FFP and PRBC:Platelets ratio was 3:1. Conversely, in the MTP group compared to the pre-MTP group, patients were transfused with significantly more FFP (13.7 units vs 5.5 units per patient) and platelets (14 units vs 9 units per patient), despite a similar number of PRBC transfused in both groups. Furthermore, in the first 6 hours, the MTP group was administered 6.9 L of crystalloid compared to 9.2 L in the pre-MTP group. Although both groups had similar coagulation parameters on hospital arrival, the MTP group had significantly lower INRs on arrival in the ICU than the pre-MTP patients (1.3 vs 1.72).

**Conclusions:** Instituting an MTP early in the resuscitation of blunt trauma patients that targets a ratio of FFP:PRBC:Platelets in a ratio of 1:1:1 significantly improves both early and late survivability.

**Reviewer's Comments:** It now appears that initial volume resuscitation in blunt trauma victims that relies extensively on crystalloid and PRBC has grave implications in terms of worsening the coagulopathy and outcomes compared to employing a volume resuscitation protocol that aims to duplicate a ratio of FFP and platelets to red blood cells that approximates whole blood. Thus, those involved in the initial management of trauma patients need to seriously consider implementing an MTP that meets the aforementioned component target ratio. (Reviewer-Douglas E. Koehntop, MD).

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Keywords: Transfusion Management, Trauma Patients

Print Tag: Refer to original journal article
Light sedation with remifentanil does not result in higher intracranial pressure and it better preserves cerebral perfusion pressure compared to propofol in patients with brain tumors for stereotactic brain biopsy.

**Objective:** To test the hypothesis that sedation with remifentanil would result in higher intracranial pressure (ICP) and preserved cerebral perfusion pressure (CPP) compared to sedation with propofol in spontaneously breathing, non-intubated brain tumor patients.

**Design/Participants:** Prospective, open-label, randomized, controlled clinical study involving 40 consecutive adult patients undergoing stereotactic brain tumor biopsy.

**Methods:** Participants were randomized to receive either remifentanil or propofol (n=20 each group). Scalp nerve blocks were performed in all patients using a 20-mL mixture of lidocaine 2.0% and bupivacaine 0.5%. In propofol patients, propofol was started at 3.0 mg/kg per hour after a 0.5-mg/kg bolus. The infusion was then adjusted to obtain and maintain a level of sedation of 4 on the modified observer’s assessment of alertness/sedation (MOAAS) scale. Remifentanil patients received a remifentanil infusion at a rate of 1.2 μg/kg per hour, which was adjusted to obtain and maintain the same level of sedation on the MOAAS scale. ICP was obtained 1 minute after stabilization. An arterial blood sample was obtained immediately after ICP recording along with mean arterial pressure, pulse oximetry, heart rate, and occurrence of signs and symptoms of increased ICP.

**Results:** Demographics and preoperative data were similar in both groups. Intraoperatively, patients in the remifentanil group had a slower respiratory rate ($P = 0.0001$) and a higher arterial $P_{CO_2}$ ($P = 0.009$), resulting in a lower arterial pH ($P = 0.007$). Mean ICP of both groups was similar, with higher mean arterial pressure in the remifentanil group ($P = 0.0008$), resulting in a higher CPP in the remifentanil group, compared to the propofol group (82.0 ± 19.0 mm Hg vs 69.5 ± 17.0 mm Hg, respectively; $P = 0.03$). There were no complications encountered in either group.

**Conclusions:** Light sedation with remifentanil results in a similar ICP and a higher CPP compared to light sedation with propofol.

**Reviewer's Comments:** There are few study limitations, including the assumption that the measured intraleional (parenchymal) pressure reflects the pressure in the rest of the cranial cavity. Another limitation is the decision not to use bolus with the remifentanil group while using bolus when initiating propofol sedation. (Reviewer-K. George Bojanov, MD).

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Keywords: Sedation, Intracranial Pressure, Intracranial Space-Occupying Lesion, Remifentanil, Propofol

Print Tag: Refer to original journal article
A new neuromonitoring device (oxygen-to-see, O₂C™) allows detection of regional blood flow changes, oxygen saturation, and hemoglobin amount in response to different arterial carbon dioxide partial pressure alterations.

