# Letters to the Editor

## Is Hydroxyethyl Starch Safe in Brain Injury?

To the Editor:

Neff et al. (1) describe a randomized trial of 31 craniocerebral trauma patients receiving repetitive infusions over a maximum of 28 d of either hydroxyethyl starch (HES) 130/0.4 up to 70 $mL \cdot kg^{-1} \cdot d^{-1}$ or HES 200/0.5 up to 33 $mL \cdot kg^{-1} \cdot d^{-1}$. Albumin was administered for additional intravascular volume needed in the HES 200/0.5 group. Patients with a history of coagulation disorders, chronic renal insufficiency, severe liver insufficiency, or cardiac insufficiency were excluded.

The investigational plan of Neff et al. was to enroll 40 patients. Of 128 patients screened, 95 failed to meet the enrollment criteria, and two could not be enrolled for logistic reasons. After 31 patients had been enrolled, the institutional ethics committee raised questions regarding the occurrence of intracranial bleeding complications in both groups and requested an interim analysis. Intracranial bleeding complications occurred in 31% of the HES 130/0.4 group and 33% of HES 200/0.5 recipients. The investigators stated, without providing evidence, that the intracranial bleeding complications "were related to the underlying cerebral trauma and were not accompanied by coagulation disorders." They further indicated that the trial was not resumed after the interim analysis because of more frequent episodes of elevated intracerebral pressure in the control group, which they speculated may have been attributable to the cumulative 7 L of albumin administered in this group rather than the 22 L of HES 200/0.5. They did not, however, acknowledge two randomized trials (2,3) and a prospective clinical outcome study (4) providing evidence that albumin improves outcomes of brain injury. Nor did they mention coagulation abnormalities due to HES 200/0.5 demonstrated in one randomized (5) and two nonrandomized (6,7) controlled trials of patients with cerebrovascular diseases. They also did not cite a pharmacovigilance study documenting 9 cases of acquired type I von Willebrand's disease associated with HES 200/0.5 administered to patients with subarachnoid hemorrhage (8). Four of the cases were complicated by cerebral hemorrhage and one by extradural hematoma. Three of the four cerebral hemorrhage cases were fatal.

No significant between-group differences were detected by Neff et al. in blood loss, use of blood products, or neurological outcomes at up to 6 mo. Factor VIII and von Willebrand factor antigen and ristocetin cofactor were transiently and modestly higher in the HES 130/0.4 group; however, these observations may have been due to the higher mean daily volume of fresh frozen plasma administered to the HES 130/0.4 (274 ± 518 mL) compared with the HES 200/0.5 group (251 ± 385 mL).

The trial of Neff et al. is the third randomized trial in brain injury to be prematurely discontinued because of serious complications in HES recipients. One of these was a multicenter trial of 88 acute ischemic stroke patients (9), in which there was significantly increased mortality related to cerebral edema in recipients of HES 200/0.5. In the other involving 70 patients with acute ischemic stroke (10), clinical deterioration occurred in 8 HES 200/0.5 recipients versus none of the control group patients ($P < 0.01$).

In the abstract of their paper Neff et al. conclude that "HES 130/0.4 can safely be used in critically ill head trauma patients over several days at doses of up to 70 $mL \cdot kg^{-1} \cdot d^{-1}$." This sanguine assessment appears difficult to justify in light of the high incidence of intracranial bleeding complications in both study groups as well as the other similar effects of HES 130/0.4 compared with HES 200/0.5, a HES preparation consistently associated with increased risk of hemorrhagic and other serious complications in brain injury patients. Indeed, the preponderance of currently available evidence suggests that HES is not safe in brain injury indications.

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In Response:

We appreciate the interest of Dr. Haynes in our article on large-dose administration of medium molecular weight (130 kd) hydroxyethyl starch with a molar substitution of 0.4 (HES 130/0.4) in patients following severe head injury (1).

Dr. Haynes has not correctly understood the paper when claiming that our trial was "prematurely discontinued because of serious complications in HES recipients." In contrast, we clearly reported that the increased incidence of ICP peaks in the *control group* was the reason for the study discontinuation. This decision was taken voluntarily by the investigators and was not demanded by the IRB. In fact, the IRB had given us clearance for study continuation after the interim analysis.

Under the conditions of our study (up to 70 $mL \cdot kg^{-1} \cdot d^{-1}$ HES 130/0.4 or HES 200/0.5 up to 33 $mL \cdot kg^{-1} \cdot d^{-1}$ for up to 28 days) no acquired type I von Willebrand disease was induced in either group, including the subjects with bleeding events. Again, contrary to that purported by Dr. Haynes, we did in fact provide strong evidence that intracranial bleeding complications in both groups were not related to any coagulation disorders. In the original article (1) we have already presented extensive coagulation data for the whole group (Table 4 in our article). Shown in Table 1 (4a) below are the same parameters for the 5 patients in each group that had bleeding events. Not one single minimum value after baseline was below the lower limit of the normal range. In addition, TEG measurements were done (data not shown), which also did not reveal any infusion-induced coagulation disorder in any of the cases. On the basis of such extensive coagulation data, all bleeding events were therefore regarded as nonrelated to the study medications.

The likely explanation for reduced influence on coagulation by large-dose HES 130/0.4 or medium-dose HES 200/0.5 as compared with hetastarch (HES 450/0.7 or 670/0.75, as used in the United States) is the improved pharmacokinetics and excretion of products with a lower molar substitution (2). HES 130/0.4 does not accumulate in plasma after single and multiple dosage in contrast to products with a higher molar substitution (3–6).

**Table 1 (4a).** Factor VIII, von Willebrand Factor, Ristocetin Cofactor in Patients With Bleeding Events (All Not Related to Study Medication)

