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General

Awake fiberoptic or awake video laryngoscopic tracheal intubation in patients with anticipated difficult airway management

Anesthesiology 2012;116:1210–6
Rosenstock CV, Thørgerson B, Afshari A, Christensen AL, Eriksen C, Gätke MR

Abstract

Purpose The purpose of this study was to determine if intubation time was faster with the awake video laryngoscopy or awake flexible fiberoptic technique in patients with anticipated difficult intubations.

Background The safest technique for management of the anticipated difficult airway is an awake fiberoptic intubation. Unfortunately, it is difficult for some anesthesia providers to obtain and maintain the necessary psychomotor skills to be competent to perform an awake fiberoptic intubation. This lack of experience may lead anesthesia providers to choose to perform an asleep intubation on patients with an anticipated difficult intubation. However, closed claims analysis has documented severe complications such as brain damage and death secondary to failed intubation in patients with anticipated or known history of difficult intubation.

In recent years video laryngoscopes such as the McGrath Series 5 have been found to be useful in difficult intubations. The McGrath scope can improve visualization of the vocal cords by one to two grades when compared to traditional direct laryngoscopy with a Macintosh laryngoscope blade. Recent case reports have described the successful use of the McGrath video laryngoscope during an awake intubation. However, awake intubation with the McGrath video laryngoscope has not been compared in a randomized controlled trial to the gold standard awake fiberoptic technique in patients with anticipated difficult intubations.

Methodology This was a prospective, randomized controlled trial comparing the McGrath video laryngoscope with awake fiberoptic intubation in 88 ASA I-III adult patients with known or suspected difficult airways scheduled for elective general anesthesia. Exclusion criteria included mouth opening less than 15 mm, poor dental status, contraindication to transtracheal injection, or surgeon request for nasal intubation. Awake intubation was performed by one of six anesthesia providers experienced with both airway techniques.

After randomization, patients were given glycopyrrolate 4-5 µg/kg and taken to the operating room. The airway was prepared with local anesthetic in a standard fashion. Patients were sedated with a remifentanil infusion between 0.1-0.15 µg/kg/min. If needed, a remifentanil bolus of 0.75 µg/kg or propofol 10-20 mg was administered. Patients in the McGrath group were intubated in the sniffing position. Positioning of patients in the fiberoptic...
group was at the discretion of the anesthesia provider. When the first technique failed after three attempts, the airway was secured with the alternative technique. Endotracheal tube placement was confirmed with capnography and bilateral breath sounds.

The primary outcome was time to tracheal intubation starting from the McGrath blade or fiberoptic passing behind the teeth until observation of a capnography curve by an independent observer. Secondary outcomes included number of intubation attempts, number of esophageal intubations, failure of technique, and Cormach-Lehane glottic view. The ease of the technique and patient discomfort with the procedure were evaluated by the anesthesia provider using a 0-100 mm visual analogue scale. Sample size and statistical analysis were appropriate. A P < 0.05 was considered significant.

Result A total of 84 patients completed the study (McGrath group N = 41, Fiberoptic group N = 43). No significant differences were found between the two groups in demographics, airway examination, or sedation requirements. A total of 42 patients had a history of a previous difficult intubation. In five of these patients there was a history of difficult mask ventilation. The median time to intubation was 80 seconds (range: 33-424) in the fiberoptic group and 62 seconds (20-678) in the McGrath group (P = 0.17). Most patients in both groups where intubated on the first attempt (Fiberoptic group: 79% vs. McGrath group 71%, P = NS). One patient in the fiberoptic group and two patients in the McGrath group required three attempts at intubation (P = NS). In one patient, three failed flexible fiberoptic intubation attempts where followed by a successful McGrath intubation. Oxygen desaturation of <90% occurred in 21% of the fiberoptic group compared to 12% of the McGrath group. However, there was no difference in the duration of desaturation between the two groups. In approximately 50% of patients in both groups, the Cormach-Lehane vocal cord grade view was 1. The anesthesia provider rated the ease of the procedure very high in both groups. Patient discomfort was low and similar between the two groups.

Conclusion When intubation was performed by experienced anesthesia providers, no significant differences were found in time to awake intubation between flexible fiberoptic and McGrath intubation techniques in patients with anticipated difficult airways. Awake McGrath intubation may be a potential alternative to awake flexible fiberoptic intubation.

