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NEWSLETTER

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Managing Cardiovascular Implantable Electronic Devices (CIEDs) During Perioperative Care

by Jacques P. Neelankavil, MD; Annemarie Thompson, MD; Aman Mahajan, MD, PhD

Cardiovascular implantable electronic device (CIED) is a term that encompasses pacemakers for bradyarrhythmia treatment, implantable cardioverter defibrillators (ICDs) for tachyarrhythmia management, and cardiac resynchronization therapy (CRT) devices for systolic dysfunction with conduction delays. Cardiac arrhythmias have an estimated prevalence of 14.4 million patients in the United States, and they account for approximately 40,700 deaths annually.[1] As the indications for device placement continue to expand and with data supportive of device placement compared to medical therapy well established, CIEDs are becoming common in our patient population.[2,3] Approximately one million patients worldwide receive a pacemaker or implantable cardioverter defibrillator (ICD) each year; therefore, it is imperative that all anesthesiolgists and anesthesia professionals understand the perioperative implications of these devices.

The 2011 Heart Rhythm Society (HRS)/American Society of Anesthesiologists (ASA) Expert Consensus

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ASA/APSF
Ellison C. Pierce, Jr., MD, Patient Safety Memorial Lecture

Toward Patient Safety in Anesthesia—Let the Journey Continue

Alan F. Merry, MB, ChB, FANZCA

Annual Meeting of the American Society of Anesthesiologists
Saturday, October 12, 2013

Moscone Convention Center, Room 103
(1:00 PM-2:00 PM)
San Francisco, CA

APSF Board of Directors Workshop

Should anesthesia incidents be investigated as they are in other high-risk industries?

Pro/Con Debate

Saturday, October 12, 2013, San Francisco, CA
Moscone Convention Center, Room 103, (2:00 PM-4:00 PM)

Inside:

A Sad Parting: Patient Safety Pioneer Ephraim ("Rick") S. Siker, MD

APSF is saddened at the passing of Ephraim S. "Rick" Siker, MD on June 21, 2013, at the age of 87. Rick was a founding member of the APSF Executive Committee in 1985 and served as the foundation's secretary from 1985 to 1995, executive director from 1995 to 1997, and chair, APSF Committee on Technology from 1997 to 2002 when he retired from the APSF Board of Directors after 18 years. He was a tireless advocate for patient safety and mixed his passion for the foundation's mission that "no patient shall be harmed by anesthesia" with wit and wisdom that only he could provide.

Ephraim ("Rick") S. Siker, MD

His contributions to Anesthesiology went far beyond APSF. He was chair of the Department of Anesthesia at UPMC Mercy for 34 years beginning in July 1, 1960.

In 1973, Dr. Siker was elected president of the American Society of Anesthesiologists and that same year was asked by President Nixon to lead a medical team on a visit to China. Dr. Siker was a director of the American Board of Anesthesiology and served as secretary-treasurer from 1974-1981 and president of the board in 1982.

Dr. Siker left a legacy that will continue to have a positive impact on our specialty. In recognition of his legacy, the University of Pittsburg School of Medicine/Mercy Hospital has established the E. S. and Eileen Siker Professor of Anesthesiology.

We will miss Rick Siker but treasure the memories and value the contributions he made to Anesthesiology and patient safety. APSF extends it condolences to his family, friends, and colleagues.

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The Official Journal of the Anesthesia Patient Safety Foundation

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Grant Deadlines for November 1, 2013

The Anesthesia Patient Safety Foundation (APSF) announces a Request for Proposals (RFP) to study the implementation and performance of the

APSF Pre-anesthetic Induction Patient Safety Checklist (PIPS)

The deadline for receipt of a proposal is November 1, 2013, for a grant scheduled for funding to begin no later than July 1, 2014.

- APSF intends to provide up to $200,000 for a period not to exceed 2 years.
- The proposed study should be a prospective, observational clinical trial utilizing the APSF PIPS checklist with a matched and/or parallel control group not cared for with the utilization of the checklist.
- The proposals will be evaluated by a scientific review committee selected by APSF.
- Proposals will be assessed for merit based primarily on their likelihood of meeting the objectives outlined in the RPF as well as the proposed study's scientific rigor, innovation, and cost-effectiveness.
- The principal investigator must be an experienced scientist from a North American institution.
- A grant mechanism will be used and funds will be awarded to a single institution.
- Funding will be contingent upon acceptable modifications to the proposal based on feedback from the APSF review committee as well as appropriate IRB and institutional approvals.

Please contact Stoelting@apsf.org to request grant guidelines and an application.

Request for Applications (RFA) for the

SAFETY SCIENTIST CAREER DEVELOPMENT AWARD (SSCDA)

Application deadline: November 1, 2013

APSF is soliciting applications for training grants to develop the next generation of patient safety scientists.

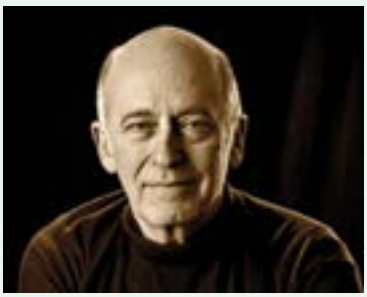
In this initial, proof of concept RFA, we intend to fund one ($150,000 over 2 years) Safety Scientist Career Development Award to the sponsoring institution of a highly promising new safety scientist. The award will be scheduled for funding to begin July 1, 2014.

Please contact Stoelting@apsf.org
to request the SSCDA GRANT GUIDELINES AND APPLICATION.

APSF Congratulates

Jeffrey B. Cooper, PhD

as the 2012 recipient of the American Society of Anesthesiologists Distinguished Service Award



Jeffrey B. Cooper, PhD

Dr. Cooper was a founding member of the APSF Executive Committee in 1985 and continues today as the foundation's executive vice president.

His contributions to "anesthesia patient safety" have had a world-wide impact. We have all benefited from his contributions to our specialty and APSF's vision that ***"no patient shall be harmed by anesthesia."***

APSF is pleased to announce the appointment of

Steven K. Howard, MD

as Chair, APSF Scientific Evaluation Committee

Steven K. Howard, MD

Staff Anesthesiologist
VA Palo Alto Health Care System
Associate Professor of Anesthesia
Stanford University School of Medicine

Preoperative Assessment of CIEDs

"CIEDs," From Cover Page

Pacemaker

Statement was a joint collaboration with the American Heart Association, the American College of Cardiology and the Society of Thoracic Surgeons, and it provides detailed information on a team approach to the management of CIEDs perioperatively. In this article, we review the contents of the consensus statement in addition to an overview of the management of CIEDs.

Perioperative Considerations

Preoperative Assessment

The HRS/ASA consensus statement concludes that most patients with CIEDs do not need a new preoperative evaluation by the CIED management team (physicians and other health care professionals who monitor the who monitor the CIED function of the patient) because, most of the time, the pertinent information will be available in the notes from the CIED clinic.[4] Many patients with CIEDs have telephone interrogations every few months and yearly evaluations by their cardiologist. There are several things that an anesthesia professional should know about the CIED before taking the patient for surgery including what type of device the patient has, as that will guide the perioperative management.

Pacemakers are devices placed for bradyarrhythmias, and they remain the only effective treatment for ameliorating symptomatic bradycardia due to sinus node dysfunction (e.g., sick sinus syndrome) or a failure of impulse propagation (e.g., complete heart block). It is important to establish if the patient is pacemaker dependent, which is defined as the absence of a perfusing rhythm without pacing. If the patient is deemed to be pacemaker dependent, it is important to establish a secondary method for pacing the patient should a pacemaker failure occur. Alternative methods of pacing patients intraoperatively include transesophageal pacing, transcutaneous pacing, or transvenous pacing through a pacing pulmonary artery catheter or through a temporary transvenous pacing wire. Whatever method is chosen, it is important to have the necessary equipment and support organized and/or available prior to beginning the procedure.

Pacemakers have many additional features that correspond to the changing needs of patients throughout the day including rate responsiveness to increase pacing during times of increased physical exertion and sleep functions to decrease pacing rate during times of rest. In general, these rate enhancements should be disabled preoperatively.

