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Gopinath, A	Accidental Inclusion of the Guiding Loop Monofilament in the Bronchial Stump Suture Line: A complicaiton of single-lung ventilation using the Arndt Endobronchial Blocker in Infants	Case Report	Tufts Medical Center
Wakshinsky, Alex F.	Anesthetic Considerations in a Patient with Dextrocardia Complete Situs Inversus Undergoing Coronary Artery Bypass Graft	Case Report	University of Massachusetts Medical Center
Scott, J. Aaron, D.O., Gabrielson, Ashley, Matheos, Theofilos	Anesthetic Management in Awake CEA in a patient with Aorto-Occlusive Disease	Case Report	University of Massachusetts School of Medicine
Taiyeb, Abdullah	A rare complication after removal of indwelling arterial axillary catheter: Axillary Artery Pseudoaneurysm: Diagnosis and Management	Case Report	
Graff, Veena M.D.	Benefits of Music in Electroconvulsive Therapy (ECT)	Research	University of Vermont Medical Center
Gopinath, A, Nelson, C.	Blood products, crystalloids and rapid infusion: An experimental study	Research	Tufts Medical Center
Scott, J. Aaron, D.O.	Clinical Calibration of Noninvasive Pulse Oximeters	Research	University of Massachusetts
Shamin, S.F.	Medically Challenging Case of Complications Occurring During a Thoracic Endovascular Aortic Repair	Case Report	Boston Medical Center
Gopinath, A	Impact of Dexmedetomidine for Sedation in Cardiac Surgery on Post-Operative Atrial Fibrillation Incidence and ICU Length of Stay	Research	Tufts Medical Center
Motzkus-Feagans, Christine	Infection Site and Hospital Mortality in Patients with Sepsis: A Systematic Review	Research	University of Massachusetts
Rubens, Andrew M.D.	An innovative intubation method in a premature neonate with airway abnormality	Case Report	University of Vermont Medical Center
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Pannu, Ameeka M.D.	MPI in Sepsis	Research	Beth Isreal Deaconess Medical Center
Montagne, K	OR Governance in Rural Hospital Systems	Research	University of Vermont Medical Center
Smart-Abbey, J	Perioperative management of a patient with factor XI deficiency, spinal cord stimulator, and chronic bronchiectasis for elective surgery	Case Report	Tufts Medical Center
Scott, J. Aaron, D.O.	Perioperative Management of Aorto-esophageal Fistula	Case Report	University of Massachusetts
Mittel, Aaron M.D.	Increased Amyloidogenic Protein Burden	Research	Harvard Medical School
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Martin, Jacob A M.D.	Staffing Transcatheter Aortic Valve Replacements: What are the Costs	Research	University of Vermont Medical Center
Finkel, Joshua	Anesthetic Management of Undiagnosed Subglottic Stenosis	Case Report	University of Massachusetts Medical Center
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Moreno-Duarte, Ingrid	The Demographic of Obesity as a Focus in Anesthesiology Research between 2009 and 2014: An Observation	Research	Tufts Medical Center

Babriak, Loren	Type I Myotonic Dystrophy for Coronary Artery Bypass Grafting	Case Report	Maine Medical Center
Gebhardt, Brian M.D.	Use of Nebulized Heparin and N-Acetylcysteine in the management of Inhalation Injuries	Case Report	University of Massachusetts School of Medicine
Smart-Abbey, J	Uterine Incarceration: A literature review and examination of anesthetic care	Research	Tufts Medical Center
Pisano, Dominic	Ventricular Bigeminy during desflurane anesthesia: a case report	Case Report	Tufts Medical Center
Camann, Zachary M.D.	Peri-Operative Mortality in a Cirrhotic Patient after Urgent Surgery	Case Report	Lahey Hospital

Accidental inclusion of the guiding loop monofilament in the bronchial stump suture line: A complication of single-lung ventilation using the Arndt Endobronchial Blocker in infants.

A Gopinath MBChB, Z Robbins MD, A Kalra MD, Tufts Medical Center

Introduction

Lung isolation in children can be achieved using variety of techniques. The easiest means is to intentionally intubate the main stem bronchus of the non-operated lung. Parallel extra-luminal placement of an Arndt Endobronchial Blocker (AEM) has been described to facilitate lung isolation in infants. The AEM is a balloon tipped stiff catheter with an adjustable guide look at the tip to enable bronchoscope assisted precision placement

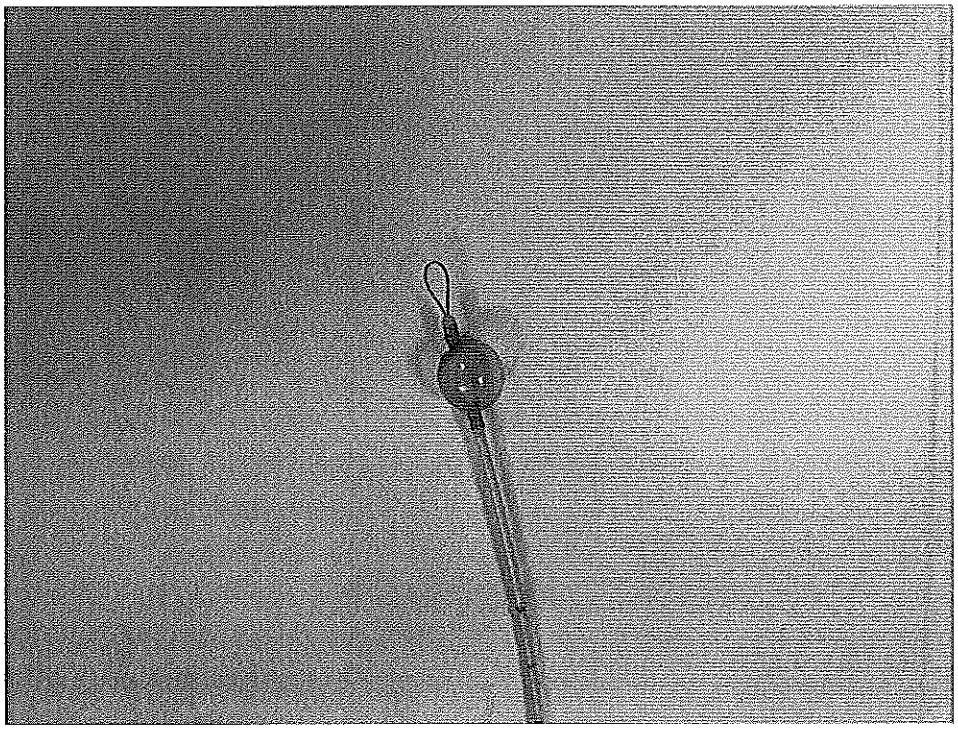
We present a case resulting in a complication using a 5 French AEB in a parallel extra-luminal configuration. This rare intraoperative complication required a stepwise collaborative approach resulting in a positive outcome.

Case

CM, a 9 month old male weighing 9.5 kg underwent a right thoracotomy, for a 1.5 x 2.9 cm right lower lobe cystic congenital adenomatous malformation. He was asymptomatic and otherwise healthy. Standard inhalation induction with sevoflurane was followed by IV placement. Paralysis and direct laryngoscopy performed using a Miller 1 blade. A 5 French AEB was placed in the trachea followed by parallel placement of a 3.5 mm microcuff endotracheal tube. Using a pediatric bronchoscope, the blocker was advanced using its adjustable guide loop into the right main stem bronchus. Excellent lung isolation was achieved. The surgery proceeded without complication. At the end, the right lung was reinflated and the patient repositioned to supine. Once extubation criteria were met, we proceeded with removal of the endotracheal tube. However, we met significant resistance when trying to extricate the AEB. We timely understood that the blocker was wedged deep in the bronchus, however the mechanism of traction was unclear. The infant was induced and reintubated in order to confirm the suspicion. Flexible bronchoscopy confirmed that the guiding monofilament loop at the tip of the AEB was incorporated within the bronchial stump suture line. We carefully cut one of the threads of the monofilament at the proximal hub of the blocker but were unable to pull the monofilament due to resistance. We consulted pediatric otolaryngology who

performed a rigid bronchoscopy, but were unable to get to the tip of the blocker due to limited access. We decided to cut the AEB midway along its length. This allowed the built-in metallic stylet to be removed, creating space for the monofilament to be pulled without disrupting the stump site. The patient was extubated and transferred to PICU.

Parallel extra-luminal placement of an AEB is a great technique for lung isolation in infants. Upon successful lung isolation and confirmed bronchial placement, it is prudent to retract the nylon loop fully or partially to prevent such a complication. In the event, the loop does gets lodged in the suture line, it is paramount to cut open the AEB midway and extricate the metallic stylet before removing the monofilament. We advocate the need to be aware of this potential but rare complication.



Photograph illustrating the loop monofilament at the end of the Arndt Endobronchial Blocker which was accidently sutured to the bronchus.

ANESTHETIC CONSIDERATIONS IN A PATIENT WITH DEXTROCARDIA COMPLETE SITUS INVERSUS UNDERGOING CORONARY ARTERY BYPASS GRAFT

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Dextrocardia with complete situs inversus is a rare congenital condition present in 1 in 10,000 of the population that involves a complete transposition of the major vessels and organs of the body. A complex procedure such as coronary artery bypass graft in a patient with this rare condition requires careful planning and innovative anesthetic techniques. In this case while considering the anatomy of the major vesicles it was decided that placing a central line in the left internal jugular vein provided appropriate and accessible access and allowed for easy placement of the pulmonary arterial catheter. A novel technique of using a TEE probe was also employed.

Anesthetic Management in an Awake CEA in a patient with Aorto-Occlusive Disease

Abstract

INTRODUCTION: Performing carotid endarterectomies on an awake patient is a valid anesthetic technique in selected patients. Patients must be cooperative and willing to participate. Also, cerebral perfusion is easier to monitor on an awake patient. Patients at higher risk of cerebral ischemic event, such as those with severe aorto-occlusive disease are perfect for this choice of anesthetic.

CASE REPORT: 78M with a 3 week history of lightheadedness and weakness presented for a left carotid endarterectomy. Duplex dopplers showed >80% carotid stenosis bilaterally. With a plethora of significant comorbidities, the patient was counseled on the possibility of an awake CEA, which was agreed upon by the vascular surgeon. Decision was made to proceed using a deep & superficial cervical plexus block and local anesthesia from the surgeonAdequate block was assessed before proceeding to the OR. Prior to surgery, a right radial arterial line using palpation alone was placed with initial blood pressure surprisingly 115/63. A bell was placed in the patient's right hand to assess motor function and ability to follow commands during the case. Upon clamping of the left internal carotid, the patient's blood pressure fell to 60s/40s after a couple minutes. During this period of clamping, the patient followed commands and conversed normally with the OR staff. The hypotension remained until the artery was unclamped, upon which the blood pressure returned to pre-operative baselines after 7 minutes of unclamping, supposedly to rebuild the collateral flow.

CONCLUSION: Awake monitoring during carotid endarterectomy was a superior method to monitor cerebral ischemia in this patient. Adequate analgesia must be maintained, but without awake monitoring, the patient would have been exposed to the effect of vasopressors that were not needed with awake monitoring.

A rare complication after removal of indwelling arterial axillary catheter:

Axillary Artery Pseudoaneurysm: Diagnosis and Management

Case Report

Abdullah Taiyeb, MD[1,4], Arwa Badeeb, MD[2,4], Jana Hudcova, MD[2,4]

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Introduction:

Arterial catheter facilitates hemodynamic monitoring in critically ill patients. Additionally it represents easy access for frequent blood draws and blood gas analyses. Radial arterial cannulation is the most common, followed by the femoral and axillary approaches. In general, complications are infrequent, however they may be catastrophic, such as thrombosis and ischemia, embolization, and hemorrhage.[1] In this case report, we describe a complication following an intra-arterial catheter removal: an iatrogenic axillary pseudoaneurysm formation and its management.

Case Report:

A 75 year old female with a past medical history of diabetes mellitus, hypertension, peripheral vascular disease, atrial fibrillation, chronic kidney disease, s/p aortic valve replacement with a mechanical valve who was admitted to the SICU after an elective abdominal aortic aneurysm repair. Routine hemodynamic monitoring was conducted via invasive arterial and venous catheters, including a radial arterial line. The patient was systemically anticoagulated shortly after surgery, primarily because of the mechanical valve. Throughout the SICU stay the patient required prolonged arterial cannulation because of ventilator status and need of accurate hemodynamic

monitoring.

Because of radial approach failure such as constant damping of the trace and inability to draw blood, the right axillary artery was cannulated. The cannulation was smooth, uneventful, on the first attempt with high quality trace and good backflow. The catheter was removed 5 days later, applying manual pressure for 30 min. During removal of the line patient was fully anticoagulated with low molecular weight heparin.

Twenty-four hours post removal, the patient was noted to have ecchymosis, swelling and tenderness to palpation at the area of former cannulation, the right axillary region. The upper extremity Doppler ultrasound revealed a large bi-lobed 10 cm and 8 cm hypoechoic soft tissue collection communicating with the lumen of the axillary artery via a narrow neck. (Figures 1 and 2) Application of color revealed a bidirectional flow between the two lumens through a narrow neck, a Yin-yang sign. (Figures 3). Radiologic findings were compatible with a pseudoaneurysm diagnosis. To control the lesion, the interventional radiologist injected thrombin around the neck of the pseudoaneurysm and the remainder of the thrombin into the cavity. The treatment with thrombin injection was repeated the following day because of mild expansion without evidence of flow through the neck. Two days after second intervention the right axillary region was reimaged and revealed no re-accumulation. During the period of pseudoaneurysm management patient's anticoagulation was on hold. After the control of the pseudoaneurysm, the anticoagulation in form of low molecular weight heparin was restarted as a bridge to warfarin.

Discussion:

Following points will be discussed:

1. Definitions of the pseudoaneurysm or false aneurysm (disruption of wall vessel with or without preservation of adventitia, frequently contained by the surrounding tissues only) and true aneurysm (outpouching of the vessel wall without disruption of the individual layers)[2]
2. Etiologies and Predisposing factors: trauma, congenital collagen diseases, infection, iatrogenic (post-catheterization)
3. Diagnosis of pseudoaneurysm:

   A/ Clinical signs: ecchymosis, swelling, pain, pulsatile hematoma, and bruit.

   B/ Radiological:

i/ Doppler ultrasound with color flow: hypoechoic collection with (Figure 1, 2).

ii/ CT scan.

4. Management:

A/ Ultrasound guided including but not limited to thrombin injection[3]

B/ Surgical repair

Conclusion:

Axillary pseudoaneurysm is a rare complication, with extremely high potential for rupture with catastrophic consequences if not diagnosed timely. Frequent monitoring of insertion site, immediate attention if any clinical suspicion arises with alerting an interventional radiologist or surgeon is advised.