Comment When I was in training I was always taught to err on the side of caution and to perform an awake fiberoptic intubation if I felt the patient was known or suspected to be a difficult intubation. However, as video laryngoscopy has come to the forefront as a primary or backup device for intubation in the difficult airway, many anesthesia trainees are graduating with little or no experience with awake fiberoptic intubation. In this study the investigators found that anesthesia providers with experience in both techniques could intubate most patients on the
first attempt in less than 2 minutes. They concluded that both techniques were similar, and therefore an awake intubation may be a safe alternative to flexible fiberoptic intubation in the known or suspected difficult airway. There is one major caveat to this conclusion; these results only apply to anesthesia providers with experience performing both techniques in an awake patient. Thus these results may not apply to less experienced anesthesia providers. Additionally, investigators excluded patients with poor mouth opening. In my experience video laryngoscopes are difficult or impossible to use in patients with small mouth openings. Therefore, I think anesthesia providers should take every opportunity to gain experience in performing awake fiberoptic intubations.

Being able to perform an awake intubation requires judgment to know when to perform the procedure, and the necessary psychomotor skills to drive the scope or perform a gentle awake intubation with a video laryngoscope. It also requires skill and patience to ensure adequate topicalization of the airway and appropriate sedation so the procedure can be performed efficiently and safely. It takes time and practice to become proficient in performance of an awake intubation, regardless of the technique. Anesthesia providers should seek out opportunities to perform the procedure with an experienced colleague and consider attending a difficult airway workshop.

Dennis Spence, PhD, CRNA

The views expressed in this article are those of the author and do not reflect official policy or position of the Department of the Navy, the Department of Defense, the Uniformed Services University of the Health Sciences, or the United States Government.
Hemodynamic perturbations during robot-assisted laparoscopic radical prostatectomy in 45° Trendelenburg position

Anesth Analg. 2011;113:1069-1075
Lestar M, Gunnarsson L, Lagerstrand L, Wiklund P, Odeberg-Wernerman S

Abstract

Purpose  The purpose of this study was to observe the central circulation and respiratory parameters during the pneumoperitoneum and extreme Trendelenburg position used for robot-assisted laparoscopic radical prostatectomy (robot prostatectomy). The investigators hypothesized that robot prostatectomy in 45° Trendelenburg position would increase filling pressures to the point that cardiac output (CO) would be reduced resulting in some degree of decompensation and acute heart failure.

Background  Vasoactive drugs are not uncommonly used for both hypotension and hypertension during robot prostatectomy. And, cardiovascular disease is not uncommon in men of the age in which robot prostatectomy is commonly performed. Pneumoperitoneum alone significantly alters hemodynamics. Mean arterial pressure and ventricular filling pressures (CVP & PCWP) increase, sometimes markedly, during pneumoperitoneum. The same can be true during extreme Trendelenburg position. Conversely, cardiac output has been reported to decrease or remain the same when pneumoperitoneum was combined with up to 20° Trendelenburg.

Methodology  Anesthesia was induced and maintained with propofol and remifentanil. The muscle relaxant was atracurium. Patients were ventilated with oxygen and air with an F\textsuperscript{O}_2 of 40\%. The volume ventilation mode was used and adjusted to produce an end-tidal CO\textsubscript{2} (E\textsubscript{T}CO\textsubscript{2}) of 32 mm Hg after induction. Ventilation was not changed during the procedure. No PEEP was used at any time. A radial arterial line was used to measure blood pressure and a pulmonary artery catheter for hemodynamic measurements. Pneumoperitoneum was held at a maximum of 12 mm Hg during the procedure. IV fluid administration of up to 400 mL/hour was planned during surgery. Data was collected at the following time points:

- during stable anesthesia in horizontal position before abdominal insufflation
- after abdominal insufflation, horizontal position, before surgery start
- immediately after position changed to Trendelenburg
after 40 minutes in Trendelenburg position (only measure during surgery)
after surgery done, returned to horizontal position, abdomen deflated (only 8 patients)

Result  This prospective observational study included 16 ASA physical status I and II patients with a mean age of 59 years. Their average weight was 87 kg and body mass index was 25 kg/m². None of the patients were smokers at the time of the study. These patients had the following health / medication history:

- 5 had “mild” hypertension
- 2 taking β-blockers
- 1 taking ACE inhibitor
- 1 taking both β-blocker & ACE inhibitor
- 1 taking angiotensin II receptor antagonist

Average surgical time was about three hours. Blood loss was less than 100 mL.

