Elderly patients are at a much greater risk for QTc prolongation than younger patients after sevoflurane anesthesia.

**Objective:** To determine whether sevoflurane and droperidol have a greater propensity for increasing the QTc interval and dispersing ventricular repolarization in the elderly than in younger patients.

**Participants/Methods:** Anesthesia was maintained with 1.5% to 2.5% sevoflurane for 2 hours in 30 elderly patients (≥70 years) and 30 younger patients (20 to 69 years). The corrected (QTc) interval and the transmural dispersion of ventricular repolarization (time from the peak to the end of the T wave [Tp-e]) were measured before and 60, 75, 90, and 120 minutes after the start of sevoflurane. Droperidol 1.25 mg was given just after the 60-minute evaluation period.

**Results:** Although the elderly group was 24 years older than the younger group, the QTc intervals before sevoflurane were not different. However, the QTc interval was significantly prolonged by sevoflurane in the elderly patients but not in the younger patient group. In the elderly group, the QTc interval was 0.434 seconds before sevoflurane and 0.450 seconds 60 minutes after maintenance with sevoflurane. The sevoflurane-induced QTc interval prolongation was not further increased with time or by droperidol in the elderly. In the younger patients, droperidol caused only a very small but significant increase in the QTc interval. The Tp-e interval was not significantly changed, and no critical arrhythmias were noted in either group.

**Conclusions:** Elderly patients are at a much greater risk for QTc prolongation than younger patients after sevoflurane anesthesia. Increasing the duration of sevoflurane anesthesia and the administration of droperidol does not further enhance prolongation in the elderly. The absence of an increase in the transmural dispersion of ventricular repolarization in either group is reassuring.

**Reviewer's Comments:** Although the lack of an increase in the transmural dispersion of ventricular repolarization in either group mitigates against an increased risk for inducing lethal arrhythmias by sevoflurane or droperidol in both groups, this study did not address the potential arrhythmogenic risk of using sevoflurane or droperidol in patients with pre-existing QT interval prolongation or other major risk factors for ventricular arrhythmias. That is, the use of sevoflurane in patients already susceptible to ventricular arrhythmias could markedly increase the potential for serious arrhythmias. For example, sevoflurane use in patients with marked electrolyte abnormalities, prolonged QT interval, or pronounced cardiac hypertrophy may require extra caution. It needs to be emphasized, however, that one of the significant findings of this study is the lack of an increase in dispersion of ventricular repolarization by sevoflurane in either age group. This is because it has been found in some studies that an increased dispersion of ventricular repolarization may be a much greater risk factor for increasing susceptibility to Torsade de pointes than QT interval prolongation. (Reviewer-Douglas E. Koehntop, MD).

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Keywords: Sevoflurane, Droperidol, Arrhythmogenic Potential

Print Tag: Refer to original journal article
Does Intraneural Injection Always Cause Neurologic Injury?

Nerve Expansion Seen on Ultrasound Predicts Histologic But Not Functional Nerve Injury After Intraneural Injection in Pigs.

Lupu CM, Kiehl T-R, et al:


Intraneural injection does not necessarily result in sensory or motor deficits.

Objective: To determine if intraneural injection visualized on ultrasound results in neurologic injury.

Design: Prospective, randomized, controlled animal study involving Yorkshire-cross pigs weighing 55 to 60 kg.

Methods: All pigs underwent general endotracheal tube anesthesia with isoflurane, with their right and left forelimbs randomized to either the control side or injection side. The median nerve was visualized with ultrasound on each side followed by subsequent dissection. The forelimb serving as the injection side received an intentional intraneural puncture with a 22-gauge, 80-mm insulated needle followed by injection of 2% lidocaine with 1:200,000 epinephrine via an automated infusion pump. The resultant nerve expansion was captured on real-time ultrasound images. The injection was given to a maximum volume of 20 mL or until extravasation outside the nerve was noted. Injection pressures were also monitored. For the control limb, no needle puncture or injection occurred after dissection. The forelimb incisions on both sides were closed, and the pigs were awakened. All pigs were evaluated on postoperative days 1, 2, and 7 for evidence of sensory or motor deficit. On postoperative day 7, the pigs again underwent general endotracheal tube anesthesia for ligation and removal of the median nerve on both forelimbs. The nerve specimens were fixed and stained for histologic examination.

Results: For the experimental forelimb side, a volume of 10 to 20 mL local anesthetic was injected. There was no association between the volume injected, the pressure generated during injection, and the increase in size of the nerve area noted on ultrasound. No pig had evidence of neurologic injury on any day assessed. However, histologically, there was evidence of nerve injury defined as the presence of axonal retraction balls in 6 of the 10 injectate group subjects versus none in the control group. All 10 of the injectate group animals also had evidence of inflammation versus only 3 in the control group.

Conclusions: Intraneural injection of up to 20 mL of local anesthetic results in histologic evidence of nerve injury, but this does not translate into functional sensory or motor deficits up to 7 days afterwards.

Reviewer's Comments: Intraneural injection is what everyone fears due to the risk of resultant neurologic injury. However, many studies are now pointing out that we probably have more intraneural injections when performing regional anesthesia than we would like to admit. There are no good solid indicators of intraneural injection, and intraneural injection can occur even with ultrasound imaging as a guide. Although as evidenced in this study, ultrasound visualization of nerve expansion due to intraneural injection does not necessarily equal nerve injury, we must still be vigilant to avoid such occurrences because neurologic injury can still occur. (Reviewer-Michelle L. Schlunt, MD).

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Keywords: Intraneural, Ultrasound, Injection Pressure

Print Tag: Refer to original journal article
What Is Minimum Local Anesthetic Volume for Sciatic Nerve Block?

Latzke D, Marhofer P, et al:
Br J Anaesth 2010; 104 (February): 239-244

For a 99% success rate when performing sciatic nerve block under ultrasound guidance, the minimum volume of local anesthetic needed is 0.10 mL/mm<sup>2</sup> cross-sectional nerve area.