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Figure 1. Grey scale ultrasound image of pseudoaneurysm

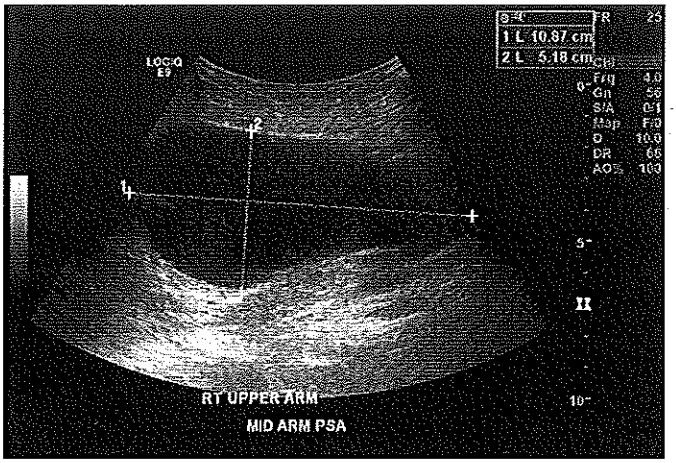


Figure 2. Color Doppler ultrasound image with a focus on the aneurysm neck.

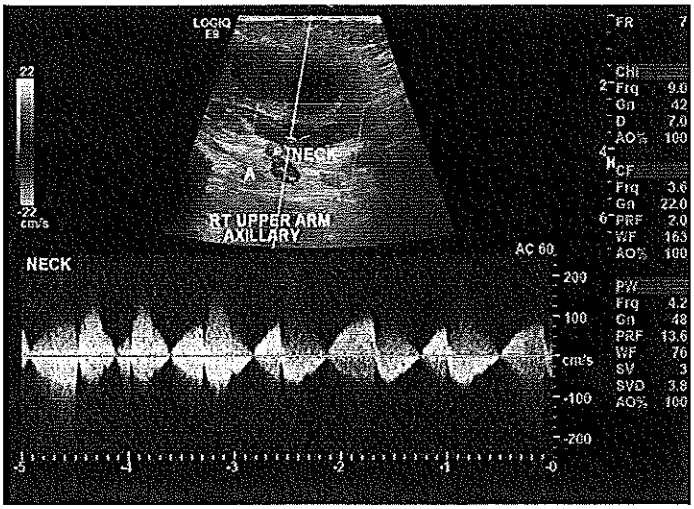
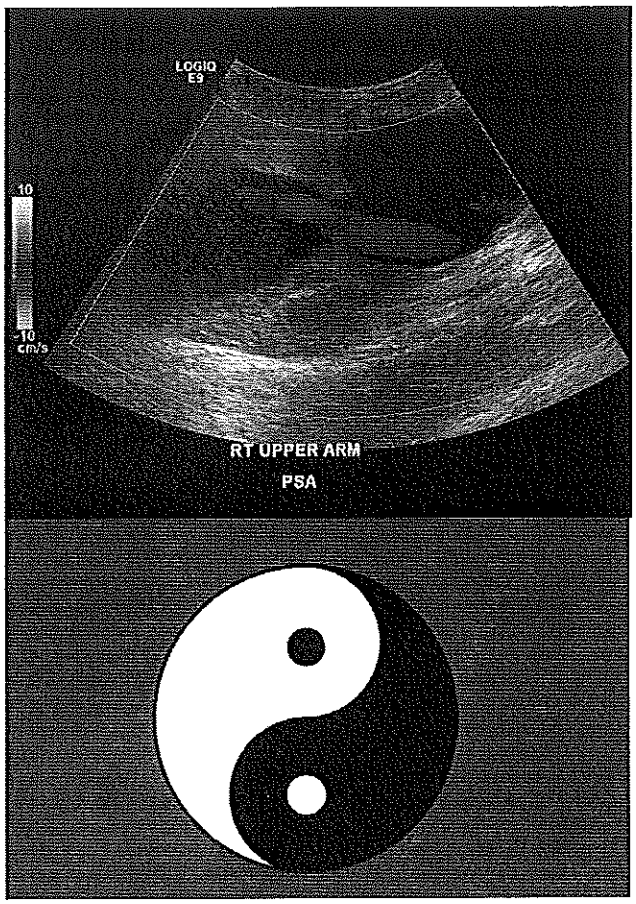


Figure 3. Classic sonographic Yin-yang sign of pseudoaneurysms.



Benefits of Music in Electroconvulsive Therapy (ECT)

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ABSTRACT

Objective – Patients may feel anxious and stressed while being prepared for ECT, which can lead to avoidance of treatments and poorer outcomes. Music has been shown to be a non-invasive, safe option to reduce anxiety in the preoperative setting; therefore, we examined its potential preoperatively during ECT procedures. Our primary aim was to examine whether patients receiving ECT to treat depression like, and benefit from, listening to music – by way of headphones or speakers – while they are prepared for ECT treatment.

Method – Approval to recruit up to 50 patients was granted by the University of Vermont IRB. Patients recommended to undergo ECT who were 18 years and older and were competent to give informed consent were recruited for this study. The patients served as their own controls in three separate sessions: in the first session, patients were randomized to music via headphones or speakers; in the second session, the patients did not receive music; in the third and final session, the remaining music intervention was administered, either music via headphones or speakers. Patients were asked for their preference in music, and if no preference was stated, the ECT provider and/or the PI chose the music for the patient. After each session, patients received a questionnaire based on a five-point Likert scale, with questions related to patient satisfaction and preferences of music being played prior to their ECT intervention. The patients received a final questionnaire at the end of the study asking which intervention they most preferred: music via headphones, music via speakers, or no music at all.

Results – 30 patients completed the study. 89.7% of patients indicated they "Agreed" or "Strongly Agreed" with the item "I enjoyed listening to music through speakers." 79.3% of patients indicated they "Agreed" or "Strongly Agreed" with the statement "I enjoyed listening to music through headphones." 17.2% of patients indicated they "Agreed" or "Strongly Agreed" with item "I preferred not having any music." In choosing music, 80% was patient's choice vs 20% ECT provider and/or PI choice. The difference in preference between speakers and headphones was not statistically significant ($p=0.563$; McNemar-Bowker Test). There was no statistical association between preference at the end of the study to the initial assignment of speakers or headphones ($p=0.542$ and $p=0.752$; Pearson Chi-Square Tests).

Conclusions – Music is a low-cost intervention with virtually no side effects that could reasonably be offered as an adjunct therapy for depressed patients undergoing ECT treatments. A large proportion of survey respondents expressed a strong preference for music prior to receiving ECT. No adverse events were reported. There was no difference in preference for music being administered via headphones or speakers. Further studies should be conducted to evaluate whether music has an effect on preoperative anxiety levels, depression scores, medication use, or the ECT treatment itself, for depressed patients receiving ECT.

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Blood products, crystalloids and rapid infusion: An experimental study

Introduction

Rapid volume infusers are used in the resuscitation of trauma patients and should be able to safely deliver warmed fluids and blood products across a range of flow rates. The Belmont FMS 2000 (MA, USA) is one such device that uses a heating coil and a roller pump mechanism. A reservoir can be used for high volume transfusion, and in clinical practice, the reservoir is often primed with blood products and crystalloids. A recent case series describes the overheating of the FMS 2000 to > 42° C and blood clot occlusion of the electromagnetic heating coil(1). The purpose of this study was:

1. To reproduce Belmont FMS 2000 pump failures with combinations of crystalloids and blood products in the reservoir.
2. To determine compatibility of reconstituted fresh frozen plasma (FFP) with packed red blood cells (PRBCs) and crystalloids and albumin during pump operation.
3. To determine a calcium threshold for coagulation in reconstituted fluid and blood product combinations.

Methods

We conducted an IRB approved observational in-vitro study using the Belmont pump with a reservoir in a closed circuit experimental model and employing blood products that were no longer eligible for human use. Reservoirs were loaded with a combination of 1U of FFP, 1U of PRBC and one of 3 different crystalloid solutions (NS, LR, Plasma-Lyte A) or albumin. A specific sequence and duration of escalating pump flow rates were administered (Fig, 1). The development of macroscopic clot formation and any pump alarms during experiments were recorded. Calcium chloride (CaCl) up to 1 gram was added to the reservoir in the absence of spontaneous clot formation.

Results

Mean post-expiration age for PRBC and FFP was 9.3 and 15.4 days respectively. No pump overheating with occlusion occurred, but high pressure alarms were observed after clot occurred in three instances (Table 1). We observed spontaneous coagulation of LR in combination with FFP and PRBC during the planning stage of the study, which could not be reproduced. The addition of 200 mg of CaCl most consistently led to macroscopic clot in the reservoir (Table 1). Mean time to clot formation was 9.1 mins following the last intervention with clotting most often observed during experimental stage C (Fig. 1). Coagulation occurred in the reservoir, and no clot transmission into the patient delivery line beyond the heating coil could be documented.

Discussion

We were unable to recreate the experience of overheating with heating coil occlusion reported previously. However, it may require longer pump runs at lower and varying speeds for several hours compared to our experimental sequence. Heating coil occlusion is likely a very rare event in clinical practice with the FMS 2000. Consistent clot formation with added CaCl within the range of 200 mg indicates that a threshold amount of calcium to catalyze the clotting cascade exists for reconstituted blood products despite a relatively large amount of dilution. The

delay in coagulation may be related to a necessary incubation period that allows enzymatic reactions for clotting to take place. Although we used expired blood products for ethical reasons, our results are consistent with prior reports in the literature that document continued clinically relevant clotting capability of FFP for a period of 28 days. Co-administration of calcium containing crystalloids or medications with blood products containing clotting factors should be avoided.

Ref. : 1. Xia et al. J Cardiothoracic Vasc Anesthesia 2011;25:1092-1094

Figure 1 Experimental protocol

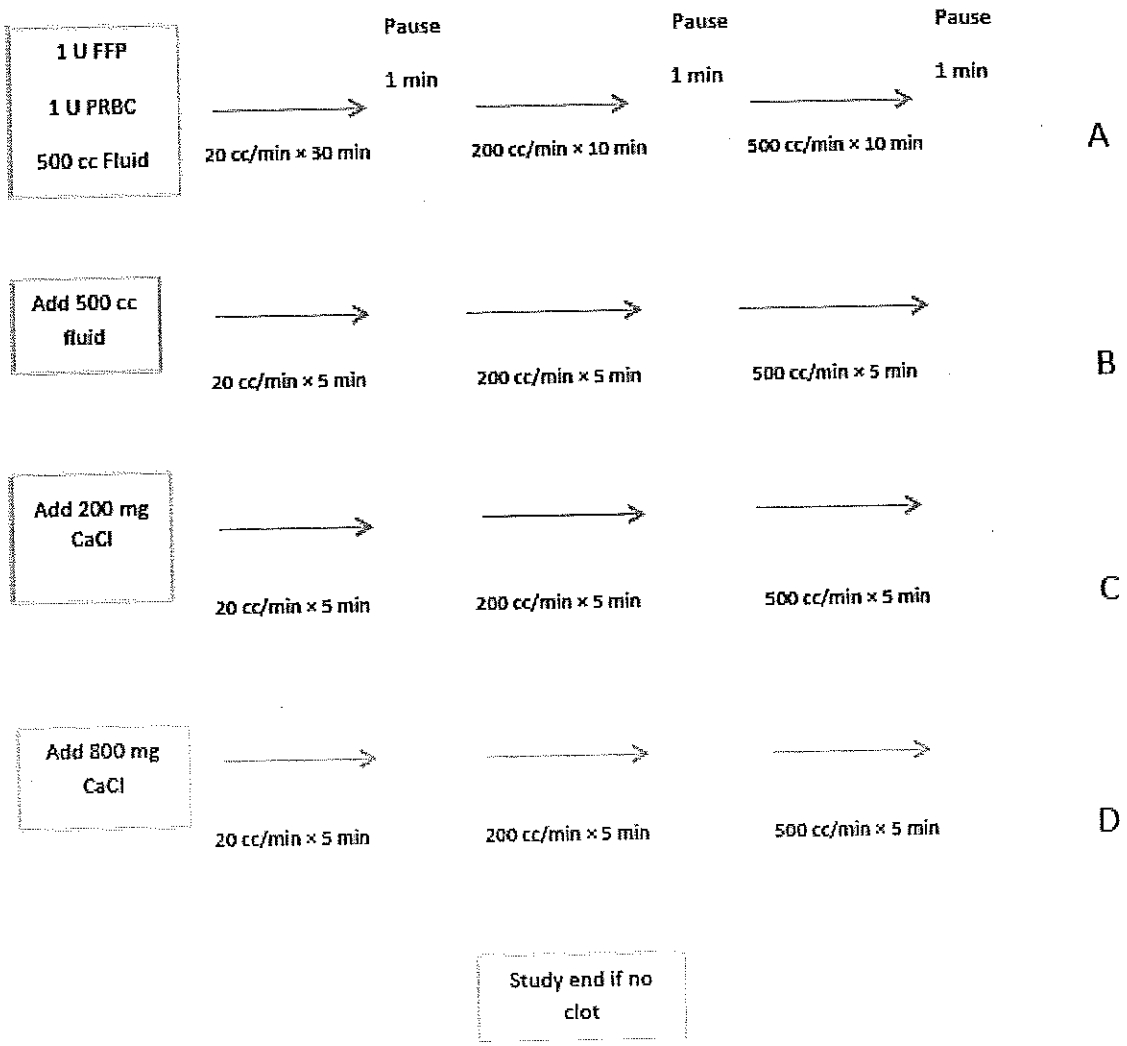

Table 1. Summary of experiments at time of macroscopic coagulation

Type of Fluid	Blood Products and Groups	Amount of Fluid Added (Liters)	Stage of Experiment Where Clot Observed	Time to Coagulation from Last Intervention (min)	Amount of CaCl added at Time of Coagulation (mg)	Observed Machine Alarms
LR	PRBC O- FFP AB+	1	C	6	200	None
	PRBC O+ FFP A+	1	C	10	200	None
	PRBC B+ FFP B+	1	D	5	1000	High Pressure
	PRBC AB+ FFP AB+	1	C	11	200	High Pressure
NS	PRBC AB+ FFP AB+	1	C	9	200	None
	PRBC O- FFP AB+	1	C	12	200	None
PL	PRBC AB+ FFP AB+	1	C	9	200	High Pressure
	PRBC AB+ FFP AB+	1	C	8	200	None
Alb	PRBC O+ FFP A-	1	C	12	200	None
	PRBC A+ FFP A+	1	C	9	200	None

Legend: LR = lactate ringers solution, PRBC = packed red blood cell, NS = normal saline, PL = Plasma- lyte A, Alb = albumin, FFP = fresh frozen plasma , CaCl = calcium chloride.