ICDs have 4 main functions. They sense atrial or ventricular electrical activity, classify these signals to various programmed "heart rate zones," deliver tiered therapies to terminate ventricular tachycardia or fibrillation, and pace for bradycardia. The most important aspect of ICD management preoperatively is deactivating the tachycardia response of the device to avoid inappropriate pacing or shocks due to electromagnetic interference. It must be noted that while the ICD's defibrillating capabilities are disabled, it is critical to have other means of defibrillation immediately available. Surface electrocardiogram and adhesive defibrillator pads allow for optimal monitoring and the ability to defibrillate should the need arise. Regarding the pacing capabilities of a device, the same management guidelines for pacemakers outlined above should be followed.

With biventricular ICDs (also referred to as cardiac resynchronization devices), ventricular pacing optimizes ejection fraction. Cardiac resynchronization therapy (CRT) has been shown to decrease myocardial oxygen consumption while improving stroke volume in patients with low EF, significant intraventricular conduction delay, or interventricular dyssynchrony.[5] In this clinical scenario, continuing to pace provides better hemodynamic stability than simply turning off the device.

The general recommendations made regarding preoperative assessment of CIEDs provide structure for anesthesia professionals caring for these patients, but it is important to remember that the HRS/ASA consensus statement stresses individualized care of each patient through clear communication between the anesthesia professionals, surgeon, and CIED team. The consensus emphasizes that a single recommendation for all CIED patients is not appropriate. It is extremely important that the surgical or procedural team communicate with the CIED team to identify the type of procedure and likely risk of electromagnetic interference, and the CIED team should communicate with the procedure team to deliver a prescription for the perioperative management of patients with CIEDs.

Electromagnetic Interference

Electromagnetic interference (EMI) can cause malfunction of pacemakers and defibrillators.[6-8] There are several potential causes of EMI perioperatively including TENS units and electroconvulsive therapy; however, the most common cause of EMI for patient with CIEDs is monopolar electrocautery. EMI can cause pacing inhibition, damage the pulse generator, and cause inappropriate tachycardia therapy depending on the type of CIED, especially if the EMI is in close proximity to the pulse generator (within 6 inches). Bipolar electrocautery is not a concern for CIEDs since the current is small and energy travels between the 2 poles of the pen or stylus.[9] However, bipolar electrocautery is usually used in microsurgery (ophthalmology or neurosurgery), which represents a minority of surgical cases. Bipolar electrocautery is only capable of coagulation whereas monopolar cautery may be used for dissection and coagulation, which is why it is more commonly used.

Current CIEDs have sophisticated algorithms to minimize inappropriate sensing and pacing from EMI, and in addition lead and generator design has improved to the point where reports of inappropriate CIED function during EMI are less common. However, it is important to understand how EMI may affect the intraoperative performance of CIEDs.

EMI can be interpreted by a pacemaker as intrinsic cardiac activity; in this setting it will not trigger a paced rhythm even though the patient may need to be paced. This is called oversensing. Oversensing with an ICD secondary to EMI may lead to inappropriate antitachycardic therapy (pacing or defibrillation) if the ICD interprets the EMI as a tachyarrhythmia.[10] Inappropriate defibrillation may trigger a ventricular arrhythmia or may result in patient movement if the patient is not paralyzed during the anesthetic. New CIED algorithms are better at filtering EMI, but misinterpretation does occur.

It is recommended that if monopolar cautery is used, it should be used in short bursts of several seconds. There are several reasons for this recommendation. The arrhythmia detection for ICDs

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CIED Responses to Magnets Vary

"CIEDs," From Preceding Page

usually requires several seconds of tachycardia detection before antitachycardic pacing or defibrillation is instituted. Pauses in monopolar cautery allow for fewer erroneous ICD interventions. In addition, patients who are pacemaker dependent are less likely to have hemodynamic instability if their pacemaker oversenses the EMI and does not pace the patient for several short bursts as opposed to a long continuous monopolar cautery application. The cautery dispersion pad should be placed on the patient in a way that the path of EMI does not cross over the CIED generator.

For surgery below the umbilicus, the HRS/ASA statement recommends that there is minimal need to reprogram a CIED or place a magnet on the CIED because the risk of oversensing, generator damage, or lead damage is small. Magnets may still be used, but it is vital to understand the different magnet responses for CIEDs.

Table 1: Essential information to be communicated to the perioperative team by the CIED specialty team

1	Date of last device interrogation -- recommend within 6 months for ICD or cardiac resynchronization therapy (CRT) device, 12 months for pacemaker
2	Device type, manufacturer, and model
3	Indication for device placement
4	Battery longevity
5	Any leads placed within the last 3 months
6	Current programming
7	Is the patient pacemaker-dependent?
8	Device response to magnet placement
9	Any alert status on device? (such as manufacturing issues)
10	Last pacing threshold
11	Individualized perioperative recommendation/prescription based on patient information, device characteristics, and surgical factors

Magnets

Magnets have been used in the perioperative period as a way to convert pacemakers into an asynchronous mode; however, the magnet response is extremely variable depending on the device, the manufacturer, and the individual settings determined by the CIED team. Historically, magnets were intended to help interrogate devices and determine battery life, but they are currently used most often to prevent inappropriate oversensing by pacemakers and ICDs.

Magnet response varies depending on whether the device is a pacemaker or ICD. For pacemakers, the magnet response can be programmed by the CIED team. Therefore, some pacemakers will have no response when a magnet is placed and some pacemakers will pace asynchronously. The rate at which the pacemaker paces when the magnet is placed depends on the manufacturer and the battery life of the generator. If the battery life is low, the pacemaker will pace at lower rates, which may not be adequate for the perioperative period. Patients with pacemakers coming for major surgery may need higher pacing rates than they typically require in their daily life. The lower rate limit for many patients with pacemakers is usually 60-70; however, a normal response to decreased systemic vascular resistance and hypovolemia is an increase in heart rate. Although placing a magnet may place the patient into an asynchronous mode, the rate may not meet the physiologic demands of the patient.

For ICDs, magnet application will prevent both antitachycardic pacing and defibrillation in order to prevent oversensing of EMI, which may result in inappropriate tachycardia therapy. It is important to remember that all modern ICDs are also pacemakers; however, there is a critical difference in function when a magnet is applied to an ICD versus a pacemaker. In general, a magnet applied to an ICD generator will disable tachycardia therapy; however, it will not have any effect on the pacemaker. Therefore, magnet application to an ICD will NOT place the underlying pacemaker in an asynchronous mode (AOO, VOO, or DOO). For patients who are pacemaker dependent and have ICDs who are undergoing surgery where there is potential for significant EMI, it is best to reprogram the CIED to address both the tachycardic and bradycardic therapy.

A magnet's effect on a CIED can be programmable in some devices, meaning that some devices will not display a typical magnet behavior when a magnet is applied to the device. Due to this varied magnet response depending on the type of CIED, manufacturer, and individual electrophysiologist inserting the device, it is important to confirm the magnet effect on each individual patient's device prior to any operative procedure whenever possible.

CIED Failure

CIED failure is a rare perioperative occurrence that can result from a failure of the device to sense, a failure to pace, or damage to the generator. Most perioperative events that are thought to be pacemaker failures are really rate adaptive features that have not been disabled. For example, current pacemakers have minute ventilation sensors that increase the pacing rate for patients during exercise. EMI can change body impedance which might cause the pacemaker to pace at a fast rate since the pacemaker "sees" the EMI as increased physiologic demand.[11,12]

Electrical reset is also a very rare occurrence that can happen when EMI directly contacts the CIED generator and results in device failure. Therapeutic radiation is the usual perioperative culprit, and it is rare in the setting of monopolar cautery or cardioversion.[13-15] If electrical reset does occur, each CIED, depending on manufacturer and device, will default to a particular setting. While the default setting may not be optimal for one's specific patient, it will function safely until the device can be interrogated to determine if it can be reprogrammed or replaced. Damage to the generator may also be caused by electrocautery applied to the generator; therefore, the path of EMI should be directed away from the generator to prevent current flow across the device.

CIED leads may be damaged intraoperatively, leading to failures in sensing and/or pacing. EMI may produce enough current to flow from the generator to the pacing electrode and could possibly damage the tissue-lead interface. This acute injury may lead to loss of pacing and sensing.

Perioperative Management for Patients with CIEDs Presenting for Non-Urgent Surgery

Patients presenting for non-urgent surgery should have an algorithm of information that is communicated between the surgical, anesthesia, and CIED team (Table 1). Pacemakers should be interrogated every 12 months and ICDs and CRT devices should be evaluated every 6 months since

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Algorithm for Perioperative Management of CIEDs

"CIEDs," From Preceding Page

ICD and CRT patients tend to have more significant co-morbidities. The CIED team should know the type of procedure, the patient position, the type of EMI that will be used, anticipated cardioversion, and post-operative disposition in order to make recommendations. Anesthesia professionals should know what type of device the patient has (pacemaker vs. ICD), the indication for placement, battery life documented greater than 3 months, the programming mode (i.e., DDD, DOO), pacemaker dependence and underlying rhythm, and the magnet response.