**Objective:** To determine the ED<sub>99</sub> volume of local anesthetic for sciatic nerve blockade.

**Participants:** The study participants were male volunteers aged 18 to 50 years.

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

**Methods:** The study participants were positioned prone for the sciatic nerve block. Ultrasound guidance was utilized to visualize the sciatic nerve at the mid-femoral level between the biceps femoris and semitendinosus muscles. The depth to the nerve from the skin surface, circumference of the nerve, and area of the nerve were measured in each volunteer. The initial dosing volume of 1.5% mepivacaine began at 0.2 mL/mm<sup>2</sup> of the cross-sectional nerve area. Sciatic nerve blockade was performed via real-time ultrasound guidance using an in-plane approach with a 22-gauge 70-mm needle. A multi-injection technique was done to obtain circumferential spread of the local anesthetic around the nerve. All blocks were performed by a single anesthesiologist blinded to the amount of local anesthetic being administered. Following block completion, volunteers underwent sensory assessment via pinprick testing. Assessment was performed at scheduled intervals until recovery occurred. When sensory blockade was complete within 45 minutes of block completion, the next volunteer received an incremental decrease in local anesthetic dose by 0.02 mL/mm<sup>2</sup>. However, if sensory blockade was not achieved within 45 minutes, the subsequent volunteer received an incremental dose increase of 0.02 mL/mm<sup>2</sup>. The study was stopped after 3 up-and-down cycles based on the step-up/step-down pharmacodynamic model.

**Results:** A total of 19 volunteers were required to complete the study to determine the ED<sub>50</sub>, ED<sub>95</sub>, and ED<sub>99</sub> volumes of local anesthetic for sciatic nerve blockade. There were 14 successful blocks and 5 failures. The ED<sub>50</sub>, ED<sub>95</sub>, and ED<sub>99</sub> volumes of local anesthetic for sciatic nerve block were 0.04, 0.08 and 0.10 mL/mm<sup>2</sup> cross-sectional nerve area, respectively. No correlation was found between the volume of local anesthetic and the time to onset of sensory block, and only moderate correlation was found between the volume of local anesthetic given and sensory block duration.

**Conclusions:** The ED<sub>99</sub> for sciatic nerve blockade was 0.10 mL/mm<sup>2</sup> cross-sectional nerve area when using ultrasound guidance. The smaller volumes did not influence time to sensory block onset; however, smaller volumes were associated with shorter block duration.

**Reviewer's Comments:** The interesting point raised in this study is that when such low volumes of local anesthetic are used, it is not possible to completely surround the nerve with local anesthetic to achieve the infamous "donut sign." Despite this, however, successful sciatic nerve blockade was still achieved. Perhaps it is not a necessary requirement that circumferential spread be achieved for a successful block. (Reviewer-Michelle L. Schlunt, MD).

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Keywords: Ultrasound, Sciatic Nerve Block

Print Tag: Refer to original journal article
It is possible to safely manage an indwelling epidural catheter in patients receiving daily clopidogrel.

Objective: To determine the incidence of postoperative neurologic complications after epidural analgesic use in patients actively receiving clopidogrel.

Design: This study was an institutional retrospective chart review for the years 2001 through 2006. The charts reviewed were those of vascular surgery patients scheduled for elective lower extremity revascularization or amputation. All patients were actively receiving clopidogrel, which was withheld only on the day of surgery versus the recommended 7 days preoperatively and was re-started on postoperative day 1.

Methods: Patients underwent placement of a lumbar epidural on the day of surgery. The epidural solution utilized local anesthetic combined with either fentanyl or hydromorphone. The specifics of bolus loading, infusion rates, or choice of local anesthetic were not mentioned in the article. The majority of patients received a single intraoperative dose of intravenous heparin. Postoperatively, patients underwent neurological checks every 2 hours for the first 24 hours, and then every 4 to 6 hours for the subsequent 72 hours regardless of successful or unsuccessful epidural placement. The neurologic checks included looking for new-onset back pain, lower extremity numbness or weakness, and bowel or bladder incontinence. All epidural catheters were removed by postoperative day number 3. After 2 attempts at epidural placement or if a bloody tap occurred, the epidural placement was abandoned.

Results: 306 patient charts were reviewed. The patient population was predominantly African-American males ranging in age from 49 to 74 years. The majority of patients were also receiving 81 mg aspirin concurrently with clopidogrel. A total of 3 bloody taps occurred in this review. There were no new reported neurological symptoms or complications for the first 3 months postoperatively, giving a point estimate risk for epidural hematoma equal to 0.

Conclusions: The use of lumbar epidural analgesia in patients receiving clopidogrel did not incur any neurologic complications. However, the authors state that this review contained only a small sample size and can only recommend the reserved use of lumbar epidural analgesia in patients receiving clopidogrel.

Reviewer's Comments: We are all cognizant of the risk of an epidural hematoma. With the potent anticoagulants and anti-platelet medications now being used daily, it becomes very frustrating to implement postoperative epidural analgesia to benefit the patient. Residents find it difficult to become familiar with American Society of Regional Anesthesia guidelines, and numerous medication timing administration errors still occur on the hospital wards despite standing physician orders, pharmacy cross-checks, and even warning stickers placed on the front of patient charts. It is heartening to see evidence such as this that, in particular situations, it is still possible to provide the benefits of regional anesthesia when warranted. (Reviewer-Michelle L. Schlunt, MD).

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Keywords: Lumbar Epidural, Clopidogrel

Print Tag: Refer to original journal article
The use of a preoperative educational video discussing regional anesthesia helps alleviate patient anxiety both preoperatively and postoperatively.

**Objective:** To determine the effect of utilizing an educational video discussing regional anesthesia on patient anxiety related to surgery.

**Design:** This clinical trial was prospective, randomized, and blinded.

**Participants:** Adult patients scheduled for elective hand or knee/ankle surgery under regional anesthesia.

**Methods:** Patients were enrolled on the day of their preoperative assessment. All patients underwent baseline anxiety level testing via the state trait anxiety inventory (STAI) and visual analog scale scoring before the start of their preoperative surgical consultation. Patients were then randomized to 1 of 2 groups: the control group and the film group who watched an instructional video discussing regional anesthesia. Depending on the scheduled surgery, patients in the film group watched a video discussing brachial plexus blockade for hand surgery or subarachnoid blockade for knee/ankle surgery. Both videos highlighted a patient having a preoperative interview with an anesthesiologist discussing the regional technique, its description and risks, actual block placement, and intraoperative usage. After completion of viewing the video, patients in the film group underwent repeat anxiety level assessment. Patients did not meet their anesthesiologist until the day of surgery. After the anesthetic interview, patients once again underwent anxiety level assessment. The final anxiety level assessment was done between 2 and 8 hours postoperatively.

**Results:** 110 patients were included in the final analysis, 55 in each study group. There were no differences in baseline anxiety levels between the 2 groups. Women were found to have higher baseline anxiety levels. On the day of surgery, patients in the control group had significantly higher anxiety levels both immediately before surgery and postoperatively compared to the film group. Visual analog scale scoring by the patients positively correlated with STAI levels.