2015 New England Resident's Conference
Maine Medical Center

Abstract Submission Form

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Title of Study:

Clinical Calibration of Noninvasive Pulse Oximeters

Type of Presentation:
Clinical Research Trial

Study Topic:

Perioperative Monitoring/Clinical Trial

Ob jective:

There is need for low-cost physiological monitoring solutions that are easy to use, accurate, and can be used in the home or ambulatory setting. The purpose of this study is to investigate the quantitative relationships between arterial SaO2 and visible-near infrared light absorbed by the skin. This correlation will subsequently be used to establish a protocol for absolute calibration of these oximeters.

Background:
Continuous noninvasive monitoring of heart rate and arterial SaO_2 can be useful during surgery, for patients requiring assisted ventilation, in the ICU, and for patients who may be at risk due to inadequate tissue oxygenation. Wearable pulse oximeters are also needed to provide first responders fast and

accurate physiological information from soldiers and firefighters during active duties and other trauma victims.

Currently, low-cost and widely affordable mobile smartphone technology extends beyond simply monitoring and measuring with ease for a patient; it could also be used to relay vital physiological information to medical professionals. This gives a patient the ability to conveniently carry an accurate physiological monitor anywhere, without additional hardware beyond what's already included in many consumer mobile phones.

To calibrate these forms of new technology, it has historically been necessary to administer hypoxic gas mixtures to lower oxygen saturation in the healthy participant and provide arterial oxygen saturation levels (PaO2) to correlate to measured oximeter oxygen saturations. Standard atmospheric fractional inspired concentration of oxygen is 21% (FiO2 .21). Administration of gas mixtures to provide an FiO2 of 10% (FiO2 .1) is necessary to reduce oxygen saturation to approximately 70%, the lower limit of safely tolerable oxygen saturation while keeping a safe physiologic buffer. An FiO2 of .1 is equivalent to being at the altitude of 20,000 feet above sea level and poses no immediate harm to the human body when exposed for short periods of time. By blending oxygen and nitrogen in different ratios, it is possible to target this reduced FiO2 to achieve the targeted levels.

Medically Challenging Case of Complications Occurring During a Thoracic Endovascular Aortic Repair

Shamim, S F, Rodriguez, G

Boston Medical Center

Case:

85 y.o F with a hx of emergent Thoracic EndoVascular Aortic repair (TEVAR) for ruptured thoracic aortic ulcer and dissection with hemothorax and hemoptysis. PMH notable for CHF, HTN, MVR, a. fib and AICD. CT chest angiography revealed a thoracic aorta rupture immediately proximal to the endograft and distal to the subclavian artery.

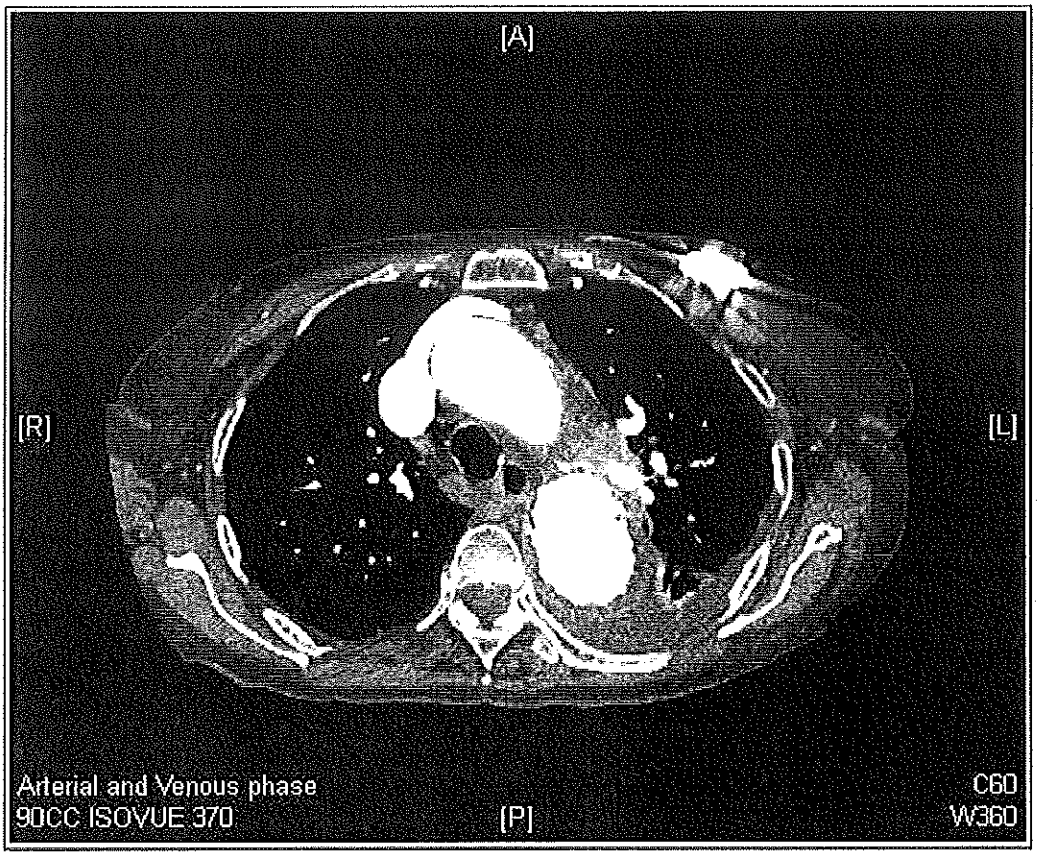
Large bore IV access and invasive monitoring was selected due to her comorbidities. MAC was chosen to minimize hemodynamic instability post induction. She was hemodynamically stable until the right groin sheath was retracted revealing a right external iliac artery rupture. Her hypotension was stabilized using vasopressors and blood products. She then complained of right leg pain with non-dopperable pulses. A thrombosed common femoral artery was noted. She was intubated emergently while an iliofemoral bypass was attempted, but complicated by massive hemorrhage.

Discussion:

This case represents a high risk patient with 3 major complications of aortic rupture, vascular access site hemorrhage and lower extremity ischemia. TEVAR is an alternative for high risk patients who are not open aortic repair (OAR) candidates. Criteria for high risk patients include advanced age, CAD with EF<0.4, CHF, COPD, CVA, poor functional status, cirrhosis, and anatomic criteria based on the preoperative CT angiogram.[1] Emergent surgery is an independent risk factor for increased 30 day mortality.[2]

Studies show a 2-5% risk of morbidity, including death, 2-8% stroke, 1-5% paraplegia and 1-5% dialysis.[1] A meta-analysis showed a 30 day mortality of 19% in TEVAR patients compared to 33% for OAR in ruptured descending TAA.[3] A multivariable analysis shows women to have an unadjusted 30 day mortality rate twice as high as men (6% vs 3%) in a non-ruptured TAA.[2]

Procedure related complications such as vascular access site complications occur in 15-20% of cases. Women have a higher incidence of TAA compared to AAA, with a male:female of 60:40 for TAA versus 80:20 for AAA[4]. Iliac artery exposure is an independent risk factor with the highest magnitude effect for 30 day mortality. It is almost 3 times more common (18%) in females in order to accommodate the large delivery catheters, with an increased risk of hemorrhage.



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Impact Of Dexmedetomidine For Sedation In Cardiac Surgery On Post-Operative Atrial Fibrillation Incidence And ICU Length of Stay

A Gopinath, B Kelly, B Oxley, J Breeze, J Devlin, M England, K Warner, F Cobey

Background

Dexmedetomidine (DEX) is being used in a non-protocolized fashion during cardiac surgery given evidence that it may facilitate extubation, reduce delirium and decrease mortality[1,2]. However, the impact of DEX on Intensive Care Unit length of stay (ICU LOS) remains poorly documented and its sympatholytic effect on post-operative atrial fibrillation (AF) is unclear. We hypothesized that there was no association between the use of DEX on the incidence of post-op AF or ICU LOS. We did not include in this study outcomes such as delirium or 30-day mortality, due to the rarity of these events in our population.

Methods

In this IRB-approved retrospective cohort study, patients undergoing coronary artery bypass grafting (CABG) and/or valvular surgery were evaluated during June 2013 to July 2014. Patients were categorized into those that received DEX and those that did not. Baseline and outcome, including age, gender, Society of Thoracic Surgeons' (STS) risk score, cardiac procedure (CABG, valve or both), incidence of new onset post-operative AF and ICU LOS were recorded. The relationship between DEX and both risk of AF and ICU LOS were assessed using regression models with and without adjustment for STS risk score and procedure type. Logistic regression was used to estimate the association between treatment and AF risk. Robust linear regression was used to determine the association between treatment and ICU LOS. SAS 9.4 was used for data analysis, and statistical testing was two-sided with alpha=0.05.

Results

266 patients were identified; one was excluded due to intraoperative death, leaving 160 patients in the DEX group and 105 in the non-DEX group. Patients had a mean age of 66.6±11.0 years and mean STS risk score of 0.026±0.044; 74% were male and 96% were Caucasian. Baseline characteristics did not differ significantly between groups. Patients spent an average of 82.9±64.1 post-operative hours in the ICU, and 96 (36.2%) developed AF. Risk of post-operative AF was similar between groups (40% DEX vs 30.5% not DEX; adjusted p=0.13) and was not affected by STS score (adjusted p=0.78) or procedure type (adjusted p=0.60). The duration of post-operative ICU stay did not differ significantly between groups (82.4±62.4 hours DEX, vs 83.7±67.1 hours not DEX; adjusted p=0.73) or by procedure type (adjusted p=0.31), but increased significantly with baseline STS score ($p<0.0001$).

Conclusions

The use of DEX during cardiac surgery did not appear to influence the risk of post-operative AF or ICU LOS. A limitation may be that ICU LOS was affected by unmeasured variables not related to a patient's medical condition. Additional controlled studies are needed to define the effect of DEX on AF and ICU LOS in patients undergoing cardiac surgery.

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Abstract

Infection Site and Hospital Mortality in Patients with Sepsis: A Systematic Review

Objectives: Current sepsis treatment protocols emphasize source control with empiric antibiotics in conjunction with fluid resuscitation. Previous reviews have examined the impact of the specific locus of infection on mortality from sepsis along with specific pathogens; however, no recent review has addressed this issue. This review focuses on studies that address the role of infection site on in-hospital mortality among patients with sepsis who do not have microbiology of their underlying infection known.

Data Sources: PubMed database from January 2001 to September 2014.

Study Selection: Studies were eligible if: they included one or more regression models with in hospital mortality as the outcome, included adult patients with sepsis, severe sepsis or septic shock, and published in English.

Data Extraction: Data elements abstracted included number of patients, sepsis spectrum level, infection sites measured, and raw and adjusted effect estimates for the association between infection site and in-hospital mortality.

Data Synthesis: 19 studies were included for review. Most studies measured infection sites including respiratory (n=19), abdominal (n=19), genitourinary (n=18), and skin and soft tissue infections (n=11). Overall, few studies found significant unadjusted results for respiratory infections. Similarly, only one study found significant unadjusted results for abdominal infections. No studies found significant unadjusted results for either genitourinary or skin and soft tissue infections.

Conclusion: At the stage of severe sepsis or septic shock, hospital mortality does not appear to differ by site of infection. Further research needs to be conducted in populations that are less severely ill.

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Case Report:

An innovative intubation method in a premature neonate with airway abnormality

Abstract

A 2.8kg male was born at 36+6 weeks via C-section with respiratory distress of the newborn, decreased tone and desaturations. With initiation of oral feeds, the patient had a presumed aspiration event and ENT evaluation revealed cricopharyngeal dysfunction. He was scheduled for percutaneous gastrostomy tube placement on day of life 20. The patient was brought to the operating room and general anesthesia was induced. Attempts at direct laryngoscopy were unsuccessful due to short epiglottis and enlarged arytenoids. We then attempted an innovative approach to intubation. A #1 AirQ LMA (Cookgas, USA) was successfully placed and a fiberoptic scope was advanced through a fiberoptic bronchoscope swivel adapter (Smiths Medical, UK) into the LMA while maintaining positive pressure ventilation. The trachea was successfully intubated fiberoptically through the LMA, which was subsequently removed over the endotracheal tube utilizing a stabilizer bar supplied by the manufacturer. Oxygen saturations were maintained throughout the intubation period, which lasted for a total of 20 minutes. The patient was evaluated postoperatively and found to have pharyngomalacia, which resulted in posterior pharyngeal collapse on inspiration, as well as confirmed enlargement of the arytenoids.

Utilization of the AirQ LMA and fiberoptic intubation was successful in this situation of inability to intubate via direct laryngoscopy. This technique has been described previously by John Fiadjoe, MD and Paul Stricker, MD at The Children's Hospital of Philadelphia as a highly effective method to safely facilitate fiberoptic intubation in children of all ages who present with difficult airways. The Air-Q LMA has unique advantages over traditional LMA's, including a tube that is wide enough to accommodate passage of a cuffed endotracheal tube and its pilot balloon, as well as a shortened length to aid in the removal of the LMA following tracheal intubation[2]. In our institution, we are teaching this technique as a standard rescue method for intubation both in children and adults.

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Strategy and Decision Making for a Patient with Diminished Collaborative and Reasoning Capacity for Cesarean Hysterectomy.

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INTRODUCTION: Patients with diminished collaborative and reasoning capacity pose special challenges to the perioperative care team as conflicting therapeutic goals arise. Pre-operative preparation including teamwork between multiple services, and attention to detail are crucial to success in such cases. We present the case of an extremely needle phobic patient for cesarean hysterectomy and our strategy and multi-disciplinary approach for a successful outcome.

CASE: A 27yo, G4P3 presented at 33 weeks gestation with a placenta percreta for elective cesarean hysterectomy. Her history included extreme PTSD with a needle phobia and previous c-sectionsl under general anesthesia. She had had multiple episodes of acute psychosis in the perioperative setting necessitating temporary declarations of incompetence for medical decision making and her mom would serve as her health care proxy. Several days before her admission, the anesthesia team contacted OB and gynecologic oncology, psychiatry and risk management, nursing, blood bank, urology, NICU and SICU services, to orchestrate a plan for her. Her PTSD prevented a neuraxial anesthetic technique, and neither an IV start nor an inhalational induction was an option from the patient's point of view. PO sedation with midazolam and ketamine was used pre-operatively and ultimately supplemented with IM sedation to allow IV placement and an uneventful induction of general anesthesia. Intraoperatively the patient remained stable requiring transfusion with multiple blood products, and she remained intubated for several days after surgery. Not surprisingly, the neonate's initial APGAR scores were 2 & 2 requiring a short period of intubation, but eventually making a full recovery. Following extubation, the patient reported no recollection of the IV start or the anesthetic induction, and she was satisfied with her anesthetic care.

CONCLUSION: This case highlights three key aspects in preparation for cases with limited anesthetic access and options for safe patient care.

1) A multi-disciplinary plan that involves all aspects of the patient's circumstances is essential and time consuming but allows to determinethe options to best maximize mom and baby's safety in the setting of contradictory goals for both.

2) Perioperative decision making in this case required a stepwise acceptable escalation of risk under careful consideration of a reasonable the risk/benefit ratio with defined endpoints.