| | HES 130/0.4 | | HES 200/0.5 + albumin | |
|---|---|---|---|---|
| | *n* | Mean ± SD | *n* | Mean ± SD |
| Factor VIII activity (%) | | | | |
| Baseline | 5 | 82 ± 20 | 5 | 78 ± 29 |
| Day 2 | 5 | 89 ± 23 | 5 | 87 ± 16 |
| Day 4 | 3 | 124 ± 16 | 5 | 123 ± 25 |
| Day 6 | 3 | 144 ± 5 | 4 | 130 ± 7 |
| Day 8 | 2 | 124 ± 6 | 3 | 133 ± 25 |
| Day 10 | 2 | 148 ± 7 | 3 | 143 ± 35 |
| 3 days follow-up | 3 | 155 ± 31 | 5 | 154 ± 17 |
| Von Willebrand factor antigen (%) | | | | |
| Baseline | 5 | 105 ± 25 | 5 | 89 ± 17 |
| Day 2 | 5 | 110 ± 29 | 5 | 108 ± 27 |
| Day 4 | 3 | 155 ± 43 | 4 | 163 ± 31 |
| Day 6 | 2 | 150 ± 9 | 2 | 133 ± 18 |
| Day 8 | 2 | 125 ± 13 | 3 | 152 ± 34 |
| Day 10 | 2 | 137 ± 11 | 2 | 163 ± 24 |
| 3 days follow-up | 1 | 126 | 2 | 195 ± 7 |
| Ristocetin cofactor activity (%) | | | | |
| Baseline | 5 | 94 ± 27 | 5 | 112 ± 49 |
| Day 2 | 5 | 132 ± 39 | 5 | 123 ± 21 |
| Day 4 | 3 | 137 ± 15 | 5 | 150 ± 31 |
| Day 6 | 3 | 151 ± 7 | 4 | 135 ± 22 |
| Day 8 | 2 | 119 ± 11 | 3 | 142 ± 28 |
| Day 10 | 2 | 164 ± 5 | 3 | 145 ± 36 |
| 3 days follow-up | 2 | 188 ± 12 | 5 | 180 ± 20 |

Note that at later time points, *n* is decreasing due to completion of the study treatment by an increasing number of patients. The 3 days follow-up was done 3 days after the end of study colloid treatment. Normal range for all 3 parameters: 50–200%. After baseline, all minimum values (not shown) were >50%. HES = hydroxyethyl starch.

It is scientifically incorrect to infer a difference between groups that had similar low volumes of fresh frozen plasma administered (274 ± 518 mL vs 251 ± 385 mL). It is also questionable to state that our study had a "high incidence of intracranial bleeding complications" without referring to a specific point of reference. Delayed traumatic intracerebral hematomas (DTICH) are common, and comparable incidences are reported in the pertinent literature (7,8). In addition, all of the 31 patients enrolled in our study were diagnosed with very severe head injury as determined by stringent inclusion criteria. The severity of the head injury in this cohort bore *per se* a high risk for posttraumatic bleeding complications.

As evidenced by our coagulation data, the significantly increased incidence of ICP peaks in the control group was not due to induced bleeding disorders. Other explanations might be hypothesized. It has recently been shown that HES does not penetrate into the cerebrospinal fluid, even when the blood-brain barrier is disrupted (9), and it is *per se* unlikely that the larger HES 200/0.5 molecules should have penetrated more easily than HES 130/0.4. In contrast, albumin (approximately 66 kd) is suspected to leak from the disrupted blood-brain barrier (10,11), which might result in an increased incidence of ICP peaks.

Dr. Haynes cites older studies claiming beneficial effects of albumin on the outcome in brain injury. However, a number of recent publications, especially since the Cochrane Group's meta-analyses on the value and potential detrimental effect of albumin in the critically ill have been published in 1998, report opposing views (12–15).

Furthermore, Dr. Haynes did not acknowledge a recent randomized trial in stroke patients. Rudolf and the HES in Acute Stroke Study Group 2002 (16) completed a double-blind trial with HES 130/0.4 (10%, 70 patients) versus normal saline (36 patients), concluding that the safety profiles were similar for the two treatment groups. There was also a nonsignificant trend towards a better functional outcome with HES therapy. HES 130/0.4 (6%) proved safe compared with crystalloids, especially regarding coagulation, in another recent trial (17).

On the basis of the results of our study, we therefore remain convinced that 70 $mL \cdot kg^{-1} \cdot d^{-1}$ HES 130/0.4 can safely be used over several days for maintenance of cerebral perfusion pressure and reduction of detrimental ICP peaks in critically ill patients with head trauma. This regimen has become the new standard in the institution where the study was performed.

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## A Well-Fertilized Bulb Should Blossom

To the Editor:

Tracheal aspiration of a foreign body is a well-known concern during the perioperative period. This occurs most commonly in patients with loose teeth, poor dentition, and/or dental prosthetics. Fortunately, aspiration of equipment or pieces of equipment is rare. We report an iatrogenic ingestion from anesthesia equipment in a pediatric patient that has direct impact on the practice of anesthesia and potential for associated morbidity. Although this has been reported in the pediatric literature (1–3), it has not been reported in the anesthesiology journals.

A 17-year-old male patient with complex congenital heart disease was scheduled to undergo cardiac catheterization under general anesthesia to facilitate right internal jugular (RIJ) cannulation, control $F_{IO_2}$, ventilation, and the potential delivery of nitric oxide for pulmonary hypertension. After induction of general anesthesia, tracheal intubation was accomplished with direct laryngoscopy. However, the laryngoscope light "went out," and was considered an irritation with no apparent consequence. Approximately 20 min later, the bulb on the laryngoscope blade was noted to be missing. By this time, the neck was fully prepped and draped, and the cardiologist was attempting RIJ cannulation. Fluoroscopy demonstrated the laryngoscope bulb in the patient's hypopharynx (Fig. 1).

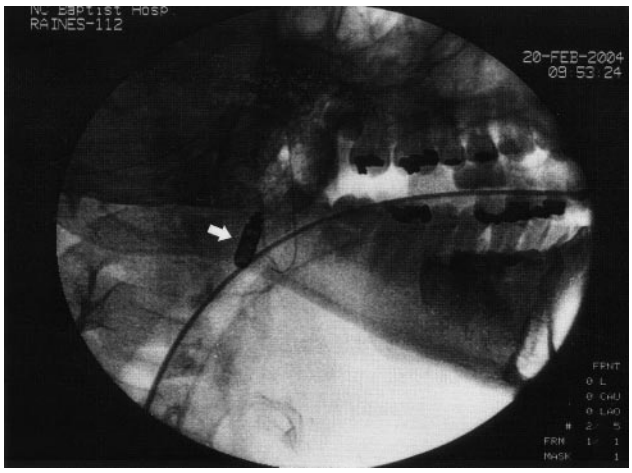


**Figure 1.** Fluoroscopy showing the laryngoscope bulb in the patient's hypopharynx.

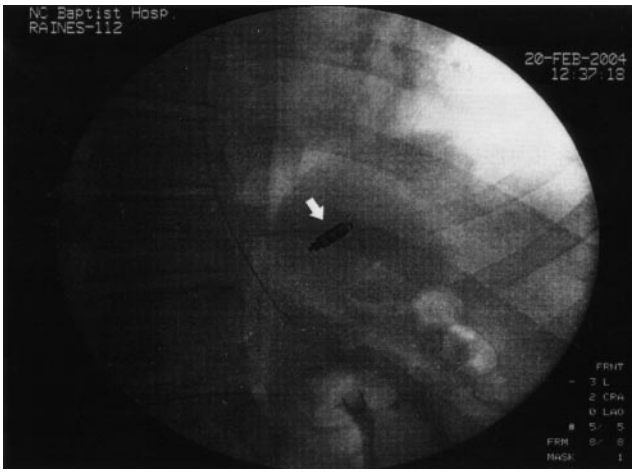


**Figure 2.** Fluoroscopy showing the laryngoscope bulb in the patient's stomach.

Due to the work in process and the presence of the sterile field, we decided to wait and remove the bulb under direct laryngoscopy at the end of the procedure. However, at the end of the procedure, the bulb could not be found by direct laryngoscopy. Fluoroscopy revealed the bulb in the patient's stomach (Fig. 2).