Understanding these variables will help the anesthesia provider understand the CIED team recommendations regarding the use of a magnet versus pacemaker reprogramming. In general, procedures below the umbilicus do not require CIED reprogramming, although prophylactic magnet application may be used if the magnet response is known to the anesthesiologist (Figure 1). For patients having surgery above the umbilicus, it is important to disable ICD tachycardia therapy and for patients with pacemakers, rate responsiveness should be disabled. For patients who are pacemaker dependent having surgery above the umbilicus, they should be reprogrammed to an asynchronous mode either via the CIED team or by magnet placement if patient positioning and surgical access allows. For patients with CRT, asynchronous pacing should be guaranteed for surgeries above the umbilicus since biventricular pacing for this subset improves cardiac output. For procedures below the umbilicus, patients with CRT do not need reprogramming.

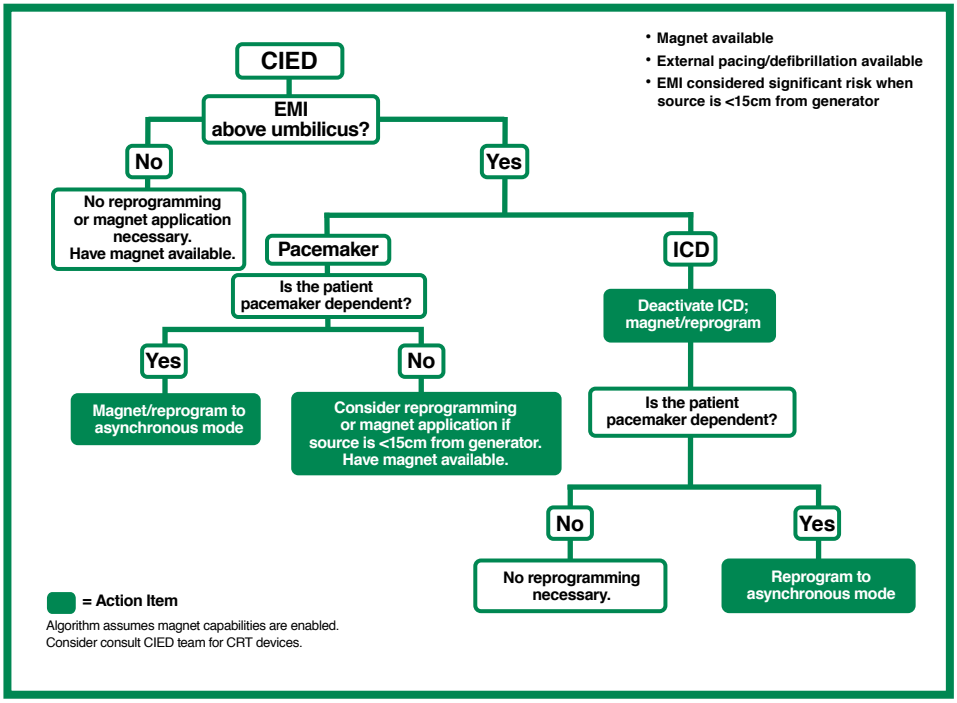

Figure 1. Algorithm for Perioperative Management of CIEDs

Emergency Management

For patients presenting for urgent or emergent surgery, there may not be sufficient time for the CIED team to make recommendations depending on the type of practice environment. In this setting, the anesthesia provider(s) should identify the type of device (pacemaker vs. ICD vs. CRT). There are several ways to obtain this information including medical records and patient CIED information card. If neither of these options is available, a chest radiograph can provide a great deal of information (see figure). Pacemakers have leads with consistent texture and thickness on radiographs but ICDs have shocking coils toward the distal tip of the lead which are brighter on radiograph and are thicker. Patients with CRT will have an additional lead that is entering the coronary sinus visible on the radiograph.

For patients having surgery below the umbilicus, one can proceed to surgery with the CIED device. For patients having surgery above the umbilicus, a preoperative 12-lead electrocardiogram or rhythm strip can determine if the patient is being paced. If pacing spikes are noted in front of most beats, one can assume the patient is pacemaker dependent. If there are no pacing spikes, one can proceed to surgery with a magnet in the room in case inappropriate sensing occurs. Monopolar electrocautery should be used in short bursts.

For ICDs, magnets should be used if the procedure is above the umbilicus to disable tachyarrhythmia therapy, but this will not change the pacemaker function. In this case, monopolar electrocautery should be used in short bursts to prevent pacemaker oversensing and resultant bradycardia in pacemaker dependent patients.

For emergencies, the CIED team should be contacted immediately. Even if there is not enough time to interrogate the device preoperatively, they can make intraoperative recommendations, and interrogate the device postoperatively. The 24-hour toll free phone contact number for all major CIED manufacturers should be readily available in the perioperative areas to all anesthesia providers (Table 2).

Conclusion

Anesthesiologists, as true perioperative physicians and other anesthesia professionals need to take an active role in learning about and managing these devices. It is important that all anesthesia providers understand the nuances to perioperative management of CIEDs, given that it is becoming increasingly difficult to obtain the consultative services of trained CIED specialists (cardiologists-electrophysiologists, manufacturer's representatives, CIED therapy trained cardiac anesthesiologists), especially during emergencies and late hours/weekends. Prior understanding and knowledge of

Table 2: 24-Hour Technical Support Contacts

Medtronic	800-633-8766
St. Jude	800-722-3774
Boston Scientific	800-227-3422
Biotronik	800-547-0394
Manufacturer	24-Hour Technical Support

All major manufacturers for bradytherapy and tachytherapy have 24-hour technical support numbers for providers practicing in environments without dedicated CIED teams. One can obtain pertinent information such as device type (bradytherapy or tachytherapy), date of implantation, magnet behavior, and the indication for placement 24-hours a day/7days a week. For specific information about pacemaker dependence or current settings, this number can also be used to contact a local device representative to help obtain more information.

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How Would You Manage the CIED?: Clinical Vignettes

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basic functioning of CIEDs along with their perioperative management will enable the anesthesia providers to better respond to patient care needs, as well as develop partnerships with the cardiology CIED teams in their institutions. Education in this area for all the anesthesia providers is an essential, but a challenging task. This needs to be accomplished through multiple sources such as local anesthesia training programs, web-based modules, simulation-based training, CIED workshop training by institutions and national societies, and national educational initiatives of multispecialty guideline development.

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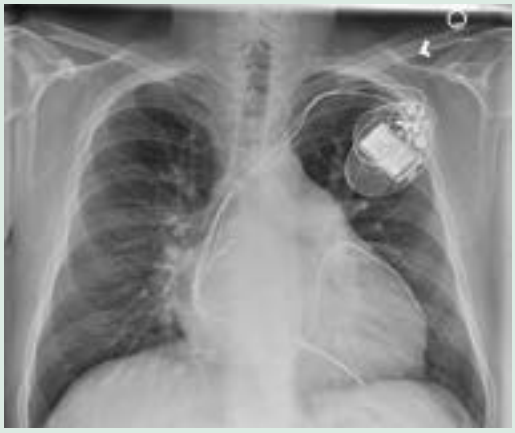
Clinical Vignette #1:

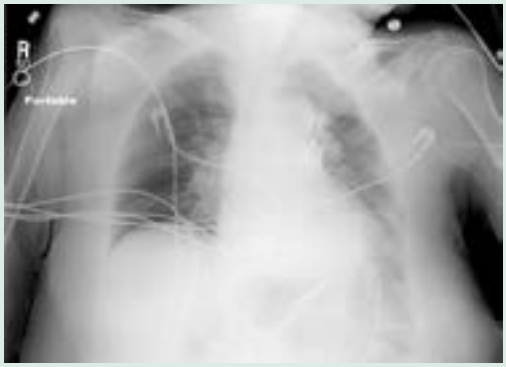
A 56-year-old male is admitted after a motor vehicle accident. He was intubated in the field, and is coming directly to the operating room for free air in the abdomen. A chest x-ray taken in the emergency department shows the following:



Teaching points: A chest x-ray can be extremely informative for patients coming for emergency surgery. A chest x-ray can identify the device type, leads, and manufacturer. From this x-ray, it is clear that the patient has 3 leads: a right atrial lead, a right ventricular lead, and a coronary sinus lead. In addition, the right ventricular lead is a shocking coil, which is identified by the thicker, denser distal portion of the lead. From this chest x-ray, it is clear that the patient has an ICD due to the shocking coil, and the coronary sinus lead suggests resychronization therapy for low ejection fraction. From this x-ray, this patient should be treated like any patient with cardiomyopathy. In addition, the emergency algorithm outlined above should be used to address the perioperative management of this ICD.