**Conclusions:** The use of an educational video when viewed preoperatively helps decrease patient anxiety both before and after surgery. The use of an educational video appears to be an effective means of relaying information to patients.

**Reviewer's Comments:** I believe the use of a video illustrating regional anesthesia is a wonderful tool for patient education. It is much easier to convey verbal information in combination with video presentation. It allows patients to see first-hand exactly what is being described and helps frame their expectations. It also helps put away many patient misconceptions related to regional anesthesia. (Reviewer-Michelle L. Schlunt, MD).

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**Keywords:** Brachial Plexus Block, Spinal Anesthesia, Anxiety, Instructional Videos

**Print Tag:** Refer to original journal article
A central laboratory or blood gas analyzer should be used in an anesthetized patient.

**Background:** In recent years, the management of blood glucose has become an important part of perioperative patient management. This was partially induced by the introduction of goal blood glucose values around 110 mg/dL in critically ill patients by the American Diabetes Association in 2008. Several recent studies, however, have indicated that intensive glycemic control can lead to unacceptable levels of hypoglycemia.

**Objective:** To discuss the accuracy of home glucose meters, which have gained access to the hospital environment. **Glucose Measurement Devices:** Blood glucose can be measured either by central laboratory devices (CLD) or by point-of-care (POC) devices. The CLDs use an enzyme-based hexokinase system with an optic detection system and are used as a reference. POD devices use either a reflectometric technique with dye or electrochemical technology with electrons. The advantages of POC devices are that they are inexpensive, provide an immediate result, use a small sample volume, and can be used for self-monitoring of blood glucose. Clinicians, however, need to be aware of the lack of accuracy of these devices. Due to the underlying technology, patient and environment factors can affect measurements with the POC devices, such as type of the sample (arterial vs capillary vs venous), hematocrit, oxygen concentration, pH, hypothermia, hypotension, and/or drugs (ascorbic acid, acetaminophen, dopamine, or mannitol). Many POC devices were brought into a hospital environment from a home use environment without proper accuracy testing. **Accuracy of Glucose Measurement Devices:** The accuracy of POC devices is usually expressed with Clarke error grid analysis in which device results are plotted against the reference device. Deviation <20% is considered good. The studies performed with different POC devices meant for self-monitoring of blood glucose have demonstrated a lack of accuracy, especially in the hypoglycemic range. This is the most concerning in a patient under general anesthesia. Among the POC devices not meant for home use, blood gas analyzers have been shown to have accuracy equal to that of CLD if an arterial sample is used.

**Conclusions:** The use of POC devices in the hospital environment needs to be carefully evaluated. The clinician needs to understand the limitations of POC technology and understand the lack of accuracy of these devices.

**Reviewer's Comments:** Hypoglycemia can lead to devastating consequences, especially in critically ill and anesthetized patients. Understanding the accuracy of glucose meters is, therefore, extremely important. When accurate measurements are necessary, the use of central laboratory devices and blood gas analyzers is advised. (Reviewer-Moja Remskar Konia, MD).

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Keywords: Glucose Measurement Meters, Reliability, Operating Room

Print Tag: Refer to original journal article
The clinical scenario is the main factor that determines the choice of drugs and course of action in rapid sequence induction and intubation.

Rapid sequence induction and intubation (RSII) is considered a standard of care in patients with “full stomach.” In current practice, the choice of induction agent depends primarily on the clinical situation. All agents, including thiopental, ketamine, midazolam, etomidate, and propofol, were investigated. Propofol is preferred by some due to greater suppression of pharyngeal and laryngeal reflexes. The dose of succinylcholine used varies considerably. To decrease the incidence of myalgias, a defasciculation dose of non-depolarizing muscle relaxant is often used. The dose, however, is not calculated on a regular basis by clinicians and is often overdosed (the suggested dose of rocuronium is 0.03 mg/kg). For non-depolarizing muscle relaxants, rocuronium seems to be the agent of choice. Studies of priming dose did not show any improvement over a larger dose (1.5 mg/kg) of rocuronium. Manual ventilation is avoided to prevent gastric distention. Ventilation with airway pressures <15 cm H₂O without cricoid pressure and <45 cm H₂O with cricoid pressure, however, do not cause gastric distention. If hypoxia develops, ventilation is warranted. We have no further evidence that cricoid pressure works. We do, however, have evidence that it may interfere with intubation and laryngeal mask airway placement. A study to confirm the preventive effect of cricoid pressure is not feasible due to ethical issues.

**Reviewer's Comments**: So what do we know? Not much really. We have very little scientific support for any of the methods used during RSII. The decision about which agent to use, whether to ventilate, and whether to use cricoid pressure will depend on the patient, clinical situation, and practitioner. (Reviewer-Mojca Remskar Konia, MD).

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Keywords: Rapid Sequence Induction, Rocuronium, Defasciculating Dose

Print Tag: Refer to original journal article
If visualization is difficult during tracheal intubation for a neck hematoma after a carotid endarterectomy, evacuating the hematoma may be helpful.

**Background:** Hematomas after carotid endarterectomy can cause airway compromise and require emergency airway management by the anesthesiologist. How best to manage the airway in this difficult situation has not been well studied, however.

**Objective:** To determine how to manage the airway in patients who develop a neck hematoma after carotid endarterectomy.

**Design:** Retrospective chart review.

**Participants:** 3255 patients who had surgery for carotid endarterectomy at the Mayo Clinic over a 10-year period.

**Methods:** The charts of the patients who had surgery for carotid endarterectomy at the Mayo Clinic over the 10-year study period were retrospectively reviewed.

**Results:** 44 of the 3255 patients studied required neck exploration for neck hematoma within 72 hours after carotid endarterectomy surgery. The time of re-exploration was 6 ± 6 hours after completion of the carotid surgery. Of the 44 patients, 42 had been extubated prior to re-exploration and required airway management by the anesthesiologist. In 20 of the 42 patients, fiberoptic intubation before induction of general anesthesia was chosen and was successful in 15 cases (75%). Standard direct laryngoscopy was successful in the remaining 5 patients, 3 before and 2 after induction of general anesthesia. Standard direct laryngoscopy was attempted in the remaining patients. It was successful in 13 of the 15 patients in whom it was performed after induction of general anesthesia and in 5 of the 7 patients in whom it was performed before induction. Hematoma decompression improved visualization in 3 of the 4 patients in whom direct laryngoscopy was not successful. The remaining patient required a tracheostomy. Arterial bleeding was identified in only 25% of patients who underwent exploration. However, a direct arterial bleeding site was identified in 36% of the patients who had no difficulty in tracheal intubation compared to only 6% of those in whom difficulty was noted ($P =0.03$).