3) Meticulous anticipation and communication between perioperative care teams remains the cornerstone of pre-, intra- and postoperative management with the greatest chances of a successful outcome.

ABSTRACT: MPI IN SEPSIS

Introduction: Myocardial dysfunction is an important feature of sepsis that consists of both systolic and diastolic dysfunction of both ventricles; it can present early and is frequently noted in the terminal stages of the illness. Given the variable response of the cardiovascular system to the disease process and resuscitative maneuvers, myocardial dysfunction in sepsis is often difficult to quantify. Although sepsis-induced cardiomyopathy is a well-described entity, thus far, the relationship between the spectrum of sepsis, mortality and gross echocardiographic parameters of dysfunction remains poor. Thus, while myocardial dysfunction is a noteworthy finding in sepsis, no single parameter has been identified that appropriately correlates the degree of myocardial dysfunction to outcome. Myocardial performance index (MPI) is a Doppler-derived index of global cardiac function that has been well correlated with other echocardiographic and cardiac catheterization measurement and has been shown to be a poor prognostic indicator in various cardiac pathologies. In this study, we sought to determine whether echocardiographically derived MPI could be useful in predicting mortality in patients with sepsis and septic shock.

Methods: Eligible patients were >18 years of age, not pregnant, without significant valvular stenosis or regurgitation, without ST segment elevation or arrhythmia, had been admitted for less than three hours, and met the Surviving Sepsis Campaign definitions of severe sepsis or septic shock. Transthoracic echocardiography (TTE) was performed at enrollment and 24 hours later and myocardial performance index (MPI) was derived using tissue doppler imaging. MPI was calculated as a sum of isovolumic contraction time (IVCT) and isovolumic relaxation (IVRT) time divided by ejection time (ET). Ejection fraction was calculated using Simpson's biplane disc method.

Results: The study participants were divided into 2 groups: one that showed improving MPI at 24 hours and one that showed worsening MPI at 24 hours. There was a statistical difference in MPI between both groups at time of presentation and at 24 hours (p-value <0.005), but no difference was noted in left ventricular ejection fraction (LVEF). 90-day mortality was significantly higher in the group that showed worsening MPI (41% vs 10% in the group with improving MPI), p-value <0.05.

Conclusion/Discussion: Much work to date has been done on myocardial dysfunction in sepsis ranging from its characterization to exploring mechanisms of its incidence. While methods of diagnosing myocardial depression have evolved, no single parameter has been delineated as a gold standard for quantifying the degree of dysfunction. Thus, despite the high incidence of myocardial dysfunction in sepsis and several reports linking myocardial dysfunction to mortality, it has been difficult to link the degree of dysfunction with outcome. In contrast to LVEF, MPI is independent of heart rate and ventricular geometry and not significantly affected by blood pressure or ventricular loading conditions, making it a better measure of both systolic and diastolic function. Since it is echocardiographically derived, it lends itself to serial measurements. Our results are consistent with a worsening MPI being a prognostic indicator as measured by mortality at 90 days. Our work helps identify myocardial performance index (MPI) as arguably the single best quantifier of myocardial dysfunction in sepsis and worsening MPI as a prognostic indicator. Further studies with serial MPI measurements will be instrumental in determining the utility of MPI in sepsis and its impact on diagnosis and treatment.

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Title: OR Governance in Rural Hospital Systems

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Introduction: Effective operating room management requires a multi-disciplinary commitment and expertise; yet, many institutions use local processes to select OR directors.[1,2] The optimal structure for operating room governance is unknown. Most hospital ORs have an average annual operating budget of $21 million.[3] In fact, the OR accounts for up to 60% of a hospital's revenue and 40% of an its expenses.[4] Despite the supposition that an effective governance structure can have profound implications for the financial health of any hospital, Sieber showed that OR management ranged from no formal arrangement, to single OR managers, and to committee management strategies.[5] We present a preliminary survey of all the hospitals in a rural state.

Methods: We had previously developed a questionnaire that was sent to members of OR management committees at various hospitals within the U.S. and Canada. Briefly (Exhibit 1), the questionnaire addressed the type of hospital (e.g. academic, private, etc.), quantitative characteristics of the OR theatre (number of ORs, staffing numbers, percentage of cases by specialty) and questions regarding the OR governance or management (e.g. existence/responsibilities of an OR director, existence of an OR management committee, composition and powers of committee, how OR time is allocated, how it's adjusted and how often). We adapted the questionnaire for use in a telephone survey and identified individuals within the 14 hospitals in Vermont using the Vermont Association of Hospitals and Health Systems' hospital directory. We conducted the telephone surveys and collected the data in October 2014.

Results: We have completed surveys for 6 (1 academic, 5 community) of the 12 hospitals in the state. Hospitals surveyed had a range of operating rooms (2-28) and performed 1800-25000 cases annually. In 5 out of 6 hospitals, the OR managers were usually filled by nurses. Similarly, the same number of hospitals stated that there was no formal organizational chart; only 1 hospital had developed a three-tiered governance structure with representation from surgery, anesthesiology, and perioperative nursing. All participants believed that improved communication amongst physicians, nurses, and administrators was a necessity for a well-functioning OR. Finally, all participates stated that the OR manager should receive additional formal management training.

Conclusions: Our survey reveals a variety of governance structures for OR management in the state of Vermont. As OR revenues and expenses represent a significant portion of a hospital's financial health, OR governance structure and function should be of paramount concern to hospital administrators and healthcare policy makers. We believe that future health care initiatives will need to consider different governance structures for solutions, and that the current health care state of affairs presents an opportunity for anesthesiologists. The American Society of Anesthesiologists has adopted the Perioperative Surgical Platform for the future of anesthesiology practice.[6] Therefore, the variability in governance structures should convince anesthesiologists to step up as OR directors in order to "standardize" and optimize OR efficiency and productivity and to facilitate the development of the PSH. Ideally, the ASA will be able to collect and present data demonstrating that an OR governance led by physician anesthesiologists is the most effective and efficient model.

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Perioperative management of a patient with factor XI deficiency, spinal cord stimulator, and chronic bronchiectasis for elective surgery

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Abstract

Introduction:

Regional anesthesia is an excellent choice of anesthesia in patients with medical co-morbidities that may be complicated or exacerbated by general endotracheal anesthesia. Contraindications to neuraxial anesthesia and be divided into absolute, relative and controversial with patient refusal being the only absolute contraindication. Relative contraindications include bactermia, preexisting neurologic deficit, stenotic valvular lesions, spinal column deformities, anticoagulation, coagulopathies, hemorrhagic diathesis, and elevated intracranial pressure.[i] The following case report discusses the use of neuraxial anesthesia in a patient with Factor XI (FXI) deficiency, comprised lung function, and chronic back pain.

Case report:

A 65-year-old woman with a past medical history of chronic bronchiectasis resulting in a left upper lobectomy, moderate chronic obstructive pulmonary disease requiring intermittent home O2, factor XI deficiency, and chronic lower back pain managed by a thoracic spinal cord stimulator and IPG placed 2009 and replaced in 2012 presented for preoperative evaluation and consultation for the planned procedure of a Le Fort colpocleisis, dilation and curettage, transvaginal tension free vaginal tape-obturator with cystoscopy, pernieoplasty with rectal prolapse repair. The patient was admitted the night before surgery and received total of 8 u FFP to achieve an aPTT of 25. On the morning of surgery, an epidural was placed at the L3-L4 level without complication. Two units of FFP were given intraoperatively as well an infusion of amicar. The surgery and anesthesia proceeded without complication. The patient was transferred to the post anesthesia care unit (PACU). The patient was given another unit of FFP. Her post transfusion APPT was within normal limits and the epidural catheter was removed with complication. Post epidural neurological exams were within normal limits. The patient's amicar infusion was continued until post operative day number 3 when she was discharged to home.

Conclusions:

Factor XI deficiency, also known as hemophilia C and Rosenthal Syndrome, is a rare inherited coagulation disorder associated with prolonged activated partial thromboplastin time. The severity of bleeding does not always correlate with plasma factor XI levels. Levels lower than 15% usually require FFP during surgical procedures, while levels above 50% are less likely to cause clinically significant bleeding.[ii] Because of the potential but unknown risk for epidural-spinal hematoma, it seems prudent that factor replacement therapy should be given in severe cases. This case contributes to the growing body of literature that shows that regional anesthesia is an acceptable and safe alternative to general anesthesia in patients with factor XI deficiencies.

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2015 New England Resident's Conference
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Abstract Submission Form

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Title of Study:

Perioperative Management of Aorto-esophageal Fistula

Type of Presentation:
Case Report

Study Topic:

General Anesthesia/Critical Care Medicine

Abstract:
Perioperative management of a patient with a bleeding aorto-esophageal fistula, and the potentially catastrophic consequences, can be extremely challenging for anesthesia providers. Only ten cases of aorto-esophageal fistula are reported each year, most commonly being a result of atherosclerotic aneurysm rupture. Only one of those ten cases will develop as a post-surgical complication[4]. Management is largely supportive until the patient can be brought to the operative suite for initial open or endovascular repair. We present a case of the perioperative management an acutely bleeding aorto-esophageal fistula in a patient who had previously undergone a distal esophagectomy.

Post-Operative Atrial Fibrillation following Cardiac Surgery is associated with Increased Amyloidogenic Protein Burden

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Introduction

Atrial fibrillation is the most common arrhythmia following cardiac surgery (1), affecting 10-65% of patients who have undergone coronary artery bypass grafting (CABG), usually early in the postoperative period.(2) Post-operative atrial fibrillation (POAF) has been associated with increased mortality, prolonged hospital stays, and increased cost.(3) Many risk factors have been identified for development of POAF, including advanced age, male sex, comorbid hypertension, prior episodes of atrial fibrillation, history of congestive heart failure, concomitant valvulopathy, and cardiopulmonary bypass duration. Despite high incidence of POAF following cardiac surgery, its etiology remains poorly understood.(2)

Traditional risk factors offer insight into the mechanism for development of POAF, but fail to elucidate underlying biological mechanisms. Recent investigations have focused on aberrations in autonomic tone, cardiac structural abnormalities, and potentially mitigating pharmacologic agents. (20, 26-30) Further research has focused on biochemical aberrations in patients who have developed POAF, revealing a physiologic response similar to that seen with profound stress. Specifically, patients who develop POAF demonstrate an intense oxidative stress response in terms of serum peroxide levels and myocardial protein oxidation. (22) Additionally, increased levels of inflammatory markers have been shown in separate studies to be associated with POAF. (19) This is especially true with regard to interleukin-6 (10, 15, 17), interleukin-8 (16), heat shock protein 70 (14), C-reactive protein (17, 18), and perhaps corroborated via observation of linkage between leukocytosis and POAF. (11, 12)

Recent studies have focused on genetic predisposition for POAF following cardiac surgery, implicating a variety of genes, some of which are more specific than others. Rader (4) identified a higher risk of POAF in certain races, but other authors have focused on more isolated genetic polymorphisms. A large number of candidate genes, many coding for proteins involved in intrinsic atrial myocyte depolarization, conduction, and repolarization, have been implicated in the pathophysiology of chronic atrial fibrillation. (5, 8, 9) Genetic modulation of the catecholamine and adrenergic response has also been identified as involved in the development of POAF. (6, 7) Furthermore, differential genetic response to oxidative stress has been shown in patients who develop POAF compared to those who do not. (22) Polymorphisms in inflammatory genes have also been shown to be involved in the development of POAF, but none have been wholly explanatory for POAF risk. (21)

Of interest, aberrancy in atrial myocyte structure, has been associated with development of POAF. Putatively, sub-clinical distortions in atrial structure, such as occurs with atrial fibrosis (23, 24) may impair the myocyte ability to withstand oxidative stress and perioperative inflammation. Cardiac amyloidosis, characterized by the deposition of amyloid fibrous protein within an organ's parenchyma, has been associated with chronic atrial fibrillation when protein deposition occurs within the atria (13). We hypothesized that deposition of amyloid proteins within cardiac atria may be a substrate which predisposes to POAF.

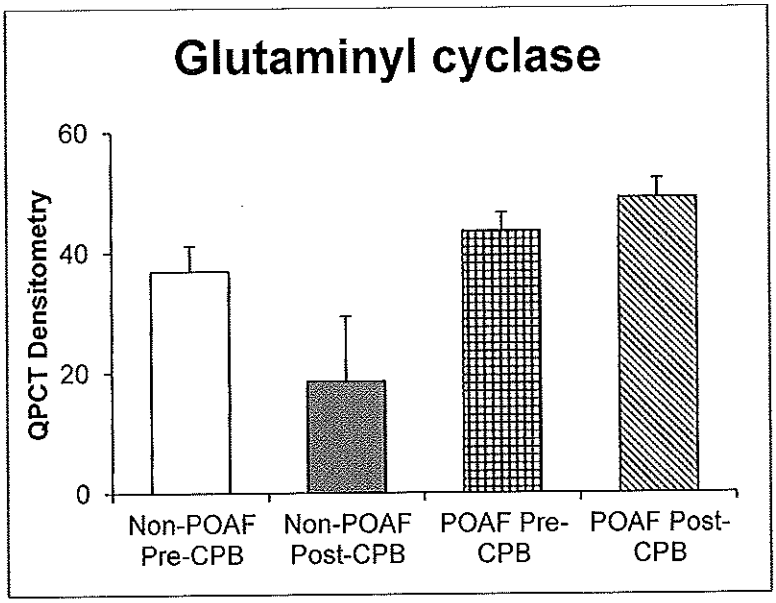
Methods

Serum and right atrial tissues from 43 patients, without mitral stenosis or chronic atrial fibrillation, were collected before and after cardiopulmonary bypass during elective CABG. Serum samples were centrifuged for plasma collection and flash frozen. High throughput genome-wide transcriptome profiling was performed. After age-matching, differentially expressed genes were identified using mixed model ANOVA. Western blotting was used in a subgroup of enrolled patients to confirm expression levels of genes of interest.