Clinical Vignette #2:

A 72-year-old female was admitted for acute abdominal pain. Surgical consultation and imaging led to a diagnosis of a small bowel perforation. She was urgently scheduled for surgery. During the history and physical, she commented that she had a pacemaker placed 1 month ago. She could not remember the details of why it was placed. A chest x-ray demonstrated the following:



Teaching points: This device is actually a loop recorder placed to monitor heart arrhythmias for longer periods of time. As opposed to the x-ray above, there are no leads entering the heart. This patient does not need special management of this device in the perioperative period.

Editor's Note: The preceding article makes frequent mention of a CIED team. Many institutions do not have such a team. It is the opinion of the Editors that in the absence of a CIED team the anesthesia providers should rely on communication with available cardiologists, surgeons, manufacturer representatives and/or the manufacturer's 24 hour telephone technical support. This should be on a case by case basis guided by clinical circumstances.

Letter to the Editor:

Obstruction to Dräger Apollo Exhaust Valve

Joyal et al.[1] recently presented an alarming case in which the Dräger Apollo system failed to detect an occlusion of the main exhaust valve during the routine self-calibration testing and missed an occlusion by a plastic wrapper which was discovered upon visual inspection. At our institution, Memorial Hermann Hospital-Texas Medical Center, we experienced the same system failure.

The incident occurred during the second case of the day. After the first case the machine was cleaned and reset as per protocol by the anesthesia technician. Pre-oxygenation, induction, and mask ventilation occurred uneventfully, but at commencement of mechanical ventilation the reservoir bag continued inflating, and the high peak pressures warning alarmed. Even reverting the machine to manual/spontaneous did not relieve the circuit's excessive pressure. The next course of action was opening the Apollo's valve/canister drawer, which rapidly resolved the pressure overload that had progressively exceeded 40 cm H_2O. The acuity of the situation allowed only a momentary glance inside the drawer; nothing abnormal was appreciated at the time. While a replacement ventilator was being rushed to the room, the patient was ventilated by an AMBU bag and anesthesia was maintained via IV agents. The relief of the accumulating pressure was rapid enough that no adverse effects to the patient were noted for the remainder of the procedure nor postoperatively.

Determining the cause of the failure was difficult since the main exhaust outlet is deeply recessed within the drawer. Thorough inspection of the Dräger Apollo after the conclusion of the case revealed a transparent plastic wrapper which had occluded the machine's main exhaust outlet, exactly as described by Joyal et al. Even in a normally lit room, supplemental lighting such as a flash light seems necessary to discover such a transparent obstruction.

In our opinion this case is disconcerting regarding not only the self testing procedure of the Apollo (the company's response to Joyal's letter did not recognize any failure of the self-test for the workstation), but also on the care in discarding any plastic covers we use in the operating room. Such covers may have less likelihood of presenting discreet problems if they had bright colored stripes or other elements which are opaque in nature.

Davide Cattano, MD,PhD
John W Henschel, MD
Houston, TX

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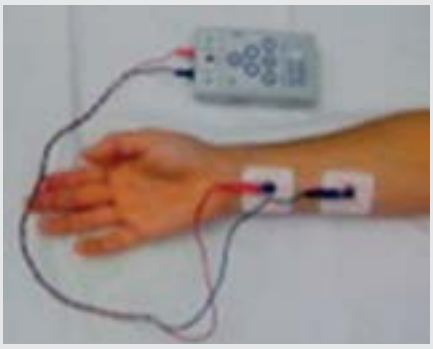

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"Thus, four decades after the first nerve stimulators were described, unacceptable levels of residual paresis in the PACU continue to be reported."

—Naguib, M. Br J Anaesth *2007*

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Q&A

Body Piercing and Electrocautery Risks

Q Dear Q&A,

It seems to me that I encounter more patients with all kinds of body piercing, and I am not exactly sure what the implications are if/when the surgeon plans to use electrocautery.

My (probably rather limited) understanding of this situation and my questions related to it are as follows:

1) Electrical current enters the patient's body and leaves it via the grounding pad, because that is usually the path of least resistance. However, in patients who have earrings (or some other form of body piercing), the path of least resistance could be the path through the earring and the electrical current could cause a burn at that site. Is that correct?

Ursula Class, MD
Seattle Children's Hospital

A Dear Dr. Class,

You are basically correct. The return plate for the electrosurgical unit ESI (it is NOT a grounding pad) is a large surface area, low resistance pathway for the ESI energy to safely return to the machine. Normally the energy will not go through other pathways. However, there is always the danger, the electrolyte gel may be dried out, or the pad could be dislodged, and indeed piercings could act as a return pathway and cause a burn.

Q Dear Q&A,

2) Does taping the earring help in any way? If yes, how?

A Dear Dr. Class,

No. It only helps to keep it from getting lost.

Q Dear Q&A,

3) Can a metal retractor act as a diverting medium also? And why is that usually not a problem? Does that have something to do with size, i.e., a certain amount of current delivered to a tiny earring can cause more harm than the same amount of current delivered to a relatively large retractor?

A Dear Dr. Class,

Again, normally no problem; however, the retractor could conduct current. Many a surgeon has discovered a hole in their glove when they held a retractor and activated the ESI. Yeow! It is true the smaller the surface area the worse the burn.

Q Dear Q&A,

4) I probably have anesthetized many patients with earrings in place and only a piece of tape applied over them and never had any problems even though electrical cautery was used. Have I and my patients only been lucky?

A Dear Dr. Class,

I think the safest thing is always to remove all piercings. If the system is working – no problem. The modern ESIs are better made than the older ones and the pads are much better. However, there is still a small risk.

I hope this helps.

Regards,

Jan Ehrenwerth, MD

Q Dear Q&A,

Thank you very much for your help!

See "Q&A," Next Page

Numerous questions to the Committee on Technology are individually and quickly answered each quarter by knowledgeable committee members or designated consultants. Many of those responses would be of value to the general readership, but are not suitable for the Dear SIRS column. Therefore, we have created this simple column to address the needs of our readership.

Q&A

Is It Safe to Eliminate CO_2 Monitoring for IV PCA After Administering Neuraxial Opioids for C-section?

"Q&A," From Preceding Page

Q Dear Q&A,

We have a major OB section with over 6,000 deliveries per year. The OB Department has requested IV PCA after neuraxial opioids for C-section patients. Our current regimen is 0.15 spinal Astramorph or 2 mg epidural Astramorph.

For breakthrough pain, we have started IV PCA utilizing on-demand opioids (no continuous) with end tidal CO_2 monitoring. The OB Department feels this is uncalled for and increases patient complaints.

Any thoughts or literature on IV PCA opioids post neuraxial opioids for C-section and appropriate monitoring. We currently maintain 24 hours of every hour clinical nursing evaluations and had tried Stadol and Nubain in the past, both of which are increasingly unavailable.

Bottom line question: Safety of eliminating CO_2 monitoring for IV PCA after administering the neuraxial opioids for C-section?

Sincerely,
Steve Lysak, MD
Greenville Anesthesiology PA

A Dear Dr. Lysak,

This is an excellent question. It touches on a number of controversial and interesting safety topics in obstetric anesthesiology. Specifically, 1) appropriate ventilation monitoring with the use of long-acting neuraxial opioids or intravenous PCA opioids for postoperative pain, and 2) the concomitant use of a long-acting neuraxial opioid and a long- or short-acting intravenous (IV) opioid via a PCA device for the treatment of acute postoperative pain.

First, Dr. Lysak, your team is absolutely correct to insist on additional monitoring beyond pulse oximetry, or additional nursing assessments to assess ventilation when either long-acting neuraxial opioids or intravenous PCA opioids are used. This would especially be true if patients are utilizing both opioid modalities. Postoperative hypoventilation is becoming the leading cause of anesthesia-related maternal mortality[1,2] With increasing rates of maternal obesity, our risk for postoperative hypoventilation in our postpartum mothers may only get worse.