**Conclusions:** Both fiberoptic and direct laryngoscopic techniques were used successfully to control the airway. Direct laryngoscopy was successful in several cases in which fiberoptic laryngoscopy failed. Evacuation of the hematoma improved visualization and the success rate for tracheal intubation.

**Reviewer's Comments:** This study demonstrates that tracheal intubation could be performed successfully in most cases before evacuation of the hematoma after carotid endarterectomy. Venous bleeding may have led to more airway edema and a more difficult tracheal intubation than in those patients who had a rapidly expanding hematoma from an arterial source. Finally, evacuation of the hematoma improved visualization and the success rate of tracheal intubation in patients who were initially not able to be intubated. (Reviewer-David S. Beebe, MD).

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Keywords: Carotid Endarterectomy, Hematoma, Airway Management, Tracheal Intubation

Print Tag: Refer to original journal article
Most allergic reactions to local anesthetics are reactions to substances, such as latex, that patients are exposed to at the same time.

**Background:** Often patients report they are allergic to local anesthetics, but how often they are truly allergic is unknown.

**Objective:** To determine how often patients who report an allergy to local anesthetics have a true allergy or are reacting to something else.

**Design:** Retrospective chart review.

**Participants:** 135 patients reported an allergy to local anesthetics and had the allergy evaluated at the allergy clinic at Haukeland University Hospital in Bergen, Norway, from 1995 to 2006.

**Methods:** Patients with a suspected allergy to local anesthetics initially had skin prick tests performed with all the agents they were exposed to at the time in addition to local anesthetics. If the tests were negative, intradermal skin tests to the agents were performed. If both sets tested negative, a challenge test using increasing doses of the offending agent administered subcutaneously was performed. Additional tests were also utilized in select patients to further evaluate their allergic status.

**Results:** Only 2 of the 135 patients demonstrated an allergy to local anesthetics by skin tests and the subcutaneous challenges tests. One patient was allergic to tetracaine, and the other to articaine-adrenaline. In contrast, 10 patients were allergic to substances they were exposed to at the same time as the local anesthetic administration, 5 to chlorhexidine, 3 to latex, 1 to triamcinolone, and 1 to hexaminolevulinate. Also, patients who tested positive were more likely to have IgE-type manifestations of their original response to local anesthesia administration such as urticaria, hypotension, or itching rather than fainting or feeling ill, which was more common in patients who did not test positive. This suggests that many of the adverse symptoms to local anesthetic administration called allergies were vasovagal or psychological in nature.

**Conclusions:** Most patients thought to be allergic to local anesthetics either do not have a true allergy or are allergic to other substances they were exposed to at the same time as the local anesthetic administration.

**Reviewer's Comments:** This study shows that many of the patients who say they are allergic to local anesthetics probably do not have a true allergy. One should still be cautious about administering local anesthesia to these patients, and be aware that they may be allergic to latex or something else that they are exposed to in the operating room. (Reviewer-David S. Beebe, MD).

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Keywords: Local Anesthetics, Allergic Reactions

Print Tag: Refer to original journal article
2-Injection Technique as Successful as 4-Injection Technique for Axillary Blocks

A Prospective, Randomized, Double-Blind Comparison of Ultrasound-Guided Axillary Brachial Plexus Blocks Using 2 Versus 4 Injections.

Imasogie N, Ganapathy S, et al:
Anesth Analg 2010; 110 (April): 1222-1226

An axillary block using 2 injections under ultrasound guidance, 1 surrounding the axillary artery with local anesthetics and 1 blocking the musculocutaneous nerve, is as successful as injecting each nerve separately.

Background: Axillary blocks can be successfully performed using ultrasound guidance by blocking each of the 4 nerves individually with separate injections. However, the radial, ulnar, and median nerves surround the axillary artery. Perhaps only 1 injection to surround the artery and 1 at the level of the musculocutaneous nerve would be necessary for a successful axillary block. This may be faster to perform and lessen the chance of nerve injury.

Objective: To determine if a 2-injection technique, 1 surrounding the axillary artery and 1 around the musculocutaneous nerve, would be as successful as injecting each nerve separately in performing an axillary block.

Design: Prospective, randomized, double blind study.

Participants: 120 patients scheduled to undergo upper limb surgery using an axillary block.

Methods: Patients were randomized to receive an axillary block using 40 mL of 0.5% ropivacaine with 1/400,000 epinephrine via 1 of 10 methods. In the first method, the patients had 30 mL of solution placed posterior to the axillary artery using ultrasound guidance with an in-plane approach. The needle was adjusted as necessary as the injection took place to ensure the local anesthetic surrounded the artery, forming a donut sign. The musculocutaneous nerve was blocked separately in the coracobrachialis muscle using ultrasound guidance and a nerve stimulator with 10 mL of local anesthetic. The second group had all of the nerves blocked separately using ultrasound guidance plus a nerve stimulator with 10 mL of local anesthetic at each nerve. The time to administer the block, the time for the block to take effect, the time to prepare for surgery, the degree of sensory and motor blocks, and the overall success rate of the blocks were determined and compared among the groups.

Results: The time to perform the block was significantly less using the 2-injection technique (7.86 ± 3.82 minutes) compared to the 4-injection technique (10.95 ± 6.77 minutes; P = 0.003). The times for obtaining complete motor and sensory blockade were consistently faster if the 4-injection technique was utilized. However, in the end, the time the patients were successfully ready for surgery after beginning to perform the block was similar in the 2-injection technique (44 minutes) and the 4-injection technique (42 minutes), with similar success rates (89.3% vs 87.9%; P = ns).

Conclusions: A 2-injection technique using ultrasound guidance is faster to perform and has a similar success rate as a 4-injection technique.

Reviewer’s Comments: The 2-injection technique described looks like an updated version of the old transarterial technique using the ultrasound to guide the local anesthetic around the artery rather than an arterial puncture. The technique appears to be faster and easier to perform than the 4-injection technique. Fewer injections may also lower the chance of nerve injury. (Reviewer-David S. Beebe, MD).

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Keywords: Axillary Block, Ultrasound Guidance

Print Tag: Refer to original journal article
Three percent hypertonic saline provides more satisfactory brain relaxation than 20% mannitol.

**Objective:** To compare the effects of administration of an equiosmolar bolus of hypertonic saline (HTS) to those of mannitol on intraoperative brain relaxation and on ICU and hospital stay.

**Design/Participants:** Prospective, randomized, double-blind, clinical study involving 238 adult patients scheduled to undergo elective craniotomy for supratentorial brain tumors.

