Background: Throat complaints were common after the use of an endotracheal tube (ETT). Sore throat was also a common complaint after the use of a laryngeal mask (LM). After the introduction of i-gel®, which is a preformed siliconized non-inflatable LM, it was hypothesized that sore throat would be less.

Objective: To compare the throat complaints postoperatively after general anesthesia with the use of either i-gel or La Premiere® LM.

Methods: 244 patients were randomized prospectively into 2 groups of patients using either i-gel or La Premiere LM during elective nonthoracic or nonabdominal surgeries. General anesthesia was given using standard protocols with propofol, sufentanil, and desflurane. Size 4 of either device was used for patients weighing up to 90 kg, and size 5 was used for patients >90 kg. Time of insertion was measured from the maneuvering of the head to the insertion of the device for a maximum of 3 attempts. A standardized cuff volume was used to inflate the LM. A successful insertion was when no leak was heard and the capnography showed a square capnogram. The device was taken out at the end of the procedure, and the patient was shifted to PACU. The patients were interviewed with specific questions at the end of 1, 24, and 48 hours, either in the ward or at home.

Results: 244 patients were randomized (i-gel group, n=111; LM group, n=107). There were not statistical differences between groups regarding number of attempts of insertions or failure to insert either device. The i-gel group had a higher mean leak pressure, better fiberoptic view, and shorter time to insertion compared with the LM group. There was a higher incidence of sore throat, neck pain, and dysphagia in the LM group.

Conclusions/Discussion: The common postoperative throat complaints of dysphagia and sore throat were less in the i-gel group versus the La Premiere LM airway group. Because no other supraglottic device was compared, one cannot conclude that the incidence of throat complaints would be better. The limitation of this study was that a standardized cuff volume was used instead of using volume to a predetermined pressure. The incidence of throat complaints and sore throat could have been lower if standard inflation pressures of between 40 to 60 cm H2O were used. The other limitation was the variables of the device, which could lead to probable bias, thus concluding that i-gel had a lower incidence of postoperative throat complaints as compared to the La Premiere LM device.

Reviewer's Comments: The i-gel is a preformed, non-inflatable laryngeal airway device which has decreased throat complaints as compared to the La Premiere LM airway. (Reviewer-Sunita Goel, MD).

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Keywords: Postop Throat Pain, I-Gel vs La Premiere Laryngeal Mask

Print Tag: Refer to original journal article
In patients with heparin-induced thrombocytopenia, plasmapheresis used to decrease anti-HPF4 antibody load followed by heparin reexposure during surgery can be used successfully during cardiac surgery.

**Background:** Heparin-induced thrombocytopenia (HIT) precludes the use of heparin during cardiac surgery and significantly complicates anticoagulant management. Alternative anticoagulants such as bivalirudin, recombinant hirudin, argatroban, danaparoid, fondaparinux, and ancrod have been used more or less successfully during cardiopulmonary bypass (CPB) surgery. The main problem remains the absence of reversal agents for these drugs, long half-life, and unavailability of tests that monitor anticoagulation with these agents.

**Objectives:** To discuss an alternative technique in patients at increased risk of postoperative bleeding which allows for the use of heparin in patients with acute or subacute HIT during CPB time in cardiac surgery.

**Design:** Retrospective review.

**Participants:** 11 patients with acute or subacute HIT were included.

**Methods:** The antiheparin/platelet factor 4 (anti-HPF4) antibody titers were determined with colorimetric ELISA test. A positive test was defined as optical density >0.4. Plasmapheresis was performed after the induction of anesthesia when the patient was hemodynamically stable. If necessary, the plasmapheresis was performed during CPB. Heparin was used as the anticoagulant. Postoperatively, bivalirudin was used as the anticoagulant, if needed. Patient characteristics, platelet count, anti-HPF4 antibody levels, thrombotic complications, and mortality up to 1 year after surgery were recorded.

**Results:** The preoperative anti-HPF4 titer was 0.8 (range, 0.7-2.2). A single round of plasmapheresis reduced antibody titers by 50% to 84%. Six of 9 patients with postoperatively available ELISA results had negative titers after treatment. The other 3 patients had high titers that were reduced to 48%, 68%, and 78% after treatment. Following surgery, no patient developed a triphasic platelet count pattern typical of HIT, and no patient developed HIT-related thrombosis. Three of 11 patients died of causes unrelated to HIT.

**Conclusions:** The authors of this study introduce an alternative technique which utilizes plasmapheresis during cardiac surgery to decrease anti-HPF4 antibody load and allow for the use of heparin during cardiac surgery. The technique may be of special use in patients with anti-HPF4 antibodies who are at high risk of postoperative bleeding.

**Reviewer's Comments:** The authors of this study introduce an interesting alternative technique to be used in patients with anti-HPF4 antibodies who are at risk for significant postoperative bleeding. Limitations of the study are discussed by the authors, who point out the small sample size, retrospective study design, problems related to specificity and sensitivity of available tests for determination of anti-HPF4 antibodies, lack of clear cutoff values for these tests, and hemodynamic and other risks of plasmapheresis. Despite these concerns, the data presented in this study warrant further exploration of this technique in the area of cardiac surgery which lacks other risk-free options. It would make sense to perform pheresis before CPB. (Reviewer-Mojca Remskar Konia, MD).

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Keywords: Heparin-Induced Thrombocytopenia, Plasmapheresis

Print Tag: Refer to original journal article
Prior to surgery, children prefer to receive information regarding their surgery, especially information about various pain-related issues. The more anxious children are, the more they desire information about pain.

Background: The experience of surgery is very stressful to children and their parents. Parents who received detailed preoperative information about their child’s surgery have less anxiety than do parents who are not well-informed. Whether the same applies to children undergoing surgery has not been explored in a large-scale study.

Objective: To identify what specific perioperative information children want to receive from the medical staff before surgery.

Design: Prospective observational cohort study.

Participants: 143 children (age range, 7-17 years), ASA I-II, undergoing elective outpatient surgery with general anesthesia.

Methods: Four measures were used. (1) A measure of 40 items was used to evaluate the children’s desire for perioperative information and a score (CDI) was calculated. (2) A standardized measure assessing each child’s temperament was completed by parents. (3) A measure of state and trait anxiety was used. (4) A measure of parental anxiety was used. The above measures were administered in the preoperative holding area on the day of surgery prior to interaction with the anesthesiologist or surgeon.