**Objective:** To investigate a recently developed neuromonitoring device (oxygen-to-see, O₂C™) for simultaneous measurements of regional cerebral blood flow (rvCBF), blood flow velocity (rvVelo), oxygen saturation (srvO₂), and hemoglobin levels (rvHb) at the venous end of capillaries during craniotomies, and how those parameters change with alterations in arterial carbon dioxide partial pressure (Paco₂).

**Design/Participants:** Prospective clinical study involving 26 adult ASA II-III patients scheduled for elective intracranial surgery.

**Methods:** The O₂C device combines laser-Doppler flowmetry (rvCBF, rvVelo) and photo-spectrometry (rvHb, srvO₂). For the purpose of the study, 1 single, 2-channel flat probe was applied on the cerebral cortex next to the site of surgery, providing measurements in 2- and 8-mm depths. For measurements, the O₂C device uses a transmission of near-infrared and visible light, detecting simultaneously 300 wavelengths of white light. Patients were randomly assigned to the first measurement at lower (35) and higher (45) Paco₂ levels. Three repetitive measurements, each lasting 1 minute with lights off, were performed, resulting in a total of 50 to 70 measurements. The assignment groups then crossed over, and measurements were repeated after 30 minutes of steady-state anesthesia. Variables followed included mean arterial blood pressure, heart rate, bladder temperature, inspired oxygen fraction, hemoglobin concentration, peripheral oxygen saturation, and blood oxygen content.

**Results:** Study groups were comparable to demographic data and surgical covariates. Mean changes in Paco₂ levels were 9.1 ± 2.8 mm Hg for 1.4% sevoflurane and 8.9 ± 2.4 mm Hg for 2.0% sevoflurane. Higher levels of Paco₂ increased rvCBF, rvVelo, and srvO₂ independent of end-tidal sevoflurane concentration (P >0.001). The rvVelo (P <0.001) and srvO₂ (P =0.007) were higher in 8-mm compared to 2-mm cerebral depth. The rvHb was positively correlated to end-tidal sevoflurane concentration, but not dependent on Paco₂ or cerebral depth.

**Conclusions:** The O₂C device provides real-time intraoperative measurements of cerebral microcirculation. The increase of rvCBF, rvVelo, and srvO₂ in 2- and 8-mm cerebral depth with increase of Paco₂ suggests preserved hypercapnic vasodilation, independent of sevoflurane concentration.

**Reviewer's Comments:** It appears that the O₂C device can be useful in studying as well as monitoring and managing cerebral physiology during various craniotomies. (Reviewer-K. George Bojanov, MD).

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Keywords: Arterial Carbon Dioxide Partial Pressure, Sevoflurane, Capillary Venous Cerebral Blood Flow, Oxygen Saturation, Craniotomy

Print Tag: Refer to original journal article
Scalp infiltration with ropivacaine can decrease the incidence of both nociceptive/inflammatory and neuropathic pain at 2 months after intracranial tumor resection.

**Objective:** To assess the efficacy of scalp infiltration with ropivacaine for reducing acute pain intensity and persistent pain incidence after craniotomy.

**Design/Participants:** Prospective, randomized, single-blinded clinical study involving 52 adult patients, ASA I-III, scheduled for elective craniotomy for excision of an intracranial tumor.

**Methods:** Patients were blindly assigned to 1 of 2 study groups: group I (infiltration, n=25) received a scalp infiltration with ropivacaine at the end of surgery, and group C (control, n=27) did not receive infiltration. Only the patient's surgeon and anesthesiologist (in charge of the intraoperative period) were not blinded to patient group allocation. Postoperative pain was assessed using a visual analog scale (VAS). All patients received acetaminophen 1 g IV 1 hour before the end of surgery and then again every 6 hours. If the VAS score was >30 (out of 100), patients were given nalbuphine 10 mg IV every 4 hours. Nausea and vomiting was treated with ondansetron 4 mg IV. The primary end point was cumulative nalbuphine consumption at 24 hours postoperatively. At 24 hours, patients were asked for satisfaction with pain management. Two months after surgery, patients were again contacted and asked about presence of persistent pain and its characteristics.

**Results:** Study groups did not differ in demographic data, intraoperative management, and surgical procedures. The total amount of nalbuphine administered during the first postoperative day was lower in group I, but this was not statistically significant (P =0.054). Group I patients had significantly reduced VAS scores during the first 24 hours postoperatively (P =0.046). Of patients, 94% were satisfied with pain management when asked 24 hours after surgery. Only 48 patients were successfully contacted at 2 months postoperatively. The number of patients suffering from persistent pain was significantly lower in group I (8%) compared to group C (56%; P <0.001). Of patients, 25% in group C and 4% in group I suffered from neuropathic pain (P =0.04).