**Methods:** Patients were randomly assigned to receive IV administration of equiosmolar hyperosmotic infusions of either 160 mL of 3% HTS (HTS group; n=122) or 150 mL of 20% mannitol (M group; n=116) for 5 minutes using an infusion pump through a central line. Intraoperatively, arterial carbon dioxide tension was kept between 35 and 40 mm Hg. Heart rate and arterial blood pressure were maintained within ± 20% of baseline. Fluid management was based on urine output. Positive fluid balance was maintained at a rate of 2 mL/kg per hour in addition to replacement of urine output with 0.9% saline or Ringer solution. Blood loss was replaced by 10% pentastarch at the ratio of 1:1. Surgeons blinded to anesthetic management assessed the degree of brain relaxation. Variables measured included study fluid administration, perioperative fluid input and urine output, laboratory data, ICU stays, and hospital days.

**Results:** Study groups were similar regarding demographic data. Severity of illness, anesthetic and surgical times, hemodynamics, arterial carbon dioxide tension, and central venous pressure were also similar between the groups. Brain relaxation was significantly better in the HTS group compared to the M group (P = 0.02). Compared to mannitol, HTS caused an increase in serum sodium concentration over time (P < 0.001). The M group had higher urine output compared to the HTS group (P < 0.001). In regard to fluid input before opening of the dura, total fluid input, and ICU and hospital days stay, the 2 groups were similar.

**Conclusions:** HTS provided better brain relaxation compared to 20% mannitol during elective supratentorial brain tumor surgery.

**Reviewer’s Comments:** There are several published studies suggesting that HTS is at least as effective, if not better, than mannitol in treatment of increased intracranial pressure. When using HTS, one should be aware of the sodium load and hyponatremia, as well as the possibility of osmotic opening of the blood-brain barrier. (Reviewer-K. George Bojanov, MD.)

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Keywords: Brain Relaxation, Supratentorial Brain Tumor Surgery, 3% Hypertonic Saline, Mannitol

Print Tag: Refer to original journal article
The newly developed OSA prediction score is effective and uses commonly collected perioperative variables.

**Objective:** To identify independent clinical predictors for obstructive sleep apnea (OSA) using common preanesthetic evaluation methods and to develop a perioperative OSA prediction model based on these variables.

**Design/Participants:** The retrospective, 2-step study involved 43,576 adult patients scheduled for surgery under general anesthesia during the first step and 512 patients during the second step in the study.

**Methods:** The first step of the study involved deriving the screening test from various general surgical patients (GSP group), while the second step involved validating the test in a set of patients undergoing a sleep study utilizing overnight polysomnography (OPS group). The primary outcome during the first step of the study was the perioperative diagnosis of OSA, defined as OSA diagnosed with OPS and treated with continuous positive airway pressure (CPAP), bilevel positive airway pressure, or surgery for OSA. Patients meeting the criteria for OSA were grouped as the GSP-OSA group, while the remaining patients were grouped into the GSP-control group. Perioperative data collected included a history of snoring, hypertension, type 2 diabetes, body mass index (BMI) score, age, gender, Mallampati class, neck thickness, thyromental distance, mouth opening, mandibular protrusion, and cervical spine mobility. Once the prediction model was established, it was tested in the OPS patients. Patients from the OPS group with confirmed OSA were grouped into the OPS-OSA group, and the rest of the patients were grouped into the OPS-control group. Comparison was made between GSP-controls and OPS-controls and GSP-OSA and OPS-OSA patients.

**Results:** Of all of the patients from the first step of the study, 3,884 (7.17%) had OSA. Logistic regression identified 9 independent predictors for OSA; these included male gender, a history of snoring, thick neck, a Mallampati class 3 or 4, temporomandibular distance <6 cm, hypertension, type 2 diabetes, BMI >30 kg/m2, and age >43 years. One point was assigned to each of these 9 predictors for the purpose of clinical scale creation. A diagnostic threshold score ≥2 showed good sensitivity (0.939) but poor specificity (0.323); a threshold of ≥6 showed poor sensitivity (0.239) and good specificity (0.911).

**Conclusions:** The developed score predicts a diagnosis of OSA with good accuracy across mild to severe disease.

**Reviewer’s Comments:** Various OSA prediction models exist, some of which are very accurate but complex, reducing their utility during the immediate perioperative period. The proposed OSA prediction score is fairly accurate and simple to perform because it utilizes routine preanesthetic assessment variables. (Reviewer-K. George Bojanov, MD).

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Keywords: Sleep Apnea, Prediction Score, Score Validation

Print Tag: Refer to original journal article
Objective: To test the hypothesis that visualization of key anatomical structures during percutaneous dilatational tracheostomy (PDT) is superior using laryngeal mask airway (LMA) devices compared to the standard approach using an endotracheal tube (ETT).

Design/Participants: Prospective, randomized, clinical study involving 63 adult ICU patients in need of PDT for facilitating long-term ventilation.

Methods: Patients were randomly assigned to the LMA group (n=33) or the ETT (n=30) group. PDTs were performed by intensivists with the experience of at least 10 PDTs. An LMA Classic™ or a single-use LMA were used in the LMA group of patients. LMA devices were introduced behind the ETT in situ, which was removed after the LMA position was confirmed. A bronchoscope was used to identify the thyroid, cricoid, and the upper 3 tracheal cartilages. In the ETT group, the ETT was positioned directly above the first tracheal cartilage, which was visualized by transillumination. After skin incision, tracheal puncture was guided by bronchoscopy in midline below the first or second tracheal cartilages. The operating intensivist evaluated the practicability of each PDT using a standardized 4-step rating scale.

Results: Patients in both groups were comparable with respect to demographics. The time for placing the bronchoscope and the airway at the site, sufficient to identify all relevant structures inside the trachea, and the time from tracheal puncture to insertion of the tracheal tube did not differ between the study groups. There was 1 failure of LMA insertion in 1 patient from the LMA group. Two LMA insertions were successful only after >1 attempt. In the ETT group, there were 2 accidental extubations, 1 laceration of the rear tracheal wall, and 1 damage of the bronchoscope. In 1 patient in the LMA group, it was difficult to guide the bronchoscope through the vocal cords. Only 1 patient (3%) in the LMA group was not rated "good" or "very good" before tracheal puncture. Relevant structures could not be reliably identified in 10 patients in the ETT group (P<0.01). There were no restrictions during tracheal puncture and dilation in the LMA group. In the ETT group, tracheal structures were poorly visible during tracheal puncture and dilation (P<0.01) in 5 patients.