Results: Two sites participated in the study, and there were no differences in the demographics, clinical data, and CDI scores of the patients between the 2 institutions. Of the children evaluated, >40% wanted to know 25 of the 40 questions. Most children (86% to 91%) expressed high desire to be informed about items relating to pain, such as “will the operation hurt,” “will I feel pain,” and “how long will I be in pain after the operation.” Fewer than 20% of children were disinterested in items endorsed by the response, “I do not want to know.” Demographic characteristics were not associated with the CDI score. Previous surgeries did not influence the CDI score. There was no difference between age and CDI score. Younger children were more interested about the medical environment. Finally, the child’s anxiety state was positively correlated with a higher desire for pain information and negatively correlated with avoidance of information.

Conclusions: Most children aged 7 to 17 years would like thorough information about their perioperative course, especially regarding pain issues during and after surgery.

Reviewer’s Comments: Surgery and hospitalization pose major challenges and stress to preadolescent and adolescent children. Most common conditions that provoke anxiety in children undergoing surgery are separation from parents, unfamiliar environment, fear of the unknown, losing control and autonomy, and parental anxiety. Preoperative preparation programs demonstrated that children who are prepared for surgery recover faster and have fewer emotional problems afterward. This study focuses on one aspect of the preoperative preparation for children: their desire to know more about their surgery. The results of this study also support the value of administering preoperative preparatory programs for children. (Reviewer-Ioanna Apostolidou, MD).

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Keywords: Preoperative Information

Print Tag: Refer to original journal article
For patients undergoing coronary artery bypass grafting, the 1-year outcomes are worse when the surgery was performed without cardiopulmonary bypass than when cardiopulmonary bypass was used.

**Background:** Coronary artery bypass grafting (CABG) without cardiopulmonary bypass (off-pump CABG) emerged in the mid-1990s in hopes to reduce complications associated with bypass. Many randomized studies of off-pump versus on-pump CABG have been published and did not show any clear benefits.

**Objective:** To compare 30-day and 1-year morbidity and mortality outcomes as well as 1-year graft patency rates between on-pump and off-pump CABG.

**Design:** Prospective, randomized, single-blinded trial at 18 medical centers for the Department of Veterans Affairs.

**Methods:** 2203 patients scheduled for urgent or elective CABG were randomly assigned to either on-pump or off-pump procedures. All surgeons had done at least 20 off-pump surgeries. The primary short-term end point was a composite of death or complications (reoperation, new mechanical support, cardiac arrest, coma, stroke, or renal failure occurring within 30 days after surgery). The primary long-term end point was a composite of death from any cause, a repeat revascularization procedure, or a nonfatal myocardial infarction (MI) within 1 year after surgery. Secondary end points included the completeness of revascularization, graft patency at 1 year, neuropsychological outcomes, and the use of major resources such as hours in the operating room, hours on ventilator, and ICU/hospital stay. Power analysis was based on 40% reduction in the incidence of the primary 1-year composite end point in the off-pump CABG.

**Results:** The 1-year composite outcome rate was higher for off-pump (9.9%) than for on-pump CABG (7.4%, \( P=0.04 \)). Fewer grafts than originally planned (“less complete revascularization”) were performed in the off-pump group (17.8%) than in the on-pump group (11%, \( P<0.01 \)). The graft patency rate was lower in the off-pump group (82.6%) than in the on-pump group (87.8%, \( P<0.01 \)). There were no significant differences between off-pump and on-pump CABG in the rate of the 30-day composite outcome (7.0% vs 5.6%, respectively) and the death rate (1.6% vs 1.2%, respectively). Kaplan-Meier analysis showed no differences in survival, neuropsychological outcomes, and short-term use of major resources. The red cell transfusion rate was less in the off-pump group.

**Conclusions:** This large randomized trial showed worse 1-year outcomes and graft patency in the off-pump group than in the on-pump group. However, the 2 groups showed no significant differences in neuropsychological outcomes or use of major resources.

**Reviewer’s Comments:** The results of the current study were consistent with the results of a recent meta-analysis that showed no difference in the short-term outcomes between the 2 techniques. The worse 1-year outcome in the off-pump group may be related to incomplete revascularization and not to bypass per se. Further analysis is needed to explore outcomes in high-risk populations with multiple comorbidities, which is the typical CABG population. (Reviewer-Ioanna Apostolidou, MD).

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**Keywords:** Coronary Artery Bypass Grafting, Cardiopulmonary Bypass Options

**Print Tag:** Refer to original journal article
Acute Pancreatitis -- Does Thoracic Epidural Help?

Hepatic Effects of Thoracic Epidural Analgesia in Experimental Severe Acute Pancreatitis.

Freise H, Lauer S, et al:

Anesthesiology 2009; 111 (December): 1249-1256

In the setting of acute pancreatitis, thoracic epidural infusion prevents sinusoidal vasoconstriction and decreases hepatocellular death.

**Objective:** To determine the effects of thoracic epidural analgesia on hepatic microvascular perfusion and injury in an animal model of induced acute pancreatitis.

**Participants:** The animal model in this study utilized male Sprague-Dawley rats.

**Methods:** All study rats were randomly assigned to 1 of 4 groups: (1) sham procedure with normal saline epidural infusion at 15 µL/hour; (2) sham procedure with 0.5% bupivacaine epidural infusion at 15 µL/hour; (3) pancreatitis with normal saline epidural infusion; and (4) pancreatitis with 0.5% bupivacaine epidural infusion. The animals underwent general anesthesia with isoflurane in 50% oxygen for a midline laparotomy. Epidural placement occurred at lumbar interspace 3-4 with the catheter being advanced to the T6 level. Acute pancreatitis was induced by injection of 5% taurocholate into the proximal bile duct. The rats were allowed to awaken after the procedure, and the epidural infusion was started. Study parameters were taken 15 hours after the induction of acute pancreatitis, with the rats being placed back under general anesthesia. Seven rats were allocated to each of the 4 groups. Intravital microscopy of the left liver lobe was performed to assess hepatic microvascular perfusion and leukocyte-endothelial cell interaction. Additional rats were also allocated to groups 1, 3, and 4 to evaluate hepatic injury as assessed by hepatocellular apoptosis, Fas ligand expression, and serum transaminase levels.

**Results:** With regard to hemodynamic values, rats with pancreatitis had lower mean arterial pressures in comparison to the sham groups, but this was not exacerbated in the presence of thoracic epidural analgesia. The use of thoracic epidural analgesia had no effect on hepatic microperfusion in the sham group, whereas in the pancreatitis model, epidural usage prevented sinusoidal vasoconstriction. However, it had no significant effect on decreasing the percentage of non-perfused sinusoids in the pancreatitis model. Induction of pancreatitis had no effect on leukocyte-endothelial cell interaction with or without the epidural infusion. Epidural usage was associated with a decrease in overall apoptosis in the pancreatitis model.

