The addition of adjuncts to peripheral nerve blocks can achieve prolongation of blockade. Perineural use of dexamethasone as an adjunct to local anesthetics with brachial plexus blocks has been shown to prolong the intensity and duration of the blocks.\(^1\) However, there is a concern for neurotoxicity with perineural dexamethasone as well as some of its preservatives.\(^2\text{-}^6\) Despite such concerns, there is some data suggesting that dexamethasone may actually be neuroprotective.\(^7\) Intravenous dexamethasone is equivalent to perineural dexamethasone in prolonging the analgesic duration of a single shot of interscalene brachial plexus block in some studies.\(^11,23\) However, an exhausting literature review on this has led to the conclusion that a direct comparison amongst the studies has been difficult predominantly due to varying definitions of analgesia duration. Some studies had confounding additives such as epinephrine that could prolong the block as well as pose a neurotoxic risk.\(^8,12,14\text{-}16\) The use of different local anesthetics and locations of the blocks have also made the correlation difficult to make.

In summary, intravenous dexamethasone prolongs analgesia duration of peripheral nerve blocks.\(^17,18\) It does appear that perineural administration of dexamethasone achieves slightly longer prolongation than the intravenous route.\(^9,10,12\text{-}14\) The duration of extended relief may not be attractive in light of the fact that there is a possible concern for the risk of neurotoxicity.\(^2\text{-}6\) An intravenous dose of dexamethasone of at least 0.1 mg/kg should be used as it was found to have a reduction in postoperative pain and opioid consumption.\(^21,22\) Doses less than 2.5 mg are not preferred due to lack of effect.\(^17\) If perineural dexamethasone is to be used, we suggest using lower doses of 1-2 mg to minimize the risk of neurotoxicity.\(^2,19,20\) Furthermore, the dexamethasone needs to be preservative free as certain preservatives have been directly linked to neurotoxicity.\(^3,4\) More research is needed to verify the possible role of dexamethasone, route of administration, and its neuroprotective versus neurotoxic effects.
References:


Finding increased value in healthcare is becoming a necessity within the American healthcare system. In this original research study, we evaluate the value of several commonly used anesthetic medications used at the University of Arkansas for Medical Sciences (UAMS). We compare the costs of pre-filled syringes to the costs of drawing those same medications from medication vials. We then evaluate the benefits of using pre-filled syringes and provide a cost-benefit analysis. The major benefit of using pre-filled medication syringes is the potential to decrease adverse drug events. We conclude that the use of pre-filled syringes for certain medications, such as propofol, lidocaine, succinylcholine and rocuronium, does not add enough value to the patients at UAMS to justify their increased costs. By drawing up just these four medications alone verses our current practice of utilizing pre-filled syringes for each patient, UAMS, an institution performing just under 23,000 anesthetic services each year, would save roughly $450,000 each year on medication expenses. These savings could be passed on to provide more resources in areas that would better serve our patients. In conclusion, we feel that utilizing pre-filled syringes for medications that pose the greatest risk for adverse drug events while utilizing more cost-effective vials for medications with lower risk potential may be the optimal strategy for increasing value. Anesthesia providers are in a unique position to be leaders in resources utilization within the OR by administering medications that are both safe and cost-effective for their patients.

Bibliography:


Post-operative acute quadriplegia after spinal cord injury in a patient with DISH
Rhae E. Battles, MD, Laurie K. Davies, MD, Steven A. Robicsek, MD
University of Florida – UF Health, Shands
Department of Anesthesiology Gainesville, FL

Introduction:
Diffuse idiopathic skeletal hyperostosis (DISH) is a syndrome characterized by ossification of spinal ligaments at their bony attachments, specifically the anterior longitudinal ligament (1) (2). The most commonly affected location is the thoracic spine, but it can affect the cervical and lumbar spine as well as peripheral joints (1). The cause of the condition is largely unknown (1). The disease commonly presents as an incidental finding on imaging but can lead to a debilitating condition with limited motion of the cervical spine, dysphagia and dyspnea. Treatment includes systemic medication, physical therapy, or even surgical decompression and fusion (1).

Case Presentation:
A 63-year-old male with a history of alcohol abuse and pancreatitis was brought emergently to the operating room (OR) for exploratory laparotomy after peritoneal and cervical free air without evidence of fracture was found on CT examination. A rapid sequence induction was performed before uncomplicated video laryngoscopy. An uncomplicated repair of his gastrostomy tube was performed and the patient was taken to the post-anesthesia care unit moving all four extremities. Thirty minutes after arrival, the patient reported inability to move his extremities and exhibited progressive hypotension. A STAT MRI revealed severe cervical canal stenosis with anterior and posterior osteophytes throughout the cervical and thoracic spine. An emergent cervical decompression and fusion was performed and the patient was left intubated and transported in stable condition to the surgical intensive care unit.

Discussion:
Our patient likely suffered a traumatic injury following a fall at home. This injury could have been exacerbated during the perioperative period leading to devastating quadriplegia. There are limited reports of the rare occurrence of quadriplegia after spinal cord injury in DISH patients. Our patient was at increased risk for deleterious events because he demonstrated both hyperostosis of his anterior and posterior spinal ligaments (2). Anesthesiologists must be aware of this often asymptomatic but insidious disorder after spinal cord injuries.

References:

1. Diffuse idiopathic skeletal hyperostosis (DISH)
   S. Helfgoltt, P. Tugwell, P. Romain,
   https://www.uptodate.com/contents/diffuse-idiopathic-skeletal-hyperostosis-dish

2. Sudden Quadriplegia Complicating Ossification of the Posterior Longitudinal Ligament and Diffuse Idiopathic Skeletal Hyperostosis
   J. Pouchot, C. Watts, J. Esdaile, and R. Hill
   Arthritis & Rheumaology 30 (1987) 1069–1072
An emerging topic of interest has been that of ‘onco-anesthesia’, focusing on optimizing anesthetic care for the cancer patient. Cancer remains a leading cause of mortality and morbidity nationally and worldwide. In 2012, cancer was responsible for an estimated 8.2 million deaths worldwide; this number is expected to increase to over 13 million by the year 2030. In the United States, cancer remains the second leading cause of death, trailing closely behind heart disease. Given the high incidence of cancer and the high healthcare utilization associated with the disease entity, anesthesiologists frequently care for cancer patients. Whether for surgical resection of solid tumors or for non-cancer surgery, these patients often require surgical intervention. While surgery remains a mainstay of treatment for many types of cancer, the stress response associated with surgical intervention has been suspected to increase risk of metastatic recurrence, and recent research has investigated what role the anesthesiologist might play in improving outcomes in the cancer patient population.

A major concern related to anesthesia in the cancer patient is the potential influence of anesthetic drugs on cancer cells and cancer recurrence. Volatile agents, ketamine, and barbiturates have been associated with decreased NK-cell activity and increased metastasis in animal models, while propofol appears to have potential antineoplastic effects. A large retrospective study demonstrated an association between type of anesthetic delivered and survival, with an approximately 50% greater mortality seen in patients receiving volatile general anesthesia compared to those receiving total intravenous anesthesia (TIVA) with propofol and remifentanil. Multiple studies have suggested regional anesthetic techniques may reduce cancer metastasis and improve mortality following cancer surgery. Further studies are warranted to fully elucidate the role anesthetic modalities play in optimizing the perioperative period for cancer patients, but there appears to be great opportunity for the anesthesiologist to aid in minimizing risk of recurrence and improving survival in this patient population.

An Unexpected Intraoperative Diagnosis during Cardiopulmonary Bypass
Kathryn Boles, DO, PharmD, MPH; Eduardo Rodrigues, MD, Martin Abel, MD
Department of Anesthesiology, Mayo Clinic, College of Medicine, Jacksonville, FL
Email: boles.kathryn@mayo.edu Phone: (904) 956-3329 Fax: (904) 956-3332

Introduction: A persistent left superior vena cava (PLSVC) represents the most common thoracic venous anomaly occurring in up to 1 in 200 individuals in the general population1. PLSVC results from the failure of the left superior cardinal vein to regress into the ‘Ligament of Marshall’ during embryologic development1,2. Up to 90% of cases involving a PLSVC drain to the right atrium, and the vast majority of these cases are asymptomatic1,3. However, rarely a PLSVC will drain to the left atrium creating a right to left shunt with significant clinical consequences4.

Case Report: A 36 year-old female with PMH of COPD, anemia, and scoliosis was transferred from an outside hospital for repair of a newly diagnosed atrial septal defect. She experienced dyspnea and fatigue for 2 months that acutely worsened and was admitted to our facility with decompensated heart failure. Echocardiogram identified a large ASD, pulmonary hypertension, severe RV enlargement, and a D-shaped left ventricle. She was taken for ASD repair with cardiopulmonary bypass (CPB). Following induction, a central line was placed into the right internal jugular vein with no issues. A TEE exam was then performed, and curiously could not locate the coronary sinus. A persistent left superior vena cava was suspected by the anesthesia team. Bubble study injected into the left arm confirmed the immediate presence of bubbles into the left atrium on TEE, indicating a PLSVC with left atrial entry point. The cardiothoracic team was alerted to the presence of this undiagnosed cardiac anomaly, and it was collectively decided to proceed with surgery. A pericardial bovine patch was placed for repair of the ASD. During gradual discontinuation of CPB, the patient began to desaturate with an SpO2 of 91% and PaO2 of 62 mmHg on 100% FIO2. A central shunt from the PLSVC was suspected, and extracorporeal circulation was immediately reinitiated. The anesthesia team proposed the creation of an anastomosis from the PLSVC to the right atrium. This would essentially allow all venous drainage to the right side of the heart, eliminating shunt once her ASD was repaired. The right atrium was reopened and the new pericardial patch removed. The PLSVC, located at the base of the left atrial appendage, was ligated and transected. Then an anastomosis was created from the PLSVC to the right atrium using a Gore-Tex graft. CPB was withdrawn for a second time, with no issues. She had a normal postoperative course with significant improvement of her symptoms.

Discussion: Routine preoperative diagnostic exams may miss the presence of PLSVC, especially in the presence of other cardiac anomalies3. If a PLSVC is encountered in the OR, identification is paramount due to the many clinical implications4.

Self-limiting Ventricular Arrhythmia During Liver Allograft Reperfusion in Orthotopic Transplant Requiring the Use of Methylene Blue
E Brown, H Joshi, J White
Dept of Anesthesiology, UF College of Medicine, Gainesville, FL

A 53-year-old male with end-stage liver and kidney disease (MELD 31) presented for liver/kidney transplant. His past medical history of portal hypertension, type 2 diabetes mellitus, and ESRD on hemodialysis was complicated by recent urosepsis with self-limiting atrial fibrillation and cardiac depression. Serious ventricular arrhythmias can occur during liver transplantation, especially at the time of liver allograft reperfusion. This life-threatening eventuality requires active preparation during the latter part of the anhepatic phase and extreme vigilance immediately upon reperfusion.

General endotracheal anesthesia was induced and arterial and central venous lines were placed, A TEE probe was inserted that confirmed normal cardiac function. Shortly after incision, dense scar tissue in the porta hepatis caused massive bleeding that persisted despite frantic cross-clamp of the inferior vena cava and rapid dissection to the anhepatic phase. Severe hypotension refractory to Belmont infusion of blood products and vasopressors was encountered. TEE showed a severely underfilled left ventricle and global hypokinesis.

Arterial blood gas (ABG) sampling revealed treatment-refractory acidemia (nadir pH 7.1 and hyperkalemia (peak 8 mEq/L). Reperfusion was expected to be turbulent, as final ABG prior to full unclamping showed serum potassium of 4.7 mEq/L. With reperfusion, hypotension developed whilst EKG demonstrated progressive widening of PR interval and QRS duration to a sine wave (Figure 1), pathognomonic of severe hyperkalemia.

Intravenous lidocaine, calcium, sodium bicarbonate, magnesium, and finally methylene blue were administered. Blood pressure and then EKG were noted to normalize, and blood and pressor requirements decreased as bleeding slowed. No cardiac or neurological sequelae have been noted in the post-operative period. Kidney transplant was postponed until the following day, and his transplants are now functioning well.

Cardiomyocytes are subjected to severe insults to liver transplant, many related to allograft reperfusion. Although storage solution makeup and temperature are carefully controlled, the right ventricle routinely encounters cold, acidic, potassium-rich blood soon after flow is re-established. This transplant was further complicated by massive surgical hemorrhage. The ventricular arrhythmias that occurred were expected yet alarming. Pre-planned rapid treatment with the above-listed medications prevented incipient cardiac arrest and need for CPR and defibrillation. In this particular case methylene blue may have been life-saving. Methylene blue has been used in extreme or refractory cases of cardiovascular compromise. Although definitive data supporting its use does not exist, anecdotal cases like this one argue for its continued use in similar special circumstances.

Anesthesia for Caesarean section in a Morbid Obese patient with Dwarfism.

(Alfredo Burgos. Email: alfredo.burgosbriceno@jax.ufl.edu. Phone: 317-652-2426. Fax: (904) 244-4704)

Alfredo E. Burgos MD, Carol Ann Diachun MD, MSEd * Department of Anesthesiology
University of Florida – Jacksonville

Introduction: The current literature of the anesthetic management of Dwarf pregnant patients is limited to only case reports; there is no standard approach to pregnant patients with this condition1. Even though neuroaxial anesthesia is the standard of care for most elective caesarean sections, a pregnant patient with morbid obesity and dwarfism represents a challenge for the anesthesia care provider.

Dwarf is defined as an adult height of 148cm or less. Multiple are the etiologies, including genetic, metabolic and constitutional predisposition to short stature2. Both general and regional anesthesia present challenges for the pregnant dwarf patient: difficult intubation, decreased functional residual capacity (FRC), poor anatomical landmarks, narrow spinal and epidural spaces, prolapsed discs, deformed vertebras, excess skin and subcutaneous space are some of those findings.

Case Description: This was a 22 y.o female with a BMI 73.56 (Height: 1.44m, Weight: 153.9Kg). She had a history of family short stature, and presented with short limbs, wrist deformities and a history of ankle and foot clubbing from birth.

On admission she was on her second gestation with a previous classical caesarean section, scheduled for repeat caesarean section at 37weeks gestation. Her past medical history was remarkable for morbid obesity, hypertension, acid reflux and tobacco abuse. On physical examination she had a short appearance, generalized obesity with short limbs, and Class IV airway.