Conclusions: The LMA technique for PDT was superior to the ETT technique and provided advantages regarding visualization of relevant tracheal structures and dilation. In addition, LMA provided superior ventilation, as accidental loss of airway and bronchoscope damage occurred only in the ETT group.

Reviewer's Comments: Some of the limitations of this study include small patient numbers, underpowered to establish possible complications from LMA use. In addition, participants showed only a minor deviation in pulmonary function. (Reviewer-K. George Bojanov, MD).

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Keywords: Laryngeal Mask Airway, Endotracheal Tube, Percutaneous Dilatational Tracheostomy
What Are the Effects of Intraarterial Nicardipine, Milrinone?

Hemodynamic Management and Outcome of Patients Treated for Cerebral Vasospasm With Intraarterial Nicardipine and/or Milrinone.

Schmidt U, Bittner E, et al:
Anesth Analg 2010; 110 (March): 895-902

Aggressive use of vasopressors for treatment of hypotension induced from intraarterial administration of nicardipine and/or milrinone is safe and does not induce systemic acidosis or end-organ damage.

Objective: To review hemodynamic management of patients undergoing treatment for cerebral vasospasm and to examine patients’ outcomes in terms of reduced perfusion-induced systemic acidosis and end-organ ischemic damage.

Design/Participants: Retrospective review of patient medical records, including 87 consecutive adult patients who underwent cerebral angiography for suspected cerebral vasospasm after subarachnoid hemorrhage (SAH) secondary to rupture of a cerebral aneurysm.

Methods: Cerebral vasospasm was suspected based on daily transcranial Doppler ultrasound and clinical examination. Patients were considered for endovascular treatment of vasospasm if they did not show improvement 24 hours after initiation of “triple H therapy” or if they developed progressive neurological symptoms despite therapy. The target systolic blood pressure was 160 to 200 mm Hg. Side-directed or cerebral vessel-specific intraarterial administration of nicardipine and/or milrinone was used to treat clinically and angiographically significant cerebral vasospasm. At all times, nicardipine and milrinone were administered individually. Anesthetic management, type of anesthesia, demographic data, ASA physical status, comorbidities, vital signs, intraarterial administration of nicardipine and/or milrinone, and dosage of drugs infused were identified from procedure and anesthetic records and recorded.

Results: Complete electronic medical and anesthetic records were available for 73 patients who underwent 160 intraarterial, side-directed or vessel-specific infusions of nicardipine and/or milrinone. A total of 57.5% of the patients received >1 endovascular treatment over a period ranging from 2 to 23 days after SAH. More than 93% of procedures were performed under general anesthesia. In 144 of the 160 treatments, at least 1 vasopressor was administered by continuous infusion to support arterial blood pressure at target before initiation of an intraarterial vasodilator. The vasopressors used included phenylephrine, norepinephrine, epinephrine, and vasopressin. Initiation of vasodilator infusion necessitated both an increase in the number of vasopressors and an increase in the dose of the infusion. Despite an increase in vasopressor administration, there was a 13% reduction in both systolic and diastolic blood pressure and a 30% increase in the heart rate during treatment (P <0.0001 for both). There was no decrement in renal function, bowel ischemia, or any other sign of peripheral ischemia or organ injury. No patient showed new or worsening arterial cerebral occlusion, and no patient died during the procedure. Mortality within 30 days of the last treatment was 11%.

Conclusions: Intraarterial administration of nicardipine and/or milrinone for cerebral vasospasm treatment after SAH requires high doses of vasopressors, which cause minimal end-organ ischemic damage and systemic acidosis.

Reviewer’s Comments: This is a good retrospective study with some limitations, including having no control group, lack of randomization, no prospective selection, and limiting the study to a single center. (Reviewer-K. George Bojanov, MD).

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Keywords: Cerebral Vasospasm, Hemodynamic Care, Nicardipine, Milrinone

Print Tag: Refer to original journal article
Adding Ketamine to Morphine Results in Better Postoperative Analgesia

Adding Ketamine to Morphine for Intravenous Patient-Controlled Analgesia for Acute Postoperative Pain: A Qualitative Review of Randomized Trials.

Carstensen M, Moller AM:

Br J Anaesth 2010; 104 (April): 401-406

Six of 11 studies show that adding ketamine to morphine results in better postoperative analgesia, while 5 studies show no improvement.

Background: Studies in animals have shown that concomitant administration of an N-methyl-D-aspartate receptor (NMDA) antagonist and an opioid may result in an additive analgesic effect. Clinical studies found contradictory results.

Objective: To review studies in order to clarify this controversy.

Design: A review of randomized, double-blinded studies of postoperative IV patient-controlled anesthesia (PCA) with ketamine added to an opioid in order to assess the benefit of adding ketamine.

Participants: Adult patients undergoing a surgical procedure having postoperative pain treatment with IV PCA with either an opioid alone or with ketamine and an opioid.

Methods: The Search was done using the Cochrane Library 2003, MEDLINE (1966 to 2009), and EMBASE (1980 to 2009). The primary outcomes were the visual analog scale (VAS) or verbal rating score of the patient and the total consumption of opioid. The secondary outcomes were respiratory depression needing intervention and adverse effects, such as hallucinations, bad dreams, dizziness, and sedation. The extracted data included eligibility, exclusion criteria, study design, duration and degree of follow-up, randomization, allocation concealment, blinding, number and characteristic of participants, type of surgery, dosage of analgesia, methods of administration, pain score, reduction in morphine consumption, duration of PCA, and side effects.

Results: 11 studies were included for analysis with 887 patients of whom 448 received ketamine. Six studies showed improved postoperative analgesia with the addition of ketamine, while 5 studies showed no clinical improvement. Different ketamine dosage regimens were used in the 11 studies. The predominant ketamine regimen was a 1:1 ketamine-to-morphine ratio; 3 trials used a 1:5 morphine-to-ketamine regimen. Six studies showed a statistically significant decrease in pain intensity with ketamine compared with morphine alone, while 4 studies showed no improvement in pain control with the combination therapy. Three studies found no significant difference between the morphine and ketamine groups with regard to respiratory frequency and hemodynamic function. Two studies found a higher respiratory frequency and SpO₂ in the ketamine group. In 7 studies, opioid-related side-effects were statistically higher in the morphine group versus the ketamine group.

Conclusions: Out of the 11 studies, 6 showed that the addition of ketamine to morphine resulted in better postoperative analgesia, while 5 studies showed no improvement.

Reviewer's Comments: As the authors conclude, more trials are needed with a larger number of patients and long-term follow-up. In many instances, the valuable benefits and proper dosing of ketamine are not well understood. Also, the impact of ketamine on patients at high risk of morphine resistance (cancer pain, drug dependency) needs to be studied. (Reviewer-Olga Plattner, MD).