**Conclusions:** The use of thoracic epidural analgesia was not associated with any changes in hepatic microperfusion or leukocyte-endothelial cell interaction in non-diseased rats. In the setting of acute pancreatitis, the presence of thoracic epidural analgesia prevented hepatic sinusoidal vasoconstriction and decreased hepatocellular apoptosis.

**Reviewer's Comments:** The effect of thoracic epidural analgesia on hepatic microperfusion and injury in this model was somewhat disappointing. It did have some positive effects, but nothing to the degree to which one would expect. Patients who receive thoracic epidural analgesia postoperatively always clinically look better than patients who do not have an epidural. The measured benefits may really only be seen when used as part of a multimodal plan versus just the sympathetic block it causes alone, even in an animal model. (Reviewer- Michelle L. Schlunt, MD).

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Keywords: Severe Pancreatitis, Thoracic Epidural Analgesia, Hepatocellular Injury

Print Tag: Refer to original journal article
When performing an interscalene block, brachial plexus injury is not the only possibility, but injury to the superficial cervical plexus also is possible.

**Objective:** To determine the incidence of superficial cervical plexus neuropathy following interscalene blockade.

**Design:** Prospective study.

**Participants:** Adult patients undergoing elective shoulder or upper arm surgery during a 1-year study interval.

**Methods:** All study patients received a neurologic examination prior to block placement. A single-shot interscalene block was performed via the modified lateral approach. Neurostimulation technique was utilized seeking to elicit contraction in the triceps, deltoid, or biceps muscles. A total of 30 mL of 0.25% bupivacaine combined with 10 mL of 0.5% bupivacaine was then injected incrementally. For those patients weighing >90 kg, the local anesthetic dose was increased to 40 mL of 0.25% bupivacaine in combination with 10 mL of 0.5% bupivacaine. Following block completion, a standardized general anesthetic with a laryngeal mask airway was administered for surgery. A repeat neurologic examination was performed 24 hours after surgery. A telephone follow-up with a standardized questionnaire was done at 31 days postoperatively searching for evidence of superficial cervical plexus neuropathy. The presence of superficial cervical plexus neuropathy was defined as “paresthesia and/or dysesthesia in the distribution area of the cutaneous branches of the cervical plexus.” Patients who had evidence of superficial cervical plexus neuropathy received further follow-up at 6 months postoperatively.

**Results:** 273 patients were included in the final analysis. Unsuccessful interscalene block was reported in only 2 patients. Eight percent of patients were found to have evidence of superficial cervical plexus neuropathy following interscalene blockade. Most of these patients were symptomatic at 24 hours postoperatively. The main neurologic deficit elicited was decreased sensation predominantly in the area of distribution for the transverse cervical nerve and supraclavicular nerve. Approximately 2% of the initially affected patients continued to have sensory deficit 31 days postoperatively. However, by 6 months, all symptoms had resolved.

**Conclusions:** There is an 8% incidence of superficial cervical plexus neuropathy following single-shot interscalene block. The authors hypothesized the neuropathy may be due to direct damage related to needle insertion, prolonged effect, or even a toxicity effect of the injected local anesthetic. It is suggested that patients be informed of this possible complication.

**Reviewer's Comments:** It seems to me that there continues to be ongoing issues with performing interscalene blockade, even with the expanding use of ultrasound. There appear to be monthly case reports with this particular block, be it either catheter migration into the spinal cord or total spinal anesthesia requiring prolonged intubation. For this particular block, it can be quite easy to inadvertently enter vascular structures or the spinal cord itself. It is important to correctly identify the brachial plexus when using ultrasound and to use an appropriate length needle to avoid delving too deep. (Reviewer-Michelle L. Schlunt, MD).

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Keywords: Interscalene Block, Superficial Cervical Plexus Neuropathy

Print Tag: Refer to original journal article
Bilateral total knee arthroplasty may be associated with an increased risk of morbidity and mortality.

**Background:** Total knee arthroplasty (TKA) is a common orthopedic procedure. Many patients require bilateral procedures, but controversy exists as to whether these surgeries should be performed simultaneously or at different times.

**Objective:** To study differences in perioperative outcome between unilateral and bilateral TKA and to further compare bilateral TKA performed during the same versus different operations during the same hospitalization.

**Design:** Retrospective database review.

**Participants:** >600,000 patients who underwent TKA.

**Methods:** Charts were reviewed and statistical models were created to identify independent predictors for in-hospital mortality and morbidity. The database used for this review is the Nationwide Inpatient Sample, which is sponsored by the Agency for Healthcare Research and Quality.

**Results:** Most patients underwent unilateral TKA. The average patient age was 67.46 years. The hospital stay was significantly longer in the group undergoing bilateral procedures. In evaluating the presence of comorbidities, patients undergoing unilateral TKA had more comorbid conditions than those undergoing bilateral TKA, except for obesity, valvular heart disease, and pulmonary circulatory disease. The bilateral TKA groups had a higher incidence of perioperative complications, including deep venous thrombosis, pulmonary embolism, and adult respiratory distress syndrome (ARDS). Anemia was twice as likely in the bilateral TKA groups. Mortality was higher among the bilateral TKA groups than the unilateral TKA group. In comparing staged versus simultaneous bilateral TKA, comorbidities were generally the same but procedure-related complications and postoperative complications were more frequent in the simultaneous group. Mortality was similar in the 2 bilateral TKA groups. Factors associated with increased risk of death in the bilateral groups included male gender and advancing age. Procedures done in smaller hospitals were associated with less mortality. No other patient demographic or health care system-related factor was correlated with mortality. Perioperative complications significantly associated with mortality included complications affecting the central nervous system, cardiac complications, or the presence of shock. Pulmonary embolism and ARDS increased the risk of mortality dramatically. Congestive heart failure, pulmonary vascular disease, and fluid/electrolyte abnormalities were among the highest predictors of procedure-related complications.

**Conclusions:** Bilateral TKA, either staged or simultaneous, carries an increased adjusted risk of in-hospital mortality and is associated with a greater incidence of in-hospital complications when compared with unilateral TKA. The authors suggest that bilateral TKA cannot be recommended.

**Reviewer’s Comments:** This is an interesting review of this database. Sometimes this procedure is performed because the patient is thought to be too sick to tolerate 2 separate surgeries. Based on this review, that strategy should be re-evaluated. (Reviewer-Allen Miranda, MD).

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Keywords: Total Knee Arthroplasty, Timing of Bilateral Surgery, Outcomes

Print Tag: Refer to original journal article
Cerebral hypoxemia may be more common than previously thought during thoracic surgery using single-lung ventilation (SLV). We may be looking at the wrong oxygen saturation monitor during SLV.