After discussing with the patient the potential risk of neuroaxial versus general anesthesia, it was decided to proceed with lumbar epidural anesthesia. The patient was monitored per standard ASA guidelines, placed in sitting position. The patient’s landmarks were identified to best of ability due to BMI. In usual sterile manner epidural placement was attempted. On the first try a 17 Gauge, 6 inch, Tuohy needle was advanced using midline approach and LOR to saline technique in L2-3 interspace. Epidural space was located at 17cm (Depth estimated due to BMI and skin indenting with 6in Tuohy needle) from skin after 2 attempts. A test dose of Lidocaine with Epinephrine was injected one time with negative results however no block level was obtained. The second try was done with an 18 G 6 inch Tuohy needle at L3-L4 level, a similar catheter was placed but again the patient did not achieve block level. On the last try an 18 Gauge 6 inch Tuohy needle was advanced using midline approach in L3-4 interspace. A purposeful dural puncture for spinal catheter placement was done (after 3 attempts). Catheter placement was positive for cerebrospinal fluid aspiration. Only 1mL bupivacaine 0.75% in divided doses was required for T3 level bilaterally. Case proceeded successfully and healthy baby was delivered. Patient had no headache postoperatively.

Conclusion: In summary, we report a case of intentional spinal catheter placement after multiple fail attempts of epidural placement for a Caesarean section in a morbid obese dwarf patient3.

GI Endoscopy Insufflating Gas Pressure: How Regulated Is the Regulator? (original research)

Alberto Bursian, PGY1 Resident, UF Dept. of Anesthesiology; abursian@anest.ufl.edu/321-684-2101

Background: Of the >55 million endoscopic procedures performed annually,1 500,000 are endoscopic retrograde cholangiopancreatographies (ERCP).2 To achieve visualization during an endoscopic procedure, the inspected lumen must be distended. Distension of a viscus risks migration of the distending medium, usually air or carbon dioxide (CO2) into the circulation. A prior in vitro study demonstrated that endoscopic gas insufflation using a hospital wall source CO2 set up to bypass the Olympus Evis Exera III CLV-190 (Olympus America, Inc., Central Valley, PA) produced distending pressures capable of exceeding 300 mmHg.3 This pressure obviously exceeds venous pressure and therefore risks potential intravascular gas embolism. A review by Matthew et al. notes that ERCP-associated air embolisms, although rare, have been reported in the literature at an increasing rate, and that they are associated with a mortality rate >40%.4 This in vitro study was undertaken to determine the gas pressures that can be generated by the Olympus UCR CO2 Insufflator (Olympus America, Inc.) using two standard Olympus endoscopes. The UCR CO2 device was developed for controlled CO2 endoscopic insufflation.

Methods: We examined two Olympus endoscopes: GIF-Q180 (EGD) and TJF-Q180 (ERCP; Fig. 1) under simulated conditions of use and measured peak distending pressure generated at their distal exit ports. A plastic US Endoscopy Guardus Overtube (Ref 00711146, Lot #1314227) sealed at its distal end and a sideport connection to an electronic pressure transducer (Edwards Lifesciences Corp., Irvine, CA) was used as an airtight sleeve for each of the examined endoscopes (Fig. 2). The distal end of each endoscope was placed within the overtube sleeve and the gas flush button was occluded for six total measurements of the maximum pressure generated for each endoscope. Two insufflating gas source connections were compared: the Olympus UCR CO2 Insufflator and the Olympus Evis Exera III CLV-190 (wall source CO2).

Conclusion: The regulation of insufflating gas pressure using the UCR or Evis Exera III CLV-190 Olympus gas insufflators does not appear to be clinically pressure limited. It remains a clinical concern that even via the UCR CO2 unit, the in vitro measured luminal distending pressure can vastly exceed local venous pressures. Great care and vigilance still needs to be taken regarding signs and symptoms of a gas embolism during GI endoscopies. The strong recommendation for using CO2 in preference to air as the endoscopic insufflating medium seems prudent due to the favorable blood solubility properties of carbon dioxide over air should the distending gas gain entrance to the vascular system.

References:


A Case Report: Opiate-Free Tricuspid Valve Repair
Jeffrey P Cardinale and George Gilly
Jeffrey.cardinale@ochsner.org
Cell: (985)630-9803; Fax: (504)842-2036

While modern anesthetic care was dramatically and positively changed with the discovery and advancement of opiates and opiate-derived medications, published research indicates opioid-induced hyperalgesia is a real and growing concern amongst physicians. Increased awareness of this phenomenon and the ever-increasing population of patients in recovery from opiate addiction has spurred new anesthetic management practices aimed at minimizing perioperative opiate administration. The current case centers on a 30 year-old male recovering from opiate addiction with a recently identified tricuspid vegetation scheduled to undergo an open tricuspid valve repair. The patient had recently undergone a kidney biopsy in which he received fentanyl postoperatively after which he endorsed experiencing symptoms of withdrawal. He requested undergoing the procedure narcotic free and a multi-modal plan was developed with the combined efforts of the surgical and anesthetic teams for his procedure and post-procedure management. This case stands as potentially the first fully opiate-free open valve replacement surgery. Although narcotics are important for perioperative pain control, in patients requiring complex invasive surgeries, advancing techniques in opiate-free anesthesia provides alternative means of adequate pain control in willing patients.

REFERENCES:


Angst MS. Opioid-induced hyperalgesia: a qualitative systematic review. Anesthesiology. 2006;104:570-87.


GLIDESCOPE ASSOCIATED AIRWAY INJURIES

Author:

Arvind Chandrashekar
Anesthesiology Resident PGY2/CA1
University of Mississippi Medical Center
Email: achandrashekar@umc.edu
Ph No: 601-331-1549

ABSTRACT:

Glidescope is a relatively new addition to the airway management armamentarium that has been shown to facilitate the intubation of both anticipated and unanticipated difficult airway and decrease the time to intubation with novice users and decrease in the frequency of esophageal intubation.

Our institution adopted the use of Glidescope in 2009 and since its introduction, there have been several intraoperative oral and airway injuries reported.

This is a retrospective study aimed to provide a descriptive account of the perioperative period in patients who experienced oropharyngeal or airway injuries associated with the use of the glidescope and to identify potential risk factors for these injuries.

This retrospective study was based on a review of existing medical records of patients with oropharyngeal/airway injuries associated with videolaryngoscopy from January 1, 2009 to Dec 8, 2016.

REFERENCES:

Dealing With the Unintubatable Patient: A Novel Approach to a Severe Case of Klippel-Feil Syndrome

Clifford A Cutchins V, MD; Michael E. Mahla, MD
University of Florida College of Medicine - Department of Anesthesiology
Phone: (352) 273-6575; Fax: (352) 392-7029 Email: ccutchins@anest.ufl.edu

Introduction: Klippel-Feil Syndrome (KFS) is a source of serious airway difficulties in pediatric patients given its classic presentation of short neck with micrognathia and restricted motion of the neck due to fused cervical vertebrae1. Since KFS is often associated with numerous other anomalies, these patients frequently present to the operating room for a myriad of surgeries and procedures2. We present a case of KFS in a teenage patient infamously known to our anesthesiology service for a markedly difficult airway scheduled for dental extractions requiring general anesthesia.

Case Presentation: A 13 year-old female with KFS and associated mild developmental delay presented to our preoperative evaluation clinic ahead of her scheduled dental extractions requiring general anesthesia. The patient developed markedly severe dental caries placing her at risk for systemic infection; unfortunately, she was unable to tolerate extractions in the dental clinic under sedation. She was well known to our department given her many previous anesthetics resulting in failure of endotracheal intubation including attempts at both oral and nasal fiberoptic approaches. Her neck rested 1.5 cm from the sternal notch and significant landmarks were unable to be palpated on exam. For preoperative airway planning, a neck CT was obtained showing a markedly anterior glottic opening. Sagittal imaging indicated that a practically-impossible 270 degree turn from the posterior oropharynx would be required to place an endotracheal tube. Given her relatively high-functioning nature for a patient with KFS, her parents adamantly refused elective tracheostomy, which may even require sternal splitting given lack of palpable landmarks. After careful discussion with procedural staff and obtaining informed consent from the parents, the patient was brought to the operating room and standard ASA monitors were applied. She was then sedated with a bolus dose of midazolam and general anesthesia was induced with infusions of dexmedetomidine and ketamine with preservation of spontaneous respiration maintained throughout the procedure. Supplemental oxygen was applied via nasal cannula. The patient tolerated the procedure well without complications and was taken postoperatively to the recovery room in stable condition. A general surgeon with an emergency tracheostomy kit was consulted and immediately available in case of emergencies.

Discussion: KFS and associated craniofacial abnormalities remain a stressful airway concern for anesthesiologists, and there are some patients in whom endotracheal intubation despite current advanced technology is simply impossible3. If an procedure is deemed a dire necessity requiring general anesthesia, consideration can be directed towards elective tracheostomy or, as in this case, unconsciousness with intravenous agents that maintain respiratory drive. Multidisciplinary discussions are necessary in such cases to evaluate sedation requirements, alternative treatment regimens and perioperative planning. Imaging can be helpful and instructive in patients with repeated failed intubations as well3.

References:
Case Report: Severe anaphylaxis after reversal with Suggamadex of rocuronium-induced neuromuscular blockade

Introduction:
Suggamadex is a synthetic cyclodextrin used for the reversal of neuromuscular blockade induced by rocuronium and vecuronium. Here we present a case of presumed anaphylaxis marked by severe bronchospasm and circulatory collapse presenting after administration of a 2 mg/kg dose of suggamadex during a routine laparoscopic general surgery case, of interest for being one of the earliest reports of such a severe reaction associated with the use of this medication.

Case Description:
A 61 year-old male with a past medical history of asthma, COPD, previous anaphylaxis to NSAIDs, and a recent URI treated two months prior to surgery was undergoing a bilateral robotic inguinal hernia repair. The patient was induced uneventfully with propofol and rocuronium, and the case proceeded in unremarkable fashion until closure, when neuromuscular blockade was reversed with approximately 2 mg/kg of suggamadex. One minute later, peak airway pressures increased to exceed 40 cm H2O, delivered tidal volumes declined to 20mL per breath, and ETCO2 declined to unmeasurable limits. The patient became hypotensive to 45/35 on NIBP and progressively hypoxemic. Epinephrine was administered intravenously and manual ventilation was attempted with 100% FiO2; significant resistance to airflow was encountered and greatly diminished breath sounds with wheezes were appreciated over the trachea. The patient’s skin became flushed with significant venous engorgement noted. Additional epinephrine was administered followed by famotidine, dexamethasone, and diphenhydramine. An epinephrine infusion was subsequently started. The patient’s severe bronchospasm and circulatory collapse were initially refractory to these interventions for about five minutes but slowly resolved over one hour of ongoing resuscitation until the patient could be delivered to the ICU in stable condition, where he was extubated safely and neurologically intact shortly after arrival. Elevated serum tryptase levels were noted within 3 hours of this event, providing secondary evidence for the diagnosis of anaphylaxis.1

Discussion:
Perioperatively, anaphylaxis occurs at an estimated incidence of 1 in 10,000 to 20,000 anesthetics delivered.2 Common agents implicated in the pathogenesis of perioperative anaphylaxis include neuromuscular blocking agents, latex, and antibiotics. Since its inception, there have been some case reports of anaphylaxis linked to suggamadex.3 At this time, suggamadex is a relatively new medication introduced at selected centers in the United States, making this case of interest as one of the earliest reported cases of anaphylaxis associated with suggamadex in the US with implications for further examination in terms of its safety in atopic individuals while also reviewing and emphasizing the prompt recognition and treatment of this rapidly progressing and quickly fatal condition.

References:
1 French Society of Anesthesiology and Intensive Care Medicine: Reducing the risk of anaphylaxis during anaesthesia: Abbreviated text. Ann Fr Anesth Reanim 2002; 21(suppl 1):7–23French Society of Anesthesiology and Intensive Care Medicine,
Efficacy of Adjuvant Obturator Nerve Block in Total Knee Arthroplasty

Good postoperative analgesia in total knee arthroplasty is essential for patient satisfaction, reduction of length of hospital stay and for early rehabilitation. The innervation of the knee joint is derived from the femoral, sciatic and obturator nerves. The obturator nerve provides sensory innervation to the medial aspect of the knee in less than 40% of people. The addition of an obturator nerve block to the commonly used femoral nerve block and/or sciatic nerve block for the management of postoperative pain in total knee arthroplasty has been studied for its efficacy as compared to femoral nerve block alone and other adjuvant blocks. Various randomized controlled trials and have shown that the addition of the obturator nerve block to the femoral nerve block significantly reduces opioid consumption and pain scores after total knee arthroplasty as compared to femoral nerve blocks alone1. The technique used to achieve an adequate obturator nerve block is also of importance as different methods have been shown to produce variable cutaneous sensory blockade versus motor blockade assessed by adductor weakness2. The decision to use the obturator nerve block as an adjuvant must weigh the benefits of improved postoperative analgesia with the possibility of increased motor blockade, which hinders early mobility and rehabilitation imperative to the postoperative recovery after total knee arthroplasty. Therefore, the obturator nerve block has also been studied for its efficacy in short term as well as long term pain relief and functional recovery3. The obturator nerve block may be of importance to provide an optimal balance of effective analgesia and adequate mobility allowing total knee arthroplasty patients to benefit from reduced pain, reduced systemic effects of narcotics, reduced hospital stay and increased participation in physical therapy postoperatively.

A Retrospective Analysis of the Efficacy of the Pecto-intercostal Fascial Block (PIFB) for Sternotomy
Michael Fiedorek, M.D.
mcfiedorek@uams.edu
501-952-9231

Background:
The Pecto-intercostal Fascial Block (PIFB) is a relatively novel regional technique for anterior chest wall pain. There are two published case reports describing its use for pain secondary to sternal fractures, anterior rib fractures, and chest tubes. This study retrospectively investigates PIFB’s use for median sternotomy and is the first original research on PIFB.

Methods:
We retrospectively chart reviewed 88 patients (single shot PIFB with adjunctive opioids; n = 44, Opioid analgesia without PIFB; n = 44) who had undergone median sternotomy for cardiac surgery from October 1, 2015 until February 1, 2017. The primary outcome was total opioid administered in IV morphine equivalents on postoperative day 0 (POD0) defined as anesthesia stop until 7am POD1. Secondary endpoints were total opioids administered on POD1 and POD2, time from anesthesia stop to extubation and hospital discharge, and the incidence of sternal debridement for infection.

Results:
Patients who received PIFB received significantly less opioids on POD0 with a median decrease of 11 IV morphine equivalents and interquartile decreases of 27 and 9 (75th and 25th percentile, respectively; p = 0.002063). Though POD1 and POD2 consumption were both decreased in the PIFB arm, this decrease was not statistically significant (p = 0.134 and p = 0.145, respectively). Time to extubation and time to hospital discharge were also numerically less but were not significantly decreased (p = 0.4 and p = 0.41, respectively). There were 3 patients in each group who had undergone sternal debridement for infection at the time of review.