The Practice Guidelines for the Prevention, Detection, and Management of Respiratory Depression Associated with Neuraxial Opioid Administration, by the ASA Task Force on Neuraxial Opioids recommend, "All patients receiving neuraxial opioids should be monitored for adequacy of ventilation (e.g., respiratory rate, depth of respiration [assessed without disturbing a sleeping patient]), oxygenation (e.g., pulse oximetry when appropriate), and level of consciousness."[1] The APSF, however, sets more challenging monitoring goals with the publication of the conclusions and recommendations of a June 8, 2011 APSF forum entitled, "Essential Monitoring Strategies to Detect Clinically Significant Drug-Induced Respiratory Depression in the Postoperative Period."[4] These recommendations seem to imply that we should provide ventilation monitoring for most of our postpartum patients who receive long-acting neuraxial opioid. However, they only specifically state that ventilation monitoring is indicated "when supplemental oxygen is needed to maintain acceptable oxygen saturations," which is rare in postpartum women.

With the current state of the art of postoperative ventilation monitoring, it is expensive and, for many hospitals, impossible to provide $ETCO_2$ ventilation monitoring on every postpartum patient that receives long-acting neuraxial and/or intravenous opioids. Until this technology advances, rigorous nursing assessments may have to be a reasonable substitute. At Mayo Clinic in Rochester, Minnesota, I believe we provide some of the most conservative postcesarean delivery monitoring in the country. We have our nursing staff obtain Richmond Agitation Sedation Scale (RASS) scores every hour for the first 12 hours and every-other-hour for the next 12. Pulse oximetry is continuous. Note, that the night time "wake up" that's required to get the RASS score is disliked by the nurses, patients, and the obstetric service. However, until we have more reliable, comfortable, and cheaper continuous $ETCO_2$ monitoring, it seems sedation monitoring may be the most reasonable alternative.

Second, Dr. Lysak, regarding your PCA question, I believe that it may be prudent to avoid the use of a long-acting neuraxial opioid with long-acting intravenous opioids in most postcesarean delivery patients. With the potential for delayed respiratory depression from the long-acting neuraxial opioid, a long-acting intravenous opioid could potentially increase the risk of respiratory depression sneaking up on our patients during the night. Therefore, if a PCA device is added for additional opioid administration, a low-dose fentanyl PCA may be safest.

Here at Mayo we do occasionally add a fentanyl PCA for postcesarean delivery patients typically starting at 10 mcg every 10 minutes with a 4-hour lock-out of 200 mcg, we increase this to 20 mcg every 10 minutes with a lock-out of 400 mcg if necessary. Note, however, that we have recently changed our routine postcesarean pain management to a multimodal regimen of oral oxycodone and scheduled acetaminophen and ketorolac eventually converting to ibuprofen. This has been a very successful practice change for us, largely eliminating our patients' needs for fentanyl PCAs. Patients are describing decreased pain, nursing is describing decreased opioid side-effects and greater patient function, and administration is anticipating much expense saved with the reduced use of pricey fentanyl PCAs. I would ask your obstetric team if their postcesarean pain regimen involves scheduled acetaminophen and NSAID administration. You can support this request by informing them that such practice is recommended in the Practice Guidelines for Acute Pain Management in the Perioperative Setting from the ASA Task Force on Acute Pain Management.[5]

Your question is excellent. I hope I was able to provide a few insights to help you keep your new mothers safe.

Respectfully,
Dr. Katherine Arendt

Katherine W. Arendt, MD
Consultant, Department of Anesthesiology
Assistant Professor of Anesthesiology
College of Medicine
Mayo Clinic
Rochester, MN

See "Q&A," Next Page

Q&A

Is It Appropriate to Use Cell Savers to Collect and Re-Infuse Blood During a C-section?

"Q&A," From Preceding Page

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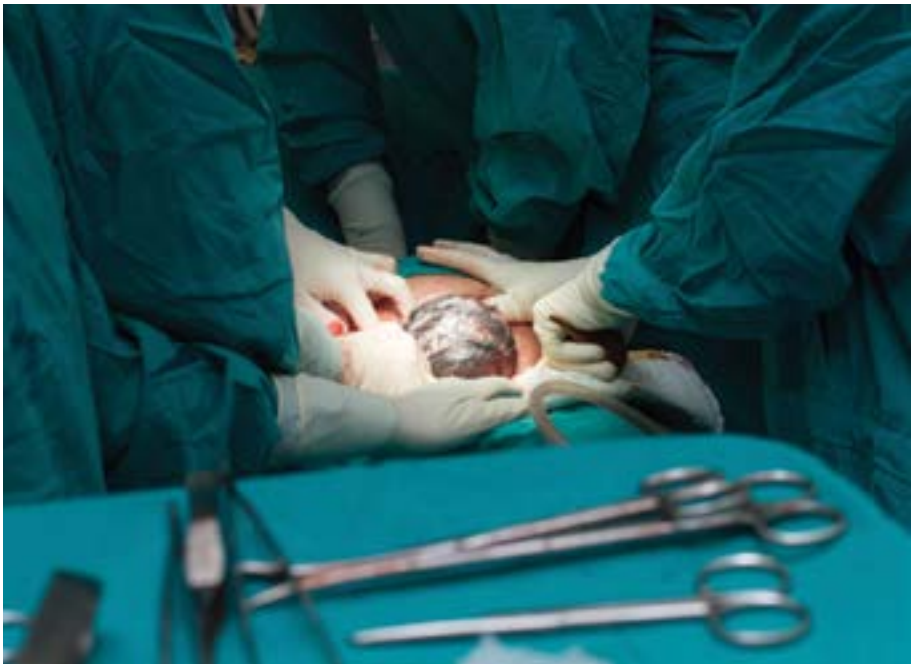

Q **Dear Q&A,**

Is it appropriate to use cell savers to collect and re-infuse blood during a C-section (i.e., are squamous cells and vernix removed safely)?

I have an OB doctor who insists it is.

Regards,
Steve Howarth, MD

A **Dear Dr. Howarth,**

What a great question! This has been hotly debated over the past 13 years with experts now leaning toward the safety of the use of cell salvage during cesarean delivery.

An excellent and thorough review on this topic[1] states that no harm has yet been reported from the use of red cell salvage during cesarean delivery or ectopic pregnancy surgery—no increased rate of infection or DIC, and no reported cases of amniotic fluid embolism. You are likely getting the information that it is safe to use from your obstetric colleagues because the ACOG has recently endorsed its use in obstetric hemorrhage associated with placenta accreta with the statement, "Autologous blood salvage devices have proved safe, and the use of these devices may be a valuable adjunct during the surgery."[2] Further, United Kingdom organizations have also endorsed its use in maternal hemorrhage since 2005.[3]

You will note, however, that one very important piece of data is missing from all the work that has been done—large enough case series to prove that cell salvage in obstetrics is safer than or even as safe as allogeneic blood transfusions. The largest series of cell salvage use during a birth includes only 46 patients.[4] I know that larger series are in the works in the UK. Until those are completed, since I practice conservatively, and my institution has an excellent blood bank, I therefore do not routinely use cell salvage for postpartum hemorrhage, placenta previa, or even placenta accreta cases.

However, if one is practicing with a limited blood supply, or if rare maternal blood antibodies exist and massive blood transfusion is needed, I would definitely consider its use. As another example, last year I set up cell saver for a cesarean delivery for a Jehovah's Witness with a placenta accreta (she simply asked that the tubing be contiguous from her to the cell salvage machine and back to her).

There are a number of important caveats to consider when using this technology in the obstetric population:

1. In the case of Rh negative mothers with Rh positive babies, some still question as to whether the use of cell saver will increase maternal antibody production as fetal blood will likely get suctioned into the cell salvage. Because during any CS it is believed that there is exposure of fetal to maternal blood, other experts do not consider this a concern.
2. *It is also important to note the filter on the cell salvage device. The "LeukoGuard RS filter (Pall Medical)" is what has been involved in many of the contamination studies and is what is recommended in the above-referenced review.*[1]
3. *The obstetricians are to avoid directly sucking up the amniotic fluid. When we used the device, the surgeons had 2 separate suctions and only after the amniotic fluid appeared to be grossly out of the surgical field did they begin to use the cell salvage suction.*

In conclusion, it is my opinion that the routine use of cell salvage during cesarean delivery for postpartum hemorrhage, previa, or accreta is debatable until large series are published

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Q&A

Use of Cell Savers During C-Section

"Q&A," From Preceding Page

demonstrating that the safety of its use nears that of allogeneic blood transfusion. I feel that in cases in which allogeneic blood transfusions are limited by supply, limited in safety, or are limited by maternal request, cell salvage is an option for the obstetric anesthesiology team.