When the abdomen was insufflated, mean arterial pressure (MAP) increased by 27% while patients were still in the horizontal position. MAP remained elevated from baseline with change to Trendelenburg position. CVP and PCWP increased slightly with pneumoperitoneum in the horizontal position. With the change to Trendelenburg position, CVP increased from 9 to 21 mm Hg. PCWP increased from 10 to 22 mm Hg. CVP and PCWP values were very strongly correlated ($r=0.92, P<0.001$). When patients were returned to the horizontal position and the abdomen deflated these pressures returned to baseline.

Cardiac output did not change with the institution of pneumoperitoneum in the horizontal position but increased 18% and 24% from baseline in the two Trendelenburg measurements. Left ventricular stroke work increased by 35% and right ventricular stroke work by 65% while in Trendelenburg position. After return to the horizontal position and deflation of the abdomen, heart rate and cardiac output became hyperdynamic for about 20 minutes before returning to baseline values.

Peak inspiratory pressure (PIP) increased by 46% following abdominal insufflation and by an additional 20% with the change to Trendelenburg position. Pulmonary compliance was reduced by half as a result (from 60 to 28 mL/cm H$_2$O).

Conclusion  The hypothesis that cardiac output would decrease during pneumoperitoneum and 45° Trendelenburg was not verified. Despite an over 2x increase in CVP and PCWP in these conditions, cardiac performance was maintained in ASA I and II patients; though ventricular stroke work increased significantly.

Comment  I have done a fair number of anesthetics for robot prostatectomies. I’ve long been concerned that we didn’t know enough about the hemodynamics of 45° Trendelenburg position during a laparoscopic procedure that sometimes lasts over three hours, so I was happy to see this study. But I’ll have to say, their results were a surprise to me, and somewhat at odds with my clinical observations.

Perhaps propofol TIVA is the norm for robot prostatectomies in Sweden where this study was performed, but in the USA I think most of these cases
are done with inhalation agent. That technique difference alone might change these results enough to significantly limit their generalizability. Furthermore, most of my patients have been ASA IIIs, not the ASA Is and IIs described in this study. And my patients commonly had hypertension and smoked cigarettes. I suspect the abdominal insufflation pressures used were higher in the cases I did than in this study as well.

Perhaps as a result of these differences in patient population and technique, I’m not used to seeing the BP increase following abdominal insufflation. It usually goes down some. Then, during the case, I’ve often dealt with a blood pressure that was too high despite apparently adequate anesthesia.
I have occasionally had a patient who became hypotensive in the absence of significant blood loss. Some of these patients were taking ACE inhibitors so the problem was one we are used to seeing. But in others, I tended to attribute the hypotension to dehydration, especially if they’d had a long NPO time. Seeing the magnitude of the increase in right and left ventricular stroke work in this study, it now seems more likely that I’ve occasionally had patients who just weren’t up to the extra work their hearts were being asked to do when faced with a pneumoperitoneum, 45° Trendelenburg, and general anesthesia.

So what can we take from this study to the OR when next we do a robot prostatectomy? Here’s what I’m taking away. 1) Healthy ASA I and II patients do better with the hemodynamic and ventilatory extremes of these cases than I would have thought. 2) If the patient has preexisting arterial hypertension, expect to have to deal with hypertension during the case. It is probably only going to go up. 3) CVP is higher than I would have predicted. Fortunately, it correlated well with PCWP. There might be a few patients in which I’d like to monitor CVP. 4) Ventricular stroke work increased quite a bit; enough to affect how I plan the anesthetic in patients with ischemic heart disease or impaired myocardial function.

Michael A. Fiedler, PhD, CRNA
Automated reminders decrease postoperative nausea and vomiting incidence in a general surgical population

Br J Anaesth 2012;106:961-5
Kooij FO, Vos N, Siebenga P, Kiok T, Hollmann MW, Kal JE

Abstract

Purpose The purpose of this study was to determine if automated reminders would lead to a decrease in the incidence of postoperative nausea and vomiting (PONV) in general surgical patients.