Conclusion:
Single shot PIFB after sternal closure following cardiac surgery decreased opioid consumption on POD0 and did not lead to increased surgical site infection, POD1 and POD2 opioid use as well as time to extubation and hospital discharge were not significantly affected.

Bibliography:
It has been noted that the prevalence of Malignant Hyperthermia (MH) is approximately 1:100,000 of adult and 1:30,000 of child procedures. Approximately half of patients who develop MH have had 1-2 previously uneventful exposures to triggering agents. Survival has been attributed to adequate monitoring, early recognition, and preparedness for acute patient management. This case report focuses on a 13-year-old child, who presented as an outpatient for MRI scan of his spine, for evaluation of previously diagnosed neuromuscular scoliosis, prior to his scheduled repair operation. This presentation not only describes stepwise events in MH development, recommended treatment strategies, and pharmacokinetics behind the MH disease process as a whole, but also on the unique obstacles one faces when attempting to rapidly treat a patient in a tertiary location, such as MRI. These obstacles include lack of assistance, distance to the MH cart, often unavailability of additional equipment for managing a code, and limited space to utilize this equipment when available. In spite of these barriers, the early detection and coordinated response of the anesthetic team involved in this case allowed for adequate patient recovery and his eventual discharge, without residual deficits, following a short PICU admission. The specifics of this case highlight the challenges in this patient’s presentation and future goals to improve care of an MH event in a tertiary care center or remote hospital location.

References:


Post-Operative Hemorrhage

Ashley Fritz, DO and Klaus Torp, MD
Department of Anesthesiology, Mayo Clinic, College of Medicine
Jacksonville, FL
Email: Fritz.ashley@mayo.edu Phone: (904) 956-3329 Fax: (904) 956-3332

Abstract:
Diagnosing the hemodynamically unstable patient after uncomplicated surgical procedure presents a clinical challenge for the perioperative clinician. This case presents a 76 year old male who comes to the hospital with altered mental status, hematuria, anemia and known bladder cancer. His medications are limited to therapy for blood pressure, cholesterol and daily aspirin. His allergies included vesicare and morphine. He presents for planned cystoscopy with biopsy, fulguration, and bilateral retrograde pyelography for evaluation of hematuria. He underwent abdominopelvic computed tomographic (CT) scan one day prior to procedure which did not reveal any acute hemorrhage. His operative course was significant for developing non-specific coagulopathy and anemia with a hemoglobin of 6.7g/dl prompting intra-operative transfusion of two units of packed red blood cells. There was no reported instrumentation of the kidney and surgeons reported no complications post operatively. Upon arrival to the post anesthesia care unit (PACU) the patient developed hypotension and worsening anemia. The patient’s post transfusion hemoglobin remained at 6.7g/dl. His physical exam at that time was significant for worsening mental status from admission, a distended abdomen that was tense and hard, no bowel sounds were present, and no urine output from Foley catheter despite irrigation. The surgical team suspected his new onset hypotension and shock was secondary to medication reaction and possibly anaphylaxis. Anaphylaxis did not explain distended abdomen, worsening mental status and acute anemia. To maintain hemodynamic stability he required a phenylephrine drip and transfusion of nine units of packed red blood cells, 2 units of fresh frozen plasma, and 2 units of cryoprecipitate. The patient was taken for CT scan of head, abdomen and pelvis to evaluate for possible etiologies of worsening mental status and hypotension such as bladder rupture, retroperitoneal bleed, and intracranial bleeding. This case highlights the diagnostic dilemma in perioperative management of shock after cystoscopy.


Case Report: Placenta accreta requiring cesarean hysterectomy despite negative radiologic evidence of abnormally adherent placenta.

Angela Fugate, M.D., PGY3 Resident, University of Florida Department of Anesthesiology, afugate@anest.ufl.edu, (p) 352.265.0077, (f) 352.392.7029.

M. Anthony Cometa, M.D., Clinical Assistant Professor, University of Florida Department of Anesthesiology.

Introduction: A significant cause of morbidity and mortality in United States parturients is peripartum hemorrhage. Understanding which patients are at increased risk of bleeding complications allows the perioperative teams to better anticipate and prepare for the possibility of rapid, massive hemorrhage and take steps to mitigate intraoperative complications and optimize both the surgical approach and potential anesthetic resuscitation and management.

Summary: The frequency of placenta accreta has increased in recent decades due to the concomitant rise in the rate of cesarean delivery. We present a case of a planned fifth cesarean delivery in a woman with known placenta previa. The patient underwent prenatal ultrasound and MRI to evaluate for evidence of placenta accreta, a condition that carries a mortality risk up to 7% (1). Ultrasound and MRI are the two main methods of predicting abnormal placental adherence to the myometrium. Ultrasound carries a sensitivity of 0.77 and specificity of 0.96 while MRI has a sensitivity of 0.88 and a specificity of 1.00 (2). Placenta previa itself presents a 1-5% risk of placenta accreta in addition to an approximate 67% risk of placenta accreta associated with a fifth cesarean delivery (2,3). Ultrasound and MRI were both negative for evidence of any features of an abnormally adherent placenta. Despite the negative radiologic findings, the patient’s cesarean delivery was performed in the main operating room to ensure proximity of resources given her high statistical risk of placenta accreta. After delivery of the fetus under a combined spinal-epidural technique, significant intraoperative bleeding was noted and anesthetic technique was converted to general anesthesia. Hysterectomy was performed and blood loss was estimated to be 2500 mL. The patient required transfusion of three units of packed red blood cells. Surgical findings and pathological report confirmed presence of placenta accreta.

Conclusion: Delivery planning is essential in patients with suspected placenta accreta. Despite negative radiological findings for placenta accreta, a thorough understanding of the patient’s obstetrical history and risk factors coupled with a high level of suspicion for placenta accreta enabled planned coordinated approach to safe cesarean delivery.

Introduction: Plica mediana Dorsalis, also known as “Epidural Septum”, is thought to be a band of connective tissue which divides the epidural space at the dorsal midline attaching from the dura matter to the ligamentum flavum. The existence and significance of this structure is controversial and still debated. While there are those who claim this structure is present in almost every individual, others state it is simply an artifact of imaging. This leads to a dichotomy in practitioners’ management of unilateral epidurals.

Case Presentation: A 56-year-old female with a past medical history significant for hypertension that is well controlled on lisinopril/hydrochlorothiazide and recently diagnosed colon cancer is scheduled to undergo colostomy reversal. The patient previously underwent a left sided colectomy with colostomy under general anesthesia with a T10 Epidural that was placed pre-operatively for post-operative pain control. The patient’s post-operative course was complicated by a unilaterally right-sided epidural. An initial attempt was made to improve epidural analgesia with a bolus of 5ml of 0.5% ropivacaine that resulted in an increased unilateral spread and density of the right-sided block. The epidural catheter was removed on post-operative day one due to inadequate analgesia from the persistent unilateral block and was replaced the same day. The replacement epidural resulted in a unilaterally left-sided block with a small amount of right sides spread following bolus. Both epidurals were placed using a midline approach. The patient now presents for colostomy reversal. There was concern for a near-complete plica mediana dorsalis based on the unique presentation of bilateral, unilateral dermatomal distribution with two separate epidurals. The decision was made to place two paramedian epidurals on the right and the left. This resulted in bilateral dermatomal coverage. Following the procedure, an attempt to perform an epidurography to confirm the presence of a septum was made in the PACU with Omnipaque through the right sided catheter, however, contrast density was inadequate to visualize the radiographic spread of the dye. In a further attempt to prove utility of the bilateral epidural placement, without additional studies at the expense of the patient, the right epidural catheter infusion was discontinued while the left infusion continued. This resulted in a unilateral left-sided block upon re-examination two hours later giving strong support for the presence of a complete plica mediana dorsalis.

Discussion: Unilateral epidural blockade has been reported as 6-8% incidence of epidural failures in one study. This complication poses a challenge to anesthesiologists. The presence of a plica mediana dorsalis is controversial and rarely the cause of unilateral epidural blockade, though often blamed. Placement issues such as lateral migration of the epidural catheter either within the epidural space or exiting the transforamen (paravertebral catheter) or inadvertent paravertebral placement are much more likely the cause of this complication and should be considered first. However, in the unique presentation of this patient presented, it is reasonable to consider presence of a near-complete plica mediana dorsalis.

References:
Hogan QH. Lumbar epidural anatomy - a new look by cryomicrotome section. Anesthesiology 1991;75:767-775
Ginosar Y, Davidson EM. Plica Mediana Dorsalis: Unilateral Epidural Anesthesia and the Use of Bilateral Double Epidural Catheter Technique. Anesthesiology 2016; 125, 220
Neuraxial Anesthesia with Type I Chiari Malformation and Interpreting Zero Numerators
Zachary Greene MD, Michael Cometa MD
ZGreene@anest.ufl.edu; phone: 850-572-6758; fax: 352-392-7029
Department of Anesthesiology, University of Florida College of Medicine

Intro: Neuraxial anesthesia and obstetrics are inextricably linked, but there are many conditions that are potential contraindications to neuraxial techniques. Chiari malformation, structural defects involving the cerebellum, is one such condition that can result in obstructive hydrocephalus. Though it is considered a rare disease, it is difficult to ascertain the true prevalence due to the increasing sensitivity of imaging studies.¹

Case: A 37-year-old Gravida 2 Para 0010 parturient presented for caesarean section with a Type I Chiari malformation and BMI of 55.7. Her symptoms were worsening throughout pregnancy and included headache, nausea, difficulties with balance, syncope upon neck extension and signs of neurogenic claudication. A literature search was performed to determine the safety of neuraxial anesthesia in this patient population. Controversy exists surrounding the choice of anesthetic technique - epidural, spinal or general anesthesia. Epidural techniques do not intentionally cause a CSF leak; however, patients with increased depth of epidural space are at increased risk of accidental dural puncture.² Spinal anesthesia intentionally causes a small dural puncture that is less likely to lead to a significant CSF leak. General anesthesia avoids both accidental and intentional dural puncture, but managing a potentially difficult airway in a patient with a symptomatic Chiari malformation warrants legitimate clinical concerns. Based on the literature search, we counseled the patient of the risks, and the patient received a single shot spinal anesthetic with no complications.

Discussion: In uncommon situations, using case reports or anecdotal experience can be helpful; however, estimating true long term risk from small sample sets can be extremely difficult, especially when there are no reported complications. In the 10 reported C-sections on patients with Type I Chiari malformations 5 received single shot spinals. There were no complications in the 5 cases following dural punctures with small gauge spinal needles. The calculated 95% confidence interval for estimated long term risk based on this sample size is 0-45.1%, much higher than we initially anticipated. Often the situations where we see 0 complications in a small sample size seem to have a far greater qualitative than quantitative impact regarding our decision making and our counseling.³ As such, weighing the risks and benefits of performing neuraxial techniques in this particular patient population must be carefully evaluated and applied according the specific clinical presentation.

References
The Aggregate Performance of Novel Auditory ‘Icon’ Alarms in a Simulated Intensive Care Unit Environment

Danielle B Horn1, Roman Dudaryk1, Christopher L Bennett2, Judy Edworthy3, Richard McNeer1

1University of Miami Miller School of Medicine/Jackson Memorial Hospital, Miami, FL, 2University of Miami, Coral Gables, Florida, 3Plymouth University, Devon, United Kingdom

Presenting author contact: Danielle.bodzin@jhsmiami.org; 305-788-7584

Introduction: Alarms are frequent and inevitable sounds in any intensive care unit (ICU) and play an important role in patient safety. [1] Unfortunately, the current International Electrotechnical Commission (IEC) alarm sounds [2] have been associated with poor alarm recognition, difficult discrimination, urgency-mismatch, and difficult learnability and identification. [3, 4, 5] and they may contribute to alarm fatigue. In contrast auditory "Icon" alarms designed to sound like what they are supposed to represent (for example, a whistling kettle corresponding to abnormal temperature) have been shown to be easier to learn and discriminate in non-physician participants in nonclinical, computer-based settings. [4, 6] We hypothesized that in a simulated ICU environment, anesthesia providers would more often and more quickly identify icon alarms compared to IEC alarms.

Methods: A set of novel icon alarm sounds was created for this study (Table 1). Resident and physician anesthesiologists were randomized to either the control (IEC) or experimental (Icon) alarm groups. A presentation was reviewed in which participants heard group-specific alarms for each category. Subsequently (Session 1), they gave a 20 minute break to a "physician" in a simulated ICU and were asked to watch over 2 critically ill "patients", during which time alarms intermittently sounded for each. Participants chose the reason why the alarm was sounding using two touchscreen monitors (1 for each patient). The identical experiment was repeated about a week later (Session 2). Measured outcome variables were percent correct identification (%Corr) and response times (RT). The main effects of group (IEC vs Icon) and Session (1 vs 2) and interaction effects were studied in the data from each simulated patient using multivariate analysis of variance (ANOVA).

Results: A total of 20 subjects consisting of 17 anesthesia residents and 3 attendings participated. The %Corr was observed to be significantly higher in the Icon vs. IEC groups (Fig. 1A). There were also significant improvements in %Corr between sessions observed for all alarm sounds (Fig. 1B), however, interactions effects were not significant (Fig. 1C) indicating that these improvements were similar for IEC and Icons alarm sets. RTs were significantly faster (~3 seconds) for the Icon vs. IEC groups (Fig. 2A). There was also a significant improvement in RT for both alarm sets for Session 2 vs Session 1, however interaction effects were insignificant (Fig. 2C) indicating that improvement in RT for both alarm groups was similar.

Conclusion: Although IEC alarm sounds have been in use for many years, the need for more intuitive, easily identifiable alarm sounds is apparent. [5] The goals of Icon alarms are to reduce alarm fatigue, improve learnability, and in turn, improve patient safety. This study had several limitations, including but not limited to: a small number of participants, single-center trial, potential for response bias, and lack of blinding. Nonetheless, given the increased percent of correctly identified alarms and faster response time associated with Icons alarms when compared to IEC alarms, further investigations should be conducted to study the potential positive impact of these types of novel alarm sounds in the ICU and other critical care settings.
Table 1. List of novel auditory icons with description.