**Conclusions:** Scalp infiltration with ropivacaine did not reduce acute postoperative pain, but it had pronounced results on development of the chronic pain state.

**Reviewer's Comments:** One of the limitations of this study is that it was underpowered, explaining the inability to detect a significant difference in the incidence of acute postoperative pain. Amazing, at least to me, is the high incidence of chronic pain (56%) in the control group at the 2-month interview. (Reviewer-K. George Bojanov, MD).

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Keywords: Scalp Infiltration, Ropivacaine, Intracranial Tumor Resection

Print Tag: Refer to original journal article
Acute Leukemia, Propofol Use - Does This Combo Increase Pancreatitis Risk?

_Crawford MW, Pehora C, Lopez AV:_


A relationship between propofol use and onset of acute pancreatitis in children with leukemia could not be established.

**Background:** There might be a link between propofol use and development of acute pancreatitis. Alterations in lipid metabolism leading to hypertriglyceridemia, release of free fatty acids, chylomicron plugging of pancreatic capillaries, etc, might lead to development of pancreatitis. Certain chemotherapeutics such as cytosine arabinoside, 6-mercaptopurine, and L-asparaginase might cause acute pancreatitis.

**Objective:** To examine whether propofol is associated with an increased risk for development of acute pancreatitis in children receiving chemotherapy for leukemia.

**Design/Participants:** Retrospective study from 2002 to 2007 involving children with acute leukemia who were receiving general anesthesia for diagnostic procedures.

**Methods:** The Hospital for Sick Children Health Records Database was used to identify cases. Children who developed acute pancreatitis were identified with codes K85 and K85.9. Acute pancreatitis was defined as an increase in the amylase and lipase and with clinical examination. Demographics, doses, dates, and times of propofol administration as well as chemotherapeutic drugs and onset of presenting symptoms consistent with laboratory findings on ultrasound or CT scan were recorded.

**Results:** 479 children with acute leukemia undergoing chemotherapy and using general anesthesia for minor procedures were included in the study. Five children (1%; 4 boys) developed acute pancreatitis, but none occurred within 24 hours after propofol administration. Pancreatitis was diagnosed as being drug related, and it occurred in the latency period for ≥1 chemotherapeutic drug (such as cytosine arabinoside, 6-mercaptopurine, and L-asparaginase).

**Conclusions:** A relationship between propofol use and onset of acute pancreatitis in children with leukemia undergoing chemotherapeutic medication could not be established. All 5 patients who developed acute pancreatitis received propofol anesthesia without complications.

**Reviewer’s Comments:** The impact of this study is poor because it is retrospective, and the true frequency and relationship to risk factors of chemotherapy and propofol administration for development of acute pancreatitis should be proven in a prospective study. (Reviewer-Olga Plattner, MD).

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Keywords: Pancreatitis, Propofol, Chemotherapy, Leukemia, Children

Print Tag: Refer to original journal article
Laryngoscope Contamination Poses Challenge to Infection Control Guidelines


Call TR, Auerbach FJ, et al:


Laryngoscope handles can be highly contaminated despite low-level disinfection techniques.

**Background:** Laryngoscope handles can be contaminated, and there are no American Society of Anesthesiologists guidelines on how to disinfect or sterilize them.

**Objective:** To examine viral and bacterial pathogens found on handles of laryngoscopes.

**Design:** Clinical study examining 60 laryngoscope handles after cleaning and made ready for the next case in main adult operating rooms.

**Methods:** 40 laryngoscope handles were examined for bacterial culture and 20 for viral detection. The investigator obtaining the sample wore sterile gloves while holding the laryngoscope by its blade. For bacterial cultures, a sterile swab was used 20 times over the handle so the entire surface could be examined. Samples were transported to the laboratory and inoculated onto various agars such as blood, chocolate, colistin-nalidixic acid, and MacConkey. Inoculated plates were incubated at 35°C and followed up for growth up to 48 hours. Growth was quantified by the number of colonies growing, and bacterial identification was accomplished with antimicrobial susceptibility tests. Growth was quantified as 1+ to 4+, according to the number of colonies that grew in each of the 3 zones of the agar medium. Viral examinations were done with nylon swabs and, after putting samples into a universal medium and freezing them at -20°C, samples were analyzed for various respiratory viruses.