**Background:** Despite having adequate peripheral oxygen saturations during single-lung ventilation (SLV), some studies have suggested that regional oxygen saturation, particularly of the brain, may decrease during SLV.

**Objective:** To determine whether decreases in regional cerebral oxygen saturation during thoracic surgery are related to postoperative complications.

**Design:** Prospective study.

**Participants:** 50 adult patients undergoing thoracic surgery that required at least 45 minutes of SLV.

**Methods:** All patients had thoracic epidurals for postoperative analgesia, and a standard anesthetic was performed. The regional oxygen saturations were blinded to the anesthetist performing the anesthetic, and therefore, no anesthetic decisions were made based on the cerebral saturations. During SLV, 100% oxygen was used, and CPAP was used intermittently to maintain peripheral oxygen saturation at >90%. Baseline values of cerebral saturation were taken in awake patients after breathing 100% oxygen for 2 minutes. The saturation decrease was calculated by subtracting the minimal value during one SLV from the baseline value, and the minimal absolute cerebral saturation period was defined as the time when saturations were minimal or within 10% of the minimal value. The Clavien and SOFA scores were used to evaluate the severity of postoperative complications. To try to predict which patients were at risk for prolonged stay, the predictors of prolonged stay were used, which are used by the Society of Thoracic Surgeons. Blood gases were monitored during the SLV period.

**Results:** Most patients were men, and the average patient age 64 years. The median cerebral saturation was 80% in the awake patients, and >50% of the patients had a decrease of at least 20%. The average minimal saturation value was 64%. Approximately 10% of patients had a cerebral saturation <55%. Peripheral saturations were approximately 97% during SLV. Interestingly, cerebral saturation was slightly lower after induction than at baseline values. Blood gases obtained during SLV showed that arterial carbon dioxide levels were lower during SLV than prior to SLV. Minimum absolute cerebral saturation correlated significantly with both the Clavien and SOFA scores. The predictors of prolonged stay did not correlate with minimal saturation values, suggesting that these predictors could not be used to identify patients at risk prior to surgery.

**Conclusions:** Thoracic surgery with SLV is associated with a significant decrease in regional cerebral oxygen saturation, and minimal absolute values during SLV seem to correlate with postoperative complications.

**Reviewer's Comments:** This study has a potentially disturbing result: we cannot assume that everything is well with the patient when peripheral oxygen saturations are adequate. This assumption could clearly lead to poor patient outcomes. (Reviewer-Allen Miranda, MD).

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Keywords: Thoracic Surgery, Postop Complications, Cerebral Oximetry

Print Tag: Refer to original journal article
Difficult Intubation Not Linked to OSA Severity

Obstructive Sleep Apnea Is Not a Risk Factor for Difficult Intubation in Morbidly Obese Patients.

Neligan PJ, Porter S, et al:

Anesth Analg 2009; 109 (October): 1182-1186

Just because an obese patient has obstructive sleep apnea does not mean that they are more difficult to intubate than other obese patients.

**Background:** Morbidly obese patients are often difficult to intubate. Recently, there have been reports that obese patients who have sleep apnea are even more difficult to intubate. However this has not been prospectively studied.

**Objective:** To determine if morbidly obese patients with obstructive sleep apnea (OSA) are more difficult to intubate than morbidly obese without OSA.

**Design:** Prospective, observational study.

**Participants:** 180 consecutive patients (140 women, 40 men) undergoing bariatric surgery.

**Methods:** All patients in this study underwent preoperative polysomnography. The degree of OSA determined by the exam was graded using the apnea-hypopnea index (AHI) and the ASA Obstructive Sleep Apnea Score (0=no sleep apnea, 3=severe sleep apnea). Patients were examined preoperatively, and the Mallampati scores were determined by an independent observer. Also recorded was the neck circumference, thyromental distance, weight, and body mass index (BMI). Patients were intubated initially by anesthesiology residents following induction of general anesthesia and skeletal muscle relaxation. All patients were placed in the ramped position prior to tracheal intubation. If the trachea could not be intubated by the residents within 3 attempts, then faculty intubated the trachea. The visualization of the larynx was graded using the Cormack and Lehane (CL) score (grade 1=full view, grade 4=laryngeal structures not seen). The number of attempts at intubation was also recorded.

**Results:** Most patients (approximately 90%) were intubated with 1 attempt, and approximately 65% had a grade 1 view of the larynx. There was no correlation between difficulty of intubation or visualization of the larynx with either the AHI or the ASA Obstructive Sleep Apnea Score. Neither the BMI nor the neck circumference was associated with difficulty in intubation. However, a larger neck circumference was associated with a higher CL score. Male gender and a higher Mallampati score were associated with difficulty in both intubation and tracheal visualization.

**Conclusions:** OSA was not associated with difficult laryngoscopy or tracheal intubation in morbidly obese patients.

**Reviewer’s Comments:** This study has different results than some earlier studies which suggested that OSA was an independent risk factor for difficult intubation. Apparently, it is not a significant factor in the obese patient. Other factors, such as the Mallampati score or male gender, appear to be more important. (Reviewer- David S. Beebe, MD).

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Keywords: Tracheal Intubation, Morbid Obesity, Obstructive Sleep Apnea.

Print Tag: Refer to original journal article
For women, the use of a smaller diameter tracheal tube may reduce sore throats following tracheal intubation for surgery.

**Background:** Sore throats are common after tracheal intubation and may be related to the diameter of the tracheal tube, especially in women.

**Objective:** To determine if a smaller diameter endotracheal tube (ETT) would result in a lower incidence of sore throats in women undergoing elective surgery requiring tracheal intubation.

**Design:** Randomized, double-blind controlled clinical study.

**Participants:** 100 healthy women scheduled to undergo elective surgery (not involving the airway) requiring tracheal intubation. Patients requiring succinylcholine for skeletal muscle relaxation or those with an ongoing upper respiratory tract infection were excluded.

**Methods:** Patients were randomly assigned to be tracheally intubated with either a 6.0 or 7.0 Mallinckrodt ETT. All patients had a standard induction of general anesthesia with propofol, glycopyrrolate, and a narcotic such as fentanyl or alfentanil. No lubricants or local anesthetic agents were used on the ETTs, and all patients were intubated by experienced laryngoscopists. The cuffs for the ETTs were inflated with air and had the pressures within the cuffs monitored and maintained between 20 and 30 cm H2O. Anesthesia was maintained using an inhaled agent plus N2O or propofol at the discretion of the anesthesiologist. Patients were assessed for presence and discomfort of a sore throat using a 4-point scale (0=no sore throat or discomfort, 3=severe sore throat and discomfort) at 1 to 2 hours after surgery and 24 hours after surgery. They were also assessed for the presence of hoarseness. If patients had a sore throat or were hoarse after 24 hours, they were contacted at 72 hours and 96 hours after surgery to determine if the symptoms had resolved.