This case underscores the need to verify the integrity of any equipment used in or on a patient. Nowhere is this more critical than when working in and around the airway where the potential for catastrophic airway problems from aspiration of foreign bodies can occur. As such, we remind our colleagues to check the integrity of the airway equipment prior to use, particularly the bulb on the laryngoscope blade!

In this case, good fortune played a role in the outcome in that the incident was recognized, no airway problem was noted, and the bulb ended up being ingested and not aspirated. The patient and family were advised of the event and informed that the "planted and fertilized" bulb should "bloom" in the next few days. The bulb subsequently blossomed without incident.

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## Falsely Low Pulse Oximetry Values in Patients Receiving Docetaxel (Taxotere®)

To the Editor:

Pulse oximetry usually provides an accurate noninvasive estimate of arterial hemoglobin saturation, but errors can be produced by several confounding variables. Factors that can produce falsely low estimates of arterial hemoglobin saturation by pulse oximetry ($Sao_2$) include the presence of methemoglobin (1) anemia combined with hypotension (2,3) motion (4), dark skin pigmentation including certain skin dyes (5), blue or green fingernail polish (6), and severe tricuspid regurgitation (7). We recently encountered a patient with docetaxel (Taxotere®)-induced nail bed changes that falsely depressed $Sao_2$.

The patient was a 61-year-old woman who had received several courses of Taxotere for treatment of stage 4 breast cancer. We were contacted by nurses who were concerned that her measured $Sao_2$ was 92–94% with the patient breathing room air. A Criticare® pulse oximeter with a Nellcor® probe was used. We noticed that the patient's fingernails were a purplish color and were partially separated from the underlying tissues. These changes were consistent with existing reports of Taxotere-induced nail dystrophy (8,9,10). When the oximeter probe was attached to an unaffected toe, the oximeter read 97–99%, as did the probe when mounted sideways on a finger.

We have since seen erroneous $Sao_2$ readings in another patient who had similar Taxotere-induced nail changes. Given the frequency with which Taxotere is used in treating both breast and lung cancers, it is important to be aware of the transcutaneous oximetric consequences of this therapy. Caution should therefore be exercised when using pulse oximetry to estimate arterial saturation in patients receiving Taxotere or related Taxol compounds.

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## Risperidol and Asystole

To the Editor:

Recent questions surrounding droperidol and dysrhythmias have been widely discussed. However, other drugs, including novel antipsychotics such as Risperdal, may also alter the QT interval and have been associated with sudden death. Recently, a 42-year-old male patient presented to our service for total knee replacement. His medications included sertraline, clozapine, and Risperdal. QT interval was 480 ms. After uneventful induction of anesthesia with propofol, a laryngeal mask airway was placed without difficulty and spontaneous respirations resumed 30 s after 2% sevoflurane in oxygen was started. The EKG then showed marked sinus bradycardia leading to asystole. CPR was performed with resumption of circulation after epinephrine 500 μg IV. Recovery was, thankfully, complete.

Is Risperdal as much a problem as droperidol?

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## The Quest for New Devices to Improve Postoperative Pain Control

To the Editor:

I wish to congratulate the authors for their study on the safety and efficacy of a fentanyl patient-controlled transdermal system for acute postoperative analgesia (1). However, their conclusion that fentanyl HCL PCTS 40 μg was superior to placebo for the management of acute postoperative pain control is optimistic. When you look at the VAS scores, there seem to be no major differences between the two groups. But a major drawback in this study is the matching of the placebo and treatment group. When you use a 3:1 ratio of patients treated to patients not treated you expect a group that is well matched. However, a clear definition of patients included in the two groups was not given. Because various operations were included (abdominal, orthopedic, or thoracic surgery) and a precise definition of pain was not given (expected to have moderate to severe pain requiring parenteral opioids), it is difficult to compare the two groups.

The only thing we can conclude from this study is that there might be a better way to treat patients postoperatively. It may be argued that the skin is not the optimal barrier to conquer in order to get an optimal pain relief postoperatively. There are other delivery systems for other surfaces to get better pain relief, such as the nasal or oral mucosa. Even implantable devices or wound catheters could be candidates for postoperative pain relief.

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Reference

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In Response:

We would like to address the comments of Marcus et al. regarding our recently published article. Our results demonstrated not only that a larger proportion of patients in the placebo group withdrew from the study due to inadequate pain control, but also that the mean last pain intensity scores of placebo patients were significantly higher than those in the active treatment group (40.8 vs 30.9, respectively, $P = 0.0474$) (1). The superior efficacy of fentanyl HCl patient-controlled transdermal system (PCTS) compared with placebo has recently been confirmed in a large randomized, controlled trial (2).

The 3:1 randomization in our trial was chosen to decrease the exposure to placebo of postsurgical patients undergoing major surgery. This is a perfectly accepted design.

As for as the comment related to the best barrier for delivering fentanyl, this is really outside of the scope of our study. In addition, Marcus and colleagues may want to recognize that our paper was about a patient-controlled system. Such a concept would be, at the very least, very difficult to apply to either an intranasal or an oral mucosa route.

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## An Uncommon Reason for Damage to the Intubating Laryngeal Mask Airway (ILMA) Endotracheal Tube Cuff-Inflation System

To the Editor:

Ever since its first clinical use to facilitate the passage of endotracheal tube (ETT) while maintaining ventilation during and between intubation attempts, the intubating laryngeal mask airway (ILMA) has been used to manage expected and unexpected difficult airway situations. A number of complications have been reported with the use of the specially designed ETT (Euromedical ILM Endotracheal Tube; Euromedical, Malaysia) leading to obstruction and permanent deformation of the tube (1,2). Recently we came across a rather unusual way for damage to its cuff inflation system.