**Results:** The bacterial culture from the laryngoscope handles showed 75.0% positive growth; 62.5% yielded coagulase-negative staphylococci, 17.5% *Bacillus* spp, 7.5% alpha-hemolytic *Streptococcus* spp, and 2.5% each vancomycin-susceptible *Enterococcus* spp, methicillin-susceptible *Staphylococcus aureus*, and *Corynebacterium* spp. No viruses were detected.

**Conclusions:** Although low-level disinfection of laryngoscope handles was performed, a high level in bacterial growth could be detected, mainly coagulase-negative staphylococci.

**Reviewer's Comments:** Different hospitals show an exposition to different bacteria. After establishing which bacteria are most likely to grow in a department, blades and the handle of the laryngoscope should be sterilized or disinfected according to that growth. (Reviewer-Olga Plattner, MD).

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Keywords: Contamination, Laryngoscope Handles, Bacterial Growth, Guidelines

Print Tag: Refer to original journal article
Preoperative anxiety and stress are common in surgical patients, and various questionnaires can help to assess the degree of this stress and fear.

Background: Preoperative anxiety and stress are common in patients awaiting surgical procedures. Objective: To assess the preoperative level of stress and anxiety between fast-track surgical patients and inpatients. Design: Prospective clinical study. Participants: Patients scheduled for non-emergency trauma surgery during the morning hours of 8:00 and 12:00, with an operation time of <2 hours. Methods: The preoperative anesthetist’s visit was recorded, and midazolam was the sole drug for premedication. The following tests were performed: Spielberger State-Trait Anxiety Inventory questionnaire using a 4-point scale; the Amsterdam Preoperative Anxiety and Information Scale questionnaire when feeling alone with personal worries before operation using a 5-point scale; and fear and stress thermometers (both similar to visual analog scales) were used on a scale of 0 to 100. Monitoring was performed before surgery. The biofeedback test, where the skin conductance and temperature were recorded, was performed on the left ring finger. Tests were performed at 4 time points, and the duration was 15 to 20 minutes on admission and 5 to 10 minutes before the operation. Blood tests, cortisol, catecholamines, and benzodiazepines were obtained via a newly placed venous catheter before any drugs or IV fluids were administered. Statistic analysis was performed with Mann-Whitney U-test and Wilcoxon signed ranks test. A P <0.05 was considered significant. Results: 135 patients were enrolled in the study and were analyzed. Preoperative anxiety was reported in 45.3% of inpatients compared to 38.3% of day-care patients. Biofeedback levels were higher in day-care patients than in inpatients. There were no significant differences in other tests between groups. Conclusions: Preoperative anxiety and stress are common in surgical patients, and various questionnaires can help to assess the degree of fear. Reviewer's Comments: The biofeedback test showed some differences between groups, but as previous studies demonstrated, this test needs further validation (in diabetic patients or patients with dysautonomic diseases) regarding its practicality in the perioperative setting. (Reviewer-Olga Plattner, MD).

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Keywords: Fast-Track Surgery, Anxiety, Stress

Print Tag: Refer to original journal article
The LMA-Proseal™ and LMA-Supreme™ perform similarly in achieving adequate ventilation.

**Background:** The new LMA-Supreme™ has features of the LMA-Proseal™, the LMA-Fastrach™, and the LMA Unique™.

**Objective:** To evaluate the clinical success rate in establishing a good airway between the LMA-Supreme and the LMA-Proseal.

**Design:** Randomized, prospective, blinded clinical study.

**Participants:** 60 patients having elective surgery in a supine or lithotomy position.

**Methods:** Patients were assigned to either the LMA-Proseal or LMA-Supreme group. Anesthesia induction and monitoring was standardized. Size of supraglottic airways used was according to the manufacturer's prescription. Airways were inserted with the single-handed rotational technique, and the cuff was inflated with air until 60 cm H₂O intracuff pressure (ICP). Three attempts at insertion were considered a failure. Time between picking up the device and no audible leak, with peak airway pressure at ≥12 cm H₂O and a square wave capnograph trace, was recorded. Oropharyngeal leak pressures were determined by closing the expiratory valve of the circle system at a fixed gas flow of 3 L/minute (maximum allowed 40 cm H₂O), recording the pressure at which an audible leak occurred. Successful placement of the oropharyngeal gastric tube was recorded, and the anatomical correct position of the supraglottic airway was visualized with the intubating bronchoscope. Complications were recorded. For statistical analysis, a paired t-test and analysis of variance was done, and a \( P < 0.05 \) was considered significant.