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Keywords: Ketamine, Morphine, Patient-Controlled Anesthesia, Postoperative Pain

Print Tag: Refer to original journal article
The configuration of the hockey stick-stylet (100° angle) tracheal tube is superior to the other styletted tube configurations during difficult airway care with the C-MAC® videolaryngoscope.

**Background:** The C-MAC® videolaryngoscope is a new videolaryngoscope that comprises a standard Macintosh blade connected to a video unit. It is unclear whether a stylet should be routinely used when performing tracheal intubation with the C-MAC, and the best shape of the configuration is unknown.

**Objective:** To compare the efficacy of the C-MAC videolaryngoscope when used with an unstylleted tube in comparison to 3 different shaped stylet-tracheal tube configurations.

**Design:** Prospective, randomized, crossover manikin study.

**Participants:** 10 senior anesthetists with >10 years of experience.

**Methods:** Each anesthetist was allowed to practice 5 minutes with the laryngoscope on the manikin. They were shown 4 different stylet-tracheal tube configurations and were allowed 1 practice intubation in the normal airway with each tube. The 4 stylet-tracheal tube configurations examined were: tracheal tube with no stylet; tracheal tube with stylet but no angle; the Parker-Flex-It Directional Stylet; and the “hockey stick” shaped stylet (Hockey-Stylet). A SimMan manikin was used. Scenarios of a normal airway, cervical spine immobilization with a collar, tongue edema, and the combination of cervical spine immobilization with a collar and tongue edema were tested with the 4 different stylet-tracheal tube configurations. The evaluation of the duration of the intubation and the success rate was the aim of the study. If the intubation time exceeded 60 seconds, it was recorded as a failure. A maximum of 3 attempts was allowed for each scenario. The Cormack and Lehane scores were recorded, as well as the score for the degree of difficulty of use for each tube preparation. Data were analyzed with the chi-squared test, Fisher’s exact test with Bonferroni corrections, and with ANOVA.

**Results:** Except in the normal airway scenario where there was no difference in the duration of the first or successful intubation attempt, the stylet-tracheal tube was superior. In the difficult airway, the hockey-stylet tube was more superior than the flexi-stylet.

**Conclusions:** In the difficult airway scenario, the use of the C-MAC performs best when a stylet tube is used. The configuration of the hockey stick-stylet (100° angle) is superior to the other stylet tubes.

**Reviewer’s Comments:** During care of patients with a difficult airway, this novel videolaryngoscope improves the Cormack and Lehane view, but intubating the trachea often requires a preformed stylet within the endotracheal tube. This manikin study shows that the configuration of the hockey stick stylet (100° angle) is superior; however, the authors were unable to evaluate erosions and trauma because it was a manikin model. (Reviewer-Olga Plattner, MD).

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Keywords: C-MAC® Videolaryngoscope, Stylet Strategy

Print Tag: Refer to original journal article
A single dose of propofol in children provides appropriate sedation for an MRI examination lasting no longer than 30 minutes.

**Background:** Propofol has a rapid onset, provides effective anesthesia and good recovery, and prevents vomiting and nausea.  
**Objective:** To compare the efficacy and safety between single-dose application and continuous propofol infusion.  
**Design:** Randomized, prospective, double-blinded clinical study.  
**Participants:** 160 children who received sedation for an MRI.  
**Methods:** After monitoring the vital signs, induction was performed with propofol 2 mg/kg mixed with lidocaine 2 mg/mL over 30 seconds. Supplemental doses of propofol 0.5 mg/kg were administered until the patient was just arousable with significant stimulation. However, if sedation was inadequate after administration of up to 3 mg/kg propofol, midazolam 0.05 to 0.1 mg/kg was administered. Children were then assigned to 1 of 2 groups. After induction of sedation, group I (n=80) received 0.3 mL normal saline at a rate of 0.3 mL/kg per hour, and group II received the same volume of 10 mg/mL propofol. Vital signs were recorded every 5 minutes. In case of inadequate sedation in either group, propofol 0.5 mg/kg was administered, and the infusion rate of the study drug was increased by 0.05 mL/kg per hour up to 0.6 mL/kg per hour. Infusion was stopped at completion of the scan. Induction time, sedation time, and recovery time (from the end of the examination until spontaneous eye opening and vocalization) were recorded. Additional intervention (airway obstruction, bradycardia, hypotension, SpO₂ drop) was treated according to the protocol. Patients were excluded from the study if the MRI duration exceeded 30 minutes. Statistical analysis was performed using SPSS 14.0, parametric data were analyzed with t-test, and nonparametric data were analyzed with the Mann-Whitney test. A P<0.05 was considered significant.  
**Results:** 160 patients were assigned and completed the study. None of the patients required additional intervention. The recovery time was significantly shorter in group I compared to group II (P<0.001). The mean total dose of propofol was 2.4 ± 0.7 mg/kg in group I compared to 3.2 ± 0.7 mg/kg in group II (infusion).  
**Conclusions:** For an MRI examination of children, a single dose of propofol can provide appropriate sedation.  
**Reviewer’s Comments:** The MRI examination can exceed 30 minutes, especially in teaching hospitals; therefore, I would recommend propofol infusion in that environment. However, if the patient moves during the examination, repetition of propofol bolus doses will prolong the recovery time even more than those receiving a continuous infusion. A single bolus technique minimizes the need for an infusion pump. (Reviewer-Olga Plattner, MD).

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Keywords: Propofol, Sedation, MRI  

Print Tag: Refer to original journal article
Compared to direct laryngoscopy, the GlideScope® affords a significant improvement of the laryngeal view.

**Background:** The pediatric GlideScope® Video Laryngoscope is a laryngoscope with a video screen that may improve the glottic view.

**Objective:** To compare the view of the glottis between the Macintosh blade and the GlideScope Video Laryngoscope.

**Design:** Prospective, blinded clinical study.

**Participants:** Children between 2 and 16 years of age with a difficult airway and scheduled for general anesthesia and tracheal intubation were included.

**Methods:** Anesthesia was done according to the protocol. Direct laryngoscopy was performed using the conventional laryngoscope with the Macintosh blade by 1 of the 2 staff anesthetists. The best laryngoscopic view was graded according to the Cormack and Lehane scale with and without backwards, upwards, and right laryngeal pressure. Then the laryngoscopy was performed with the GlideScope by the second anesthetist with and without backwards, upwards, and right laryngeal pressure, and the Cormack and Lehane scale was used. The time until the best view was achieved was recorded. Intubation was performed either with the GlideScope or management was left to the discretion of the anesthetist. Data were analyzed using a 2-tailed Wilcoxon signed rank sum test; a $P$ value <0.05 was considered statistically significant.