A 17-year-old, ASA grade I, quadriplegic male patient with unstable cervical spine due to fracture of odontoid process was scheduled for fixation and stabilization of cervical spine. After induction of anesthesia and muscle relaxation, ILMA #4 was introduced. Adequacy of ventilation was checked and the ILMA-ETT size-8 was introduced blindly into the trachea through ILMA in a single attempt. After confirming the position of the ETT, the ILMA was removed and the ETT was fixed at the angle of mouth. At the end of an uneventful surgery the remaining neuromuscular block was reversed. The patient was breathing well spontaneously but tolerating the tube, so the trachea was not extubated. However, the bite block that was removed during oropharyngeal suctioning was not replaced. Soon the patient started biting the tube and it got compressed between the molars. Immediately the bite block was reintroduced and the compression on the tube released. There was no further problem and his trachea was extubated after 5 minutes and he was shifted to the post anesthesia care unit.

The flexometallic tube was washed and checked. A leak was diagnosed as the cuff would get deflated quickly after inflation with air. A red dye was introduced into the cuff-inflation system and was seen leaking through a rent in the inflation tube blended into the body of the ETT (Fig. 1A). A closer look revealed that the damage to the inflation tube was not due to the teeth directly but due to one of the wire loops. This was supported by the finding that the wire loop had got compressed by the patient's teeth in such a way that part of the spiral perpendicular to the line of compression by the teeth (line ab, Fig. 2) became sharp and projected sideways through the wall of the ETT (along line cd, Fig. 2), and pierced the embedded inflation tube tangentially to cause the leak that bled on the outer wall of the ETT (Fig. 1B).

In addition to presenting an unusual method of damage to the cuff-inflation system, this case reasserts some of the valuable standard teachings: (a) keep a bite block/dental prop in place when a patient has an airway maintaining gadget in place (ETT, LMA, etc); (b) do NOT remove the bite block/dental prop during oral suction; (c) remove the bite block/dental prop *after* removal of the ETT/LMA etc; and (d) if available, use the tubes with covering at the bite portion.

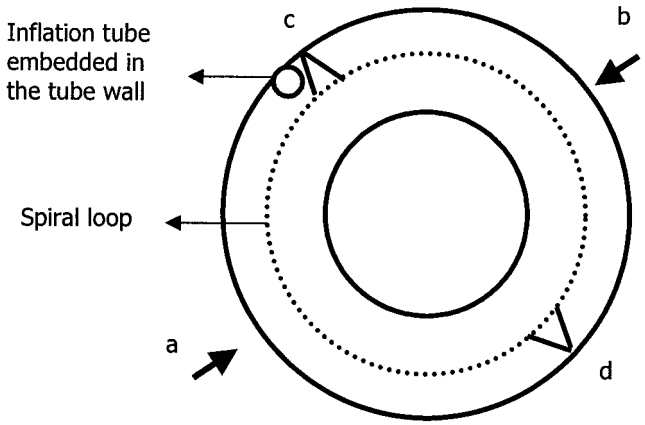


**Figure 2.** Compression of tube by teeth leading to spiking of the spiral in axis (cd) perpendicular to the axis of compression (ab).

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## Peripartum Management of a Suspected Spinal Hematoma After Epidural Puncture

To the Editor:

We managed a case of suspected spinal hematoma (SH) after a failed attempt of epidural analgesia during labor.

A 32-year old multiparous woman was admitted at 38 weeks' gestation for left iliac vein thrombosis and was treated with Enoxaparin 70 mg twice daily that was switched to continuous IV unfractionated heparin 5 days later (activated partial thromboplastin time [aPTT]: 54 s [normal value < 40 s]). At the end of the 39th week, heparin was discontinued and labor was induced with oxytocin. Four hours after heparin discontinuation, aPTT was 31 s.

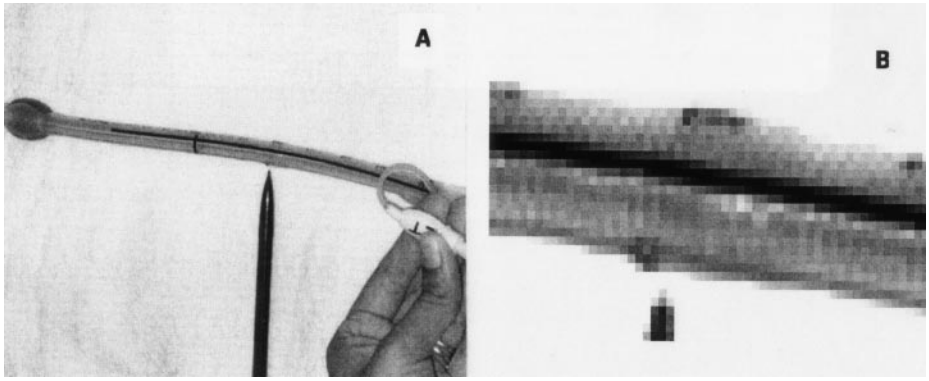


**Figure 1.** (A) The damaged intubating laryngeal mask airway (ILMA) endotracheal tube (ETT) showing the leak of the dye, and (B) a closer look showing the spiral compressed in a manner so as to cause a hole tangent to the embedded inflation tube.

After informed consent and at the patient request, epidural placement was attempted at the L3–4 interspace in the sitting position, 6 hours after heparin discontinuation. Direction of the needle was changed four times before epidural space could be located. A multihole flexible epidural catheter (18-gauge, no inside leader, Portex Ltd, Keene, U.S.) was introduced 4 cm cephalad in the epidural space. A frank blood tap was immediately observed in the catheter, which prompted both catheter and needle removal. The patient wished to rest for a moment, and no further attempt of epidural analgesia was done. One hour later, she complained for severe back pain located at the L3–4 interspace with bilateral and cephalic radiation, suggesting radicular back pain. Pain was constant, not altered by uterine contraction and clearly differentiated by the patient from uterine contraction. Pain was unchanged by vertebral palpation and no sensory or motor deficit was observed. No symptom of subarachnoid hemorrhage was found. Epidural hematoma was suspected. After a neurosurgeon's advice was obtained, it was decided, in order to reduce the delay before spinal imaging and eventually surgery, to perform emergent C-section under general anesthesia after patient information and consent. Magnetic resonance imaging (MRI), done 4 h after back pain onset, ruled out SH. Backache decreased progressively and disappeared in 6 h. Neurological examination remained normal. Enoxaparin (70 mg twice daily) was reintroduced 18 h after the failed epidural. Postpartum period was uneventful with normal neurological status.