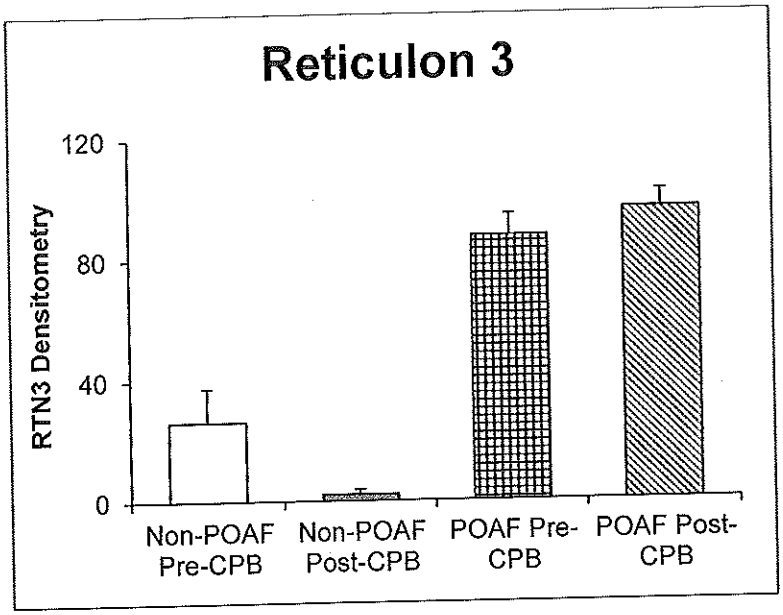
Results

12 patients developed POAF (POAF group), while 31 patients did not (non-POAF group). The mean age of the POAF group was 69.5 years, compared to 64.46 years in the non-POAF group. 11 patients in the POAF group were male, compared with 17 in the non-POAF group. Microarray analysis identified 57 genes that were differently expressed between the two groups. Western blotting was performed a posteriori on protein expression from 2 genes thought to be involved in amyloid deposition, QPCT and RTN3.

Following CPB, expression of QPCT's coding protein, glutaminyl cyclase, rose in the POAF group, while falling in the non-POAF group. Following bypass, glutaminyl cyclase burden was significantly higher in the POAF group, compared the non-POAF group. ($p = 0.044$).



Expression of RTN3's coding protein, reticulon 3, was significantly different between the POAF and non-POAF groups. Before bypass, the POAF group had a higher burden of RTN3 protein when compared to the non-POAF group ($p = 0.0078$). After bypass, the reticulon 3 burden remained significantly higher in the POAF group compared to the non-POAF group ($p = 0.0000058$).



Discussion

The pathophysiology of POAF remains undetermined. Prior studies have identified significant roles for oxidative stress and inflammation, corroborated with alterations in gene expression. However, oxidative stress and inflammation only tell a portion of the POAF story. Indeed, other investigators have focused on atrial structural abnormalities, and found an association between atrial fibrosis and POAF (23, 24). Atrial fibrosis is commonly attributed to accumulation of age-related comorbidities which lead to an increase in atrial size (e.g. hypertension). This investigation explored the impact of another age-related illness, amyloid deposition, identifying a potential role for amyloid dys-metabolism in the pathogenesis of POAF.

We identified previously unknown changes in regulation of enzymes involved in amyloid protein metabolism in response to cardiopulmonary bypass. Glutaminyl cyclase, encoded by *QPCT*, is known to be involved in the formation of amyloid deposits in the brain in Alzheimer's disease. (32) Our study identified a post-bypass increase in glutaminyl cyclase in those patients who developed POAF. Patients without POAF did not have this same increase. Elevated glutaminyl cyclase may lead to an accumulation of amyloid protein. In the perioperative inflammatory and oxidative stress response, this small increase in amyloid burden may be enough to induce atrial arrhythmia.

We also identified an increase in reticulon 3 burden. Reticulon 3, encoded by *RTN3*, is thought to be involved in reduction of beta-amyloid accumulation. Even a small increase in *RTN3* expression in transgenic mice has been shown to lead to reduced amyloid deposition. In our study, patients who developed POAF had significantly elevated levels of reticulon 3 both before and after cardiopulmonary bypass. While the exact mechanism is unclear, it seems plausible that the oxidative stress and inflammatory response to cardiopulmonary bypass triggers *QPCT* over-expression, which may be unable to be compensated for in patients who already have a need for high *RTN3* expression.

This study is significantly limited by small patient samples, incomplete genetic profiling of all potential biomarkers associated with amyloidosis, and (most importantly) unknown clinical amyloid burden. Microscopic examination of atrial tissue, with documented amyloidosis in patients who had pre-existing high reticulon 3 burden or post-operative glutaminyl cyclase expression, would strengthen our findings.

Ultimately, both QPCT and RTN3 code for enzymes which are involved in a wide variety of biochemical processes, and may be reflective of alternative pathology, rather than amyloidosis. Further research is necessary before cause-and-effect assumptions can be made.However, it seems plausible that the combination of oxidative stress, inflammation, and potentially, the presence of amyloid protein, response creates a powerful stimulus for atrial arrhythmia.

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Liposomal Bupivacaine in Total Knee Replacement: Preliminary Results of a Two-Surgeon, Retrospective Study

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Background: Liposomal bupivacaine (LB) is a slowly degrading preparation that provides local anesthesia for up to 72 hours. It targets the site directly responsible for pain, with no associated motor blockade. In total knee replacement (TKR), it may have superior outcomes to anesthesia with regional nerve block.

Methods: We considered all patients following each surgeon's LB start date to be the experimental group. An equivalent number of pre-LB patients served as the control group. All control group patients received femoral nerve block, and all experimental group patients received peri- and intra-articular LB. We used retrospective chart review to identify patient demographics, total perioperative opioid, incidence of postoperative nausea/vomiting, time to first ambulation, and time to discharge.

Results: A total of 138 patients received LB; 140 patients received a femoral nerve block. We found no significant difference between the two groups with regard to gender, age, weight, preoperative opioid exposure, or side of procedure. On average, LB patients consumed 27% less opioid after leaving the PACU ($p=0.000545$), and 21% less opioid in the entire perioperative period ($p=0.003594$). Despite this decrease in narcotic use, there was no statistically significant difference between the groups with respect to postoperative nausea and vomiting ($p=0.639$). LB patients ambulated an average of 3.5 hours sooner ($p=0.039$), and were discharged an average of 14 hours earlier ($p<0.0000001$).

Conclusions: Our results indicate that LB decreases total systemic opioid requirement, time to first ambulation, and time to discharge from the hospital.

High Flow Nasal Cannula Is Associated with Anesthesia Practice Change During Endoscopy Procedures

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Introduction

High Flow Nasal Cannula (HFNC) is a humidified oxygen delivery system mostly used in non-intubated patients with pulmonary conditions because it decreases the work of breathing and can improve oxygenation. The role of HFNC during moderate or deep sedation is unclear. This technology was available for a period of 3 months in the institutional endoscopy suite, and we hypothesized that HFNC reduces the use of general anesthesia (GA) in favor of sedation techniques (ST) for complex upper endoscopies.

Methods

Following IRB approval we conducted a retrospective chart review of patients undergoing non-emergent endoscopic ultrasound (EUS) or endoscopic retrograde cholangiopancreatography (ERCP). Patients were divided into 3 groups. The Pre-HFNC, HFNC and Post-HFNC groups had their procedure before during or after HFNC availability respectively. Data collected included the type of procedure and anesthesia used, patients' age, BMI and ASA status. One-way analysis of variance, the Kruskal-Wallis test, and the chi-square test (with Bonferroni adjustment for post-hoc comparisons) were used as appropriate for statistical analysis. Continuous data are reported as means ± standard deviation (SD); categorical data are reported as percentages.

Results

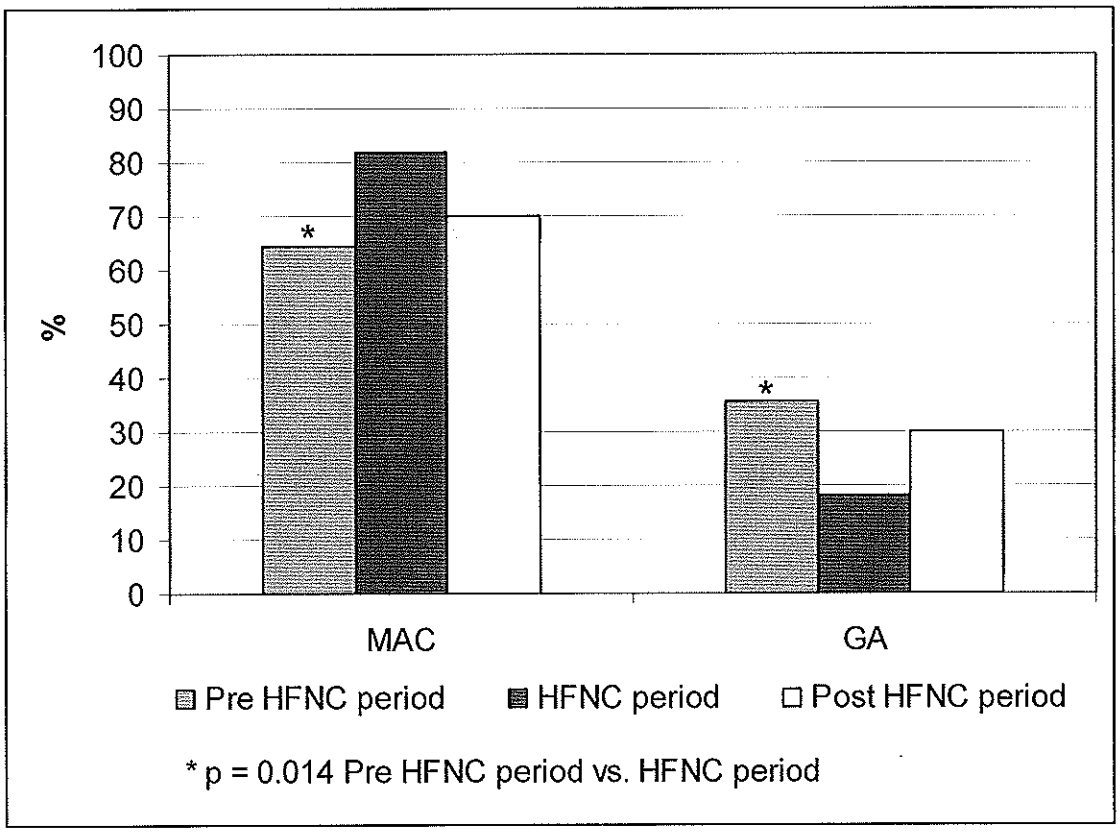
Records of 241 patients 61.6 ± 16.7 of age with a BMI of 26.9 ± 7.3 kg/m^2 were included, 65, 89 and 87 in the Pre-, During and Post-HFNC groups respectively. There was no statistically significant difference between groups for age ($p = 0.8$), BMI ($p = 0.3$) and ASA status ($p = 0.9$). The percent use of GA was significantly different between groups ($p = 0.04$). Post-hoc tests with Bonferroni adjustment revealed a significantly lower percent use of GA in the HFNC group compared to the Pre-HFNC group (Fig.1).

Conclusion

Our results suggest that the availability to anesthesia teams of HFNC as an oxygen delivery method may reduce the utilization of GA for patients undergoing complex endoscopies in the ES. Interestingly the significant reduction of GA use between the Pre-HFNC and HFNC groups only persisted as a trend between the HFNC and Post-HFNC groups. This observation may be explained by a possible learning

curve of anesthesia teams after a positive experience with HFNC, expanding the feasibility for ST use into the Post-HFNC population. Our study confirms that HFNC as a method to support spontaneous breathing during ST for endoscopies should be examined in a prospective controlled trial that includes patient safety and economic outcomes.

Figure 1. Utilization of sedation and general anesthesia in three study groups.



Legend: MAC = monitored anesthesia care, GA = general anesthesia, HFNC = high flow nasal cannula

The Role of Non-Technical Skills in Simulated Trauma Resuscitation

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Objective: Trauma Team Training (TTT) provides instruction on crisis management through debriefing and discussion of teamwork and leadership skills during simulated trauma scenarios. The effects of team leader Non-technical skills (NTS) on technical performance have not been thoroughly studied. We hypothesized that team and team leader's NTS correlate with technical performance of clinical tasks.

Design: Retrospective cohort study

Setting: Brigham and Women's Hospital STRATUS Center for Surgical Simulation

Participants: Twenty teams composed of surgical residents, emergency medicine residents, emergency department nurses and emergency services assistants underwent two separate high fidelity simulated trauma scenarios. Each trauma scenario was recorded on video for analysis and divided into four consecutive sections. For each section, two raters used the Non-Technical Skills for Surgeons (NOTSS) framework to assess non-technical skills of team. Two additional raters used the Modified Non-Technical Skills Scale for Trauma (T-NOTECHS) system to evaluate the entire team's non-technical skill. Clinical performance measures, including adherence to guidelines and time to perform critical tasks were measured independently.

Results: NTS performance by both teams and team leaders in all NTS categories decreased from the beginning to the end of the scenario (all $p<0.05$). There was significant correlation between team and team leader cognitive skills and critical task performance, with correlation coefficients between 0.351 and 0.478 ($p<0.05$). The NTS performance of team leaders highly correlated with that of the entire team, with correlation coefficients between 0.602 and 0.785 ($p<0.001$).

Conclusions: The NTS of trauma teams and team leaders deteriorate as clinical scenarios progress, and the performance of team leaders and teams are highly correlated. Cognitive NTS scores correlate with critical task

performance. Increased attention to non-technical skills during Trauma Team Training may lead to sustained performance throughout trauma scenarios. Decision Making and Situation Awareness skills are critical for both team leaders and teams and should be specifically addressed in order to improve performance.

Title: STAFFING TRANSCATHETER AORTIC VALVE REPLACEMENTS; WHAT ARE THE COSTS?

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Summary: Transcatheter aortic valve replacement is a relatively new, less invasive, resource-intensive modality used to treat patients with aortic stenosis. Among the centers currently performing this procedure, there is a substantial degree of variability in the staffing models used to deploy the valve. The specific numbers and different skillsets of the staff required to execute the procedure safely is a major determinant of cost. To date, no study has modeled the difference in costs based on the staff present for the procedure. We used Time Driven Activity Based Costing to model the potential cost savings based on two different staffing models.

Introduction: Transcatheter aortic valve replacement (TAVR) has been developed as a technique to treat patients with severe symptomatic aortic stenosis. Before the advent of TAVR, these patients were deemed "inoperable". With the continuous improvement in the technology and the development of regional and institutional expertise, the use of TAVRs has expanded to include those patients who are at intermediate risk for surgical aortic valve replacement (AVR).[1],[2] Currently, there is considerable heterogeneity and little discussion about the staffing models utilized to deploy a transcatheter aortic valve. One of the major determinants of cost is the number of staff required to execute the procedure and several retrospective studies have found no difference in outcomes when TAVRs are performed with fewer staff members.[3,4,5] Time Driven Activity Based Costing (TDABC) is a system that calculates the cost associated with each resource used as a patient moves along a care process.[6] We used TDABC to compare the manpower costs associated with a minimalist approach currently used in some Austrian health centers versus the more resource intensive model utilized at our institution.

Methods: Using a standardized approach to TDABC[6], we developed a model to assess the personnel staffing costs for a TAVR procedure. The model considered the following key variables: 1) the cost per clinical hour for each staff member, 2) the amount of time required of each staff member and 3) the number of staff members present during the procedure. The model was developed using Excel software (Microsoft Corporation, Redmond, WA). Table 1 provides data on our assumptions for modeling the costs of the two different staffing approaches.