**Results:** 18 patients were recruited. There was a significant improvement of the laryngeal view using the GlideScope compared with the direct laryngoscopy with ($P = 0.003$) and without ($P = 0.004$) backwards, upwards, and right laryngeal pressure. There was no difference between the time needed until the best view was generated. All but 3 patients were intubated with the GlideScope.

**Conclusions:** There was a significant improvement of the laryngeal view using the GlideScope Video Laryngoscope compared with the direct laryngoscopy.

**Reviewer's Comments:** The problem with the GlideScope is that although the view might be improved in comparison to the direct laryngoscopy, intubation of the larynx might not really be easier, and without the stylet, often impossible. A lot of practice is needed with this scope. (Reviewer-Olga Plattner, MD).

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Keywords: GlideScope® Video Laryngoscope, Difficult Airway

Print Tag: Refer to original journal article
This study of videolaryngoscopes showed that a stylet was needed for the GlideScope and McGrath but not with the Storz.

**Background:** Morbid obesity is often associated with difficult intubation. Introduction of the videolaryngoscope (VLS) helps facilitate these intubations, and the use of a stylet is advocated by the manufacturers for this procedure.

**Objective:** To compare 3 VLS models (GlideScope® Ranger™, McGrath®, and Storz® V-Mac™) in obese patients without the stylet, negating complications of the stylet.

**Participants/Methods:** 150 patients with a body mass index >35 kg/m2 were randomized into 3 groups for intubations depending on the equipment used: GlideScope, Storz, and McGrath. Exclusion criteria included any airway pathology, cervical spine injuries, and ASA status III to IV. Difficult airway was assessed preoperatively. Anesthesia was performed by standard protocols. An experienced anesthetist performed intubation with 1 of the 3 devices, and time to intubation, difficulty, number of attempts, and use of a stylet were documented. A rescue device was the use of a stylet bent at 90° with the GlideScope. The number of attempts was calculated by the approach of the endotracheal tube to the glottis entrance. The intubation score was graded from 0 to 4, with 0 being failure and 4 being good.

**Results:** Demographic data were comparable. There was no drop in saturation, and intubation was successful in all patients. The Cormack-Lehane scores were better with the VLS than with direct laryngoscopy. The time to intubation was 2.6 with the GlideScope, 1.4 with the Storz, and 2.9 with the McGrath. Intubation was successful with 8 patients with the GlideScope, 34 with the Storz, and 4 with the McGrath without the stylet at the first attempt. Average intubation time was 33 seconds for the GlideScope, 17 for the Storz, and 41 for the McGrath.

**Conclusions:** This studied showed that a stylet was needed for the GlideScope and McGrath but not with the Storz. Also, intubation times were shorter with the Storz, requiring fewer attempts, and the stylet was not mandatory. This may be due to the fact that the Storz blade was similar to the Macintosh blade. The authors conclude that the stylet may not be needed when using a VLS, whereas most morbidly obese patients in this study were easily intubated with a direct Macintosh blade, negating the use of any VLS.

**Reviewer's Comments:** This is an interesting study comparing VLS models. The blades of the GlideScope and the McGrath are angled such that there is an angulation of 60°, making the hockey stick stylet vital for intubation and functionally an important aspect of the VLS. This study, therefore, could not highlight the importance of the VLS in a difficult airway scenario in which time is of the essence due to improper and suboptimal use of the devices studied. This relevant point brought out by this study is the adequate and optimal use of any airway equipment for its success in intubation at any given point in time. (Reviewer-Sunita Goel, MD).

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Keywords: Intubation, Obesity, Videolaryngoscope, GlideScope, McGrath, Storz

Print Tag: Refer to original journal article
The GlideScope Ranger® video laryngoscope is useful in the airway management of entrapped patients.

**Background:** Airway management in the field can be very challenging. Numerous devices have been time tested and tried. Currently, with the advent of various videolaryngoscopes, the ease of access to the potential difficult airways is becoming more optimal.

**Objective:** To test the GlideScope Ranger® in a helicopter emergency medical service to evaluate the ease of use with minimal training.

**Design:** This was a randomized, controlled study with 8 experienced anesthesiologists in airway management but no experience with the GlideScope Ranger.

**Methods:** A Laerdal SimMan manikin was used with the retropharyngeal balloon inflated with a non-fixated neck to simulate a Cormack-Lehane (CL) score of 1 and 2 with direct laryngoscopy. Every anesthesiologist had to complete scenario A before proceeding to scenario B. Scenario A mimicked a typical prehospital setting, and scenario B mimicked a difficult access. The time to intubation, attempts, CL scores from 1 to 4, unsuccessful intubation, and, at the end of the scenarios, the preference of Macintosh or GlideScope were evaluated.

**Results:** In scenario A, all anesthetists could intubate with both Macintosh and GlideScope at the first attempt within 60 seconds. In scenario B, 4 of 8 attempts succeeded with the Macintosh, while all attempts succeeded with the GlideScope Ranger. With the Macintosh, CL scores were 1 and 2 in scenario A and 4 in scenario B; with the GlideScope Ranger, the scores were 1 and 2 in both scenarios. The level of difficulty was 1 and 2 with the Macintosh in scenario A and 4 in scenario B; this score was 2 and 3 with the GlideScope Ranger in both scenarios, and the anesthesiologist had a preference for the GlideScope Ranger.

**Conclusions:** Airway management in an entrapped patient may pose a challenge, with the need for immediate securing before transferring the patient to a tertiary center. Supraglottic airways may not be the answer in such a situation. Very few trials have been performed or published in such situations. One limitation of this study was that one cannot always extrapolate findings from a manikin study to that of a live clinical situation. The group was too small to detect any differences in either method of intubation. The GlideScope Ranger was chosen as it could be used in different odd compromised positions for intubation. Further studies are needed as well for comparison with other videolaryngoscopes and their economic viability.

**Reviewer’s Comments:** This study shows the viability and use of the GlideScope Ranger in emergency field situations, as well as its ease for intubations in a compromised situation with minimal training compared to a Macintosh laryngoscope, although further studies are warranted. Being the day and age of video laryngoscopes, the versatility and viability of the GlideScope Ranger makes it a useful tool in compromised positions in an emergency setting. (Reviewer-Sunita Goel, MD).

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Keywords: Airway Management Video Laryngoscope, GlideScope Ranger®

Print Tag: Refer to original journal article