Respectfully,
Dr. Katherine Arendt

Katherine W. Arendt, MD
Consultant, Department of Anesthesiology
Assistant Professor of Anesthesiology
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Mayo Clinic
Rochester, MN

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The APSF continues to accept and appreciate contributions.

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Letter to the Editor:

Proposed Standardizations for the LMA

To the Editor:

I applaud the excellent work and publications of the APSF, and I thank you for the outstanding Newsletter.

I would like to make an appeal to all the LMA manufacturers. As an anesthesiologist in practice for the last 26 years, I celebrate the innovation that is the LMA. This remarkable device has revolutionized anesthesia care and our entire practice. As more and more companies enter the market in this arena, we see a multitude of LMAs designed for various special uses. There are 2 safety issues of great concern to me. The first issue is that of the intrinsic bite block. It is my belief that all LMAs should share this feature to avoid occlusion of the LMA if the patient bites down during emergence.

The second and more serious issue is that of intubation via an LMA. It is my belief that all LMAs, not just the "intubating LMAs" should easily accommodate an endotracheal tube. This would simply require that all LMAs have a slightly shorter shaft and larger lumen. I don't believe this would impair the use of specific LMAs in any way, and it would prevent the need for changing LMAs in an urgent airway situation.

Just as we have standard adapters on endotracheal tubes and standardized luer lock syringes, we deserve a standardized LMA design that would facilitate endotracheal intubation in emergencies.

Perhaps the APSF can assist in advocating for this standard.

Danielle M. Reicher, MD
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Letter to the Editor:

Safer Injection Practices: Filter Needle Use with Glass Ampoules

To the Editor:

It has come to my attention that many anesthesia professionals do not follow established standards when preparing medications from glass ampoules. The American Society of Health-System Pharmacists and the Infusion Nurses Society are 2 health care organizations that have guidelines for standards of practice regarding filter needle use with glass ampoules. These organizations base their guidelines upon recommendations from the United States Pharmacopeia (USP) Chapter <797>: Pharmaceutical Compounding-Sterile Preparations. The purpose of USP 797, in part, is to prevent patient harm resulting from unintended physical (glass) contaminants and provide minimum quality and practice standards based upon recent scientific evidence. The Joint Commission, formerly the Joint Commission on Accreditation of Healthcare Organizations, also considers USP " best" clinical practice. Therefore, anesthesia providers should follow established guidelines for standards of practice.

The following key points are noted based upon my review of the literature:

1. Glass particle contamination (GPC) of medication may occur when opening ampoules
2. GPC has the potential to cause patient harm when injected into the patient
3. Filter needle use with ampoules can reduce the risk of GPC
4. Pharmacy and nursing have established standards of practice to improve patient safety by reducing GPC when drawing medications from ampoules
5. Some Anesthesia professionals that regularly use ampoules do not routinely use filter needles when preparing medications from ampoules

In summary, anesthesia professionals should be dedicated to providing to the public the safest anesthesia services possible based on current science supporting best practices. This includes considering established guidelines and standards from pharmacy and nursing health care organizations when preparing medications from ampoules. Blunt filter needles or filter straws with a 5 micron filter should be available and used each and every time a medication is aspirated from a glass ampoule to reduce glass particle contamination Such action will promote patient safety and reduce the risk of patient harm.

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Special Letter to the Editor:

A Dangerous Side of In-Line IV Filters When Used for Vasoactive Infusions in Infants

To the Editor:

In-line IV filters are commonly used in pediatric patients with congenital heart disease. The main purpose is the prevention of air from reaching the systemic circulation with resulting potential catastrophic effects in this patient population. Other advertised benefits include the filtering of fluid contaminants such as undissolved drug particles; precipitates; bacteria; endotoxins; fragments of glass, plastic, or rubber; and large lipids. Negative aspects of in-line IV filters include reduction of infusion flow rates secondary to filter clogging and added costs.

In-line IV filters house a membrane that separates the whole unit into a patient side and an air-vent side. Proper priming techniques allow the fluid to fill the air-vent side first while saturating the membrane and then filling the patient side. The saturated membrane will prevent air from passing through to the patient side.

In-line IV filters are observed to back-siphon when lowered below the patient's heart level. This effect is usually readily visible as blood can be seen traveling up the tubing toward the filter. However, there is less awareness that once a filter is raised above the patient's heart level, a bolusing effect occurs. In pediatric cardiac patients receiving vasoactive infusions with an in-line IV filter in place, inadvertent change of the patient's position relative to the filter level can cause major changes in infusion rates and lead to clinically significant hemodynamic effects. These hemodynamic changes could be attributed to other causes and lead to erroneous patient management actions.

Figure 1. Posydine ELD96NT in-line IV filter.

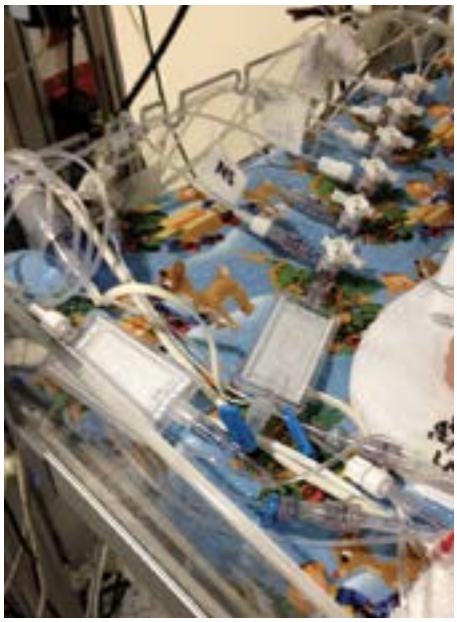

Figure 2. In-line IV filter as used clinically in a postoperative pediatric cardiac neonatal patient.

We would like to report the results of an experiment studying these effects. This experiment arose from observation of unexplained episodes of significant hypertension in a neonate after congenital cardiac surgery. The events occurred when the patient was not being touched or stimulated. It was noted that some episodes were in close proximity to repositioning of the IV tubing and infusion apparatus around the neonate. Clinical concern derived from the unexplained hypertensive episodes, which led to EEG monitoring looking for subclinical seizures and other studies to elucidate their causation. Nothing conclusive was found. At this point, we began to investigate the in-line IV filter used on this patient (Posydine ELD96NT from PALL Medical), which has a casing volume of about 2 ml (Figures 1 and 2).

See "Inline IV Filters," Next Page

Figure 3. Open system demonstration: Primed filter, end of infusion line with 25-gauge needle and syringe at same level. Note that no fluid is dripping at the open end.

IV Filter Alters Infusion Rate Depending on Height of Filter Above Heart Level

"Inline IV Filters," From Preceding Page

The first part of the experiment was an open system consisting of an in-line IV filter (ELD96NT) in an IV delivery apparatus consisting of a 20 ml syringe connected to a stopcock, 2 lengths of 3-ft-low-volume IV tubing with the Pall filter in between. The open end was connected to a 25-gauge needle (Figure 3). Normal saline was used as the infusate for all experiments. The system including the Pall filter was properly primed. The syringe, IV filter, and the open end of the system were initially placed at the same level. No fluid was flowing out at the open end. When the in-line IV filter was raised to an arbitrary level above the rest of the apparatus, fluid started to briskly drip out at the open end (Figure 4). The in-line IV filter housing was observed to lose its prime fluid as evidenced by an air-fluid level on the air-vent side with decreasing prime level (Figure 5). No air was observed on the patient side of the filter. As the in-line IV filter was returned to its original position, the dripping stopped (Figure 6).