Background PONV is one of the most frequent side effects of general anesthesia, with a reported incidence up to 80% in high-risk patients. Consensus guidelines for PONV prophylaxis have been in place for a number of years; however compliance with the guidelines is approximately 37%. Many patients at high-risk are under treated with PONV prophylactic medications, whereas patients at low risk are over treated. Previous investigations by this research group demonstrated that PONV guideline adherence was doubled with the use of automated reminders. The investigators hypothesized that these automated reminders would increase PONV guideline compliance and thus decrease the overall incidence of PONV.

Methodology This was a prospective, on-off study comparing the 24 hour incidence of PONV in adult, non-cardiac patients whose anesthesia care included decision support for PONV prophylaxis using automated reminders. The automated reminders group was compared to a group of patients treated without automated reminders. At this facility an anesthesia information management system (AIMS) was used to store all patient care information. The AIMS system displayed the patient’s PONV risk category, high or low risk, based on Apfel’s simplified risk factor score. Patients were considered high risk if they had three or more risk factors. If a patient scheduled for general anesthesia was high-risk for PONV, anesthesia providers in the preoperative clinic would see the following message displayed on the AIMS computer screen, “Do you want to prescribe PONV prophylaxis?”, and in the operating room a similar message was displayed reminding the anesthesia team to administer PONV prophylaxis to high-risk patients. Departmental policy recommended all high-risk patients be administered dexamethasone 8 mg after induction of anesthesia and granisetron 1 mg prior to emergence from general anesthesia. No message was displayed on the AIMS screen telling the anesthesia team that low-risk patients did not require PONV prophylaxis.

PONV incidence was recorded at 24 hours. Investigators examined early and late PONV incidence (early = PONV before PACU discharge, late = PONV after PACU discharge to 24 hours). Data was collected on overall antiemetic use in both high and low-risk patients with and without automated reminders. The investigators expected a 5% decrease in the overall incidence of PONV with
implementation of the PONV automated reminders. Statistical analysis and sample size were appropriate.

**Result**  There were 1,681 patients in the automated reminders group and 981 in the control group. The average age of all patients was 50 ± 16 years. PONV risk factors (female gender, non-smoking status, history of PONV or motion sickness, and anesthesia duration >60 minutes) where similar between the two groups; however, the rate of expected opioid use postoperatively was significantly higher in the automated reminders group (52% vs. 40%, P < 0.001).

No significant difference was found in the incidence of early nausea (automated reminder group: 4% vs. control group: 5%) or vomiting (automated reminder group: 1% and control: 1%). The incidence of late nausea was 3 percentage points lower in the automated reminder group, 21% vs. 24% (P = 0.03). Late vomiting was similar in both groups, 8% vs. 9%. The overall incidence of PONV was significantly lower in the automated reminder group compared to the control group, 23% vs. 27% (P = 0.01). Patients that were high-risk for PONV benefited the most from the automated reminders. Only 31% of high-risk patients experienced PONV in the reminder group compared to 47% of high-risk patients in the control group (P < 0.001).

The use of automated reminders improved compliance with PONV guidelines. In high-risk patients, there was an approximate 10% increase in the use of dexamethasone and granisetron in the automated reminder group compared to the control group who did not receive automated reminders (P < 0.001). In low-risk patients, there was a 7% decrease in the use of PONV prophylaxis medications with the use of automated reminders when compared to the control group (P < 0.002).

**Conclusion**  The use of automated reminders during the perioperative period increased compliance with PONV guidelines and reduced the overall incidence of PONV in high-risk patients.

**Comment**  Anesthesia information management systems (AIMS) are helping to revolutionize the way anesthesia providers approach quality improvement and evidence-based practice projects. In this study, the investigators demonstrated how, with a little computer

![Figure 1. PONV Prophylaxis in High-Risk Patients](image)
programing, patients at high-risk for PONV could be identified and anesthesia providers reminded in the preoperative clinic and in the operating room to prescribe or administer PONV prophylaxis medications. This ultimately led to a decrease in the incidence of PONV in high-risk patients. With rapid advances in anesthesia it is difficult to keep up with all the latest recommendations. Having a simple message reminding us to give certain medications is beneficial. I believe this technology will help improve our compliance with guidelines ranging from PONV to infection control and obstructive sleep apnea in the very near future.