**Results:** Significantly more women intubated with a 7.0 ETT had sore throats in the recovery room (51.1%) compared to those intubated with a 6.0 ETT (27.1%; p=0.006), and the severity of the sore throats was greater. The incidence of hoarseness was greater in the patients intubated with the larger ETT (larger tube, 46.9%; smaller tube, 38.3%), but this difference was not statistically significant. After 24 hours, the incidence of sore throats declined to 20.4% in those intubated with a 7.0 tube and 18.8% in those intubated with a 6.0 tube. Interestingly, either hoarseness or sore throat was present in 16.5% of women at 72 hours after surgery and in 11% at 96 hours.

**Conclusions:** Use of a smaller diameter ETT can lessen the incidence of sore throats following tracheal intubation for women in surgery.

**Reviewer’s Comments:** Women have a smaller diameter larynx than men and a higher incidence of sore throats following tracheal intubation for surgery. This study shows pretty convincingly that using a smaller diameter ETT may be an easy way to lessen the incidence of sore throats in women following surgery. (Reviewer-David S. Beebe, MD).

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Keywords: Tracheal Intubation, Tube Size, Postop Sore Throat

Print Tag: Refer to original journal article
Effective Dose of Phenylephrine Found for Hypotension Reversal

Up-Down Determination of the 90% Effective Dose of Phenylephrine for the Treatment of Spinal Anesthesia-Induced Hypotension in Parturients Undergoing Cesarean Delivery.

George RB, McKeen D, et al:

Anesth Analg 2010; 110 (January): 154-158

The 90% effective dose of phenylephrine bolus required to reverse hypotension induced by spinal anesthesia in cesarean section delivery is 147 µg.

Objective: To estimate the 90% effective dose (ED$_{90}$) of IV phenylephrine for treatment of hypotension associated with spinal anesthesia for cesarean section delivery.

Design/Participants: Prospective, double-blind, up-and-down clinical study including 65 adult ASA I and II non-laboring women undergoing elective cesarean section delivery with spinal anesthesia at term.

Methods: All participants received spinal anesthesia administered between L3 and L5 in sitting position using hyperbaric bupivacaine 12 mg. In addition to bupivacaine, the anesthetic solution contained fentanyl 15 µg and preservative-free morphine 100 µg. After spinal anesthetic administration, patients were laid supine with left uterine displacement. Each patient received IV preload and co-load of lactated Ringer's solution, administering approximately 500 mL before spinal anesthesia and 2 L before delivery. If systolic blood pressure (SBP) decreased >20% of baseline or to an SBP <90 mm Hg, a predetermined dose of phenylephrine was administered. Return of SBP to within 20% of baseline or ≥90 mm Hg within 1 minute was considered a success. If hypotension persisted for >1 minute, treatment was recorded as a failure and blood pressure was treated with the attending anesthesiologists’ drug of choice. Initial phenylephrine dose was 100 µg. Each subsequent dose was based on the response of the preceding subject according to the up-down sequential method. Dosing changes were in increments of 20 µg.

Results: Of the 65 patients, 20 did not experience hypotension and were withdrawn from the study. There was no difference in the demographic data, crystalloid volume, or sensory level between patients who experienced hypotension and those who did not. Patients with hypotension received doses of phenylephrine ranging from 80 to 180 µg, with failures registered in all dosages except for 180 µg. Mean SBP reduction was 25% ±7% from baseline. No patients experienced hypertension after phenylephrine. Mean time to hypotension was 5.8 ±3.6 minutes. ED$_{90}$ of phenylephrine was 147 µg (95% CI, 98-222 µg). Two patients who received phenylephrine boluses required treatment for bradycardia. Conclusion: The estimated ED$_{90}$ of phenylephrine for hypotension treatment after spinal anesthesia for cesarean section delivery is approximately 150 µg.

Reviewer’s Comments: Phenylephrine 100 µg, which we commonly use for treating hypotension induced by spinal anesthesia for cesarean delivery, is well within the 95% confidence interval of the study established ED$_{90}$. (Reviewer-K. George Bojanov, MD).

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Keywords: Cesarean Section, Spinal Anesthesia, Phenylephrine Effective Dose

Print Tag: Refer to original journal article
Compression of the dural sac, associated with the engorgement of the epidural veins, results in a gestation-related reduction in cerebrospinal fluid volume and dural sac surface area.

**Objective:** To investigate the relation between gestational week and the reduction in cerebrospinal fluid (CSF) volume and dural sac surface area caused by dural sac compression by the engorged epidural veins during pregnancy.

**Design/Participants:** Prospective, clinical study involving 18 healthy women.

**Methods:** Magnetic resonance imaging (MRI) studies were performed twice for each participant: once in a nonpregnant state and again during pregnancy at gestational weeks 31 to 39. All MRI studies were done in a supine position and without uterine tilting. Low thoracic and lumbosacral axial MRI scans were used for measurement of CSF volume and dural sac surface area. Individual CSF volumes and dural sac surface areas were compared between the nonpregnant and pregnant states.

**Results:** Individual lumbosacral CSF volume and dural sac surface area decreased in all subjects in the pregnant state ($P<0.001$). Comparison of the difference in axial section areas between the nonpregnant and pregnant states demonstrated a significantly larger reduction in the axial section area of the L5-S1 disk level than at T11-T12 and at T12-L1 disk levels. The mean reductions in CSF volume and dural sac surface area were 6.4 ±2.7 mL and 1.1 ±0.6 cm², respectively. The corresponding reductions in percent in CSF volume and dural sac surface area were 16.7% and 10.0%, respectively. There were significant correlations between gestational week and the reduction in CSF volume and dural sac surface area. **Conclusion:** The results confirm an association between gestational week and reductions in both CSF volume and the dural sac surface area, explaining the facilitation of the spread of intrathecal anesthesia in pregnant women.

**Reviewer’s Comments:** The few limitations of this study include (1) 14 of the 18 patients studied during a nonpregnant state were studied after parturition; and (2) all measurements were performed with patients in the supine position without uterine tilting. (Reviewer-K. George Bojanov, MD).