To simulate the effect of in-line IV filter height change on fluid delivery rate to a patient, a closed system was created by the use of a Medfusion 3500 infusion pump, a delivery apparatus consisting of a 10 mL syringe and a stopcock connected to 2 lengths of 3-ft- low-volume tubing that is attached to a 16-gauge 16-cm-long single lumen central line. An in-line IV filter was placed between the 2 low-volume tubings. The system including the Pall filter was then properly primed with saline. Simulating the central pressure conditions in a child, the central line was freely suspended into a column of water 11 cm deep, representing about 8 mmHg at the central circulation. The container with the column of water was placed on a high

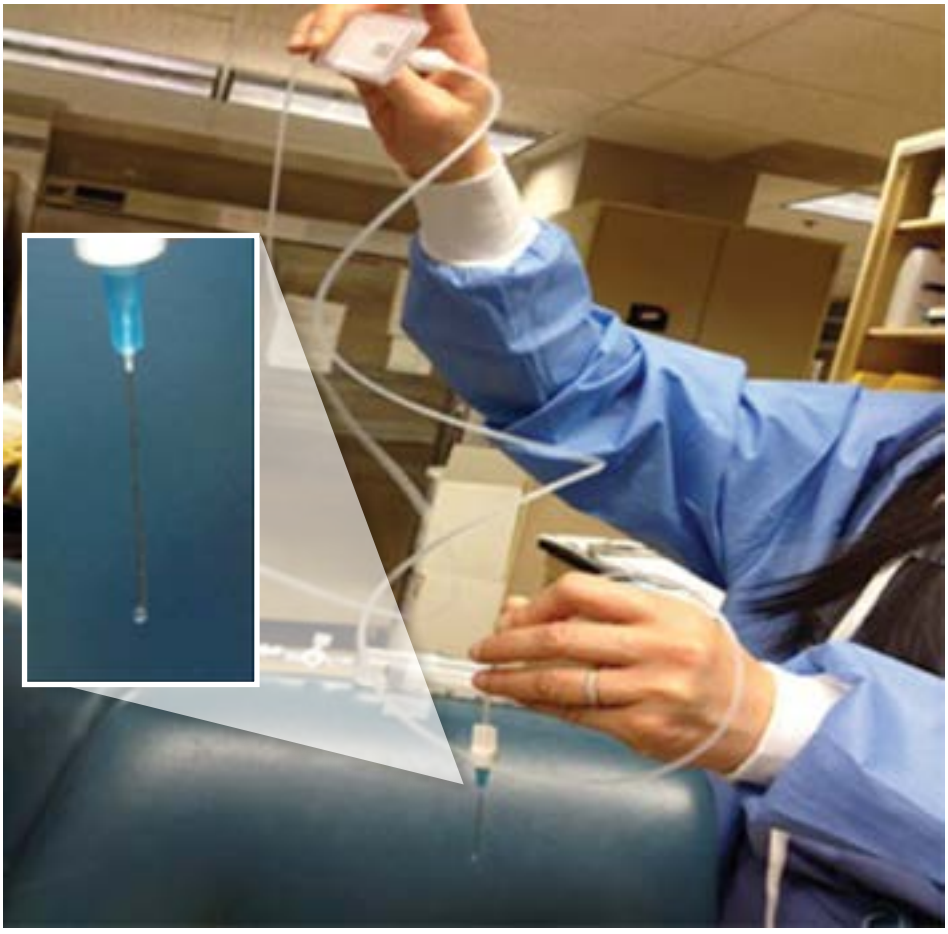

Figure 4. Open system demonstration: Now, the in-line filter is raised above the rest of the system. Fluid briskly drips out at the open end.

Figure 5. Open system demonstration: Note prime level decreasing inside filter housing. This happens while the fluid drips out at the open end.

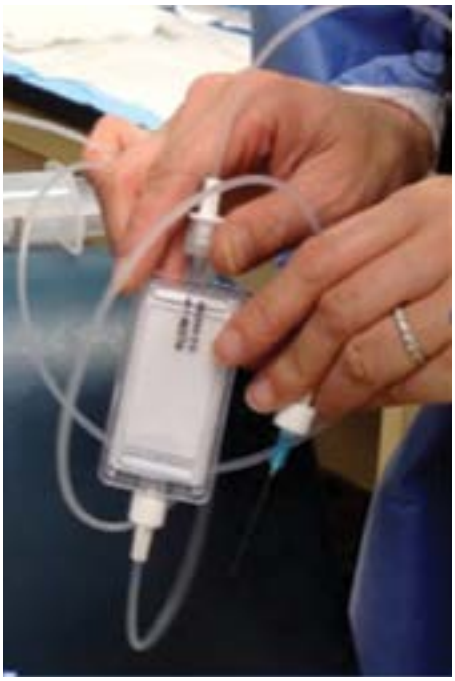

Figure 6. Open system demonstration: The filter is lowered to the original level. Note that the dripping stops.

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Small Changes in Infusion Rate May Be Dangerous in Neonates

"Inline IV Filters," From Preceding Page

precision scale for weighing the delivered fluid out of the syringe pump. The scale was calibrated prior to use. Care was taken such that the delivery apparatus was freely suspended and not touching the sides of the water column. The syringe pump and the in-line IV filter were secured at the mid-level of the water column to minimize gravity effects of the pump with respect to the level of the central circulation ("patient's heart level"). To minimize the effects of start-up delay, a 2 ml bolus prime through the syringe pump was performed. The scale was tared, and then the syringe pump was allowed to run at 0.6 ml/hr for over 90 minutes to ensure steady state. The timer was set to zero and started when the weight was 1.9000 grams with the pump and the in-line IV filter leveled with the "patient's heart." Then, the in-line IV filter was raised to an arbitrary height above the water column and the rate of change of fluid delivery recorded. The calculated average rate of delivery during this time period was 34 ml/hr, even though the pump was set at 0.6ml/hr. Lastly, once the rate of weight change was slowing down, the in-line IV filter was dropped to its original position. When the filter was lowered to baseline level, back-siphoning into the filter housing occurred at a calculated rate of 24 ml/hr although the filter was NOT below the "patient's heart" level.

Note that in neonates and infants it is important to minimize the total non-nutritive fluid given; therefore, infusion rates are kept very low, often testing the limits of the infusion pumps for accurate delivery. In sick neonates, infusions can be as low as 0.1- 0.5 ml/hr.

The position of the in-line IV filter relative to the patient can fluctuate throughout the day. IV tubings and infusion delivery systems get rearranged, changed, connected, and disconnected multiple times a day. The patient also gets repositioned and moved to allow for patient care activities.

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Manufacturer Recommends Using Smallest Filter for Neonates

"Inline IV Filters," From Preceding Page

In our institution, the in-line IV filters are kept on the patient's bed, so they are unlikely to drop below the patient's level unless the patient is lifted up. By observation, it was more common to have the filters be raised up above the patient during manipulation of the IV tubing systems. For illustration purposes, epinephrine's concentration is standardized to 16 mcg/ml for a 5 kg patient at our institution, so that even a small unintended bolus of 0.5 mL means that 8 mcg of epinephrine would be delivered to the patient in a bolus. In a postoperative pediatric cardiac patient with many fresh systemic suture lines, the hemodynamic effect of this unintended drug bolus can have devastating clinical consequences and can lead to unnecessary studies and management changes to account and adjust for the hemodynamic derangements.

Neither the ELD95NT in-line IV filter's brochure nor its website (www.pall.com) made mention of back-siphoning or bolusing effects. The company was contacted regarding this problem, and the following letter was received as response:

> Thank you for contacting Pall Medical with your concern regarding using the ELD96NT filter with your neonatal population. You observed that if the filter becomes raised above the heart of the patient the filter begins to empty, flowing unintentionally and at an unknown flow rate. Your observation is consistent with the design of all air venting filters. During normal operation, the 0.2 micron air venting membrane of the ELD96 filter allows inadvertent air within the fluid to be vented out of the filter. When an air-venting filter is raised above the patient's infusion site and the delivery of IV fluid is stopped, or flowing at an extremely low flow rate, gravity exerts pressure on the liquid column between the filter and the patient. If the patient's venous pressure is less than the gravity pulling on this liquid column, the upstream side of the filter housing can begin to fill with air, via the air vents, allowing IV fluid to flow until the main filter membrane becomes air blocked (ie: air therefore will not pass through and enter the patient side of the filter). Once the IV flow is initiated again or the filter is placed back to the level of the infusion site, the filter will automatically refill with solution. Therefore, for normal operation, the filter should be maintained at the level of the infusion site during use. If the IV administration system must be manipulated in a way that requires elevating the filter above the patient, a clamp should be applied on the patient side of the filter until the filter is returned to its original orientation.
>
> For your particular application, Pall Medical has recommended using reorder code NEO96 which is a 0.2 µm filter for use with neonatal patients. The filters hold up volume is 0.4 mL compared to the larger ELD96NT which has a hold up volume of 2.0 mL.
>
> I hope this information is helpful and I appreciate your feedback. To better inform our users, we will update our instructions for use to provide guidance more explicitly.