<table>
<thead>
<tr>
<th>Function</th>
<th>Auditory Icon Characteristics*</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Doorbell chime version of fate motif in Beethoven's 5th symphony</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>Heart beating with no discernable frequency</td>
</tr>
<tr>
<td>Drug Administration</td>
<td>Rattling 'pillbox'</td>
</tr>
<tr>
<td>Oxygen</td>
<td>Intermittent jet ventilation-two pulses</td>
</tr>
<tr>
<td>Artificial Perfusion</td>
<td>Flowing liquid</td>
</tr>
<tr>
<td>Temperature</td>
<td>Attempted 'pull start' of a lawn mower</td>
</tr>
<tr>
<td>Ventilation</td>
<td>Tea kettle whistling</td>
</tr>
<tr>
<td></td>
<td>Heavy breathing for one respiratory cycle</td>
</tr>
</tbody>
</table>

*A beacon was added to each icon consisting a basic pulse structure made of a three-note major triad chord (G3-B3-D4).

Figure 1. A: Percent correct for patient 1 and patient 2 in the IEC versus ICONS group; B: Percent correct for session 1 and session 2; C: Percent correct from session 1 to session 2 (improvement comparison of IEC versus ICONS groups).
Figure 2. A: Response times for patient 1 and patient 2 for IEC versus ICONS group; B: Response times for session 1 and session 2; C: Response time from session 1 to session 2 (improvement comparison of IEC versus ICONS groups).

References:
4. Edworthy, J, Hellier, E, Titchener, K, Naweed, A, & Roels, R. Heterogeneity in auditory alarm sets makes them easier to learn. Int J Ind Ergonom 2011; 41(2);136-146
Case Report: Diagnosis of Acute Compartment Syndrome of the Forearm After Ambulatory Surgery in the Presence of a Continuous Infraclavicular Perineural Catheter
Spencer Hyde, DO; Stephen Vose, MD
shyde@anest.ufl.edu, 515-803-9646

Introduction: Acute compartment syndrome (ACS) is a rare, yet serious complication of certain operative procedures and high-energy orthopaedic injuries. It is characterized by increased tissue pressures within a confined space that compromises the circulation and function of tissues within that space. Delayed diagnosis may lead to irreversible ischemic changes with subsequent neuromuscular deficit. Although diagnosis can be assessed by invasive pressure monitoring, it is often diagnosed clinically by a pain level that is out of proportion to clinical exam; particularly when this pain is severe despite a working regional anesthetic block. ACS is a surgical emergency treated by immediate fasciotomy to relieve pressure within the affected compartment. Regional Anesthesia (RA) has long been used to provide postoperative pain control for orthopedic procedures. However, controversy exists regarding the potential role of RA in the delayed diagnosis of ACS.

Case Report: A 39-year-old female underwent repair of a left distal humerus intercondylar fracture as a result of a motor vehicle collision. Her post-operative course was complicated by left elbow heterotopic ossification requiring removal of ossification, capsulectomy of left elbow and transposition of the ulnar nerve. Preoperatively, an infra-clavicular perineural catheter was placed without difficulty. A 30mL bolus of 0.5% Ropivacaine provided appropriate surgical site coverage. Intraoperative anesthetic management utilized the surgically-dosed infraclavicular catheter and a Propofol infusion. She was discharged with the perineural catheter infusing Ropivicaine 0.2%.

The patient presented to the emergency room early on POD #1, with complaint of left arm, elbow and forearm pain. Pain was not localized to her surgical site as would be expected and she did not have radial or ulnar pulses that could be assessed with Doppler. Diagnosis of left forearm ACS was made and the patient was taken emergently to the OR for fasciotomy. Post-operatively, the continuous infraclavicular perineural catheter remained in place, and the ropivacaine infusion was restarted after being held upon presentation to the ED. Her pain was well controlled with the continuous regional anesthetic catheter infusing for the following 12 days. Upon discharge patient had limited extension of elbow, 4th and 5th digits, and hypothenar atrophy but did not suffer tissue loss as a result of her ACS.

Discussion: RA in patients at risk for developing an ACS is a highly controversial topic. In one systematic review of 34 articles it was concluded that 55.9% of those had symptoms of ACS masked by RA. However, when only looking at articles published after 2009, likely more reflective of current practice, the abovementioned percentage dropped to 12.5%. Several authors of current literature suggest that a lower concentration of local anesthetics can provide analgesia while improving the detection of ACS. Others advocate for improved monitoring. Regardless, it is clear that communication between anesthesiologist, surgeons, and patients remains to be of pivotal importance in early diagnosis and detection of ACS.


Residual Hypoxia and Hypotension After Correction of Inadvertent Endobronchial Intubation

Michael Ibrahim; michael.ibrahim@jax.ufl.edu, Cell: 786-282-4087

Abstract

Endobronchial intubation is associated with adverse events including hypoxemia, barotrauma, cardiac arrhythmias and hypotension. It is imperative to ensure adequate placement of the endotracheal tube. One should not rely on a single mode of confirming the endotracheal tube alone, but multiple approaches must be used to ensure appropriate position of the endotracheal tube. This presentation presents a case of a 49 year old male who presented for a transesophageal echocardiogram and cardiac ablation who received general anesthesia for this case. The patient was evaluated as an American Society of Anesthesiologists physical classification of 3. Physical exam revealed a Mallampati score of 4, mouth opening >3cm, thyromental distance >6cm, and full range of motion in his neck. After induction and muscle paralysis a Macintosh blade 3 was used for direct laryngoscopy, a grade 2 view of the vocal cords was noted and a 7.5mm cuffed endotracheal tube was passed through the vocal cords. The cuff was inflated and breath sounds were noted to be equal bilaterally, adequate end-tidal carbon dioxide was noted on the capnograph and peak pressures were well below 30cmH20. The endotracheal tube was then secured at 26cm to the lips. Within ten minutes after intubation the pulse oximeter readings started to decline, with the lowest saturation reading 71%. After checking the circuit for any disconnections or any kinks or damage in the endotracheal tube, it was suspected that the patient had a right main stem intubation, as such, the tube was retracted by 2cm and pulse oximeter readings began to trend up to 95%. The patient also experienced an associated hypotension during this time. This case presentation discusses methods to verify endotracheal tube placement, complications of endobronchial placement of tube placement, pre-op examination of patients and discussion of reconfirmation of tube placement.

References:


Intraoperative Management during Orthotopic Liver Transplantation in a Patient with a History of Severe Portopulmonary Hypertension and Coronary Artery Disease

Introduction:
The diagnosis of portopulmonary hypertension (PoPH) carries significantly increased mortality rates for patients with end-stage liver disease (ESLD) despite medical treatment with pulmonary vasodilating agents \(^1,^2\). PoPH exists when the measured pulmonary hypertension is accompanied by increased calculated pulmonary vascular resistance in the presence of a normal pulmonary capillary occlusion pressure (PCOP). Liver transplantation is the best hope for survival, yet itself carries high risk due to right heart hemodynamic stress at reperfusion of the liver allograft, with risk stratified according to baseline mean pulmonary artery pressure (mPAP) \(^3\).

Case Report:
A 64 yo female with ESLD secondary to cryptogenic cirrhosis (MELD score of 29), known severe multivessel coronary artery disease, and history of severe PoPH (PASP 83mmHg, RVSP 55-60mmHg, PCOP 7) underwent orthotopic liver transplantation. Pre-transplant planning included four years of extensive treatment with pulmonary vasodilators (remodulin infusion, revatio transitioned to sildenafil) until her right heart catheterization showed normalization of her PAP (35/10, mPAP 19mmHg). Despite her improvement from NYHA Class III to NYHA Class I status, we anticipated a challenging surgery. The patient was pre-admitted for placement of a right IJ introducer, pulmonary artery catheter, and arterial line. Induction of general endotracheal anesthesia was achieved with lidocaine, propofol, and rocuronium. Transcutaneous defibrillator pads were placed with confirmation of external pacing capability. Transesophageal echocardiography (TEE) was inserted. General anesthesia was maintained with inhaled isoflurane and bolus fentanyl. Intravenous remodulin therapy was continued throughout the perioperative and intraoperative periods. Normotension was maintained with vasopressin and norepinephrine infusions, bolus calcium chloride, and judicious blood product transfusion to avoid acute right heart failure. PoPH and cardiac function, particularly right ventricular stroke volume, were managed with continuation of perioperative remodulin, early initiation of milrinone infusion, and inhaled nitric oxide (iNO). Intra-operative monitoring and direction of medical therapy was achieved with continuous mPAP monitoring and intermittent tricuspid annular plane systolic excursion (TAPSE) measurements. Particular attention was paid during organ reperfusion, with TAPSE measured at 19mm and maintenance of target mPAP < 40mmHg. Given stable mPAP readings after reperfusion, iNO was trialed off, but was restarted as mPAP climbed to > 35mmHg. The patient was successfully transferred in stable condition to the surgical intensive care unit and successfully discharged home on POD 22.

Discussion:
With the presence of PoPH there is an added degree of complexity for anesthetic decision making and management in addition to the greatly increased mortality for this high-risk liver transplant patient \(^3\). Through the utilization of continuous mPAP monitoring and intra-operative TAPSE measurement, we successfully guided this high-risk patient through her liver transplant to a positive outcome with particular attention paid to the prevention of acute right heart overload and exacerbation of her pulmonary hypertension.

References:
Long-Term Treatment of Chronic Non-malignant Pain with Opioids: Cure or Curse?

Presenter: Tyler Kabes, MD (email: Tkabes@anest.ufl.edu)

Tyler Kabes, MD, Tim Vollmer, DO, and Rene Przkora, MD PhD

Department of Anesthesiology, University of Florida, Gainesville, Florida

Background:
Chronic non-malignant pain (CNP) has long been one of the least well understood and treated conditions in modern medicine. Modern therapies have largely fallen short of providing adequate pain relief and preserving patient function, while also offering their own constellation of untoward side effects. Opioids are the most potent analgesics used in medicine, and for years have been a large component of chronic non-malignant pain treatment, yet their role remains ambiguous. To further scrutinize these medications, opioids have a wealth of side effects including diversion and the potential for abuse resulting in increased regulatory efforts accompanied by a negative publicity. These risks call into question an already uncertain niche for opioids in treating chronic non-malignant pain. We therefore conducted a literature review to assess the effectiveness of long-term opioid therapy for CNP.

Methods:
A systematic literature review of electronic data bases including Medline and Pubmed was performed for publications from 1990 to 2017. Search terms used: Opioids/opiates/narcotics/non-terminal pain/chronic non-malignant pain/chronic pain and combinations/clinical trial/review/meta-analysis/Cochrane review.

Results:
Using the search terms and no filter, thousands of publications were found. Meanwhile, with filters, several hundred publications remained including meta-analyses and Cochrane reviews. Upon review, we found that the evidence regarding the efficacy of “long-term” opioid therapy for chronic pain is extremely limited and high quality data is essentially non-existent. There is little evidence that long-term therapy with opioids for CNP may have some beneficial effects in specific subgroups of patients. On the other hand, evidence regarding severe side effects from long-term opioid therapy for CNP is also very limited, but would indicate opioids are tolerated by most individuals.

Conclusion:
Although opioids make front page headlines, data about the efficacy and side effects of opioids used for long-term therapy for CNP is surprisingly sparse. We clearly identified the need for randomized, double-blind and placebo-controlled studies. In the interim, there are guidelines and recommendations which we as practitioners should follow, and which we will discuss in this presentation. The guidelines main focuses are risk assessment, opioid agreements and compliance monitoring.

References:

Title: Aortoiliac Thrombosis following Tranexamic Acid Administration During Urgent Cesarean Hysterectomy

Presenting Author: Huma Khan
407.747.6888
Huma.Khan@jhsmiami.org

References:


2. Sundstrom A, Seaman H, Kieler H, Alfredsson L. The risk of venous thromboembolism associated with the use of tranexamic acid and other drugs used to treat menorrhagia: a case-control study using the General Practice Research Database. BJOG. 2009;116(1):91-97


Abstract:

Postpartum hemorrhage (PPH) contributes to 25% of maternal deaths worldwide. Abnormal placentation is a well-known culprit of PPH. Although controversial, iliac artery balloon occlusion has been used in patients to decrease bleeding. The use of antifibrinolytic agents, such as tranexamic acid (TXA), has gained popularity in the management of PPH. We present a 35-year-old parturient with placenta percreta that was managed with internal iliac artery balloon occlusion with concomitant use of TXA during urgent cesarean hysterectomy with subsequent aortoiliac thrombosis formation. The role of both TXA and arterial balloons in PPH, along with their respective limitations, are discussed.
Application of the High-Flow Nasal Cannula with 100% Oxygen therapy for hypoxemia control during short TIVA cases.

viachaslau.koushyk@jax.ufl.edu, (347)-575-1380

**Introduction:** A high-flow nasal cannula (HFNC) therapy is a type of respiratory support method that delivers a high flow (10–70 L/min) of heated and humidified gas with different Oxygen concentration to a patient through the nasal cannula. High flow nasal cannula therapy is currently used by physicians in variety clinical settings: post-extubation, pre-intubation oxygenation, sleep apnea, hypoxic respiratory failure, acute exacerbation of COPD. [1] HFNC is considered to have a number of physiological effects: apneic oxygenation, reduction of anatomical dead space, PEEP effect, constant fraction of inspired oxygen. A recent study demonstrated that the HFNC with 100% Oxygen therapy can be an effective tool in the maintenance of adequate oxygen saturation (>90%) and in the maintenance of acceptable end-tidal carbon dioxide level (mean 58.5 mmHg) in an apneic patient with opened upper airways for a time range of 9-19 minutes. [2] Here we present two cases of successful application of the HFNC with 100% Oxygen therapy to provide an adequate oxygenation during short Total Intravenous Anesthesia (TIVA) cases.

**Case Reports:**

**Case 1:** A 50-year-old non-obese (BMI 20.6) male with Arthrofibrosis was scheduled for Right knee manipulation under deep sedation/general anesthesia. During preoperative interview, the patient denied any cardiopulmonary past medical history. The patient had a normal physical exam and normal upper airways exam with Mallampati score II. A single-shot Right femoral nerve block was performed for intra- and post-operative pain control; Midazolam 2 mg and Fentanyl 100 mcg were used in the preoperative area. In the operating room, patient was positioned supine. An HFNC with a flow rate of 40 l/min of humidified and warmed 100% Oxygen was applied to the patient. A pulse oximeter, NIBP, 3 lead ECG, and a body temperature sensor were used for monitoring. We were not able to accommodate the ETCO2 monitor, due to Oxygen high flow in HFNC. Anesthesia was induced with the bolus of Propofol (1.3 mg/kg). Propofol infusion 125 -150 mcg/kg/min was used to maintain deep sedation/GA. Additional 50 mg and 30 mg of Propofol boluses were given during the procedure. A total sedation time was 8 minutes. The upper airway patency was monitored by anesthesia provider and was supported one time with the chin-lift maneuver. Oxygen saturation was more than 98% during all case. The patient did not have any clinical signs of hypercapnia during the emergence. Post op period was unremarkable.