One limitation I saw with this study was that the automated reminder group was followed first. By doing this the investigators were not able to establish a “true baseline” PONV guideline compliance rate because providers were already exposed to the automated reminders and thus may have already begun changing their practice. My guess is they would have seen a much stronger effect on PONV incidence in high-risk patients had the control group been followed first.

By following the control group (no reminders) second, what the results tell us is that PONV guideline compliance actually got worse without the reminders, which in turn led to a higher PONV incidence in high-risk patients. Compliance decreased by 10%. I believe this strengthens the argument for automated reminders at the point of care to help providers remember to administer PONV medications to high-risk patients.

One weakness of the use of automated reminders in this study was that no message was displayed reminding the anesthesia team that the patient was low-risk for PONV and no prophylaxis was required. I think this is important because, as you can see in their results, between 14% and 21% of low-risk patients received PONV prophylaxis when it was not required. I wonder what the results would have been like in the low-risk group had this message been displayed?

There are many reasons why the anesthesia providers used their clinical judgment and decided to administer two anti-emetics in low-risk patients. However, I suspect some of the anesthesia providers in this study routinely gave “universal prophylaxis” with two antiemetics, despite evidence suggesting doing so was unnecessary. While these medications are very safe, they are not without risk or increased cost. Anesthesia providers should consider their clinical environment and patient population to determine if a risk-based approach supported by evidence is best or if a policy of universal PONV prophylaxis should be followed.

Dennis Spence PhD, CRNA

The views expressed in this article are those of the author and do not reflect official policy or position of the Department of the Navy, the Department of Defense, the Uniformed Services University of the Health Sciences, or the United States Government.
Pain

Caudal Epidural Injections in the Management of Chronic Low Back Pain: A Systematic Appraisal of the Literature

Pain Physician 2012;15:E159-E198
Parr AT, Manchikanti L, Hameed H, Conn A, Manchikanti KN, Benyamin RM, Diwan S, Singh V, Abdi S

Abstract

Purpose The purpose of this systematic review was to evaluate the effectiveness of caudal epidural injections on lower back pain associated with disc herniation, discogenic pain, spinal stenosis, and post lumbar surgery syndrome.

Background Back pain is a growing problem in the United States. A common treatment for back pain is the injection of steroids, saline, and anesthetic agents into the epidural space. There are 3 typical approaches for epidural steroid injections. They are transforaminal, interlaminar, and caudal. Of the 3 approaches, the caudal approach has the most advantages which include specific efficacy for lower back pain, reaching the ventrolateral epidural space easily, and the ability to perform the technique safely in patients with lumbar hardware in place from previous back surgery. The caudal approach to the epidural space is the safest and easiest approach while posing the lowest risk for inadvertent dural puncture. Some studies have concluded that caudal epidural injections are the most effective approach for treating back pain in the lower region, but the debate over which approach is best continues.

Methodology The methodology for this systematic review included review of randomized trials, observational studies, and case reports. Studies and reports included adult patients only, and those with low back pain and lower extremity pain of at least 3 months in duration. The interventions were caudal epidurals with or without steroids, and the primary outcome parameter was pain relief. The quality of each article used was assessed by the Cochrane review criteria for randomized trials, and the Newcastle-Ottawa Scale for observational studies. The patient population had to be at least 50 subjects. Typical thresholds for positive pain relief are a 20% improvement on a pain scale, but for purposes of this review, a minimum of a 50% improvement was accepted as a positive outcome. Long term benefit included any positive results that lasted more than 6 months. At least two independent reviewers evaluated the evidence for inclusion in the analysis. If there was disagreement between the two reviewers, a third reviewer resolved the conflict.

Result Of the 73 studies identified, 16 were found to be acceptable randomized trials and 5 were acceptable observational studies or case reports that were of high quality according to the Newcastle-Ottawa Scale. Among the condition specific studies, 8 were for disc herniation, 2 were for discogenic pain, 3 were for spinal stenosis, and 3 were for post-surgery syndrome. However, homogeneity was limited among
the acceptable studies and an accurate comparison between studies was difficult. Even without homogeneity between studies, effectiveness of caudal epidural therapy as compared to transforaminal and interlaminar epidural injections could be determined for specific etiologies. For purposes of this review, long term pain relief was considered to be relief lasting longer than 6 months and providing at least a 50% improvement on a pain scale.