Our patients now use the NEO96 filters. We also tested the NEO96 filters and found that the back-siphoning and bolusing effects are present but in a much smaller scale. According to Pall Medical the labelling on the ELD96NT is being updated and will be included during in-service training sessions. The additional information will include statements that the filter is intended to be secured at the intravenous catheter and that if downstream extension tubing is used a clamp should be used to prevent unintentional draining. If downstream extension tubing is not used a temporary clamp should be used to prevent such unintentional draining.

In conclusion, we would like to alert health care providers who care for small children and use in-line IV filters about the unwanted flow effects of inadvertent back-siphoning and bolusing. Care should be taken to keep the in-line filters at the patient's heart level at all times minimizing changes in height between both. If changes are necessary, a clamp should be applied to the patient's side of the filter realizing that all flow through that line will be stopped till the clamp is released.

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Letter to the Editor:

Unable to Withdraw the Optishape™ Stylet During Endotracheal Intubation: An Unusual Cause

To the Editor:

The Truview EVO™ laryngoscope (Truphatek International Ltd. Netanya, Israel) is introduced with integrated optical lens that provides a 42° anterior reflected magnified laryngeal view.[1] It facilitates visualization of the glottis without the alignment of oral, pharyngeal, and tracheal axes.It has a dedicated preformed stylet (Optishape™ stylet) that helps in better control during intubation. We report a case, where we encountered difficulty in withdrawing the stylet during endotracheal tube intubation using Truview® laryngoscope.

A 30-year-old female patient with a history of cervical spine trauma causing fracture and dislocation of cervical spine (C4-5) was scheduled for surgical fixation and stabilization via anterior approach. In the operating room (OR) routine monitors were attached to the patient, and after induction of general anesthesia laryngoscopy was performed in neutral position with Truview® laryngoscope to access the glottic aperture. We planned for intubating the trachea with 7.5 mm internal diameter cuffed endotracheal tube (ETT).The ETT was premounted on the dedicated stylet (Optishape™) available with Truview® for the ease of insertion. The stylet was introduced inside the ETT and secured to the tube by a screw present on the proximal end. After positioning the distal tip of the ETT in front of the glottic aperture we intended to withdraw the stylet but were unsuccessful. There was resistance during withdrawal and on further attempts; both ETT and stylet were coming together as a single unit. We immediately removed the ETT along with the stylet and planned for intubating the trachea with another ETT of same size. The ETT was premounted on reusable malleable stylet (PORTEX®) with shape exactly like the Optishape™ stylet. Laryngoscopy with Truview® laryngoscope was repeated and patient trachea was intubated without any difficulty.

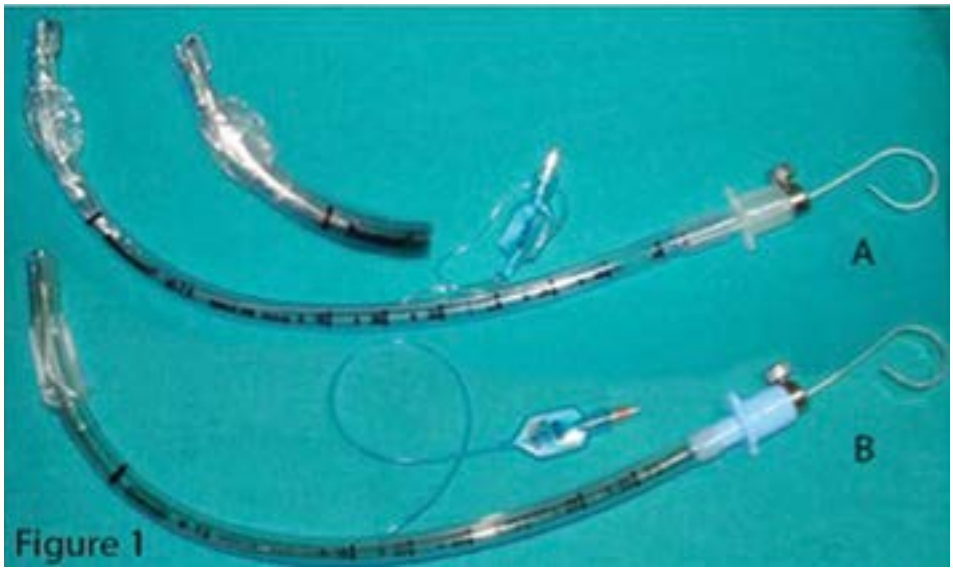

Figure 1. A) Optishape™ stylet tip entangled with ETT distal end. B) Normal position of stylet.

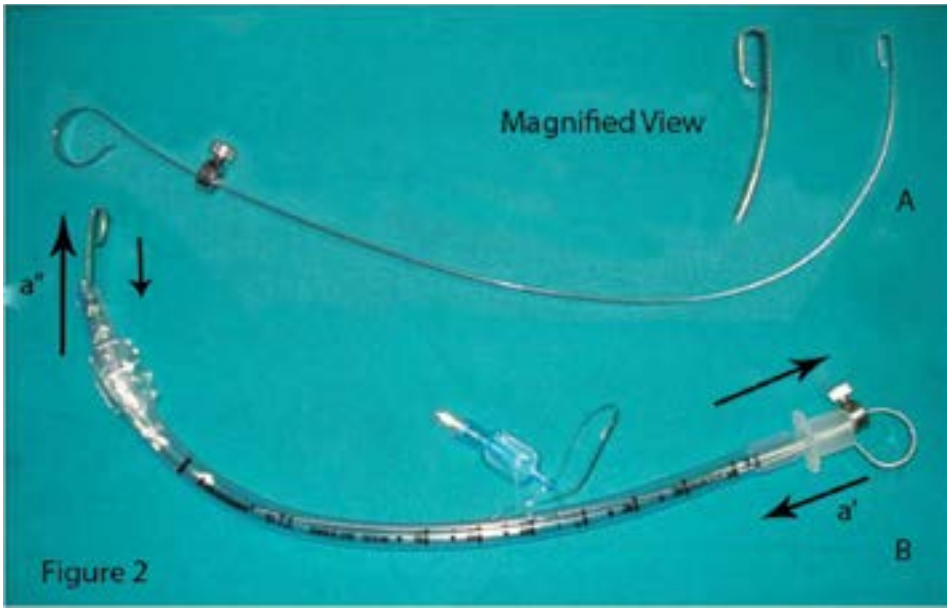

Figure 2. A) Optishape™ stylet and magnified view of tip with gap. B) Tip of stylet projected beyond the ETT tip, while withdrawing the stylet, ETT tip got entangled in the gap as shown by arrows.

On inspection of the Optishape™ stylet, it was found that the distal tip of the stylet was entangled with a distal end of the ETT, causing problems while withdrawing the stylet (Figure 1A). The manufacturers made the distal end of the Optishape™ stylet blunt by folding of the stylet tip, creating the possibility of a potential gap (Figure 2A). There can be a possibility of entanglement only if the tip of the stylet is projected beyond the ETT. We realized that in our case the same situation might have occurred arising from dislodgement of the stylet due to accidental loosening of the screw (Figure 2 B).

We infer that the Optishape™ stylet provided with Truview® needs certain modifications to avert this complication. We suggest that the distal end should not be folded to avoid the creation of a potential gap which can possibly get entangled with the ETT.

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Dr. Sunita, MD
Dr Dheeraj Kapoor, MD,FCCP
Dr. Rashi Sarna, MD
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Reference

1. Li JB, Xiong YC, Wang XL, Fan XH, Li Y, Xu H, et al. An evaluation of the Truview EVO2 laryngoscope. *Anaesthesia* 2007; 62:940-3.

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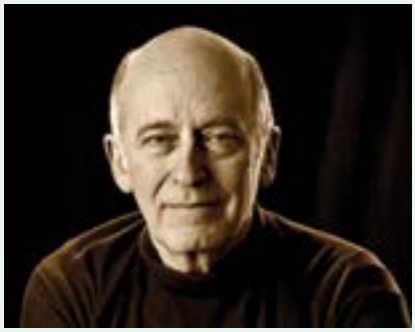
APSF NEWSLETTER Fall 2013

APSF Congratulates

Jeffrey B. Cooper, PhD

as the 2012 recipient of the American Society of Anesthesiologists Distinguished Service Award



Jeffrey B. Cooper, PhD

See Page 3 for full announcement

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