**Case 2:** A 29-year-old overweight (BMI 27.6) male with Left knee Arthrofibrosis was scheduled for Left knee manipulation under general anesthesia. Past medical history was significant for HTN, Chronic pain, Anxiety, Active drug seeking behavior. The patient had a normal physical exam and a normal upper airways exam with Mallampati score II. A single-shot Left femoral nerve block was performed for intra- and post-operative pain control; Midazolam 4 mg, Fentanyl 10 mcg, and Propofol 50 mg were used in the preoperative area. In the operating room, patient was positioned supine. An HFNC with a flow rate of 30 l/min of humidified and warmed 100% Oxygen was applied to the patient. Standard ASA monitors were used, except the ETCO2 monitor. Anesthesia was induced with the bolus of Propofol (0.6 mg/kg). Propofol infusion 135 -175 mcg/kg/min was used to maintain deep sedation/GA. Additional 150 mg of Propofol bolus was given during the case. A total sedation time was 6 min. The upper airway patency was supported one time with the jaw-thrust maneuver. Oxygen saturation was more than 95% during all case. The patient did not have any clinical signs of hypercapnia during the emergence. Post op period was unremarkable.

**Discussion:** HFNC with 100% Oxygen therapy may be an effective and convenient tool for hypoxemia control during short TIVA cases. However, physiological effects and mechanism of action of this therapeutic modality requires certain criteria to be considered prior its usage for intraoperative oxygenation: an expected loss of respiratory drive during anesthesia should be no longer than 10-15 min, patient's upper airways should remain opened under deep sedation/GA (low risk for obstructive sleep apnea), and the patient should be without significant cardiopulmonary pathology to tolerate possible hypercapnia.

**Literature:**


Vein of Galen Malformation (VGM) is a rare congenital vascular malformation in the choroidal fissures with shunting of arterial flow into enlarged cerebral vein dorsal to the tectum. VGM often presents in early childhood and, in severe cases, can cause neonatal congestive heart failure with persistently elevated cardiac output (to accommodate for large diversion to the cerebral circulation), right to left shunt via the patent foramen ovale, and increased flow through the pulmonary vasculature ultimately leading to suprasystemic pulmonary hypertension. Before the development of catheter embolization techniques, treatment option was limited to surgical, with a reported mortality rate of almost 90% after surgery in neonates. Endovascular techniques have since markedly increased the odds for successful treatment of these lesions.

Case description:
Two cases where patients with known VGM with similar initial presentation of hydrocephalus and left-to-right shunt leading to right heart failure requiring urgent embolization at birth who now return for further endovascular treatments were compared. These two cases demonstrate the challenges of managing patients with potential high-out heart failure, the narrow window of opportunity of intervention in the setting of variable effect of beta blockade and/or length of cardiac pause, as well as the fact that multiple sessions of staged embolization are often required throughout the disease process. History, clinical presentation, treatment strategies, and intraoperative management were reviewed with emphasis on the use of adenosine and esmolol to control arterial flow during Onyx embolization or coil deployment. Adenosine is effective in inducing cardiac pause to allow partial flow arrest; in comparison, less dramatic flow reduction is achieved with esmolol boluses followed by continuous infusion. Importantly, pre-operative planning with the pediatric cardiology team is crucial in care coordination and the extent of flow reduction required is established by direct communication with the IR team.

References
The following case report details an 88-year-old female with severe mitral stenosis and moderate mitral regurgitation who presented with worsening dyspnea on exertion. The patient had undergone 4 vessel coronary artery bypass graft (CABG) and mitral valve replacement (MVR) 14 years prior and was deemed high risk for redo sternotomy. A transeptal mitral valve in valve replacement was performed which resulted in intraoperative hypoxia and hypotension following atrial septal defect (ASD) creation for valve deployment. A right to left shunt had developed due to the patient’s underlying pulmonary hypertension. Successful ASD closure resolved the hypoxia and hypotension. The patient had a brief and uncomplicated post-op course.

References:


Extracorporeal Membrane Oxygenation (ECMO) has successfully provided circulation and oxygenation in a number of clinical conditions requiring life support until one of three outcomes occurs: 1) The patient improves. 2) The patient receives destination therapy with the cessation of ECMO, such as transplantation or portable mechanical heart support, for example. 3) The patient is faced with the “bridge to nowhere” scenario when ECMO becomes destination therapy necessitating Intensive Care Unit support until patient expiration. ECMO intrinsically poses many ethical concerns, however ECMO as a destination therapy poses a uniquely complex ethical dilemma. Such complexity arises when multiple morally acceptable management strategies are in direct conflict. These options include immediate discontinuation of ECMO, indefinite continuation of ECMO, or continuing ECMO under the notion of “no escalation of care”. For this reason, a literature search was performed to better elucidate the key ethical considerations of ECMO destination therapy in order to provide a framework with which clinicians can approach this ethically complex scenario.

A PubMed search was performed for inclusion of case reports and expert opinion articles that highlighted ethical considerations of ECMO, with particular emphasis on ECMO for destination therapy. The majority shared the same four relevant topics in common: challenges in obtaining informed consent, balancing discordant desires for management strategies, medical futility, and allocation of resources. Through balancing applied ethical principles of autonomy, beneficence, non-maleficence, justice and Virtue Ethics, authors offered logical justification for each of the three proposed ECMO management strategies. One can therefore conclude that decision making must be made on a case-by-case basis, however valuable generalizable lessons were provided. Hospitals should develop universal protocols for aspects of care including but not limited to patient eligibility, management, and duration of ECMO therapy. Although challenges exist, informed consent must be attempted with thorough explanation of all possible outcomes including potential discontinuation of ECMO and withdrawal of care. Early inclusion of family members/surrogates may prove critical in avoiding conflict regarding decision making if bridge becomes destination therapy. If conflict does occur, consult with the hospital ethics committee, legal department, palliative care, and/or case management services while reserving court order as a last resort. If care is deemed futile, with the support of the above resources, physicians need not feel obligated to continue care.

Obesity alters pulmonary mechanics through weighing the chest wall and exerting increased upward pressure on the diaphragm. When ventilating obese patients (pts) or pts with increased abdominal pressure, physicians must decide between maintaining target plateau pressure (Pplat) < 30 cmH2O and allowing greater Pplat assuming decreased chest wall compliance. No specific values are currently attributed to obesity as a determinant of Pplat. Our study focused in elective surgery mechanically ventilated (MV) pts and their body mass index (BMI) to quantify Pplat values. This cross-sectional study evaluated 328 individuals (> 21 years old, ASA I and II) scheduled for GETA procedures. Five minutes after neuromuscular blockade, medical record (height, weight and diagnosis) and MV parameter information was collected. Kruskal-Wallis test, as well as multiple logistic and linear regression (robust variances) models were performed. The mean age of pts was 53.1±16.1 years; about 42% were females. Patients had a mean BMI of 28.0±6.1 kg/m²; about 32% were obese. Mean value of Pplat was 17.3±4.0 cm H2O. Under/Normal weight patients had lower Pplat values (15.4±3.8) when compared to overweight (16.9±3.5), obese class I (19.0±3.5) and obese class II/III (21.0±3.6), p<0.0001. After adjusting for sex and age, the odds for a Pplat ≥ 18 cm H2O among pts with class I (30.0-34.9 kg/m²) and class II/III (≥ 35 kg/m²) obesity was around 5.1 (95%CI: 2.6-10.2) and 14.1 (95% CI: 5.6-35.7) times higher, respectively, compared to those under/normal weight (< 25 kg/m²). Males had lower odds of showing Pplat levels ≥ 18 cm H2O (adjusted odds ratio: 0.45; 95%CI: 0.27-0.74) than females. About 27% of the variability observed in Pplat could be explained by BMI, sex and age; for every additional kg/m² in BMI, Pplat increased on average by 0.32 cm H2O (95%CI: 0.26-0.38); limiting the predictors to BMI only showed similar results. This study has shown proportional correlation between BMI and Pplat possibly due to alterations in chest wall compliance and pulmonary mechanics as BMI increases.

References:
Fanelli V, Ranieri VM. When pressure does not mean volume? Body Mass Index may account for the dissociation.Critical Care.2011;15:143
Synergistic Effect of Dantrolene and Nimodipine in Reducing PHE-Induced Vasoconstriction in Type-1 Diabetic Rats

Jonathan.matias2@upr.edu; Phone: (787) 361-9595; Fax: (787) 758-1327

Matias J,1 Roman M2, Zack R,1 Morales M1, Torres H1, Torres-Grajales M1, Alemar S2, Crespo MJ.1,2
Departments of 1Anesthesiology and 2Physiology and. University of Puerto Rico, School of Medicine, PO Box 365067. San Juan, Puerto Rico 00936

Diabetic patients have a high risk of developing cerebral vasospasms (CVSP). The current treatment of this condition is similar for diabetics and non-diabetics, and includes the use of nimodipine and other calcium channel antagonists to reduce vasoconstriction. Concomitant administration of the ryanodine receptor (RyR) blocker dantrolene with these antagonists may be beneficial to diabetic patients, knowing that this combination reduces vasoconstriction in non-diabetic patients. In this study, we evaluated the effects of dantrolene (50 µM), nimodipine (50 nM), and both drugs in combination, on the phenylephrine (PHE)-induced contraction of aortic rings from streptozotocin (STZ)-induced Type-1 diabetic rats. Age-matched non-diabetic rats were used as controls (CT). PHE-induced concentration response curves from 0.1 nM to 10 µM were performed in the presence and absence of dantrolene, nimodipine, or their combination. After a 30-minute incubation period with dantrolene, the PHE-induced contraction was reduced by 11% (N=8, P>0.05) in diabetic and by 24% (N=10, P>0.05) in non-diabetic rats. Dantrolene also increases significantly EC50 values in both diabetic and CT groups. Nimodipine, however, reduced PHE-induced contraction about 50% (N=7, P<0.05) in CT without affecting this parameter in diabetic rats. The combination of these drugs reduced the PHE-induced contraction by 80% in both groups (P<0.05 when compared with untreated groups). In addition, endothelium-independent relaxation with 10 µM sodium nitroprusside (SNP) was not affected by dantrolene or nimodipine in either diabetic or CT rats. Our results suggest that the combination of dantrolene and nimodipine may have beneficial effects in both diabetics and non-diabetics with CVSP by decreasing arterial tone more than either drug alone. Supported by RCMI Grant G12-RR03051.

References:
Attacking America's Opioid Epidemic through a Multi-Modal approach to Pain Management
Gary S. McDaniel, M.D.

BACKGROUND: Opioid abuse is the cause of significant morbidity and mortality in the United States. With an estimated 1.9 million Americans abusing pain relievers in 2013, an estimated cost to the nation of 75 billion dollars in lost productivity and healthcare cost and death from overdose at historic levels the need for reducing opioid exposure is evident. In an effort to reduce opioid abuse the CDC published guidelines in 2016 for the prescription of opioids in chronic pain. Recognizing that opioid abuse often originates with opioid use for the treatment of acute pain the CDC suggests prescribing the minimum dose for the shortest time necessary. With a multi-modal approach to pain management the number of patients whose pain requires treatment with opioid medications and the amount of opioids required to control pain can be reduced.

METHODS: A literature review of major PubMed articles related to management was conducted. The search terms Multi-modal analgesia, post operative pain management and non-opioid pain management was conducted. A PubMed search for articles on non-opioid drugs commonly used in pain control was also conducted. Relevant articles were reviewed and included in the presentation.

CONCLUSION: Many non-opiod drugs can be used to augment pain control. Some have been shown to reduce opioid use. With the use of a multimodal approach to control post operative pain opioid use can be reduced.

Gary S. McDaniel M.D.
gmcdaniel@ochsner.org
c 504 606 6416

Pavy, T.J., Paech, M.J., Evans, S.F (2001). The Effect of Ketorolac on opioid requirements after cesarean delivery. Anesthesia and Analgesia, April,92 (4) 1010-1014

Mini aortic valve replacement with Sutureless Valve - Nothing holding us up
Oscar Alam Mendez, email: oscar.alammendez@jax.ufl.edu, Phone: (352) 213-1038

Background
Aortic valve disease is the most common valvular heart disease in developed countries. Its incidence is 2-4% in people aged more than 65-85 respectively. Conventional aortic valve replacement (AVR) with a full sternotomy (FS) using cardiopulmonary bypass (CPB) is the gold standard technique. A minimally invasive aortic valve replacement (MIAVR) refers to AVR, which involves a small chest incision as opposed to the FS. The two most common approaches are: ministernotomy (MS) and the right anterior minithoracotomy (RT). While the RT has shown superior outcomes to the MS, patients must meet specific imaging and clinical criteria for the RT approach. Other options are the right parasternal approach (requiring resection of the costal cartilages) and the transverse sternotomy. RT involves a 5-7 cm transverse incision at the 2nd intercostal space. CPB cannulations sites can somewhat vary for MIAVR. It can be done through the femoral artery and vein or direct aortic cannulation with a flexible cannula. Fluoroscopy and transesophageal echocardiography are often used to aid cannula placement. Specific anesthetic considerations related to MIAVR include lung isolation techniques, possible requirement for transvenous pacing, and placement transcutaneous defibrillator pads.

Case description
A 35 year old male with aortic regurgitation secondary to infectious endocarditis. He was to undergo MIAVR via RT approach. After induction, a 39 F double lumen endotracheal tube was placed. Central intravenous access was obtained at the right internal jugular vein. CPB cannulas were placed via the right common iliac artery and superior vena cava through right femoral vein. A sutureless Perceval valve was placed which initially appeared to be in good position, however, while separating from CPB, the valve became dislodged and fell into the left ventricle. This was noted immediately by TEE examination. After return to CPB, the valve was successfully retrieved and the patient received a mechanical AVR. TEE examination showed proper valve position and function. The patient was successfully weaned from CPB and transported to the ICU. His postoperative course was complicated by right hemothorax requiring surgical evacuation on post-op day 5. He was discharged to home on day 10 post MIAVR.

Discussion
Sutureless aortic valves are held in place by the outward force of its circular frame against the aortic valve annulus. The Perceval valve is used for conventional surgery since FDA approval in January 2016. It facilitates a minimally invasive approach due to easier placement technique and shorter time on CPB. The failure of the Perceval valve in this case was likely due to the lack of aortic annular calcification which resulted in the valve migration. This concept is similar to patients who undergo transcatheter aortic valve replacement (TAVR). As newer, safer, and less invasive approaches to cardiac surgery emerge, it is important to become familiar with the evolving equipment and products and be able to recognize complications and shortcomings of these newer procedures. Currently the two commercially available sutureless valves are the self-expanding Perceval S and the rapid-deployment Intuity elite. Of note, postoperative conduction disorders are more commonly encountered after sutureless AVRs.
References:


Diastole is the phase of the cardiac cycle providing ventricular filling for systole, and depends on both ventricular relaxation and compliance. Constrictive pericarditis (CP) involves a pathologic process which limits compliance and creates abruptly shortened filling. Physical exam (PE) and radiographic imaging are supportive, however TEE is crucial for delineating necessity of surgical repair, differentiating CP from restrictive cardiomyopathy (RCM), and monitoring post-repair diastology.