Effectiveness for disc herniation: Of the 8 studies evaluating the effectiveness of epidural injections for disc herniation, 6 examined long term results. Only four of those studies were randomized trials using local anesthetics and steroids (87 patients), local anesthetics only (60 patients), or placebo (37 patients). The placebo studies showed no improvement or were unclear, but the studies using local anesthetics (with or without steroids) showed long term pain relief. The 2 non-randomized studies produced split results. One (39 patients) demonstrated long term pain relief, while outcomes in the other were unclear.

Effectiveness for discogenic pain: Discogenic pain is the result of disc inflammation and anterior axial pain without disc herniation, and excludes the posterior structures such as facets joints and the sacroiliac region. Only one study was reviewed (N=120 patients). There was no short or mid-term follow-up. The study evaluated these patients at one year after caudal injection of anesthetic agent, with or without steroid. Even without therapy beyond the initial caudal epidural injection, 23% of the patients showed improvement.

Effectiveness for spinal stenosis: A randomized controlled trial of 100 patients using anesthetic agents, with and without steroids, demonstrated both short term and long term pain relief. A retrospective study showed improvement in pain for 35% of the patients at one year after injection. A non-randomized study using local anesthetics, with steroids, showed both short term and long term pain relief.

Effectiveness for post-surgery syndrome: One of the randomized trials included 140 patients who received injections with anesthetic agents and steroids, repeated only if the pain returned. The study demonstrated long term pain relief only in patients who had immediate relief of pain with the initial injection and who did not need a repeat injection. A second study used an unusual caudal epidural technique of forcefully injecting a high volume (40 mL) of normal saline and compared this to injection of 2 mL of steroid. The study demonstrated a higher rate of pain relief following the high volume saline injection than for low volume steroid injection. A third study in this group evaluated the inclusion of hyaluronidase in caudal epidural injections for the treatment of post-surgical syndrome. It found that hyaluronidase improved pain relief when used with local anesthetic, steroids, and hypertonic sodium chloride solutions.

Conclusion The effectiveness of caudal epidural injections, with or without steroids, appeared to be “good” for disc herniation and “fair” for discogenic pain, spinal stenosis, and post-surgical
syndrome. The caudal injection route appears to be superior when compared to studies using interlaminar or transforaminal lumbar epidural steroid injections. Overall, the balance of evidence evaluated in this review favored the use of caudal epidural injections for low back pain.

Comment
The problems with most systematic reviews are that they use complex and confusing inclusion criteria that make the review hard to validate, or the studies about the subject are not homogeneous enough. I enjoyed reading this systematic review because it used good simple inclusion criteria and included plenty of studies. Although the agents used in the studies were not the main focus of the review, I found it very interesting that positive results were found when anesthetic agents were injected with and without steroids. Many recent studies have evaluated the use of steroids for back pain management and found that steroids may not be any more effective than anesthetic agents and saline. I continue to follow the study of such agents closely because the use of steroids does have risks, and reducing or eliminating their use may reduce the agent risks without diminishing the therapeutic results. I use a fair amount of caudal epidurals in my pain management practice because they seem to be effective for low back pain without radiculopathy when an interlaminar or transforaminal approach does not prove to be effective. I find the caudal approach to be safe and simple, with fewer risks of complications. The only increased risk I have found in my practice is that when using contrast, I see more intravascular needle placements using the caudal approach than I see with the other two approaches. For that reason, I highly recommend the use of fluoroscopic guidance and contrast verification of needle placement when the caudal approach is used. Beyond that, caudal epidurals are easy enough for less experienced providers who can properly identify needle placement. I think this review demonstrated that caudal epidural injections may provide great benefit for patients who have low back pain associated with disc herniation, spinal stenosis, discogenic pain, and post-surgical syndrome.

Steven Wooden, DNP, CRNA
Surgical Outcome in Children Undergoing Hypospadias Repair Under Caudal Epidural vs Penile Block

Pediatric Anesthesia 2012;22:707-712
Kundra P, Yuvraj K, Agrawal K, Kishnappa S, Kumar LT

Abstract

Purpose  The purpose of this study was to compare the success, quality, and complication rate of caudal epidural and penile block when used for postoperative pain relief in children undergoing hypospadias repair.