**Results/Conclusions:** Insertion time and ICP were similar in both groups. Insertion failed in 3 patients. Fiberoptic cord visualization (full and partial cord view) was similar in both groups.

**Reviewer's Comments:** Supraglottic airway design is improving constantly and might be an alternative to tracheal intubation in many general surgery cases. (Reviewer-Olga Plattner, MD).

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Keywords: Supraglottic Airway, LMA-Supreme, LMA-Proseal

Print Tag: Refer to original journal article
Propofol Infusions Increase Pancreatic, Hepatic Enzymes in Neurosurgical Children

The Effects of Propofol Infusion on Hepatic and Pancreatic Function and Acid-Base Status in Children Undergoing Craniotomy and Receiving Phenytoin.

Türe H, Mercan A, et al:


Propofol infusion during craniotomy in children receiving phenytoin causes a transient increase in pancreatic and hepatic enzymes and serum triglycerides, all without clinical significance.

Objective: To investigate effects of propofol infusion on hepatic and pancreatic enzyme levels and the acid-base status of children receiving phenytoin prophylaxis and undergoing craniotomy for tumor resection.

Design/Participants: Prospective clinical study involving 30 ASA I-II children (aged 2 to 12 years) scheduled for elective craniotomy for supratentorial tumor resection.

Methods: Blood samples were drawn for measure of serum aspartate aminotransferase (AST), alanine aminotransferase (ALT), gamma-glutamyl transpeptidase (GGT), alkaline phosphatase (ALP), bilirubin, pancreatic amylase, lipase, triglycerides, and phenytoin plasma concentrations preoperatively. During anesthesia, the Bispectral Index was kept at a level of 40 to 60 with propofol infusion, using a pharmacokinetic model, and remifentanil, titrated to hemodynamic stability. Arterial blood was drawn and analyzed after endotracheal intubation; during hours 2 and 4 of surgery; on admission to recovery; 1, 2, 6, and 12 hours after extubation; and 1, 3, 5, and 7 days after surgery.

Results: Serum transaminase increased significantly in the postoperative period, with a peak on postoperative day 1 ($P=0.02$). The AST decreased to baseline on postoperative day 7, and ALT decreased by day 5. Serum GGT was significantly higher than baseline for 7 days ($P=0.01$). ALP increased significantly on postoperative day 1 and returned to baseline on day 3. Serum triglyceride levels stayed significantly increased until postoperative day 5, with a peak on postoperative day 1. Serum bilirubin levels were within normal limits. Pancreatic amylase levels were significantly higher compared to baseline until postoperative day 5 ($P=0.02$), with no symptoms of pancreatitis. Lipase levels increased significantly and peaked on postoperative day 1 ($P=0.01$). Total propofol dose did not correlate with peak enzyme levels obtained on postoperative day 1. None of the participants developed liver or pancreas complications over 4 to 6 months of follow-up.

Conclusions: Propofol infusions for <6 hours at anesthetic doses transiently increase pancreatic and hepatic enzymes without clinical symptoms in pediatric neurosurgical patients receiving phenytoin.

Reviewer’s Comments: One of the limitations of the study is the small sample size and the lack of a control group not receiving phenytoin; it would also have been a good idea to have a group not receiving propofol but receiving inhalational agents alone. (Reviewer-K. George Bojanov, MD).

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Keywords: Propofol, Hepatic/Pancreatic Function, Acid-Base Status, Children, Craniotomy, Phenytoin

Print Tag: Refer to original journal article
Desflurane - Faster Emergence Doesn’t Mean Speedier Resumption of Activities

Desflurane Versus Sevoflurane for Maintenance of Outpatient Anesthesia: The Effect on Early Versus Late Recovery and Perioperative Coughing.

White PF, Tang J, et al:

Desflurane for maintenance of anesthesia shows an advantage over sevoflurane with respect to early recovery, but not with intermediate and late recovery.

Objective: To study the hypothesis that desflurane, but not sevoflurane, used for anesthesia maintenance would result in a higher percentage of patients resuming normal daily living activities on day 1 post-ambulatory surgery.

Design/Participants: Prospective, randomized clinical trial involving 130 adult patients scheduled for a non-cavitary surgical procedure.