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Keywords: Gestation, CSF Volume, Dural Sac Surface Area

Print Tag: Refer to original journal article
Monitor Dexmedetomidine Sedation With BIS, OAA/S Scores

The Correlation Between Bispectral Index and Observational Sedation Scale in Volunteers Sedated With Dexmedetomidine and Propofol.
Kasuya Y, Govinda R, et al:
Anesth Analg 2009; 109 (December): 1811-1815

At comparable sedation scores, bispectral index values were lower with dexmedetomidine sedation than with propofol.

**Objective:** To test whether bispectral index (BIS) values are less with dexmedetomidine than with propofol sedation at comparable Observer’s Assessment of Alertness and Sedation (OAA/S) scores.

**Design/Participants:** Randomized, clinical, crossover study of 11 healthy adult volunteers.

**Methods:** On day 1 of the study, volunteers were randomly allocated to propofol or dexmedetomidine sedation. On a subsequent day (at least 7 days after the initial study), the alternative drug was used. Propofol and dexmedetomidine were given using a target-controlled infusion. Propofol incremental infusion steps were targeted at effect-site concentrations of 1, 2, and 4 μg/mL, while dexmedetomidine targeted effect-site concentrations of 0.6, 1.2, and 2.4 ng/mL. Each concentration was maintained for 40 minutes. Electrocardiogram, heart rate, noninvasive blood pressure, oxygenation, and BIS values were monitored. Sedation was evaluated via OAA/S score at 20 and 40 minutes for each drug concentration. BIS was recorded before each OAA/S evaluation.

**Results:** All participants maintained spontaneous breathing throughout the study. Heart rate decreased significantly during the dexmedetomidine phase of the study. End-tidal carbon dioxide concentrations were significantly elevated with high propofol doses and remained normal even with high dexmedetomidine doses. BIS scores at OAA/S values of 1, 2, 3, 4, and 5 during propofol sedation were 95.5, 78, 67, 57, and 34, respectively. BIS scores at OAA/S values of 1, 2, 3, 4, and 5 during dexmedetomidine sedation were 95, 62, 45.5, 39.5 and 24.5, respectively. BIS was significantly lower with dexmedetomidine than with propofol at OAA/S responsiveness level of 2, 3, and 5. BIS cutoff value calculated for propofol sedation was 67, and the analogous BIS value for dexmedetomidine was 46.

**Conclusions:** OAA/S scores were significantly less with dexmedetomidine than with propofol sedation at comparable BIS values. When using dexmedetomidine for sedation, BIS and OAA/S scores should be used in combination for evaluating a patient’s response to sedation.

**Reviewer’s Comments:** The results of this interesting study suggest that BIS values should be interpreted in the context of the drugs being used. Study limitations include small sample size, using healthy adults, and not measuring the plasma drug concentrations. (Reviewer-K. George Bojanov, MD).

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Keywords: Bispectral Index, Sedation Scale, Dexmedetomidine, Propofol

Print Tag: Refer to original journal article
Absorption of an irrigating fluid containing isotonic glucose increases serum glucose concentration in inverse linear proportion to the reduction in serum sodium during transurethral resection of the prostate.

**Objective:** To evaluate if 1% glucose added to the irrigating fluid can be used as an absorption tracer during a transurethral resection of the prostate (TURP). A second goal of the study was to establish a nomogram for the correlation between the irrigating fluid volume and the increase in serum glucose concentration.

**Design:** Prospective, 2-phase study.

**Methods:** During the first stage of the study, a monopolar TURP was performed on 250 adult males, who were randomly assigned to receive either 1.5% glycine or 5% glucose in water as irrigation fluid. Blood samples were taken before and 5 minutes after the end of each surgery for serum glucose and serum sodium concentration evaluation. During the second stage of the study, 10 healthy male volunteers received 1% glucose infusion, and blood samples were drawn at 5-, 10-, and 20-minute intervals between 0 and 60 minutes, 60 and 100 minutes, and 100 and 160 minutes, respectively. Samples were evaluated for plasma glucose, hemoglobin, red blood cell count, mean corpuscular cell volume, and hematocrit. In addition plasma sodium and potassium concentrations were measured at 0, 30, 60, and 160 minutes. Urine was collected during and after the experiment and studied for the content of sodium, potassium, and glucose.

**Results:** During the first stage of the study, there was a statistically significant linear relation between the decrease of serum sodium concentration and the increase of the serum glucose. During the second part of the study, plasma glucose doubled during the infusions and reached a maximum of 8.27 mmol/L, while the plasma was diluted by 17.7%. At the end of the experiment, excreted urine was 66% of the infused fluid volume. Systolic blood pressure increased an average of 9%, diastolic blood pressure increased by 12%, and heart rate decreased by 7%. There were no adverse reactions secondary to the glucose infusion.

**Conclusions:** Adding 1% glucose to the electrolyte solution used for bladder irrigation during bipolar TURP makes it likely to detect clinically significant fluid absorption by measuring plasma glucose at least during the first 30 minutes postoperatively.

**Reviewer’s Comments:** The significance of the study is in the possibility of using glucose as an early marker of fluid absorption – something that is difficult to easily detect for absorbed volumes of <2 L. (Reviewer-K. George Bojanov, MD).

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**Keywords:** Bipolar Transurethral Surgery, Fluid Absorption Tracer, Glucose

Print Tag: Refer to original journal article
Ketamine’s Analgesic Effects Persist 6 Months After THA

The Early and Delayed Analgesic Effects of Ketamine After Total Hip Arthroplasty: A Prospective, Randomized, Controlled, Double-Blind Study.

Remérand F, Le Tendre C, et al:


In addition to decreasing morphine consumption after total hip arthroplasty, the analgesic effects of ketamine were persistent 6 months after surgery.

**Objective:** To assess the postoperative morphine-sparing effects of ketamine combined with other systemic anesthetics including paracetamol and NSAIDs in patients undergoing for total hip arthroplasty (THA).

**Design/Participants:** Prospective, randomized, double-blinded, clinical study, involving 154 adult patients scheduled for THA.

**Methods:** Participants were randomly assigned to 1 of 2 groups: the ketamine group (n=79) and the placebo group (n=75). All patients received general anesthesia. Between induction and skin incision, patients received an IV bolus of 0.5 mg/kg ketamine or a similar dose of saline, according group allocation. This was followed by a 24-hour ketamine or saline infusion, according to group allocation, at 2 mL/hour. In the ketamine group, the infusion amounted to 2 μg/kg per minute ketamine. Postoperative analgesia was started before skin closure with 1 g paracetamol and 50 mg ketoprofen repeated every 6 hours for 24 hours. Patient-controlled analgesia (PCA) delivered morphine and droperidol. Paracetamol and ketoprofen were started on postoperative day 1. After PCA removal, oral morphine was started per patient’s request. Pain scores, analgesic medications consumption, use of ondansetron, complications, and hospital stay duration were recorded, including interviews on day 30, 90 and 180.