Background  Both caudal epidural and penile blocks are common anesthetic techniques used for postoperative pain relief in children undergoing hypospadias repair. Caudal anesthesia continues to be preferred over penile block by most anesthesia providers even though previous studies have indicated that penile block is superior to caudal anesthesia for the following reasons:

- lower complication rate
- improved analgesia
- longer duration of block
- less peripheral venous engorgement

This study sought to clarify previous studies on the subject.

Methodology  This was a randomized, double blind study on healthy children ages 4 to 12 undergoing primary hypospadias repair. Children were allocated to one of two groups. Group P contained 27 subjects who received penile blocks for postoperative pain relief. Group C contained 27 subjects who received caudal anesthesia for postoperative pain relief. Both groups received the same preoperative sedation and general anesthesia technique for the surgical procedure. After induction of general anesthesia, the penile block or caudal anesthesia was administered according to the randomization protocol. Penile blocks were administered at the dorsal root nerve with 0.5 mg/kg of 0.25% bupivacaine. The caudal epidurals were administered with the same dose of bupivacaine. In the first 48 hours of the postoperative period, nurses who were blinded to the type of postoperative pain block given to each patient administered intravenous morphine 0.1 mg/kg to patients that reported a visual analog scale (VAS) pain score greater than 5 on a 0 to 10 scale. After 48 hours, patients were given acetaminophen on demand. The differences between groups were analyzed with a two way repeated measure analysis of variance (ANOVA) with significance considered at P < 0.05.

Result  VAS scores demonstrated that penile blocks provided better postoperative analgesia than caudal epidurals, and this conclusion was supported by less morphine consumption in the penile block group. In addition, the penile blocks lasted significantly longer on average than the caudal epidurals. Penile blocks provided 5-6 hours of postoperative pain relief while the caudal epidurals provided 4 hours. Acetaminophen consumption was similar in both
groups for the period 48 hours after surgery. In addition, while there were no failures in the penile block group, there was one block failure in the caudal epidural group. Five patients developed postoperative urethral fistulas, and all of those patients were in the caudal epidural group.

**Conclusion** This study of children undergoing hypospadias repair demonstrated that penile blocks provided superior and longer lasting postoperative pain relief compared to caudal epidural blocks. All patients who developed postoperative urethral fistula were in the caudal epidural group.

**Comment**
This study asks an interesting question about an issue that occurs in anesthesia as well as other health care settings. Why do we continue to use a particular technique when evidence suggests that there is a better technique available? In this case, it appears that using a caudal anesthetic for hypospadias repair is less effective and has greater risk of complications than using a penile block. Other studies have supported this conclusion as well. It is not so much the marginal benefit of pain relief one technique has over the other (6 hours for penile blocks vs 4 hours for caudal epidurals), but the significant postoperative complication of urethral fistula developed by those patients who received a caudal anesthetic. Venous engorgement from peripheral dilatation caused by caudal anesthesia is suggested to contribute to this complication. So why, as the article indicates, do anesthesia providers prefer to use caudal anesthesia for this procedure? This may be an example of providers not keeping up with evidence based practice. This also may be an example of providers using techniques that they are most comfortable with, even though there are other techniques that might have greater benefits with less risk. Regardless of the reason, it is important to periodically evaluate one’s techniques and make an effort to acquire new skills; choosing those that are best suited for the patient instead of clinging to “routine” techniques.

Steven Wooden, DNP, CRNA

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PAGE 17
Quality Improvement

Association between anesthesiologist age and litigation

Anesthesiology 2012;116:574-9
Tessler MJ, Shrier I, Steele RJ

Abstract

Purpose  This paper examined the relationship between anesthesiologist age and the incidence of litigation.

Background  The Canadian health care system is a single payer design that allows for collection and evaluation of patient and provider data from a single source. Canadian physician malpractice claims are managed by a single organization. These consistent sources of patient, provider, and malpractice information allowed for simple data collection and evaluation. Malpractice litigation data may not have been the best source for adverse event evaluation but it did suggest that patient harm had occurred. There was no known literature evidence that demonstrated a relationship between age of provider and risk of litigation. This study sought to review that relationship for anesthesiologists who practiced in Canada.