Results: The cost of deploying a transcatheter aortic valve in the resource intensive model was $2,925. When the cost of the manufacturing representative was excluded the institutional cost was $2,632. The cost of deploying a transcatheter aortic valve in the minimalist staffing approach was $1,850. The difference in costs between the two models is approximately $1,075, representing a 37% reduction in manpower cost per case. On an annualized basis, we perform a

little over 100 TAVRS per year and this cost savings represent a potential annual savings of $107,500 to the institution.

Conclusions: Value in health care can be defined by a given health outcome achieved per dollar spent.[7] The application of a TDABC model shows that a substantial amount of health care dollars could be saved by restructuring the number of health care personnel involved in the TAVR procedure. As American hospitals expand the role of TAVRs for the treatment of aortic stenosis, we believe that a multi-disciplinary approach to the staffing model should be used in order to maximize value and to increase cost savings at an institutional and even national level.

Illustrations:

Table 1. Personnel Costs by Staffing Model

	Resource Intensive				Minimalist			
	No. of Staff	Cost per Clinical Hour*	Total Time (mins)	Total Cost*	No. of Staff	Cost per Clinical Hour*	Total Time (mins)	Total Cost*
Anesthesia								
Anesthesia Attending†	1	$203	180	$608	1	$203	180	$608
Anesthesia Resident*	1	$19	180	56	0	$19	0	$0
Cardiology								
Non-invasive cardiology Attending†	1	$120	30	60	1	$120	120	$240
Non-invasive cardiology Fellow†	1	$19	120	37	0	$19	0	$0
Invasive Cardiology Attending	1	$197	120	394	1	$197	120	$394
Invasive Cardiology Fellow†	1	$20	120	40	0	$20	0	$0
Surgery								
Cardiothoracic Surgeon†	1	$190	120	380	0	$190	0	$0
Perfusionist†	1	$88	120	175	0	$88	0	$0
Misc								
Nurse Cath Lab†	5	$53	720	632	4	$53	576	$505
Nurse OR†	1	$47	180	141	0	$47	0	$0
Surgical technologist**	1	$26	180	78	0	$26	0	$0
Technical Services Provider†	1	$32	60	32	0	$32	0	$0
Radiology tech**	0	$34	0	0	1	$34	180	$102
Manufacturer Representative***	1	$98	180	293	0	$98	0	$0
Totals	**17**			**2,925**	**8**			**$1,850**

**All cost numbers rounded to the nearest whole number*

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Introduction:

Subglottic stenosis, specifically when encountered unexpectedly during endotracheal intubation, can pose significant challenges. In this case report the anesthetic management of undiagnosed subglottic stenosis will be discussed.

Case Presentation:

A 62 year old male with history of gastroesophageal reflux disease (GERD) and esophageal stricture presented to UMass Medical Center for elective esophagogastroduodenoscopy (EGD) and esophageal dilation. Of note, the patient had a history of traumatic brain injury secondary to a gunshot wound which required a tracheostomy. This was complicated by residual left sided paresis, speech deficits, and epilepsy. Preoperatively, attempts to obtain intravenous (IV) access were unsuccessful. Since the patient was unable to cooperate with IV placement, the decision was made to perform a mask induction with a combination of nitrous oxide and sevoflurane. Once IV access was obtained, he was induced with propofol, fentanyl, and rocuronium for endotracheal intubation. Mask ventilation of the patient was continued with ease prior to administration of rocuronium. Direct laryngoscopy was performed with a Macintosh 3 blade and a grade 1 view was obtained. A 7.5 mm cuffed endotracheal tube (ETT) was passed easily through the cords, however resistance was met at 20 cm. Subsequent attempts with 7.5 and 7.0 mm lubricated endotracheal tubes were unsuccessful. Oxygen saturations remained stable and the patient was easily mask ventilated between attempts. A 6.5 mm lubricated ETT was eventually placed after a total of 4 attempts. The patient was given dexamethasone 8 mg for prevention of airway edema. At the end of the case, he received neostigmine and glycopyrrolate for reversal of neuromuscular blockade. After the patient was fully awake and met extubation criteria, a cuff leak was confirmed. He was successfully extubated and given nebulized racemic epinephrine for prophylaxis. There were no signs of stridor or upper airway obstruction. The patient was monitored in the post-anesthesia care unit (PACU) for 6 hours, weaned to room air, and admitted for overnight observation on the medicine service. The patient did well and was subsequently discharged back to his rehabilitation facility the next morning with plan for ENT follow up.

Discussion:

Subglotic stenosis is most commonly seen as a long term consequence of tracheostomy and prolonged endotracheal intubation. The incidence varies across studies, occurring in as high as 65% of patients after tracheotomy and 22% after prolonged intubation. Other etiologies include laryngeal or pharyngeal cancer, radiation to the head and neck, GERD, and Wegener's Granulomatosis. Stenosis associated with intubation is thought to be due to direct mechanical pressure on the tracheal side wall leading to compression, necrosis, edema, and ulceration causing a fibrous web at the cuff site. Conversely, patients with tracheostomies can develop stenosis due to granulation tissue formation around the stoma site often with associated cartilage fractures or malacia of the tracheal wall. As far as anesthetic management is concerned, a patient with undiagnosed subglottic stenosis can pose significant challenges to the anesthesiologist. In this case, our ability to easily mask ventilate the patient between intubation attempts gave us a significant advantage. Additionally, this was non-emergent case, and the option to awaken the patient was available. In the event that mask ventilation was unsuccessful, other airway management techniques include jet ventilation, small diameter endotracheal tube, spontaneous ventilation via bronchoscope, tracheostomy, or laryngeal mask airway. In patients with diagnosed subglottic stenosis undergoing surgery, a critical finding in one was study was a 7.5% initial failure rate of airway management technique. This demonstrates the need for additional studies in which a defined strategic management plan can be created for subglottic stenosis similar to the ASA difficulty airway algorithm.

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SUSTAINED INCREASE IN BISPECTRAL INDEX DURING PAROXYSMS OF SUPRAVENTRICULAR TACHYCARDIA IN A PATIENT WITH WOLFF-PARKINSON-WHITE SYNDROME

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INTRODUCTION: Bispectral index (BIS) monitor uses an algorithmically processed EEG and EMG to generate a dimensionless integer ranging from 0 (no brain activity) to 100 (complete wakefulness). Certain beta receptor agonists (isoproterenol, ephedrine) are known to increase BIS values in patients undergoing general anesthesia. This effect is believed to be mediated by direct stimulatory properties of these agents on central nervous system (1). Whether a primary increase in heart rate (such as spontaneous tachyarrhythmia) can trigger BIS changes has not been reported. Herein we present a case of sustained BIS elevations in a patient with Wolff-Parkinson-White syndrome that occurred during paroxysms of supraventricular tachyarrhythmia and a return of BIS values to the baseline during normal sinus rhythm.

CASE REPORT: A 32 year old patient with Wolff-Parkinson-White syndrome and a 10 year history of paroxysmal supraventricular tachycardia underwent general endotracheal anesthesia for the electrophysiology study and the radiofrequency ablation of an accessory conduction pathway. Standard ASA monitors and BIS monitor were applied and the values were continuously recorded by an automated anesthesia system. General anesthesia was induced with intravenous propofol (2mg/kg), fentanyl (2mcg/kg) and rocuronium (0.6 mg/kg) and maintained with sevoflurane titrated to BIS values 40-50. Muscle relaxation was maintained with rocuronium at one twitch of TOF. When in sinus rhythm, patient's HR ranged between 80-100 bpm and BIS values fluctuated between 40-50 under general anesthesia. Three episodes of spontaneous atrioventricular reentry tachycardia (abrupt increase of HR to 150-170 bpm) lasting 1-2 minutes occurred at 180, 210 and 250 minutes after the induction of anesthesia. BIS values rapidly increased during tachycardia and fluctuated between 60 and 67. A return of BIS values to the baseline was noted upon spontaneous conversion to sinus rhythm. Patient remained hemodynamically stable during the episodes of tachycardia with MAP 60-70 mmHg. The episodes have not coincided with surgical stimulation (femoral vein access) and were not triggered by pacing.

CONCLUSION: Continuous BIS monitoring during general anesthesia may provide further insights into a relationship between heart rate and cortical activity. Cardiac electrophysiology studies provide a unique opportunity to study this relationship, given that patients often present with spontaneously occurring tachy- or bradyarrhythmias. Our observation suggests that an intrinsic change in heart rate such as supraventricular tachyarrhythmia can trigger changes in BIS. BIS-guided maintenance of general anesthesia should therefore be considered in patients with certain arrhythmias or those requiring continuous infusions of beta-adrenergic agonists.

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Technique for Safe Placement of a Trans-Esophageal Echocardiogram Probe in a Patient with Zenker's Diverticulum Undergoing Mitral and Tricuspid Valve Repair

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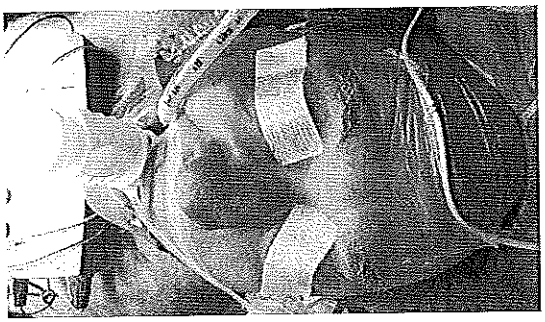
Advances in perioperative management of patients during cardiac surgery have lead to the use of trans-esophageal echocardiography (TEE) as a staple of practice. TEE provides real time myocardial/valvular visualization and evaluation, improving outcomes in patients with impaired cardiac function in cardiac/non-cardiac procedures alike. Though a simple procedure, placement and use of the TEE probe is not without potential complications that occur at a rate similar to upper GI endoscopy (1). Though infrequent, serious complications such as esophageal perforation may result in a mortality rate as high as 56% (2). Furthermore, specific gastrointestinal diseases such as Zenker's Diverticulum (ZD) have been associated with increased risk of perforation with TEE probe placement and are considered "contraindicated" (3). However, in high risk patients with severely impaired cardiac function, the use of TEE should still be considered. A novel approach of upper endoscopy and placement of an overtube covering the ZD via guide wire prior to TEE placement may reduce the risk of esophageal complications.

Case report:

A 75 year old male with increasing shortness of breath and fatigue due to congestive heart failure secondary to severe mitral and moderate tricuspid regurgitation presented to us for MV and TV repair. His past medical history included HTN, A-fib, Reynaud's phenomenon, AV nodal ablation followed by insertion of a PPM, IDDM and chronic dysphagia from a ZD. Trans-thoracic echo revealed a dilated LV with an EF of 45-50%, diffuse hypokinesis, dilated RV, prolapsed anterior MV with leaflet malcoaptation, severe MR by ERO of 39mm2 and RVol of 65ml, and severe TR due either to leaflet malcoaptation and/or annular dilation.

Preoperatively, large bore IV access and radial A-Line were placed. Central line and PA catheter placed in OR under sedation. Following an RSI and GETA a gastroenterologist completed an upper endoscopy. After identifying the ZD at the level of the cricopharyngeus, the short overtube advanced over the scope under endoscopic visualization, covering the stem of the diverticulum. Endoscope was removed while keeping the overtube secure in place. The TEE probe was then passed freely through the overtube and used without incident for the remainder of an uncomplicated case. At the conclusion of the procedure the overtube was removed by gently pulling it from the esophagus. The rest of his postoperative course was without incident.

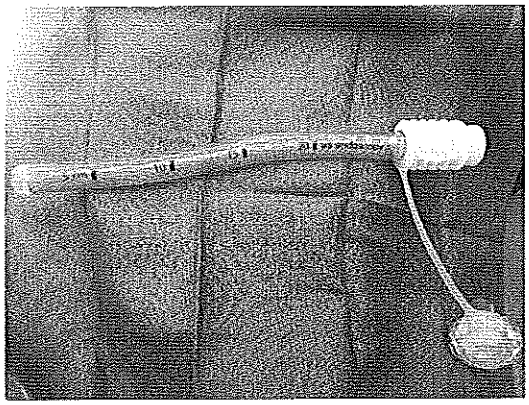


Discussion:

Mild and serious complications of placing a TEE probe can be categorized by a systems-

based approach: gastrointestinal, cardiovascular, pulmonary, and medication related. Gastrointestinal complications can be further divided by severity with the most common and least severe, retching, described by 39% in patients with little to no anesthesia (4). Similarly, forceful vomiting, development of Mallory-Weiss tears and esophageal perforation have been described (in order of decreasing incidence) in the literature. Severe complications from placement of the TEE probe in the general population are rare 0.08-0.13% (1). Perforation from probe placement itself likely has an incidence of 1 in 3,020-12,644 with a mortality rate of 10-56% (2, 5-7). Furthermore gastrointestinal and esophageal lesions increase the risk of complications associated with TEE placement. Diverticula, hiatal hernia, neoplasm, mucosal inflammation and changes in the cervical spine increase risk to injury as well as difficulties with probe placement (4). Difficult probe placement alone may account for 0.03% of TEE-associated esophageal perforations (3, 1). Advanced age is an independent risk factor in the development of esophageal lesions. Patients presenting preoperatively with symptoms of dysphagia and these risk factors, warrant further investigation.

Zenker's diverticulum is an out-pouching of the esophageal mucosa due to a weakness of the cricopharyngeus and lower inferior constrictor muscles. The incidence of ZD is uncommon 2:100,000 and often presents as transient dysphagia (8). As the sack of the diverticulum enlarges it can retain mucus, sputum and food leading to foul breath, pulmonary aspiration and potentially complete obstruction of the esophagus. These characteristics alone pose challenges to the induction of general anesthesia and potential risk of aspiration.



A paper by Hilberath JN et al suggests that placement of a TEE probe in patients with an esophageal diverticulum be considered as an absolute contraindication unless a risk/benefits assessment favors the use and all appropriate precautions are taken (3). Due to the increased risk novel approaches for successful and atraumatic placement of the TEE probe have been attempted and described in the literature. Few case reports depict using direct visualization with a fiberoptic endoscope to place an overtube in which the TEE probe can then pass through (9-12). Additionally one paper described the use of fluoroscopy to place a balloon in the neck of the diverticulum as well as the TEE allowing for safe passage (7). Based on the current literature we opted to proceed with the overtube technique with significant success with little additional time and resources. Inferences based on limited data suggest that if the risks of placing a TEE probe in patients with ZD outweigh the potential harm of proceeding without, placement of an overtube may be an appropriate modality for management and minimizing risk.

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THE DEMOGRAPHIC OF OBESITY AS A FOCUS IN ANESTHESIOLOGY RESEARCH BETWEEN 2009 AND 2014: AN OBSERVATION

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Introduction

Obesity has become a common comorbid condition in patients presenting for surgery and anesthesia. The growing perioperative prevalence of obesity has led to increasing concern among anesthesiologists, and at least 2 learned societies have formed in the US beginning in 2010 and 2011 respectively. The International Society for the Perioperative Care of Obese Patients (ISPCOP) concerns itself with anesthesia and obesity, and the Society for Anesthesia and Sleep Medicine (SASM), which also now has an accredited fellowship in this field, explores sleep disordered breathing, often present in obesity. We aimed to determine the impact of obesity on anesthesiology research, and describe the type and the main areas of research interest prompted this condition.