**Results:** The demographics and operative characteristics of the 2 study groups were similar. Morphine consumption during the first 24 hours postoperatively was decreased by 28% in the ketamine group compared to the placebo group. This difference was persistent during the first 7 days after surgery. No morphine was required in recovery room for 59% of the ketamine group and for 33% of the placebo group. Pain scores were similar between the groups during the first 7 days postoperatively, as were the length of stay and the times to weight bearing and walking. At 1, 3, and 6 months after surgery, persistent pain at the operated hip and at rest was less frequently reported in the ketamine group than in the placebo group. Patients in the placebo group needed 2 crutches or a walking frame on postoperative day 30 more often than did patients in the ketamine group.

**Conclusions:** In patients undergoing THA, 24-hour ketamine infusion has a morphine-sparing effect. Ketamine also improves postoperative rehabilitation at 1 month and reduces persistent postoperative pain up to 6 months after THA.

**Reviewer’s Comments:** It is interesting that ketamine did not improve rehabilitation outcome during hospital stay despite improved analgesia, something that can be explained with the particular rehabilitation schemes used at the study institution. (Reviewer-K. George Bojanov, MD).

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Keywords: Total Hip Arthroplasty, Ketamine, Analgesic Effects

Print Tag: Refer to original journal article
A single IV dose of propofol does not reduce pain or analgesic use during the 30 days after injection for patients with disability and pain from chronic daily headache.

**Objective:** To quantify the effect of a single IV dose of propofol on disability and pain from chronic daily headache (CDH) during a 30-day study interval.

**Design:** Prospective, randomized, double-blind, placebo-controlled study.

**Participants:** 40 adult patients diagnosed with CDH (a disabling pain syndrome with a prevalence ranging from 5% to 9% in the general population).

**Methods:** Patients with CDH were identified using history, physical examination, and completion of the Headache Disability Inventory (HDI). A large vein was cannulated, and intravenous normal saline 250 mL was infused over 1 hour. Patients were randomly assigned to receive either propofol infusion at 40 μg/kg per minute for 60 minutes (total, 2.4 mg/kg) with a concurrent saline infusion over 10 minutes, or placebo infusion of intralipid 20% over 60 minutes with a concurrent infusion of midazolam in saline at 35 μg/kg over 10 minutes. The primary outcome was the difference in reduction of the HDI from day 0 to day 30 between groups. Secondary outcomes included Headache Index (HI), pain scores, activity, medications use, visits to the emergency room, sedation, nausea, and adverse side effects.

**Results:** Patients in the propofol group were similar to patients in the control group with respect to age, gender, and headache duration. From baseline to day 30, there was a statistically significant reduction of 9.47 points in HDI for the propofol group, but HDI did not change significantly for the control group. There were no statistically significant differences in HI within or between the groups. Both groups had a significant reduction in the HI scores after each infusion. Although these reductions were statistically significant, they were small and likely were not clinically meaningful. Three patients in each group experienced pain on injection of the study drug.

**Conclusions:** A single continuous infusion of propofol, in the doses used in this study, produces a statistically significant but not clinically significant reduction of headache-related disability 30 days after treatment and does not significantly reduce pain scores or medication use during the same period.

**Reviewer's Comments:** Just for clarification, there is an incidental finding that a large number of patients presenting with a headache could experience relief when those same patients receive IV propofol for sedation during nerve blocks. (Reviewer-K. George Bojanov, MD).

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Keywords: Chronic Daily Headache, Propofol Single Injection

Print Tag: Refer to original journal article
Using liquid for loss of resistance decreases the risk of postdural puncture headaches by 1.5 percentage points in chronic pain patients.

**Objective:** To test the hypothesis that loss of resistance with a liquid medium leads to less epidural-related complications than does loss of resistance with air.

**Design:** Meta-analysis of 5 students.

**Participants:** A total of 4422 patients.

**Methods:** The meta-analysis included prospective, randomized, controlled trials published from 1966 to 2008, comparing the use of the loss of resistance technique with air versus liquid for identifying the epidural space. Searched databases included Ovid MEDLINE, EMBASE, the Cochrane Central Register of Controlled Trials, and the Cochrane Database of Systematic Reviews. In addition, abstracts from conferences and scientific meetings published by the major anesthesia and pain societies after January 2003 were included. Using a standardized data extraction form, each study was assessed for quality and scored. Only studies of moderate or high quality were included. Statistical analysis was performed using Stata® software.

**Results:** From >700,000 abstracts, 670 records were selected for further evaluation. Of those records, 15 published prospective randomized studies investigated the risk of complications associated with air versus liquid medium during the loss of resistance technique. Ten of those were excluded, leaving 5 studies for evaluation (4 evaluated use of labor analgesia via epidural catheter; 1 involved epidural analgesia without catheter for chronic pain management). Four of the 5 studies used saline, and 1 study used lidocaine for the liquid medium and compared it with air for loss of resistance. With respect to difficulty of epidural catheter insertion, intravascular catheter insertion, paresthesia, accidental dural puncture, and the incidence of partial block were not significantly different for the mediums used for loss of resistance. A small, statistically significant risk difference for postdural puncture headache (PDPH) was observed with using fluid when the epidural was placed for chronic pain management.

**Conclusions:** Due mostly to heterogeneity, the data in the included studies are insufficient to objectively evaluate the effect of loss of resistance medium on complications during epidural placement.

**Reviewer's Comments:** The study shows that the incidence of complications is relatively low when using air versus liquid for epidural space identification. Larger studies that overcome the limitation of heterogeneity are needed to determine the optimal method for loss of resistance during epidural placement. (Reviewer-K. George Bojanov, MD).

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Keywords: Epidural Space Identification, Loss of Resistance Technique

Print Tag: Refer to original journal article
The use of the Video Intubation Unit improves the visualization of the larynx and the intubation conditions in obese patients.

**Background:** Morbidly obese (MO) patients are at higher risk of difficult airway management than are non-obese patients.

**Objective:** To evaluate the efficacy of the new Video Intubation Unit (VIU) in intubating MO patients.

**Design:** Prospective randomized clinical study.

**Participants:** Patients scheduled to undergo bariatric surgery who had a body mass index (BMI) >35 kg/m² and an ASA of 2 or 3.