Methodology  The Canadian Medical Protective Association collected malpractice information for anesthesiologists. Data from a 10 year period (1993-2002) was used for this study. Complexity of procedure, severity of injury, and age of the provider were extracted. Severity was broken down using an ordinal scale. Severity of patient harm were categorized as:

- none
- emotional
- temporary physical minor
- temporary physical major
- permanent physical minor
- permanent physical major
- catastrophic
- death

Patient complaints to the physician professional organization were also included in the analysis because sometimes adverse events resulted in a complaint rather than legal action. The data did not allow for evaluation of patient related factors that might have had an impact on the study. Provider age was broken down into three groups. Those groups were, less than 51, 51-64, and 65 and older. Case complexity was considered by dividing the cases into low, moderate, or high complexity. The Generalized Estimating Equation (GEE*) was used to compare litigation claim rate with age group.

Result  When age and litigation was evaluated using severity of injury, it was found that injury severity was greater as the age of the provider increased. The number of claims was lower for the age 65 and above group, but so were the number of exposures. When the less than 51 age group was used as a reference (litigation rate ratio = 1.0), and when litigation and complaints were combined, the rate ratio for the 51-64 group was 1.16 (CI: 1.07-1.26), and the rate ratio for the 65 and older group was 1.29
(CI: 1.02-1.62). Since the anesthesiologists over age 65 also tended to do lower complexity cases an additional analysis was performed matching the complexity of cases across groups. When evaluating only the matched low complexity cases, the 65 and older group had a much higher litigation rate compared to the under 51 year old anesthesiologists (2.20, CI: 1.65-2.94).

**Conclusion**  
After being adjusted for exposure, the 65 and older age group had a higher rate of litigation when compared to younger age groups, and the degree of injury was also greater. This finding was evident even though older anesthesiologists were involved in fewer moderate and high complexity cases. The reasons for the increased incidence of litigation were not determined.

**Comment**  
This study addressed anesthesiologists only because CRNAs do not practice in Canada. But the reader should look beyond this fact and understand that as anesthesia providers, we all are subject to age related issues. This paper looked at anesthesia providers in a country that has educational and practice standards very similar, if not identical to, those in the United States. This study might suggest that there is a causal relationship between provider age and negative patient outcome, but it did not evaluate the numerous variables that might impact such results. Articles can be found that indicate the longer health care providers are in practice, and away from an educational process that helps them keep current with changing health care information, the less competent they may become.(1-4) When reading this study, it is interesting to note that the Canadian health care system did not require continuing education for all physician providers until 2004.

It is important to look beyond the obvious limitations of this study and contemplate the importance of looking at issues that might negatively impact patient outcome. We must do this not just to determine if there is a problem, but to also look for solutions if there is indeed a problem. Perhaps this played a role in the outcome of this study. It has become evident that continuing education with demonstration of knowledge does play a positive role in maintenance of competency over time.(4) State and national regulatory and certifying bodies search for the proper balance of continuing education, practice, and demonstration of competency that will most effectively protect the public from incompetent and ill prepared health care providers. At the same time, providers resist the ever growing demands for recertification which takes them away from patient care. I believe that those who take the time to seek out quality educational products, which enhance the knowledge and capability of a provider, are much better prepared than those who seek the easiest path to recertification. However, those who are best prepared are not the focus of recertification requirements.

Time and study will tell how effective the various recertification processes are. Perhaps these authors will revisit this topic starting with the 2004 continuing education requirement for all Canadian physicians,
and see if mandatory CE made a difference when looking at the impact of the aging provider on litigation rates. I suspect they will find that education has improved the situation.

As our own efforts to improve health professional recertification processes in the United States evolve, it will remain important to study the effects of the CE process on provider competency so that we do not arbitrarily create unnecessary and ineffective work that may keep providers away from direct patient care.

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*The Generalized Estimating Equation (GEE) was introduced by Liang and Zeger in 1986. It is used to analyze correlated data in a generalized linear model. Data that is evaluated using GEE is typically obtained from subjects belonging to the same group measured at different points in time, or from clusters. It belongs to statistical class called semiparametric regression.

Editor’s Note: Dr. Wooden is a member of the National Board for Certification and Recertification of Nurse Anesthetists.