Methods

In this observational study, we searched the annual meeting abstract databases of both, the International Anesthesia Research Society (IARS) and the American Society of Anesthesiologists (ASA) from 2009 – 2014 using the following search terms: Anesthesia AND Obesity; Anesthesia AND obese; Anesthesia AND Overweight; Anesthesia AND bariatric, Anesthesia AND sleep apnea, and Anesthesia AND BMI. Clinically challenging case abstract databases were not included. Data collected included the number of abstracts per year, the country of origin, and the type of research and topic areas of study.

Results

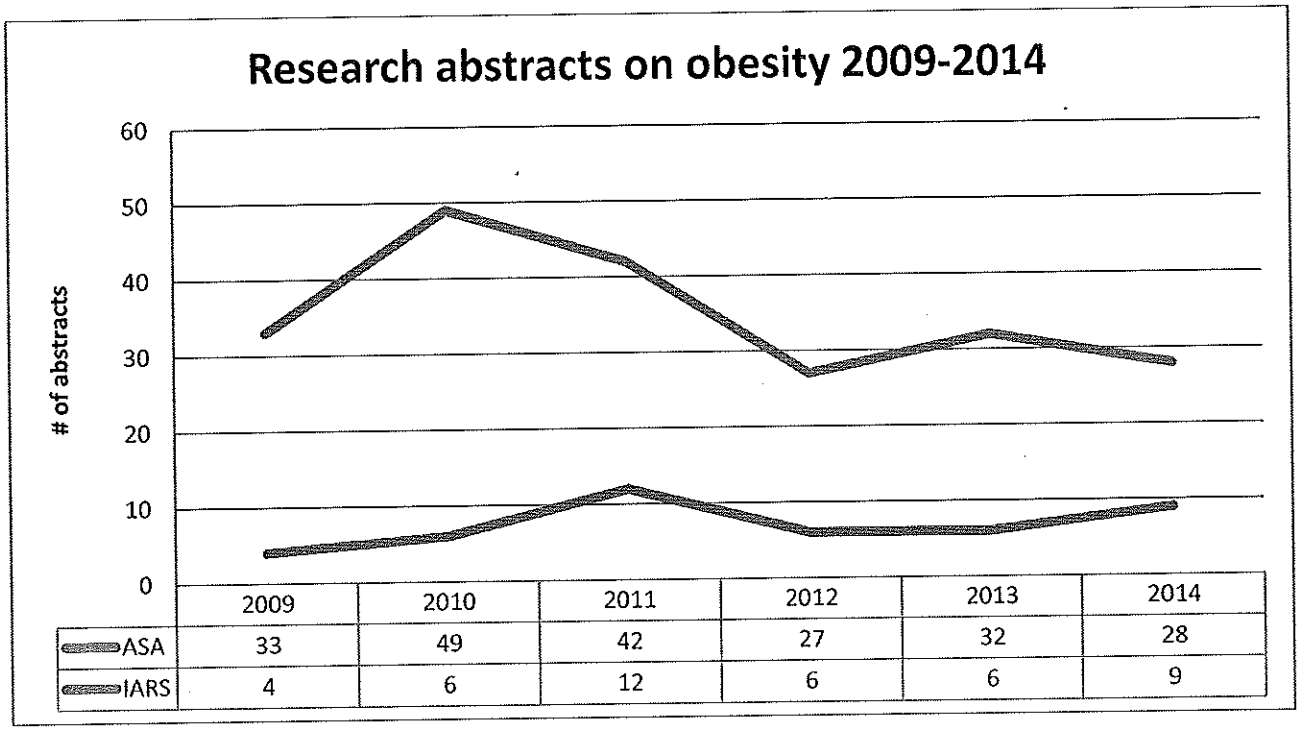
From 2009 – 2014 the IARS and the ASA accepted a total of 2433 and 9144 abstract submissions, respectively. Of these, 43 (1.8%) and 211 (2.3%) were obesity specific abstracts with a noticeable single annual increase in 2010 for the ASA and in 2011 for the IARS (Fig 1). The vast majority of them originated from North America followed by Europe and Australasia (Fig 2). The main study topics (> 10 % of all abstracts) were respiration, patient safety and practice management, outcomes and database research, and pediatric and obstetric anesthesia for the ASA, and education and patient safety for the IARS (Fig 3). Most of the studies were either retrospective in nature (ASA: 66/211; 31%, IARS: 16/43; 37%) or prospective observational (ASA: 69/211; 33%, IARS: 14/43; 33%) with fewer prospective randomized or basic science and other studies (Fig 4).

Conclusion

This study shows a relatively constant obesity abstract acceptance close to 2 % for the ASA and the IARS from 2009 - 2014, with a spike in 2010 and 2011 respectively that coincides with the formation of 2 new learned anesthesia societies exploring obesity and anesthesia/sleep medicine. Not surprisingly, most abstracts were from the United States, as the ASA and the IARS are US based, and the main research focus of the abstracts was patient safety and respiration, followed by outcomes, pediatric and obstetric anesthesia. The IARS and ASA databases differ in their submission categories, which may explain the differences in apparent research focus between societies. Gold standard prospective, randomized trials have a low frequency, and the specialty of anesthesiology should address this shortcoming in future years.

Figures.

Figure 1. Anesthesiology research abstracts in obesity from 2009 to 2014.



	2009	2010	2011	2012	2013	2014
ASA	33	49	42	27	32	28
IARS	4	6	12	6	6	9

Figure 2. Research abstracts in obesity from 2009 to 2014 by geography.

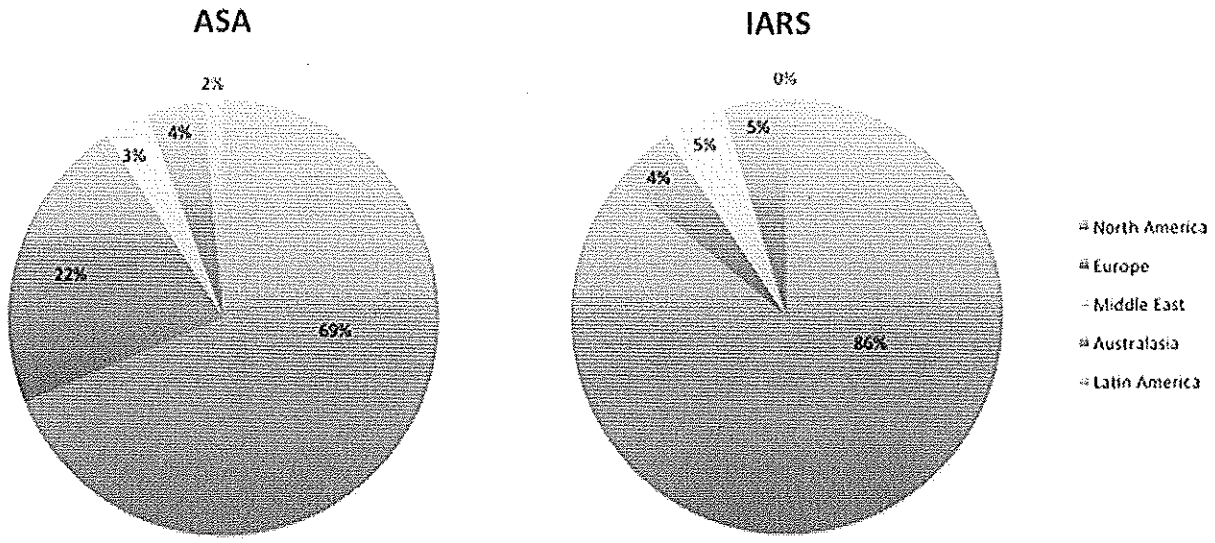


Figure 3. Research abstracts in obesity from 2009 to 2014 by main topic.

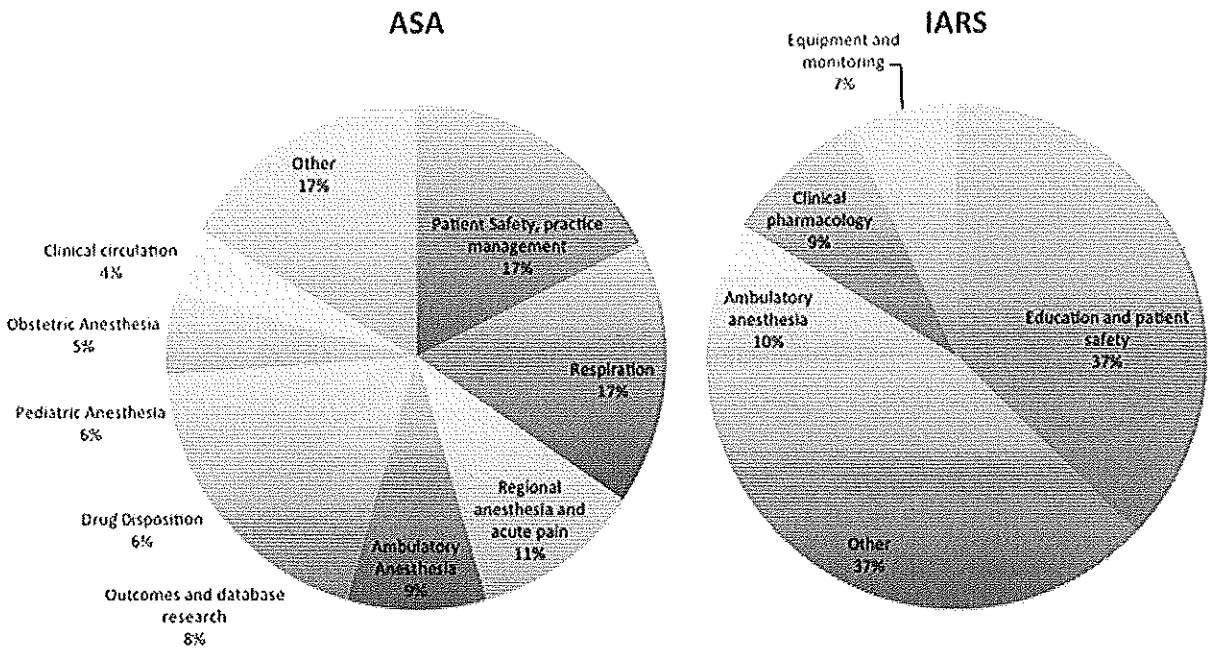
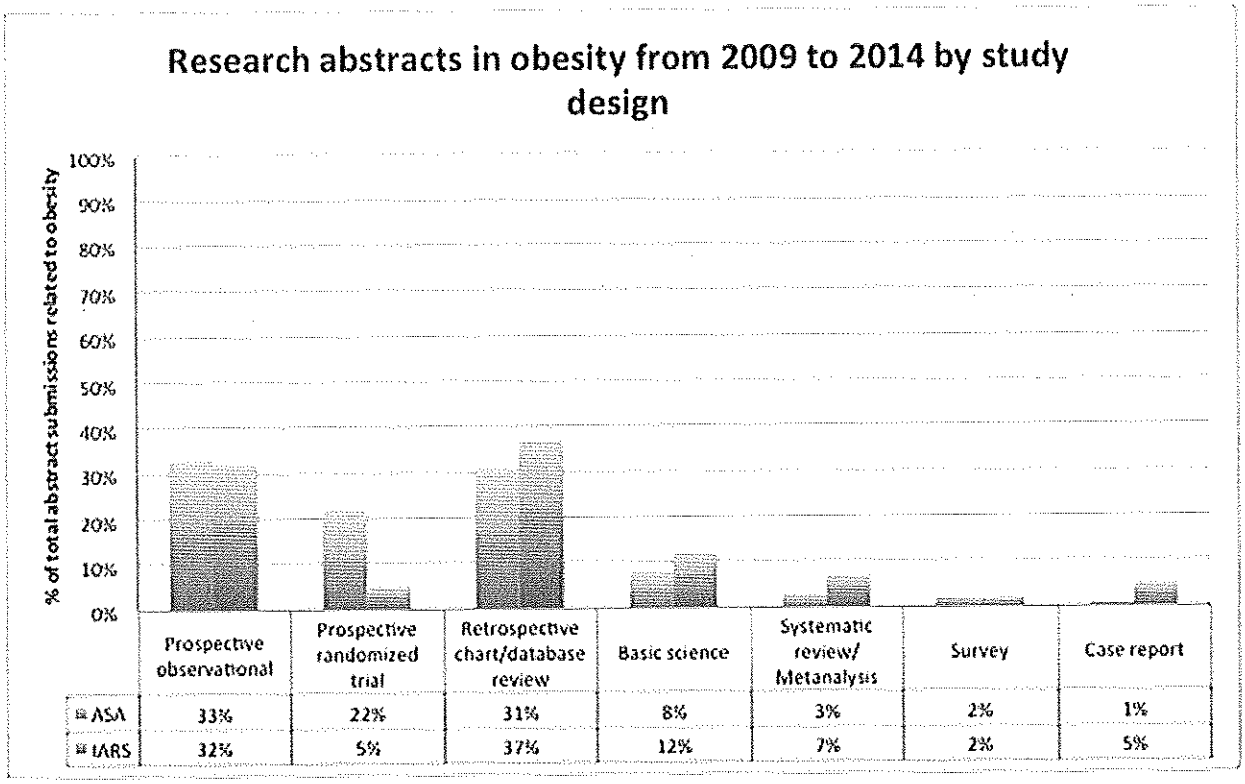


Figure 4. Research abstracts in obesity from 2009 to 2014 by study design



Case Report: Type I Myotonic Dystrophy for Coronary Artery Bypass Grafting

Loren Babirak MD, Jennie Nguyen DO, James Gagnon MD, Angus Christie MD. Case Report: Type I Myotonic Dystrophy for Coronary Artery Bypass Grafting. New England Anesthesia Resident Conference (NEARC). February 2015

Abstract

56 year old male with past medical history of myotonic dystrophy type 1, restrictive lung disease, and CAD s/p multiple PCIs. The patient presented with unstable angina and ruled in by serial enzymes for a NSTEMI. Cardiac catheterization was performed and demonstrated progression of CAD; the lesions were determined to be not amenable to PCI. The patient was scheduled for CABG.