Confirmation of SH by specific imaging is an emergency, since neurological prognosis of SH depends on the delay between SH symptoms and decompressive laminectomy (1–3). Classical features of SH (i.e., backache, cauda equina syndrome) can be masked by neuraxial block and diagnosis is commonly suspected in face of unusual recovery from neuroaxial block. In our case, we had to manage a suspected SH very early during labor as epidural analgesia was abandoned. The benefit/risk ratio of three strategies were analyzed. Immediate MRI was considered, but was found not possible because of the problem to obtain several minutes of stillness in a laboring woman without analgesia. To expedite vaginal delivery and perform MRI just after was not considered appropriate, as the duration of labor is unpredictable, leading to an unacceptable delay in SH diagnosis. Furthermore, SH extension may be favored by both uterine contractions and pushing efforts that lead to epidural venous plexus congestion. The strategy we choose gives the advantage to reduce the delay before MRI to 4 h, and to limit the duration of uterine contractions and avoid pushing efforts, but was balanced with a fivefold increase in the perioperative risk of C-section under general anesthesia as compared with vaginal delivery (4). This case emphasizes the difficulty to analyze back pain during labor and the problem of early SH diagnosis on clinical symptoms only.

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## Failure to Advance the Guidewire When the Seldinger Technique Is Used for Central Venous Cannulation: Safe and Reliable Recovery

To the Editor:

Drs. Arya and Kumar describe (1) a thoughtful approach to withdrawing a guidewire through a metal needle when it proves impossible to advance the guidewire after easy aspiration of blood. Their technique does not eliminate the risks of the guidewire becoming stuck in the needle and of embolization of a severed fragment. Furthermore, withdrawal of the guidewire through the needle is a violation of the written warnings of manufacturers (2) in their product packaging.

It is clearly desirable to avoid further puncture of the vessel, and this can be achieved. Most Seldinger procedure packs contain a cannula that fits over the guidewire. The guidewire is kept in place while the metal needle is withdrawn. The cannula (without the inside needle) is gently advanced over the guidewire until it meets resistance. The guidewire is withdrawn and the position of the cannula is adjusted until there is free aspiration of blood. The cannula is advanced until the hub is close to the skin and free aspiration of blood is again confirmed. The guidewire is then reinserted and advanced. The Seldinger technique is continued. In some instances the straight tip (must be flexible) of the guidewire will pass more readily than the J-tip. If there is no cannula in the procedure pack, a 16-gauge IV cannula (without the inside needle) may be used. I have used this technique many times and it is usually successful. It is safe and reduces the risk of complications and loss of time incurred by further attempts to cannulate the vein.

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DOI: 10.1213/01.ANE.0000130910.46642.52

In Response:

The cornerstone of safe central venous cannulation (Seldinger technique) is to stop when resistance is encountered during insertion or withdrawal of a guidewire. Initially, it is unwise to pull harder on encountering resistance to withdrawal. In our technique (1), the first step is to disengage the J-tip guide wire by pushing it slightly forward while holding the introducer needle stationary, and to rotate the guidewire or metallic needle by 90–180°, whichever is done easily without resistance. Subsequently, use minimal traction to retrieve the guidewire while maintaining the new angle. If the golden rule of "stop on resistance" is followed, the problem of a sticky guidewire (2) and subsequent damage to its tip and embolization is avoided.

We have also used the technique described by Dr. Henderson. It is helpful only in situations where insertion difficulties are due to the J-tip getting stuck within the lumen of the vein or at a counter puncture hole on the posterior wall of the vein. When the introducer metallic needle has slipped out of its intraluminal position and the guidewire is stuck at the entry hole on anterior wall of the vein, threading the cannula alone over the guidewire after removing the introducer needle usually does not help. This is because the cannula cannot be negotiated into the venous lumen after removing the

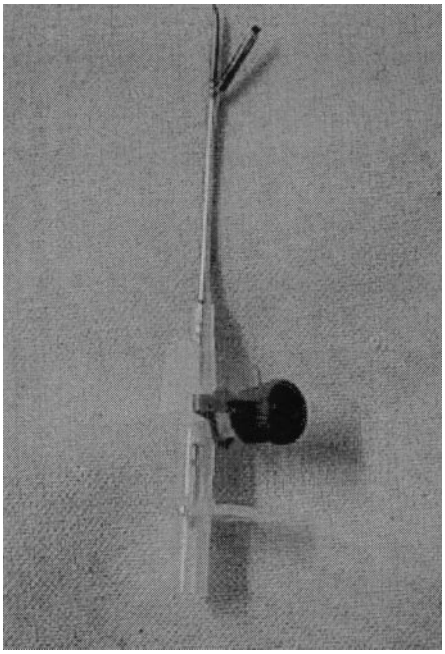

**Figure 1.** Damage of kinked 16-gauge IV cannula tip by blind insertion of its metallic needle for repositioning during multiple attempts for central venous cannulation.

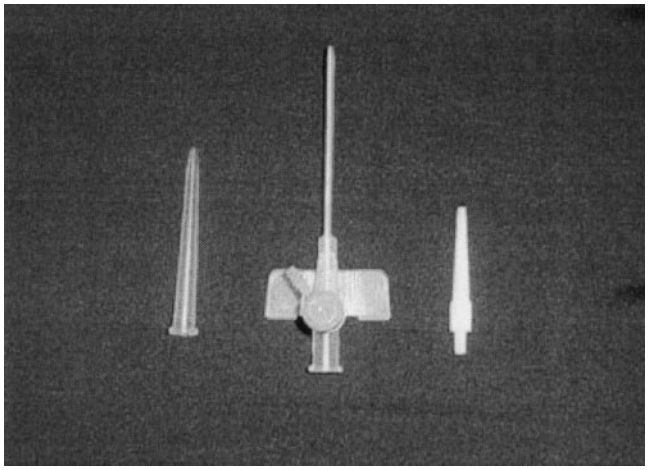

**Figure 2.** 16-gauge IV cannula without metallic needle (center) and introducers for smooth and easy insertion of J-tip or flexible tip guidewire through it.

guidewire without reinserting its metallic needle through it. Safe maneuvers for this flexible cannula are slow withdrawal and rotational movements with gentle negative pressure and not pushing forward until it is inside the lumen of the vein and free flow of blood is aspirated. Attempts at pushing the cannula forward when outside the vein or even when it is hitting posterior wall of vein usually kinks its tip. Blind insertion of metallic needle through it at this juncture for repositioning may lead to the damage of a kinked cannula tip (Fig. 1). If a 16-gauge IV cannula (without the inside needle) is used successfully for repositioning, another problem is reinsertion of the J-tip or a flexible straight tip guidewire through it as its proximal lumen entry does not have a smooth taper. We usually overcome this problem using short introducers that come with Arrow-Howes™ central venous cannulation sets or in some of the pulmonary artery catheter sheath introducer sets (Fig. 2).

In conclusion, for success and safety of any procedure, the operator must be familiar with fine technicalities of the procedure. There can be many ways to deal with a problem, so the operator must choose an option best suited for the situation.