**Methods:** Of the 3 investigators, 1 had used the VIU 100 times, and the others had used it 20 times. The VIU consists of an optical fiber, a stiff stylet, and the endotracheal tube. Patients were monitored and pre-oxygenated. Induction of anesthesia was according to the protocol with propofol, fentanyl, and cisatracurium (0.15 mg/kg real body weight). The laryngoscopic view was graded (laryngoscopic grade [LG]) according to Cormack and Lehane and was performed conventionally with the Macintosh blade and with the VIU. Then patients were randomly assigned to 1 of the 2 techniques. After 3 attempts of tracheal intubation with the assigned device, the procedure was considered as a failure. The intubation time was recorded from picking up the tracheal tube until the appearance of the EtCO₂ curve on the capnography. Comparisons between the groups were performed with the Mann-Whitney test and the Fisher’s exact test. A \(P<0.05\) was considered significant.

**Results:** 38 patients were analyzed. Seventeen patients had an LG of 2 or 3 with the direct laryngoscope. This score improved to 1 with the VIU (\(P<0.0001\)). The intubation time was not significantly different between the 2 groups. After intubation, no significant difference in SpO2 was observed between the 2 groups.

**Conclusions:** The VIU improved the visualization of the larynx and improved the intubation conditions in obese patients.

**Reviewer’s Comments:** The Airtraq®, the GlideScope®, and other optical devices have been shown to improve the Cormack and Lehane classification. Each hospital has their own devices used in the care of patients with a difficult airway. To achieve a high success rate, daily experience and training are essential. (Reviewer-Olga Plattner, MD).

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Keywords: Intubation, Obese Patients

Print Tag: Refer to original journal article
Mg Infusion During Spinal Anesthesia Improves Analgesia

I.V. Infusion of Magnesium Sulphate During Spinal Anaesthesia Improves Postoperative Analgesia.

Hwang JY, Na HS, et al:

Br J Anaesth 2010; 104 (January): 89-93

IV infusion of magnesium sulphate during spinal anesthesia improves postoperative analgesia.

**Background:** Magnesium (Mg) has antinociceptive effects, and numerous studies could demonstrate that Mg infusion during general anesthesia leads to less postoperative analgesic use.

**Objective:** To evaluate the effects of Mg on postoperative pain during spinal anesthesia.

**Design:** A randomized, prospective, double-blinded, clinical study.

**Participants:** 40 patients undergoing hip replacement arthroplasty in spinal anesthesia.

**Methods:** Anesthesia monitoring was standardized, and spinal anesthesia was performed through the interspace of L3-4 or L4-5 with a 25 G needle. A solution of 0.5% hyperbaric bupivacaine was administered according to patient height (height <155 cm, 12 mg bupivacaine; height 155-170 cm, 13 mg bupivacaine; height 170-180 cm, 14 mg bupivacaine; height >180 cm,15 mg bupivacaine). To each bupivacaine amount was added 20 mg fentanyl. Patients were randomly assigned to 1 of 2 groups. Group M received 50 mg/kg Mg over 15 minutes after spinal anesthesia followed by 15 mg/kg per hour continuously until the end of surgery. Group S received the same volume with normal saline. Vital parameters (blood pressure drops <20% from the baseline or the pulse rate drop <45 with medication according to the protocol [ephedrine, atropine]). In each case, a patient-controlled analgesia pump was given to the patient with morphine 70 mg and ketorolac 150 mg in a total volume of 100 mL. This was set to deliver a 1-mL bolus dose with 10 minutes lockout time. PCA consumption and pain scores were recorded after surgery and again at 30 minutes, 4, 24 and 48 hours after surgery. The rescue drug administered during or after surgery was 30-mg ketorolac. The Mann-Whitney test was used to analyze the VAS pain score, the PCA consumption, and patient satisfaction. A *P*<0.05 was statistically significant.

**Results:** Demographic data were comparable for the 2 groups. The M group had significantly lower VAS scores at 4, 24, and 48 hours postoperatively, as demonstrated by decreased use of PCA consumption (*P*<0.001).

**Conclusions:** Mg sulphate given during spinal anesthesia reduced postoperative pain and analgesia consumption.

**Reviewer's Comments:** The exact mechanism of the analgesic effect of Mg is still unclear. Due to many other studies which show the effect in postoperative pain and analgesia consumption, it might be recommended additionally to opioids for analgesia in big operations. It would have been better if Mg levels were also monitored because the dose is quite high but may be the effective dose for this benefit. (Reviewer-Olga Plattner, MD).

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Keywords: Postoperative Pain, Magnesium Sulphate

Print Tag: Refer to original journal article
**Objective:** To determine whether a single dose of morphine given epidurally shortly after a vaginal delivery can reduce postpartum perineal pain and reduce the use of IV or oral opioids in the early postpartum period.

**Design/Participants:** Single-center, randomized, double-blind, clinical study involving 228 women who delivered vaginally and who had epidural analgesia for labor and delivery.

**Methods:** Within 1 hour of delivery, participants were randomly assigned to receive 1 of 2 identical-appearing syringes epidurally, containing either preservative-free morphine 2.5 mg diluted to 10 mL, or 10 mL of preservative-free saline. Patients were monitored for 24 hours after discharge to the postpartum ward (every hour for the first 12 hours and every 2 hours for the second 12 hours). Sedation level, pruritus, nausea, vomiting, and visual analog scale score for pain were recorded. Primary outcome was the proportion of women in each group who received opioid analgesia within first 24 hours postpartum. Secondary outcomes included maternal visual analog scales for pain scores, maternal satisfaction, and time to requesting the first supplemental analgesia after delivery. Participants were interviewed again at 1 week postpartum. Perineal trauma was classified as minor and major trauma.

**Results:** 113 women were randomly assigned to receive morphine, and 115 were assigned to receive saline. The 2 groups were similar for demographics. One-third of study patients had an operative vaginal delivery, and 74% of women had major perineal trauma. Eight women of the 113 in the epidural morphine group required additional analgesics in the first 24 hours compared to 37 of 115 in the epidural saline group ($P<0.001$), representing a 78% reduction in the risk of opioid analgesia requirement. The time to first request for an additional opioid analgesia was prolonged by 4 hours among women receiving epidural morphine ($P<0.001$). Maternal satisfaction and the incidence of side effects were not different between the groups.

**Conclusion:** Epidural morphine after vaginal delivery caused a 78% reduction in analgesic requirements compared to placebo for both primiparous and multiparous patients.

**Reviewer's Comments:** The significance of this study is that long-term effects (not studied currently) might be more significant and beneficial for the patients. It is suspected that acute postpartum pain may be associated with development of persistent long-term pain syndrome, which might be favorably altered by something as simple as delivering 1 dose of epidural morphine. (Reviewer-K. George Bojanov, MD).

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Keywords: Vaginal Delivery, Epidural Morphine, Analgesia

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