Use of Nebulized Heparin and N-Acetylcysteine in the management of Inhalational Injuries

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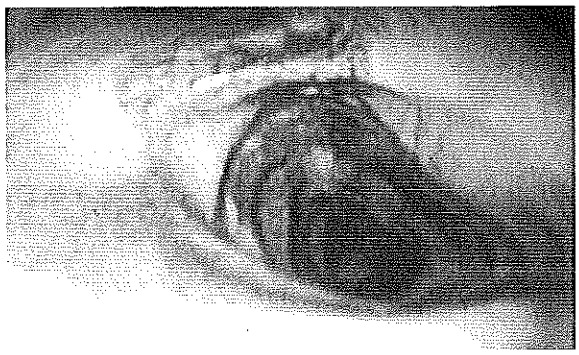
University of Massachusetts School of Medicine
(1) Department of Anesthesiology, (2) Department of Neurology Critical Care

Abstract:

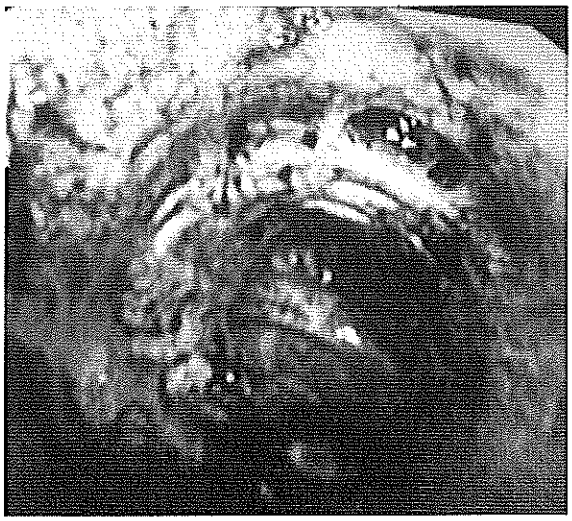
Over 450,000 burn injuries occur in the United States on an annual basis, of those injuries 1.5-19.5% include inhalational injuries. Inhalational injuries often exist without any signs of any cutaneous burns (2). Regardless of obvious inhalational injury there appears to be a 70% prevalence of respiratory failure from hypoxemia, infection or long term ventilator support as well as ARDS (20% of all burn cases) (11). Injuries to the airways from inhalational burns are associated with a devastating mortality rate as high as 80% (2). Pathophysiology of the evolving burn suggests that physiological responses to the injury may account for the progression to respiratory failure (1, 6). Novel approaches to reducing the level of activated inflammatory mediators to the airway such as nebulized heparin has lead to potential improved outcomes and a significant decrease in mortality (3, 10).

Case description:

A 60 year old male with a past medical history of COPD on home O2 at night, witnessed a house fire and proceeded to enter the building in attempts to help people trapped inside. He was found by EMS outside the building alert and short of breath. The patient was treated for a COPD exacerbation in route to the ED. In the ED he progressed to shortness of breath with stridor. Exam revealed singed nose hairs and erythematous lips suggestive of an inhalational injury. Patient was intubated via an awake-fiberoptic-intubation and transferred to the ICU for further management. Bronchoscopy 12 hours following the injury produced the pictures below. He was then started on nebulized Heparin 10,000 units Q4 hrs, alternating with nebulized acetylcystine and albuterol Q4 hrs for a course of five days. His endotracheal suctioning initially produced carbonaceous secretions which progressed to whitish frothy sputum. Bronchoscopy was not repeated and on hospital day five the patient underwent video laryngoscopy with glidescope; no edema was visualized. He was then extubated over a cook exchange catheter which remained for 5-10 min to ensure no collapse of the upper airway. He was transitioned to nasal cannula over the course of two days and continued to improve to baseline.



Video fiberoptic view of the left mainstem bronchus at the level of the carina



Discussion:

Inhalational injuries are often a result of heat exposure to the airway mucosa and associated with inhalation of noxious particles or gas. These exposures lead to damage of the large and small airways. The epithelium of the tracheobronchial tree then undergoes necrosis leading to sloughing, clumping, loss of cilia, decrease in the mucocilliary clearance and ultimately obstruction of the airways (11). Additionally, free radicals increase the permeability of the pulmonary vasculature leading to interstitial and intralveolar edema. Obstructive casts produced by fibrin deposition (producing fibrinocellular pseudomembranes), PMNs and mucus lead to further obstruction (1). Therapies to interrupt the formation of these casts and clots have lead to the use of nebulized medications such as heparin and N-Acetylcystine (3, 5, 9, 10). Theoretically, nebulized 10,000 units of heparin every 4 hours starting within 48 hours of the injury will disrupt the deposition of fibrin and reduce airway collapse. Nebulized N-Acetylcystine every 4 hours (alternating with heparin) helps to inhibit the formation of obstructive airway casts. The use of albuterol provides bronchodilation and reduction of atelectasis. Additional inhaled fibrinolytics like TPA and agents that cleave extracellular DNA (Dornase alfa) have been proposed but are less studied in patients with inhalational injuries. A systematic review of all the current literature has suggested improved survival, decreased morbidity and a lack of altering systemic markers of clotting and anticoagulation (0.5714 +/- 0.1497 vs 0.9375 +/- 0.0605 (RR 0.0055; 95% confidence interval 0.0314–0.0204; HR 1.003)) (9). Two conflicting papers found no benefit to using nebulized heparin and was shown to increase the risk of pulmonary infection (45% vs. 11% in control); however, lower doses of heparin were used in these studies (4, 8, 9). The level of supporting evidence has lead to an ongoing multi-center clinical trial called HEPBURN aimed to investigate the effectiveness of nebulized heparin, N-acetylcysteine and albuterol in reducing the inflammatory response to endothelial damage of the airways and improving outcomes (7).

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Uterine incarceration: a literature review and examination of anesthetic care

Authors: J. Smart-Abbey MD, Eric Ursprung MD, R. Schumann MD

Abstract

Introduction:

Uterine incarceration (UI) is a rare complication of pregnancy that occurs when the gravid, retroflexed fundus becomes trapped under the sacral promontory and does not ascend out of the pelvis by the second trimester. Treatment includes bladder catheterization, knee to chest maneuvers, and manual reduction.[1] For the latter anesthetic interventions may be required. We present a review of the literature attempting to identify optimal anesthetic care.

Methods:

We conducted a systematic search of case reports using specific key words in the pub-mad database from 1955 to 2014. All articles meeting inclusion criteria were extracted for their description of UI, reduction success rates and anesthesia relevant information, including techniques used. Descriptive statistics were used to present data.

Results:

51 Case reports and series describing 54 cases were identified. 25.9% of UI occurred in the 1st trimester, 55.5% in the 2nd, and 18.5% in the 3rd trimester. 78.5% of 1st trimester UI required 1 attempt at successful reduction and 21.4% needed ≥ 2 attempts. Use of neuraxial anesthesia was reported twice in single attempts and general anesthesia (GA) once in a multiple attempt case.

In 2nd trimester UI, 76.7% were successfully reduced with 1 attempt and 23.3% with ≥ 2attempts. Neuraxial anesthesia was reported once for 1 attempt. No anesthetic information in ≥ 2 attempts were reported. All 3rd trimester UIs underwent cesarean delivery without reduction attempts. Use of GA was described in 2 such cases and no anesthesia information in the remaining 8 cases. Table 1 summarizes these findings.

Conclusions:

UI can result in premature rupture of membranes, spontaneous abortion, bladder and uterine rupture.[2] We found 54 cases described in the literature, with more than half reporting 2nd trimester UI. Greater than 75% of 1st and 2nd trimester UI was successfully manually reduced with just one attempt. In only 6 cases anesthesia relevant information was provided. In two 1st trimester cases with use of neuraxial techniques, single reduction attempts were successful. Due the limited overall reports containing anesthesia information, no definitive conclusions regarding optimal anesthetic management for UI can be made.

Ref:

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2. Sweigart A et al. West J Emerg Med. 2008; 9:232-234

Ventricular Bigeminy during desflurane anesthesia: a case report

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Introduction

Inhalational agents provide many anesthetic advantages in the operating room but are not without side effects. One well known but infrequently observed side effect of inhalational agents is cardiac dysrhythmias. All volatile agents are known in theory to cause QT prolongation, especially in the presence of baseline QT prolongation. However, these prolongations were often observed in the presence of adrenergic agents such as epinephrine. When compared with nitrous oxide and sevoflurane, desflurane was observed to cause interval prolongation but there was no increase in cardiac dysrhythmias. Several older case reports have shown halothane to cause ventricular bigeminy and other ventricular dysrhythmias; however, no case reports or literature have shown sevoflurane or desflurane to cause ventricular dysrhythmias. In the presence of Ehlers-Danlos Syndrome (EDS), no volatile anesthetics have been shown to cause ventricular bigeminy or dysrhythmias; the most commonly reported cardiac dysrhythmias in EDS patients with or without inhalational agents were complete heart block, atrial fibrillation, sinus bradycardia and postural orthostatic tachycardia syndrome (POTS). Of note, all cardiac dysrhythmias in EDS patients were supraventricular in etiology. We report a case of a patient undergoing desflurane anesthesia and developing ventricular bigeminy intraoperatively.

Case Presentation

A 42 year-old female with a history of EDS of unknown subtype presented for detethering of filum due to persistent numbness of feet bilaterally. Regarding her EDS, she reported a recent history of subluxation of her posterior ribs as well as hyperextension of her wrists. She did not take any electrolyte-altering medications, and was not on a beta blocker. Thirty minutes after an uneventful induction and all antibiotic administration, the patient was switched to desflurane from sevoflurane for maintenance, as well as propofol and remifentanil infusions, as the surgeon requested somatosensory monitoring. Shortly thereafter, an unusual ventricular rhythm appeared on the 5-lead electrocardiogram (EKG) as show to the right. At the same time, the surgeon was incising the surgical field. The surgeon was asked to stop incision, and the rhythm persisted. A cardiac anesthesiologist was consulted, and recommended drawing labs, all which were normal. A decision was then made to switch desflurane back to sevoflurane, and twenty minutes after the switch, the patient converted back into normal sinus rhythm.

Special thanks to Dr. Munther Homoud for his electrocardiogram analysis

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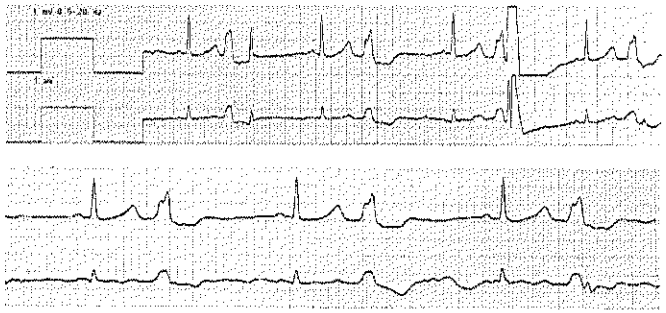
Results



Labs

141	111	12	102
4.4	20	0.9	

Ca 8.5
Mg 1.9
Ph 2.9

Discussion

The rhythm strip shown above demonstrated ventricular bigeminy as confirmed by an independent electrophysiologist who was not involved in the case. All possible causes of ventricular bigeminy were investigated. As noted before, the patient was on no electrolyte-altering medications. She also had a normal EKG pre-operatively with no ventricular or wave morphology changes. Because of her chronic pain related to her tethered film, she received a pre-operative cocktail of pregabalin, tylenol and scopolamine. A brief literature search revealed no incidences of ventricular bigeminy caused by either of the 3 medications. She received cefazolin, which has potential to cause QT prolongation, but it was administered more than 30 minutes prior to onset of ventricular bigeminy. Interestingly, a literature review shows no cases of ventricular bigeminy caused by cefazolin. Additionally, the patient did not receive any medications for 30 minutes prior to the onset of ventricular bigeminy, and no changes in dosing of medications were made. As shown above, electrolytes were normal. Surgical stimulation was considered but the rhythm persisted despite no surgical stimulation. Sevoflurane was also considered a possible culprit, but as demonstrated above, the patient converted back into normal sinus rhythm when desflurane was switched over to sevoflurane. Of note, the patient remained hemodynamically stable throughout the procedure, and the estimated blood loss was less than 25 cc. To demonstrate reproducibility of the rhythm, desflurane was turned on to 0.5 MAC at the conclusion of the case, one and a half hours after cessation of the rhythm to ensure adequate desflurane washout. The ventricular bigeminy returned, and thus desflurane was again shut off. When the patient arrived to the post-anesthesia care unit (PACU), rhythm analysis was performed and showed normal sinus rhythm. The patient had no further recurrence of ventricular bigeminy throughout the remainder of her 3-day hospital stay. Our case report shows that inhalational agents, in the absence of chemical and physiological derangements, are capable of triggering ventricular dysrhythmias that may require alternative anesthetic management.

Peri-operative Mortality in a Cirrhotic Patient after Urgent Surgery

Zachary Camann MD, Sarah Meade MD, Uoo Kim MD, Jana Hudcova MD

Background

Liver cirrhosis greatly influences peri-operative outcome in elective and unplanned emergent surgery. Post-operative mortality increases with worsening Child-Pugh score and can approach 100%.

Case Report

64M with past medical history significant for liver cirrhosis (calculated pre-admission MELD 15, Child-Pugh score 8), hepatitis C, alcohol abuse, IV drug abuse, presented with perforated diverticulitis complicated by feculent peritonitis. An emergency exploratory laparotomy with Hartmann's stage 1 was performed. Of note, the patient was removed from the liver transplant list due to his emergency surgery. Septic shock was treated with vancomycin, cefepime, and flagyl as well as vasopressors. Over the course of a few days, pressors were weaned off and the patient was extubated. Antibiotics were continued and the patient appeared to be recovering well. However a couple days later the patient began to deteriorate. Abdominal CT imaging was obtained showing paraumbilical hernia, without evidence of infection. As the clinical status continued to deteriorate, and the patient was taken back to the OR for washout and closure of the paraumbilical hernia. Pressors were restarted and the patient was intubated. Diflucan was added for fungal coverage and Vancomycin was switched to Daptomycin as the patient was found to be a Vancomycin-Resistant Enterococci (VRE) carrier. Subsequent cultures were significant for VRE in the blood and peritoneal fluid. Over this time the AST and ALT initially rose above 1000 and then trended down. Meanwhile, bilirubin rose into the 30's, INR > 6, platelets fell to about 20. Continuous Veno-Venous Hemofiltration (CVVH) was initiated for hyperkalemia and the patient began to improve once again as vasopressors were able to be weaned. After a few days the patient became febrile and tachypneic. Vasopressors were restarted and the cisatracurium was initiated for improved ventilation. Due to the poor prognosis, a family meeting was held and it was decided to transition goals of care to comfort measures only. The patient passed away shortly afterwards.

Discussion

There are several considerations for the cirrhotic patient undergoing surgery. First of all, morbidity and mortality is higher compared to non-cirrhotic patients. The presence of ascites increases the risk of aspiration on induction of anesthesia and can decrease the functional residual capacity (FRC). Resuscitation with blood products for either anemia or coagulopathy may alloimmunize a transplant candidate against HLA antigens in a future potential donor liver. Decreased hepatic synthesis of coagulation factors can lead to coagulopathy. However in the case of emergencies such as a perforated diverticulitis as stated in the case report, there may be no other option for the clinician but to proceed with surgical intervention. The clinician must be ready for a difficult post-operative course and prolonged hospital stay, with the knowledge that there is increased risk of morbidity and mortality in these patients.