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## The Natural Half Life of a Large Stock of Reusable Laryngeal Mask Airways at a Teaching Hospital

To the Editor:

The potential reusability for laryngeal mask airways (LMAs) is substantial. While the manufacturer does not recommend more than 40 uses per unit, reports of 100–200 uses per LMA are not uncommon (1–3). In our institution (as in others), tracking the number of uses of a given airway as it passes through many hands at many sterilizing areas is almost impossible. Therefore, these airways typically are recycled until a defect is noticed that threatens their integrity.

Our hospital has spent thousands of dollars on reusable LMAs per year, as these units have disappeared at an alarming rate. Others (1) have reported that 25% of their stock (5/20) were lost in a 2-year period. We would like to report the results of a study to determine how fast our stock of LMAs was being depleted. Tracking the number of times each LMA was used was not feasible, due to the many technicians and sterilizing locations involved. Instead, we followed the rate of attrition of LMAs from the entire stock of our hospital to estimate the cost of their use.

At time zero, a complete inventory of LMAs was performed by inspection of all operative sites at our institution. There are over 40 operating rooms as well as 4 anesthesia workrooms in our hospital where LMAs can be found. The size and serial number of each LMA were recorded. LMAs without a legible serial number were excluded from the study. At three consecutive 6-month intervals between July 1999 and January 2001, an exhaustive search of all the operative locations was performed by the same single anesthesiologist in the identical manner. An additional search was performed 6 months later to verify the results of the 18 months check. The LMA sizes and serial numbers then were correlated with the initial inventory.

To estimate the number of times each of the LMAs was used, all operating room charts for a random month (November 1999) were reviewed. The frequency that each size of LMA was employed was tallied.

The anesthesia and auxiliary operating room personnel were instructed regularly about the importance of saving and resterilizing the LMAs. They were told that after each use, the soiled LMAs were to be placed in a special recycling bin located under each anesthesia machine, and that the contents of these bins were not to be discarded.

A total of 142 LMAs were present initially, representing 7 sizes between 1 and 5. The rates of attrition of the various sizes of airways differed considerably. At the 6-, 12-, and 18-month intervals, 71%, 57%, and 47% of the LMAs, respectively, were found. Therefore, it took slightly $<$18 months for half of the entire stock of LMAs to disappear.

All sizes between 1.5 and 4 were reduced to 33–42% of the original number by 18 months. Sizes 1 and 5 probably were the least used of the airways. The number of size 5 airways was reduced to only 65% of the original stock, and none of the size 1 airways was

missing at 18 months. Of the airways that were used frequently, the very small ones were as likely to be lost as the larger ones.

We found that our stock of LMAs was depleted much more rapidly than we expected. Large institutions that cannot maintain their stocks of reusable LMAs for reasonable periods of time may have to consider changing to disposable airways, such as the disposable LMA or the PAXpress. However, while reusable LMAs may not be more economical than an endotracheal tube or the PAXpress, other considerations may cause them to be the airway of choice.

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## What Is Wrong with This Picture of Pain Management?

To the Editor:

Apfelbaum et al. remind us that we have not solved the issue of postoperative pain (1). They randomly surveyed 250 postsurgical patients, identifying that 82% reported some pain after surgery, with 39% of them experiencing "severe to extreme" pain. Their survey appears to have included only patients receiving parenteral or oral opioids: 23% of those patients reported experiencing adverse side effects.

Their report is frustrating because of the lack of acknowledgment of highly effective analgesic modalities developed in the last 20 years. Specifically, epidural opioid/local anesthetic infusions are superior to other forms of analgesia (2), especially following thoracotomy (3) and upper abdominal (4) surgery. For outpatients, regional techniques also provide significant postoperative analgesia without the side effects associated with opioids, both as single injections (5) and continuous infusions (6–8). The information supporting the use of these regional techniques has become so extensive that the Veterans' Health Administration (VHA) and the Department of Defense (DOD) have made recommendations for procedure specific analgesic regimens emphasizing regional analgesia (9). These regimens, available on their Web page (www.oqp.med.va.gov/cpg/cpghtm), identify the use of regional techniques for many procedures based on the evidence-based data that supports significantly lower pain scores.

Why haven't these modalities been included in the experience of the patients surveyed by Apfelbaum et al.? Is it because of reimbursement problems? Is it an issue of manpower? Do we not want to spend the time? Are we not familiar with the techniques (10)? More information is needed. What are the impediments to providing the level of care that we know can produce better results? Clearly, there are more questions here, and certainly challenges, for all of us in our profession to implement the technology that we have available to solve a problem that has persisted for far too long.

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Dr. Apfelbaum did not send a response.

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## Inadvertent Femoral Nerve Impalement and Intraneural Injection Visualized by Ultrasound

To the Editor:

We present a case of femoral nerve impalement and subtotal intraneural injection during femoral nerve block (Fig.1) that was recognized in retrospect after review of the recorded ultrasound imaging (see videos available at www.anesthesia-analgesia.org). A total of 35 mL mixture of 0.5% mepivacaine and 0.25% levobupivacaine was administered via a 22-gauge blunt Quincke tip needle. On follow-up 24 h later, quadriceps function was intact, but sensory block remained, resolving the following day.

With nerve impalement, crucial barriers to local anesthetic diffusion are disrupted, which probably renders the impaled nerve more susceptible to conduction blockade, independently of intraneural injection (1). Nerve injuries following intentional impalement with microelectrodes (5–300 $\mu$m diameter) generally repair without sequelae (2–4). Similarly, no substantial injury resulted from femoral nerve impalement in the present case with a 22-gauge needle (700 $\mu$m diameter) (5).

The sonographically measured cross-sectional area of the intraneural injection was 7.3 $mm^2$ (only 22% of the femoral nerve cross-sectional area). Therefore, the increase in intraneural pressure due to injection likely was within the tolerable pressure range (6,7). Moreover, the femoral nerve increases in caliber along its course in the inguinal region (8), indicating dispersion of nerve fibers within the femoral nerve before separating into its cutaneous and muscular branches. This polyfascicular architecture may have prevented a significant increase in intraneural pressure in our patient.

The present case demonstrates that femoral nerve impalement and intraneural injection of local anesthetic may occur without major adverse sequelae. We hope this report will serve to improve the understanding of these potentially harmful events.