A 74-y/o, 75-kg WF with a PMH of progressive exertional dyspnea, orthopnea, atrial fibrillation, recurrent DVT/PE on apixaban, well-controlled GERD, HTN, and remote history of TB exposure, presented for pericardectomy via sternotomy. PE revealed distant heart sounds without m/r/g. 12-lead EKG showed low-voltages (figure 1), and outside TTE revealed normal LV function and no PFO with saline study. A dystrophic calcification around the heart apex was seen on CXR (figure 2), and quantification on CT chest measured: 8mm anterior, 18mm posterior, and 11mm inferior. Left heart cath confirmed EF 65%, no WMAs or significant CAD, and LVEDP 20. Right heart cath showed RAP 20 with prominent X/Y descent, RVSP 40/16 with square root sign, mPAP 25, and LV/RV pressure discordance. Standard ASA monitors and a 20g PIV were placed, then midazolam 3mg and fentanyl 100mcg were given for awake brachial arterial line placement. Induction agents were administered including propofol 1mg/kg, fentanyl 2mcg/kg, vecuronium 0.1mg/kg, ephedrine 10mg, and isoflurane maintenance. Hemodynamic stability was maintained with MAP>65, then intubation and right IJ CVC placement were performed. A TEE probe was placed and baseline diastology was quantified, shown in Figure 3 with mitral valve variation (MVV) 25.6%, MV E/A ratio 4.66, tricuspid valve variation (TVV) 81.5%, mitral annular index (MAI) 8cm/s, co-dominant left upper pulmonary vein (LUPV) flow, and D-dominant right upper pulmonary vein flow. The pathologic pericardium (Figure 5) was removed uneventfully off-CPB. Post-excision TEE revealed marked improvement with MVV 15.8%, TVV 32.2%, MAI 9cm/s, and pseudonormal D-dominant LUPV as shown in Figure 4. The patient was transferred to the SICU after sternal closure, remained intubated on propofol gtt, hemodynamically stable. She was extubated POD#0 and discharged home on POD#4. At 1-month f/u the patient denied any dyspnea or orthopnea, and was cleared for cardiac rehab. Pathology confirmed dystrophic calcification and cultures remained (-).

The case illustrates fundamentals of diastolic function quantification with intraoperative TEE for pericardectomy. CP is typically attributed to idiopathic or viral causes, however may result from infiltrative processes, autoimmune diseases, or medications.(1) Abnormal filling is attributed to the noncompliant pericardium, a crucial distinction from RCM which is characterized by chamber noncompliance, reduced tissue Doppler velocity, absence of respiratory velocity variation, and would considerably worsen function if pericardectomy was attempted. (1,2) It is imperative to understand TEE as it
relates to CP thus ensuring: an accurate diagnosis, repair is performed when appropriate, and precision in pre-/post-repair diastology measurements.

REFERENCES

Percussion Pacing Revisited

Introduction: Anesthesiologists frequently encounter acute, vagally mediated bradycardia in the perioperative setting. Percussion pacing has been suggested as an alternative to treat those events. Percussion pacing involves using one's fist to repeatedly strike a patient's left lower chest in a rhythmic manner resulting in increased left ventricular pressure and subsequent depolarization and contraction of the myocardium (1). The approach to acute bradycardia in the perioperative setting has been recognized as an entity requiring a separate algorithm. While the ACLS and A-ACLS differ in the initial approach, differential diagnosis and treatment, both do not include percussion pacing in the 2015 treatment algorithm (2,3).

Case Presentation: Our patient was a 63 year old male who sustained multiple bone/rib fractures and a complete T6 spinal cord injury from a motor vehicle accident 10 days prior, and was scheduled for an insertion of a gastric feeding tube. The patient arrived to the operating room intubated and ventilated. When reconnected to the anesthesia ventilator on spontaneous ventilation with semi-closed pop-off valve creating high CPAP, his heart rate dropped to 30 BPM and a corresponding decrease of end-tidal carbon dioxide to 15 mmHg was noted. While commencing mechanical ventilation, administering atropine 0.5 mg, and calling for a transcutaneous pacer, we performed percussion pacing at a rate of 80 percussions per minute. Our monitor showed that each of these fist percussions resulted in ventricular depolarization as evident on continuous electrocardiogram, which was further confirmed by the re-emergence of a waveform on plethysmography, arterial line waveform tracing, and lastly a return of EtCO2 values in the 30-40mmHg range. The patient returned to normal sinus rhythm after 120 seconds of percussive pacing, and the fist pacing was subsequently discontinued. Surgery was completed and the patient fully recovered with no adverse sequelae.

Discussion: Reports on the use of this technique in the perioperative period are limited, and the specific use in cases of vagally mediated bradycardia under anesthesia is rare. One report has described percussive pacing treatment of acute bradycardia under spinal anesthesia (3) and another described its utility secondary to an oculocardiac reflex during strabismus repair surgery (1). This case demonstrates the utility of percussion pacing as an adjunct to medical management for bradycardia during general anesthesia. This is an immediately available tool that can be used as part of the anesthesiologist's armamentarium. The AHA states that there is insufficient evidence to recommend this technique during cardiac arrest. While this practice is not recommended as part of the AHA ACLS guidelines, it can be considered A-ACLS.

References:


Epidural Hematoma After Epidural Catheter Placement for Total Hip Arthroplasty
Wasef Muzaffar, MD, Cameron R Smith, MD, PhD, Stephen O. Vose, MD
Department of Anesthesiology, University of Florida

Introduction: Epidural hematoma is a rare complication of neuraxial anesthesia. The reported incidence: spontaneous 1:1,000,000; 1:220,000 with atraumatic epidural placement; 1:20,000 with traumatic placement. Risk factors included anticoagulation use, platelets < 100,000; traumatic placement, female sex, increasing age. Spinal canal pathology may increase risk of hematoma after neuraxial anesthesia/analgesia; even if known, spinal canal stenosis is not considered a contraindication to neuraxial anesthesia.

Case Presentation: 61 yo Female presenting for left total hip arthroplasty. Her past medical history includes cardiac arrhythmias, hypertension, asthma, obstructive sleep apnea, Diabetes mellitus Type 2, and chronic left hip pain secondary to osteoarthritis. Patient reports a history of back surgery greater than one year ago complicated by wound infection requiring two months of inpatient rehabilitation. She returns for procedure now as an outpatient and reportedly continues with physical therapy sessions thrice weekly. Patient has a BMI 40 and physical exam demonstrates chronic pain in left hip with orthopedic surgery patient currently unable to walk due to pain, uses wheelchair, cane for transfers. Labs demonstrate an INR 1.0 and platelets > 350K. A lumbar epidural was performed with a single needle pass requiring redirection after encountering bone on initial approach 1 level above previous lumbar incision, easy catheter placement, however, a test dose revealed approximately 15 bpm elevation in HR. Catheter removed and replaced 1 level up, again with a single needle pass and easy catheter placement without any hemodynamic changes with test dose injection. No evidence of heme in the needle at any point, no evidence of heme in the catheter at any point. On POD #1 patient denied pain or weakness and epidural trialed off and restarted due to patient complaining of significant pain. In the evening patient reported weakness in both legs and epidural infusion rate decreased. A resident was instructed to re-evaluate Pt in 90-120 min for resolution of weakness. No further report of weakness from resident. POD #2 patient found to have intact sensation to light touch, proprioception and pain lower extremities with worsening L>R motor weakness, minimal motor function in left leg. A STAT CT followed by MRI demonstrated multilevel spinal canal stenosis and epidural hematoma extending from levels T11-12 to L1-2 with mass effect of the dorsal aspect of the thecal sac and narrowing of the CSF. Based on these imaging findings, immediate consult was placed to neurosurgery who emergently took the patient to the operating room for evacuation of epidural hematoma. Post-operatively patient was noted to have normal sensory function immediately out of the operating room, and over the next several days had a gradual return of motor function. At the time of discharge she still had L > R motor weakness she reported as an improvement from prior to admission and was discharged to inpatient rehab.

Discussion: Epidural hematoma can happen with any epidural, or even spontaneously. Epidural hematomas do not always present with classical signs and symptoms of back pain and lower extremity sensory deficits. Epidural hematoma needs to be recognized and aggressively treated as early as possible, ideally less than 8 hours from first symptoms to decompression. The adequacy in clinicians is to not only perform procedures, but the role is to communicate with other practitioners in the patient care model as well as value the importance of physical exam and patient-brought concerns.

References:
Perioperative Management of Awake Craniotomy in Third Trimester of Pregnancy

Introduction: We present the perioperative anesthetic management of a 40-year-old female who required resection of a large glioma at 30 weeks gestation. Special considerations and a successful approach to awake craniotomy for this unusual case are discussed.

Case Presentation: A 40-year-old female at 30 weeks gestation presented with a five-month history of headaches and progressive left-sided face and arm numbness. Magnetic resonance imaging showed a 5.5x5.0x5.0cm malignant glioma in the right posterolateral frontal lobe encroaching on the primary motor and sensory areas of the left face and arm. There was also a 10mm midline shift with right uncal herniation and obstruction of cerebral spinal fluid flow. In the week leading up to the presentation the patient’s headaches had worsened and morning nausea had developed. Weighing the risks of delivery of a significantly preterm infant from a mother with a decompensating neurologic status, the decision was made to pursue cranial surgery first while attempting to preserve the pregnancy intact for another 4 weeks.

Brain tumors and pregnancy each give rise to physiological changes that significantly impact anesthetic approach. A craniotomy for a large brain tumor requires attention to factors that affect intracranial pressure, such as ventilation, oxygenation and cerebral blood flow, to create operative conditions for maximal resection. Advanced pregnancy may pose challenges when undergoing anesthesia such as a restrictive ventilator defect, increased minute ventilation, and increased aspiration risk. Airway management is often more difficult due to weight gain and mucosal edema. The presence of a viable fetus mandates perioperative attention to preterm labor and fetal well-being.

For this tumor resection involving eloquent cortex, an awake craniotomy with an asleep-awake-asleep technique was chosen to allow maximal resection while preserving neurological function. The anesthetic consisted of Clonidine premedication, Propofol and Remifentanil infusions titrated to the phase of the operation and a scalp block. For the initial phase of the operation, the patient was turned nearly lateral and intubated with a second generation supraglottic airway with gastric drain port, placed over an esophageal bougie. She awakened uneventfully and cooperated easily for the mapping and resection, but required management of nausea and headache. At the conclusion of the resection, the supraglottic airway was replaced. Fetal non-stress tests were performed pre- and postoperatively and were reassuring. Four weeks post-craniotomy she returned for induction of labor. We ruled out intracranial hypertension with a CT scan of the head, prior to labor epidural placement. The patient vaginally delivered a healthy infant at 34 weeks gestation.

Discussion: An awake craniotomy requires balancing opposing goals of minimizing patient discomfort while ensuring cooperation in neurological examinations. Understanding the physiologic changes of pregnancy and tumor pathology are critical in anesthesiology. This case presented an excellent opportunity to manage and learn from two medically fascinating scenarios.

References:
Title: Spinal Cord Stimulation: Salvaging Failed Trials

Andrew Oberlin, M.D.
University of Miami, CA-2
Andrew.oberlin@jhsmiami.org
(765) 438-4047

Background: Back pain is a common symptom of multiple etiologies requiring tailored treatments. Many patients eventually choose to undergo surgical intervention, a subset of which develop failed back surgery syndrome. Spinal cord stimulation (SCS) has emerged as a viable treatment option for these patients. With advent of newer SCS technologies, it is becoming apparent that stimulation waveforms are of paramount importance to pain relief.

Methods: 4 patients in a university pain clinic who had undergone SCS trials were identified. Prior to trial completion, these patients with suboptimal or borderline improvement were offered a different brand of SCS generator and therefore access to a different waveforms.

Results: The 4 patients in this ongoing case series had significant improvement in their pain scores after undergoing a switch to a new waveform. These patients subsequently underwent permanent implantation and continue to have improved pain control.

Conclusions: Consistent with current literature, these 4 patients varied in their response and preference to different waveforms. Given the difficulty in re-trialing SCS in a failed patient, we believe that offering a different waveform during the same trial is an excellent option to improve patient care while reducing cost.

Sources:

**TAVR – Subvalvular Surprise**

**Background**
Transcatheter Aortic Valve Replacement (TAVR) is indicated for severe, symptomatic aortic stenosis (AS) in patients who have a high or prohibitive surgical risk. When combined with another LVOT obstruction, careful consideration must be taken prior to proceeding with TAVR, since an additional masked HOCM/SAM pathology can lead to challenging hemodynamics in the peri-deployment phase, as reported in this case.

**Case Report**
A 56-year-old male with severe AS, CAD, COPD, HTN, and Crohn’s Disease presented for TAVR procedure under MAC. Following successful deployment of the transcatheter valve the patient’s clinical status worsened despite escalating interventions. Given his refractory response to inotropes, an LVOT obstruction was high on our differential. Consequently, rate-control and afterload increasing medications (esmolol, phenylephrine) were prioritized with marked improvement in symptoms. The expedited TEE assessment confirmed the presence of a previously undiscovered hypertrophic cardiomyopathy pathology causing severe LVOT obstruction with SAM. An urgent alcohol ablation was discussed by the TAVR-team, if medical management would fail to improve the gradient. With initiation of long-acting beta blockade, a phenylephrine infusion, and judicious fluid administration to achieve euvolemia guided by TEE, we were able to decrease the gradient satisfactorily and transferred the patient to the ICU. Medical optimization continued in accordance with HCM-treatment guidelines, and he was extubated on POD#2, and discharged on POD#5. Post-discharge, the patient’s was closely followed and he has not required invasive intervention for his HCM to date.

**References**
Combined Cervical Spinal Cord Stimulator & Peripheral Nerve Stimulator for Brachial Plexopathy: Case Report

Mohamed Osman MD, Egle Bavry , MD

Introduction
The brachial plexus provides innervation to the skin and muscles of the upper extremities and is susceptible to various injuries. Brachial plexopathy is one of the many causes of intractable upper extremity pain and may present in the setting of traumatic, non-traumatic, ischemic, and neonatal injury. Most brachial plexopathies are treated conservatively however management is challenging. Optimal treatment of chronic neuropathic pain in this situation includes multimodal and multidisciplinary approach with pharmacotherapy, physical therapy, optimization of mental health and invasive procedures. We present the case of a patient with intractable upper extremity, shoulder and cervical pain resistant to various noninvasive and invasive treatment modalities and received good response to combined cervical spinal cord and brachial plexus stimulation.