Methods: Patients received no pre-anesthetic medication, intraoperative opioids, or muscle relaxants. Anesthesia was induced with 2 mg/kg propofol after 2 mL of 1% lidocaine. After laryngeal mask airway insertion, patients were randomized to receive either sevoflurane or desflurane for anesthesia maintenance. Inspired concentrations were adjusted to maintain clinically adequate Bispectral Index values. Local anesthetic was injected at the surgical incision site before skin incision and again after skin closure. Variables followed included anesthesia and surgical times; operating conditions; eyes opening time; time to following commands; time to being oriented to name, place, and date of birth; times to sitting, standing, ambulating without assistance, and tolerating oral fluids; pain; nausea; duration of recovery room stay; time to discharge; and ability of patients to resume normal daily living activities.

Results: Average end tidal concentration was 0.72 of the minimum alveolar concentration (MAC) for sevoflurane and 0.8 of the MAC for desflurane. Duration of anesthesia and surgery, amount of local anesthetics injected, and number of opioid analgesics administered during recovery room stay were similar between groups. Times to eyes opening, following commands, and orientation were significantly shorter in the desflurane group. There were no significant differences between groups with respect to times to sitting, tolerating fluids, standing, ambulating alone, length of recovery room stay, and times to actual discharge to home. Desflurane patients coughed more often than did sevoflurane patients, but coughing was short lasting, did not lead to laryngospasm, and did not interrupt the surgical procedure.

Conclusions: Using either desflurane or sevoflurane for maintenance of anesthesia resulted in fast-track recovery after superficial ambulatory surgery. The faster emergence when using desflurane failed to result in speedier resumption of normal daily living activities.

Reviewer’s Comments: The results of the study confirm those of previous studies showing that, even in morbidly obese patients, desflurane produces similar intermediate and late recovery characteristics, compared to sevoflurane. (Reviewer-K. George Bojanov, MD).

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Keywords: Desflurane, Sevoflurane, Outpatient Anesthesia, Early/Late Recovery, Coughing

Print Tag: Refer to original journal article
There appears to be no relationship between propofol dose or effect-site concentration at loss of consciousness and blood progesterone concentration.

**Objective:** To investigate whether propofol dose and predicted effect-site concentration (Ce) at loss of consciousness (LOC) during induction of anesthesia and eye opening at emergence are decreased in early pregnancy, and whether this correlates with blood progesterone concentration.

**Design/Participants:** Prospective clinical study involving 112 consecutive women, scheduled for early elective termination of pregnancy (TOP) or transvaginal oocyte retrieval for in vitro fertilization (IVF) under general anesthesia.

**Methods:** All patients' monitoring included Bispectral Index (BIS). Propofol infusion pump displayed real-time predicted propofol Ce according to Schnider's pharmacokinetic model. Anesthesia was induced with continuous propofol infusion at 200 mL/hour until LOC, after which it was switched to an effect-site target-controlled infusion (TCI), selected to maintain BIS scores between 45 and 55. At LOC and eye opening, the predicted propofol Ce, total propofol dose, time from start of infusion, and BIS values were recorded. Venous blood samples for progesterone concentration assay were obtained on arrival in the postanesthesia care unit.

**Results:** Data analyzed included 57 TOP and 55 IVF patients. The TOP group was significantly younger and had higher blood progesterone concentration. Mean propofol dose at the time of LOC was significantly lower in the TOP group, as was the time from the start of infusion to LOC ($P = 0.014$ and $P = 0.026$, respectively), compared to the IVF group. Ce for propofol at LOC was significantly lower in the TOP group ($P = 0.0014$). BIS scores at LOC did not differ between groups. At the time of eye opening, mean Ce for propofol was similar between TOP and IVF groups. Mean propofol dose infused at the time of eye opening on emergence was lower in the TOP group, due to the shorter duration of surgery in that group. There was no association, at the time of LOC, between progesterone concentration and propofol dose, and between progesterone concentration and Ce.

**Conclusions:** Total propofol and predicted Ce for LOC on induction of anesthesia are decreased during early pregnancy and are not associated with blood progesterone concentration.

**Reviewer's Comments:** It is interesting that mechanisms of pregnancy-related decrease in anesthetic requirements remain mostly hypothetical and likely secondary to pharmacokinetic changes. Progesterone involvement suggested by animal experiments is not supported by human studies. (Reviewer-K. George Bojanov, MD).

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Keywords: Propofol Effect-Site Concentration, Induction, Emergence, Early Pregnancy

Print Tag: Refer to original journal article