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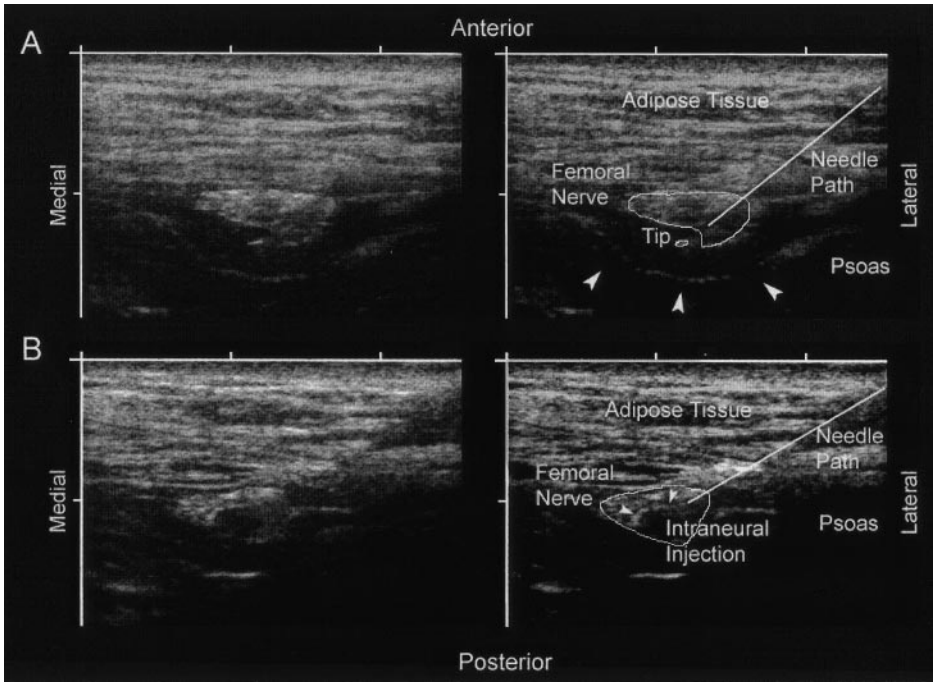


**Figure 1.** Short Axis (transverse cross-sectional) ultrasound scan of the inguinal region (left) and the corresponding labeled image (right). (A) The femoral nerve (Femoral Nerve) is shown impaled by a 22-gauge blunt Quincke tip needle (solid line, Needle Path) with the needle tip (Tip) appearing at the underside of the nerve. Local anesthetic spread around the nerve is shown between the large arrowheads. (B) Intraneural injection is shown between small arrowheads. The femoral nerve lies on top of the psoas muscle (Psoas Muscle). Tick marks are spaced 10 mm. Supplemental material available at www.anesthesia-analgesia.org.

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## Percutaneous Dilatational Cricothyroidotomy: Airway Control via CobraPLA™

To the Editor:

Video-assisted percutaneous dilatational cricothyroidotomy (PDC) (1) in patients ventilated with an endotracheal tube does not permit the visualization of the second tracheal ring when the tube is slowly withdrawn by inserting the cannula.

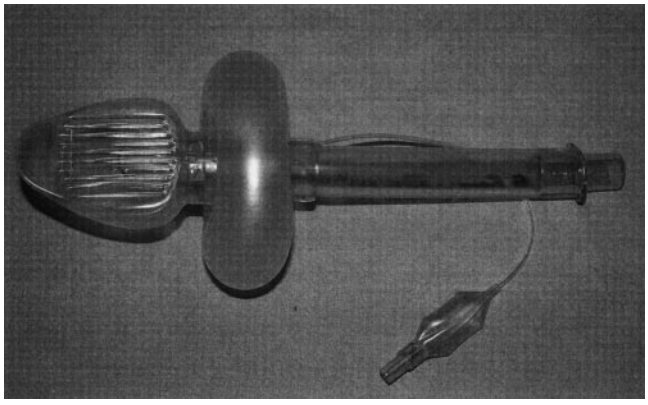

**Figure 1.** The CobraPLA™.

We used the new supraglottic device CobraPLA™ (2–4) (Engineered Medical System, Indianapolis, IN) in a 71-yr-old male patient with respiratory failure to perform the cricothyroidotomy following the Griggs technique (Fig.1).

The fiberscope, passing through the CobraPLA's slotted openings, allowed an internal view of the tracheostomy site. This way the operator could observe the needle and guidewire entering the trachea by ensuring the proper placement of the introducer and dilator.

A 9-mm tracheostomy tube was used. The entire procedure lasted 15 min. Hemodynamic and respiratory parameters remained stable.

CobraPLA allowed continuous fiberoptic visualization of the larynx and trachea with uninterrupted airway control. Thanks to its simplicity and safety, it is an ideal teaching technique.

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## Lifestyle Changes in U.S. Academic Anesthesia: Quo Vadis?

To the Editor:

Historically, U.S. resident physicians (including residents in anesthesiology) were expected to work (often in "glamour" of self-sacrifice) never-ending hours, spend countless (and sleepless) nights on call caring for the ill and the needy, and (surprisingly or

not?) miss on many important events of their own lives while learning how to improve the quality of the lives of others (their patients). Interestingly, and to the contrary today, at the onset of a new millennium many resident physicians in the United States seem as concerned about their personal lives (family, leisure time, and outside activities) as they are about their professional lives (postgraduate medical education) (1).

The newly introduced 80-hour workweek for resident physicians (mandated for all U.S. residency training programs as of July 2003) have no doubt improved the quality of life of many residents (2). However, at many academic institutions (including this author's own—University of California, San Diego) attending faculty members may have (or have already had) to pick up the slack, assuming more clinical (patient care) responsibilities and often working longer hours. The goal of limiting residents' work hours (long overdue in this country) was to improve patient care by reducing fatigue (and indirectly improving physical and mental competence) among resident physicians. However, the issue of how this recent residents' workweek reduction will impact postgraduate medical education in anesthesiology itself (the process of becoming a consultant in anesthesiology) as well as the attending faculty members' clinical weekly workload distribution remains of concern to many academic anesthesiologists. Will this process of adopting more humane (positive) lifestyle changes for resident physicians result in a simultaneous adoption of unhealthy (negative) lifestyle changes for the attending anesthesiologists [researchers, health care leaders, and educators (3)]?