Case
A 57 year old male developed chronic neck pain with radiculopathy as well as chronic shoulder pain, right greater than left, from the result of a fall injury in 1981. The patient was evaluated at our clinic and work up studies demonstrated that patient suffered from brachial plexopathy involving upper and middle trunks with denervation in C6 and C7 innervated muscles. The patient failed multiple conservative therapies as well as pain interventional procedures. These treatments included epidural steroid injection, radio frequency ablation, trigger point injections, physical therapy, cognitive behavior therapy, hydrotherapy, transcutaneous electrical nerve stimulation, opiates, topical, and neuropathic pain medications. The patient was evaluated by our neuromodulation team which included psychological evaluation and functional assessment and was deemed to be a good candidate for neuromodulation therapy. The patient had significant cervical stenosis at C3-4 and C4-5 levels, therefore the decision was made to perform combined cervical and brachial plexus lead placement to achieve optimal coverage of painful areas. After a successful nerve stimulator trial, a permanent cervical spinal cord stimulator and brachial plexus peripheral nerve stimulator were placed.

Results
The brachial plexus lead was placed using posterior approach as described by A. P. Boezaart(1) and T. Goroszeniuk(2). Under fluoroscopic guidance, a 21G 100mm length nerve stimulation needle was advanced into the right cervical paravertebral area 3 cm lateral from the midline at the level of the C6 vertebral body until a biceps twitch was obtained with 2Hz stimulation. Then a 14 G coude needle was advanced parallel to the nerve stimulation needle and a percutaneous Boston Scientific lead SC-2366-70 was inserted into the cervical paravertebral region through the coude needle. The final position of the lead for the peripheral nerve stimulator was at the bottom one third of C4 on the right side. The cervical SCS lead was inserted using usual approach with entrance at the T1-T2 epidural space. An eight contact lead was advanced into the epidural space and to the bottom one third of the right C5 vertebral body. Both leads provided adequate coverage to the patient's usual pain areas. The patient was given six different programs with varying amplitudes, pulse width and hertz to accommodate for different intensities of pain. At one week follow up, the patient’s numeric rating scale(NRS) showed approximately 30% pain relief with increased range of motion of the neck. Follow up after four weeks, the patient's pain relief was greater than 50% on the NRS with continued improvement in neck range of motion. Oswestry Disability Index went down from 54% before the procedure to 30% three months after the procedure. Overall the patient was very satisfied with the results of improved pain control and functionality.

Discussion
SCS alone has been proven to improve pain relief, Pain Disability Index (PDI) score, quality of life (QoL), and satisfaction at 3, 6, and 12 months post-implantation. Brachial plexus lead placement can be effective therapy for brachial plexopathy if cervical SCS lead placement is problematic. Combination of peripheral nerve and spinal cord stimulation can prove to be beneficial in certain patients with complex pain problems.
An Evidence-Based Opioid-Sparing Anesthetic Technique Based on a Review of the Literature*
J. Paetzold, DO, PG Boysen MD, MBA
jpaetzol@tulane.edu; (817) 291-0646

The term “balanced anesthesia” was introduced by Lundy in 1926; smaller doses of other anesthetic agents (i.e. opioids) when combined with volatile agents, avoided complications compared to using a single agent. Kehlet and Dahl (1) coined the term “multimodal” and “balanced analgesia” to add to our clinical lexicon. In turn, we use the term “balanced non-opioid anesthesia” and performed a literature search to identify intravenous agents pertinent to achieving a goal of identifying a non-opioid or opioid sparing anesthetic technique.

**Lidocaine:** lidocaine by intravenous infusion exhibits dose-dependent effects: plasma concentrations of 1-5 mcg/ml provide analgesia; toxic effects begin >5 mcg/ml. Lidocaine has active metabolites: MEGX is 80% active, xylidide is 15% active. MEGX has a longer half-life, (>2.5 hr) than lidocaine. (2) Lidocaine also has a demonstrated anti-inflammatory action. (3)

**Dexmedetomidine:** An infusion of dexmedetomidine can provide total anesthesia, has a synergistic analgesic effect when combined with lidocaine infusions or volatile anesthetic agents, and blunts the stimulative response to intubation and to ketamine. Sub-anesthetic doses of the drug also have an opioid-sparing effect in surgical patients.

**Drugs With Intermittent Dosing:** We reviewed the literature on the pharmacokinetics and the pharmacodynamics of paracetamol (acetaminophen), ketorolac, ketamine, and ibuprofen as other agents capable of opioid-sparing when combined with drugs amenable to infusion.

**Opioid-Sparing Prescription:** We suggest an evidence-based opioid-sparing anesthetic as follows. Begin with a pre-induction dose of intravenous acetaminophen of 1000 mg (in adults). Also prior to induction, begin an infusion of lidocaine 0.03 mg/kg/min, and dexmedetomidine 0.5 mcg/kg/hr. Induce general anesthesia with low dose propofol, ketamine bolus 0.3 mg/kg prior to intubation, and neuromuscular blocker of choice. Volatile agent 0.8 – 1.0 MAC and adjust as indicated. Reduce dexmedetomidine to 0.25 mcg/kg/hr after 2 hours and discontinue 30 min before emergence, and reduce lidocaine infusion to 0.02 mg/kg/min. Treat hypertension and tachycardia with beta blockers. Lidocaine infusion ½ dose or not at all if Exparel is injected. Use with caution or not at all with hepatic or renal impairment or congestive heart failure. This regimen is intended for anesthetics more than two hours in length.

References* (Extensive annotated bibliography provided during presentation).

An Evidence-Based Opioid Sparing Anesthetic Technique: Preliminary Data

Author: Jacquelyn Paetzold, D.O., jpaetzol@tulane.edu, (817) 291-0646

Institutions: Tulane University School of Medicine, New Orleans, LA; Ochsner Health System, New Orleans, LA

Introduction: Perioperative pain control remains problematic. Opioid sparing techniques, due to side effects of the drugs (possible prolonged hospital length of stay) and increasing numbers of patients with physical dependence and/or tolerance to narcotics are also of particular concern. We developed an evidence-based and multimodal anesthetic technique using a lidocaine and dexmedetomidine infusion at its base. Since previous literature identifies benefit from opioid-sparing techniques in terms of return of bowel function, reduced pain scores, and shorter length of hospital stay in the perioperative period for abdominal procedures, we concentrated our investigation on urologic, gynecologic, and colorectal surgical patients (1).

Methods: Over a two-month period we selected consecutive scheduled cases in which the procedure would last >2 hours. Study group 1 (25 patients): Prior to anesthetic induction, infusions of 1.) lidocaine, 0.03mg/kg/min, and 2.) dexmedetomidine, 0.05 mcg/kg/min were initiated without bolus. Anesthetic induction was achieved with propofol and volatile agent as necessary, then neuromuscular blocker and tracheal intubation. Ketamine, 10 mg IV was given prior to intubation and a second dose, 0.3 mg/kg IV bolus just prior to incision. Anesthetic maintenance was achieved with lidocaine and dexmedetomidine by continuous infusion and volatile anesthetic agent at 0.5 - 0.8 MAC. Hypotension was treated with a vasopressor in order to maintain a mean arterial blood pressure >65 mm Hg. Decadron, ondansetron, acetaminophen, ibuprofen, midazolam, and ketorolac were given if not contraindicated in both groups of patients. The target visual analog scale (VAS) during recovery was < 4. We compared the two groups using a two-sample t-test.

Results: With IRB approval, we compared 25 consecutive patients who had an opioid sparing anesthetic to 25 patients undergoing similar procedures, but with opioid supplementation to a general anesthetic. Our particular focus was on 1.) length of hospital stay, and 2.) post-operative analgesia requirements. We excluded patients with severe liver disease, end-stage renal disease, heart block or congestive heart failure.

Conclusion: Length of stay for the two study groups is not statistically significant. This is in agreement with another study, which examined "short stay" or same day discharge. Our study was also influenced by a preponderance of procedures accomplished with laparoscopy and robotic guidance. For example, there were no open nephrectomies performed during the study period, and some colorectal surgeries were also robotic procedures. In contrast to LOS data, no patient who underwent an opioid-sparing anesthetic was given an opioid during PACU stay or after discharge from PACU the next 24 hours. Either, intravenous acetaminophen, ibuprofen, or ketorolac provided adequate analgesia. In this sense, the technique has been validated; when to use the technique, which patients would benefit, and cost comparison will require further study. Finally, in the PACU our study patients did not require use of opioids immediately and maintained visual analog scale (VAS) < 3. This confirms previously published data demonstrating an opioid-sparing effect (2).

2. Anesthesiology 2008; volume 109, pages 118-121.
A Case Report: Acute Pulmonary Hypertension in Pregnancy

Ashley Peairs and Elaine Pages-Arroyo

Ashley.peairs@ochsner.org

Cell: (225) 202-0515; Fax: (504) 842-2036

Pulmonary hypertension in general terms is more than 4 times more likely encountered in women, with eighty percent of these being in childbearing range. Prognosis remains poor with high maternal mortality despite advances in treatment. Pulmonary hypertension is still a relatively rare phenomenon encountered in the pregnant population, but is becoming more prevalent as women with this diagnosis are choosing to become pregnant and carry the child to term. Multiple physiologic changes come together to make pregnancy an inciting event for elevated pulmonary artery pressures: increasing CO and increasing blood volume, namely. The risk for cardiovascular collapse is further exacerbated by a decreased SVR (due to progesterone and estrogen) which decreases the patient’s preload. Labor and delivery are precarious times for these patients, as their already exaggerated hemodynamic status is intensified further. The current case centers around a 27 year old G2P1 at 30 weeks gestation who presented with acute onset chest pressure, dyspnea, and abdominal pain that woke her from sleep. Patient carried no significant comorbid conditions. EKG in the emergency department showed evidence of right heart strain and a CTA obtained to rule out pulmonary embolism showed contrast refluxing into hepatic veins, concerning for elevated right heart pressures, which prompted a transthoracic echo. Echo showed RVH with severely depressed RV systolic function and a pulmonary artery pressure of 89mmHg. Patient underwent emergent cesarean delivery with minor complication of rapidly occurring hypotension upon delivery, requiring vasopressin and epinephrine boluses. Intraoperative TEE confirmed elevated pulmonary artery pressure and severely depressed RV function. Patient was successfully extubated in the OR and transported to ICU. Patient was discharged on day 5 with normalizing PA pressures as evidence by repeat TTE on day of discharge.

References:

43 Years Old, Mechanical Heart Valves, Anticoagulation with a Complete Placenta Previa---Really?

Pedersen, M., Hoefnagel, A., James, C. mark.pedersen@jax.ufl.edu

Introduction. Placenta previa is a leading cause of third trimester hemorrhage, which can lead to morbidity and mortality to mother and fetus. Our case was complicated by a history of rheumatic fever with subsequent mechanical heart valve replacements, necessitating strict anticoagulation.

Case. A 43 year old female with a history of rheumatic fever requiring a mitral and aortic valve replacement and tricuspid repair 2 years earlier was admitted at 33+4 week gestation, for conversion from warfarin to intravenous heparin prior to an elective cesarean section due to a complete placenta previa. The patient’s symptoms included shortness of breath and orthopnea. The patient was in atrial fibrillation and echocardiogram revealed moderate aortic stenosis, moderate pulmonary hypertension with dilated atria and right ventricle and normal LV function with an EF of 50%. Thirty-six hours prior to the scheduled procedure, the patient began bleeding. The heparin infusion was stopped, the patient was transfused 2 units of PRBC’s, and an urgent cesarean section was performed under general anesthesia (GA). After placement of an arterial line, the patient underwent a modified rapid sequence induction with etomidate, fentanyl and succinylcholine. The patient’s blood pressure ranged from 120-150 systolic to 60-85 diastolic; a transesophageal echo (TEE) was placed and demonstrated a LVEF of 45-50%, dilated atria and moderate pulmonic and tricuspid regurgitation. A viable female infant was delivered weighing 1.63 kg, with Apgars of 8 and 8, and was sent to the NICU. Fortunately, the placenta separated easily and the blood loss was only 700 ml. The patient was extubated at the end of the procedure in stable condition.

Discussion. This case involving a complete previa was complicated by significant heart disease and the need for anticoagulation. Either a GA or a neuraxial anesthesia (RA) is a viable option for cesarean section for placenta previa (1). A RA was originally planned with electively stopping the heparin infusion for 4 hours, assuming a normal PTT. However with the acute hemorrhage, a GA was the only option but it afforded the opportunity for TEE placement and monitoring her cardiac status for the duration of the case. Despite planning for an elective procedure, an acute hemorrhage necessitated a change in plans and despite the urgency, the ongoing cooperative and communicative efforts among the sub-specialties, obstetrics, cardiology, anesthesia, neonatology and nursing, facilitated this difficult situation.

The Use of HBOC-201 (Hemopure) In a Severely Anemic Jehovah’s Witness after Trauma
Andrew Redfern, D.O.
David Brenneman M.D
University of Florida College of Medicine, Department of Anesthesiology

Introduction:
Treatment of Jehovah’s Witnesses with severe anemia continues to be a challenge. Hemoglobin below a critical level is known to cause a decrease in oxygen delivery, causing end organ damage and increased morbidity and mortality. Without the ability to give human blood products to this patient population, practitioners must seek other means to reduce blood loss, supplement the creation of red blood cells (RBCs), and increase oxygen carrying capacity. One proposed method to increase oxygen carrying capacity is through the use of hemoglobin oxygen carriers or HBOCs.