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DOI: 10.1213/01.ANE.0000131458.38817.66

## Latex Allergy: Oh, What a Surprise! Another Reason Why All Anesthesia Equipment Should Be Latex-Free

To the Editor:

We report here an unusual presentation of a life-threatening latex allergy. The patient was an 18-year-old male with a history of spina bifida and developmental delay. He was admitted to our institution for treatment of a recurrent right ischial and peroneal pressure sore. He had undergone multiple previous general anesthetics for urological problems without incident, and he had no history of latex allergy. Despite that, our index of suspicion for latex sensitivity was high. Of interest and some concern was that he was seen chewing on an old latex-containing tourniquet for over 30 minutes prior to anesthesia. Routine general anesthesia was induced with patient placed in a prone position. Approximately 1 hour after induction of general anesthesia, the patient developed high peak inspiratory pressures (45 cm $H_2O$), hypoxemia (85%), hypotension and a dramatic decrease in end tidal $CO_2$. The $F_{IO_2}$ was increased to 1 and the patient placed in the supine position. Chest auscultation revealed no breath sounds over the left lung and very minimal sounds from the right. The ETT was withdrawn from 23 to 21 cm at the lips, with no change in the above respiratory findings. The ETT cuff was palpated in the trachea. Peak inspiratory pressures remained elevated (above 50 cm $H_2O$). Epinephrine (50 $\mu$g) was administered IV for hypotension and presumed bronchospasm, after which chest auscultation revealed profound wheezing bilaterally. An additional 20 $\mu$g of IV epinephrine, 100 mg of IV hydrocortisone, and 10 puffs of Albuterol were administered through the ETT resulting in near resolution of the bronchospasm. The vital signs returned to normal. A decision to continue with the operation with full latex-free precautions was agreed upon. The operation concluded uneventfully. Tests revealed that the patient was highly sensitive to latex (1).

We learned three things from this case: 1) Patients with no history of latex allergy, but with a surgical history suspicious of a latex allergy can develop a life-threatening latex allergy at any time; 2) patients who have a high potential risk of developing latex allergy should be advised and prevented from chewing on and/or being exposed to latex products prior to general anesthesia; and 3) our hospital's decision to have all latex-free anesthetic equipment, including latex-free tourniquets, is laudable.

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## A Nasal Bridle for Securing Nasotracheal Tubes

To the Editor:

The use of the nasal bridle to secure nasoenteral feeding tubes has been previously reported (1,2). The application of this technique was applied to secure a nasotracheal tube in a 2-year-old female patient with Type 1 spinal muscular atrophy who required prolonged mechanical ventilation. She had been intubated nasotracheally for several days with subsequent irritation to her face from the tape and liquid adhesives. The nasal bridle method of securing the nasotracheal tube was chosen because no tape is in contact with the skin.

For the procedure, the patient should be adequately sedated and placed in a standard intubation position in reference to the practitioner. Two small-bore (6–8F) pediatric feeding tubes are placed, one in each nare to the posterior pharynx. With the aid of a laryngoscopic blade, the feeding tubes are retrieved with Magill forceps and removed through the mouth. The two oral ends of the tubes are secured together with a suture or a simple knot. One feeding tube is then pulled at the nares so that the second tube is exposed exiting both nares. The first tube is cut off and discarded. The second tube is left in place entering one nare, looping around the nasal septum and exiting the other nare. The three tubes (nasotracheal and two ends of feeding tube) are then taped together close to the external nasal septum, holding the tube in place.

We have found this method of securing nasotracheal tubes to be extremely useful. It has potential applications in patients with tape allergies or excessive secretions that loosen the tape on the upper lip. This method is not recommended for long-term use as it may lead to damage to the nasal septum. Umbilical tape may also be used in place of the enteric feeding tube to lessen the possibility of septal damage.

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## Bilateral Brachial Plexus Block Versus Segmental Epidural Anesthesia

To the Editor:

In the case report by Franco et al. (1) on bilateral brachial plexus block procedures, I believe that two points have not been considered:

a) Perhaps an injection with a 22-gauge needle without a local anesthetic infiltration into skin in a region where there is no guarantee of injecting the needle at the desired location with a single injection technique should not be made.

b) A concurrent injection of 53 mL 1% mepivacaine in a critical case like this is a dose that cannot be undermined.

A regional technique to be performed through the placement of an epidural catheter appropriate for the innervation of the regions to be operated in both of the upper extremities might have served as an alternative option to this approach. Thus, it would have been possible to avoid such large doses of local anesthesia to administer additional doses in case of a prolonged operation and to gain more effective postoperative analgesia. Lastly, the rate of a successful segmental epidural anesthesia is more frequent than a bilateral brachial plexus blocking technique.

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Dr. Franco does not wish to respond.

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## The Use of Tourniquets in Patients with Sickle Cell Disease

To the Editor:

We were interested to read a case report of successful tourniquet use in a sickle cell patient (Hb SS) undergoing knee replacement (1). A case series of 12 Hb SS patients from the same institution in Saudi Arabia also demonstrated use of tourniquets without complication (2). In interpreting these results, it is important to note that Saudi Arabian patients have the Arab-Indian Hb SS haplotype, characterized by more benign disease, attributed to a higher percentage of fetal hemoglobin in their circulation (an average of 25% versus 5–10% in African haplotypes) (3). A case series from Africa, in contrast to the Saudi Arabian experience, reported that 3 of 14 Hb SS patients developed sickle cell related complications after surgery with tourniquet use (4). Given that 83–100% of Hb SS patients in the United States are African haplotypes (6), tourniquet use may not be appropriate for most sickle cell patients in North America.

Also in this report (1), the patient underwent preoperative exchange transfusion reducing Hb S from 82.6% to 47%. However, a RCT demonstrated that simple preoperative transfusion (total Hb to 10 g/dL) was as effective as exchange transfusion (Hb S <30% of total) in preventing perioperative complications in Hb SS patients, and was also associated with a 50% reduction in transfusion-related complications (5). Thus, preoperative exchange transfusion is rarely indicated.

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In Response:

The letter by Sarjeant and Callum discusses two important controversial issues in the perioperative management of patients with sickle cell disease, namely, the use of tourniquets and preoperative blood transfusion.

I agree with Drs. Sarjeant and Callum that Arab-Indian sickle cell disease is a more benign one than the African form, probably because of the more frequent percentage of HbF. The case reported, however, cannot be regarded as a benign one, since the patient was rendered crippled by the age of 27 years (1). Moreover, we think that with adequate preoperative preparation and with advances in intraoperative monitoring and homeostasis, tourniquet use may be considered if it is beneficial to the patient.

A recent Cochrane-based study (2) concluded that, while, in general, conservative transfusion appears to be as effective as aggressive transfusion in preparation for surgery in sickle cell patients, further research is needed to examine the optimal regime for different surgical types, and to address whether preoperative transfusion is needed in all surgical situations. Exchange transfusion for such a patient was an essential part of his preoperative preparation. As our patient was scheduled for bilateral total knee replacement under tourniquet, it was felt that a more tight control of HbS through exchange transfusion would contribute to better outcome.

We believe that in areas of medicine where large series RCT is difficult to perform or unethical, breakthrough cases, dictated by the patient's benefit and careful discussions, as with the editorial of Drs. Tobin and Butterworth (3) and the current letter, form the basis of changing traditional practice.

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