Case Presentation:
A 50 year old female Jehovah's Witness with a past medical history of antiphospholipid syndrome, on warfarin, was a restrained driver in a head on collision requiring prolonged extrication. Initial evaluation of this trauma patient revealed open fractures to the upper and lower extremities, as well as pelvic fractures and rib fractures. The patient was hypotensive and tachycardic, anemic and acidotic which raised concern for hemorrhagic shock. Because of her religious beliefs, she refused packed RBCs but other blood products were acceptable. After resuscitative efforts, her clinical status continued to deteriorate as she developed worsening dyspnea requiring intubation and vasopressor support. There was no further sign of bleeding after temporary splinting by the orthopedic surgery team and the Hgb stabilized at approximately 3.5 g/dL overnight after further crystalloid resuscitation. Due to the severe anemia, the orthopedic surgery and critical care team deemed the patient too unstable to undergo stabilization of the multiple fractures in the operating room. On hospital day two, she had an acute change in mental status, thus, a stat CT head was ordered, revealing multiple scattered hypodense areas in the cortex, which were consistent with fat emboli. On hospital day three, it was decided to place the patient in a pentobarbital coma and to cool the patient to 36 degrees Celsius to reduce cerebral metabolic oxygen demand. The patient’s Hgb remained approximately 3 g/dL and the use of HBOC-201 was discussed; the process of obtaining the product was initiated. On hospital days five-six, she received 3 units of HBOC-201 with total Hgb improving to 5.2 g/dL. On hospital day seven, patient became febrile, with signs of infection of the open fractures, therefore, the decision was made to take the patient to the operating room for washout and pinning of unstable fractures. HBOC-201 was continued in the operating room. She was transported to the ICU in critical but stable condition. On hospital day 8, a repeat CT scan showed a new infarct of the posterior division of the middle cerebral artery with worsening neurological exam. Care was withdrawn after discussion with family and all medical teams.

Discussion:
The HBOC-201 is a cross-linked, and polymerized bovine Hb in a lactated ringer’s solution which has been shown to decreased transfusion requirements and increase oxygen carrying ability. It is currently non-FDA approved, and can be requested for “compassionate use” which allows the use of investigational drugs outside of a clinical trial. Its strict qualification for use is secondary to a recent meta-analysis that showed a 30% increased risk of mortality and over 2 fold increase in MI risk with certain HBOCs. As with most medical decisions, the risks and benefits must be weighed. This case represents a possible use of HBOCs as an “oxygen bridge” in a scenario where human blood was not an option in setting of a hemoglobin level that was not compatible with life.


Title: Evidence-Based Practice on an International Health Program in Nepal

Abstract: The Mayo International Health Program is a grant that serves to provide medical residents and fellows with an opportunity to serve and learn from varying international health organizations in resource-scarce areas. Likewise, there are many other programs available to all providers who wish to gain competency with hypoxic medicine and altitude pursuits. Many missions, other than Medecins Sans Frontieres (MSF), provide healthcare professionals with an opportunity to serve abroad and a short list is provided herein. I received a grant to travel to Kathmandu, Nepal in November of 2015 to learn from the local physicians about the unique challenges of delivering an anesthetic at an altitude of 4600 feet. In addition to the hypoxic physiologic challenges, they face adversity from resource scarcity, cleanliness, facility limitations, and even cultural issues. Because of this, endotracheal tubes sometimes had to be reused, capnography was not routine for surgical procedures, oxygen pipelines were malfunctioning, and patients routinely had to purchase their own medications at an outside pharmacy and bring a “shopping list” into the hospital for their admission. To that end, careful attention should be paid to the resources of the intended destination through communication with the host institution to help alleviate the resource vacuum. In certain instances, technology companies could help to provide demonstration units for certain duration or donation to the host facilities in need. My goal is to inform healthcare professionals that international grants can be used to gain firsthand experience in high altitude environments which would be useful for endeavors that might require skills obtained from serving in hypoxic conditions. These grants aren’t always the length of a typical MSF contract lasting two months to two years and serve as great primer in the quest of vertical pursuits to come.
This is case report of a 69 year old female with postoperative residual neuromuscular blockade treated, initially, with naloxone and flumazenil. Subsequently, the patient was treated successfully with sugammadex. Like many patients, this patient was reversed with neostigmine and glycopyrrolate, yet respiratory arrest developed in the postoperative anesthesia care unit thirteen minutes after handoff to the nursing staff. Postoperative residual neuromuscular blockade is a common occurrence; according to peer reviewed literature it occurs in 19-50% of patients in which intermediate acting nondepolarizing neuromuscular blockers are used. This incidence rate has not decreased greatly since 1979, when this complication was initially addressed by the Anesthesiology community; at that time postoperative neuromuscular blockade was reported to occur in 42% of patients receiving paralytics. Contributing factors include: co-administered medications, physiologic conditions, recurarization, incorrect dosing of neostigmine, and improper monitoring and assessment of neuromuscular function. Medications that contribute to prolonged nondepolarizing neuromuscular blockade include inhaled anesthetics, local anesthetics, cardiac antidysrhythmics, some antibiotics, corticosteroids, calcium channel blockers, dantrolene and furosemide. Physiologic states that can cause prolonged blockade include: hypermagnesemia, hypocalcemia, hypothermia, respiratory acidosis, hepatic or renal failure, and myasthenia syndromes. Recurarization refers to return of neuromuscular blockade after a period of successful reversal. This phenomenon occurred frequently with long acting nondepolarizing agents such as pancuronium, which has a longer duration of action than neostigmine. When neostigmine is given too early, residual neuromuscular blockade may result. Additionally, if neostigmine is given in high dose after blockade has resolved, this may also result in neuromuscular weakness in the form of depolarizing blockade. Correct dosing of neostigmine is dependent on appropriate monitoring and interpretation of neuromuscular function and blockade. Sugammadex is a cyclodextrin which forms a complex with rocuronium or vecuronium in the plasma. It rapidly decreases the amount of paralytic that is present at the nicotinic receptor. Sugammadex can be used effectively in the postoperative anesthesia care unit for treatment of postoperative residual neuromuscular blockade.

References:
4. Multi-Faceted Initiative Designed to Improve Safety of Neuromuscular Blockade. Maria van Pelt, PhD, CRNA; Hovig V. Chitilian, MD; and Matthias Eikerman, MD, PhD. Journal of the Anesthesia Patient Safety Foundation. Feb, 2016.
**Title:** Anesthesia for the ‘Convergent Procedure’: A Review of Literature and Anesthetic Considerations

**Background:** Atrial fibrillation (AF) is the most common cardiac arrhythmia. Endocardial catheter ablation is indicated in patients with recurrent AF despite optimal medical therapy. With declining success rates, repeated ablations are often required, exposing extended periods of radiation and inherent complications. Traditional open ‘Maze’ procedure requires sternotomy and cardio-pulmonary bypass (CPB). A hybrid procedure, ‘The Convergent Procedure’, combines catheter-based endocardial and minimally-invasive epicardial ablation into one single operation designed to more effectively treat atrial fibrillation. In this report, we discuss anesthetic considerations and technical complexities of the Convergent-Procedure.

**Discussion:** The Convergent procedure represents novel advancement in therapy of AF, combining effective techniques of both surgical and endocardial catheter ablation. Carefully integrated and collaborative team approach, communication, and well-defined roles of the team members are central to the success of this complex technique. During endoscopic stage, goals are to maintain a motionless field, prevent hypotension during insufflation and ablation using fluid bolus with or without vasopressor supplementation, and being prepared to convert to an open cardiac procedure if required. The esophageal temperature monitoring allows safe ablation of atrial structures in close proximity to the esophagus by providing early warning about excessive heating of ablating electrode. During endocardial stage, goals are to monitor the pericardial drain output, monitor anticoagulation, prevent hypotension, and watch for arrhythmias.

**Conclusion:** Despite its higher success rate, the widespread acceptance of surgical ablation is low due to its invasiveness. The Convergent Procedure combines endocardial and epicardial unipolar ablation, which bonds together minimally invasive endoscopic surgery with electro-anatomical mapping delivering best results.

**References:**
PITFALLS OF ELECTROPHYSIOLOGICAL MONITORING DURING CEREBRAL ANEURYSM CLIPPING
Joseph Siebenaler MD, Ferenc Rabai MD, Raymond Sessions MD, MBA
Department of Anesthesiology, University of Florida, College of Medicine, Gainesville, FL
jsiebenaler@anest.ufl.edu, 619-884-3794(cell), Fax: (352) 265-6922

Introduction
Electrophysiological (EP) monitoring may enhance the detection of ischemia during surgical clipping of cerebral aneurysms and allow for timely corrective maneuvers aimed at preventing permanent neurological damage. We present a case to highlight physiologic and anatomic basis, limitations and potential pitfalls of EP monitoring during cerebral aneurysm clipping.

Case Presentation
An otherwise healthy 45 year old female presented for craniotomy and microsurgical clipping of an unruptured 5mm right posterior communicating artery aneurysm. Multimodality EP monitoring including electroencephalography (EEG), somatosensory evoked potentials (SSEPs) and motor evoked potentials (MEPs) were chosen to monitor parts of the central nervous system (CNS) potentially at risk for ischemia during surgical dissection, temporary and permanent clip placement. Bilateral lower and upper extremity SSEPs were utilized to monitor integrity of the sensory pathway carrying signals ascending through the internal capsule to the primary sensory cortex. Bilateral lower and upper extremity MEPs were utilized to monitor the integrity of the corticospinal tract, carrying signals descending from the motor cortex through the internal capsule. EEG was used for recording spontaneous electrical activity of the cortex.

After induction of total intravenous general anesthesia (GA) and uneventful surgical exposure, the surgeon placed temporary clips on ipsilateral major vessels of the circle of Willis including the internal carotid artery, to divert blood flow and reduce risk of rupture. Temporary clip occlusion lasted for 3 minutes during which a permanent clip was placed. During temporary clip occlusion ipsilateral cortical SSEPs diminished significantly, but returned to baseline shortly after reperfusion of the right hemisphere. EEG and MEPs were unchanged throughout. Intraoperative angiography was also normal. However the patient woke up with left hemiplegia. GA was induced and on immediate reexploration the clip was found to have occluded a small perforating branch arising from the aneurysm. The clip was repositioned to free up this perforator. There were no EP changes during this phase. The patient woke up in a stable condition with improvement in movement of left extremities. Unfortunately 8 hours later the patient suffered an unexpected intracerebral bleed and required further surgical interventions and suffered a guarded prognosis.

Discussion
EP monitoring may be a useful monitoring adjunct during cerebral aneurysm clipping, however even combinations of modalities may not cover all vital parts of the CNS at risk for ischemia. The presence of unchanged EP signals in the face of a new postop deficit is a recognized pitfall of EP monitoring. In our case SSEPs correctly identified transient ischemia during temporary clipping, however all 3 EP modalities failed to capture ischemia caused by occlusion of a vital perforator by the permanent clip resulting in a false negative. Intraoperative EP monitoring is an imperfect surrogate for post-operative neurologic status and interpretation should be done with caution.

References
Propofol Waste in Anesthesia: Environmental and Economic Ramifications
Claudia Sotillo, MD; Lauren Berkow, MD
csotillo@anest.ufl.edu (email), 863-944-2565 (phone), 352-265-6922 (fax)

Abstract: Sustainability in anesthesia care is a crucial issue for both ecological and healthcare cost containment. The widespread use of pharmaceuticals, coupled with unnecessary pharmaceutical waste, has emerged as a leading environmental problem through the identification of contaminants of emerging concern (CEC) in drinking water supplies and outdoor habitats1. Healthcare facilities, specifically operating rooms (ORs), provide a prime venue for the misappropriation of pharmaceutical CECs, as many of these are commonly-used anesthetics. Currently, very little data exists in the anesthesiology literature to identify anesthetic CECs, or to delineate their environmental ramifications.

In a typical US anesthesiology department, anesthetic waste and its management comprises a significant proportion of the annual budget. Inefficient use of perioperative pharmaceuticals represents a hidden cost that is entirely avoidable, particularly when factoring not only the cost of the medication itself, but also the cost of appropriate disposal by high temperature incineration3. Recent literature suggests that increasing levels of medical residues (i.e. analgesic and painkillers) are being identified in surface water and sewage around the world1,2.

The purpose of this study is to perform a multifactorial evaluation of the economic and environmental impact of propofol, a commonly-used and wasted short-acting IV sedative hypnotic. Preliminary data from a randomly selected two-week period of propofol usage in the operating rooms at UFHealth, an 830-bed Level I Trauma Center that provides anesthetic care to over 80,448 patients annually, suggests that 15-25% of propofol vials are wasted. Extrapolating this data to an estimate of annual waste, the yearly cost of propofol waste amounts to $77,208.03, ($65,472.42 from drug cost and $11,735.61 from disposal).

Our aim is to encourage perioperative sustainability and curtail unnecessary spending by implementing a volume and cost analysis of our systems-based propofol management. We will identify barriers, implement education, and then measure propofol wastage after the intervention. We aim to use our role as anesthesiologists to spearhead a cost-conscious and green health care environment that will prove beneficial to both hospital economics and the ecosystem.

References:
Historical controlled study of perioperative improvement through a standardized clinical pathway for adolescent idiopathic scoliosis repair

Robert Stoker¹, MD rstoker@anest.ufl.edu (801) 656-5756; Carl Tams¹; F. Cole Dooley¹, MD; Sarah Philips², Megan Koenig¹, Judith Wishin¹, Tranjit Sangari¹, MD, Sandra N. Gonzalez¹, MD, Sarah Molinari², MD, Laurel C. Blakemore², MD, Christoph N. Seubert¹, MD, PhD
University of Florida Departments of Anesthesiology¹ and Orthopedics², Gainesville, Florida

Introduction: The purpose of this study was to determine the effect of a comprehensive perioperative clinical pathway on patients undergoing repair of adolescent idiopathic scoliosis. We hypothesized that preoperative use of gabapentin and acetaminophen, intraoperative single-time dose of intravenous methadone, and propofol and remifentanil infusions would decrease pain scores on the first postoperative day and decrease opioid consumption in the postoperative period following surgical intervention while facilitating early mobilization and return to function.

Methods: University of Florida IRB approved this historical case-control study (NCT02481570). The experimental group included 14 patients (12-19 years) who received preoperative acetaminophen and gabapentin, followed by an intravenous bolus of methadone (0.25-0.4mg/kg) at induction with a maintenance phase regimen of propofol and remifentanil infusions. The historical control group consisted of 25 adolescent patients (12-18 years) for idiopathic scoliosis repair from 2013-2015. The anesthetic regimen in this historical control group consisted of propofol with or without ketamine, and sufentanil or remifentanil infusion for analgesia. End points of interest included: emergence time, pain ratings during the first 24 hours postoperatively, opioid consumption (in fentanyl equivalents), and length of stay.

Results: Postoperative opioid consumption was significantly less in the experimental group (500 mcg fentanyl equivalents) compared to 970 mcg in the historical control group (P<0.04). Pain ratings in the experimental group were reduced by approximately 1 point throughout all time points measured, but not significantly so. Hospital length of stay was decreased from 4.5 days (S.D. 0.9 days) to 3.5 days (S.D. 0.8 days, p=0.0013). The new clinical pathway was not found to prolong emergence time.

Discussion: Our study demonstrates that a comprehensive clinical pathway including multimodal analgesia and a standardized anesthetic regimen was successfully implemented as indicated by the reduced opioid requirements following surgery and decreased overall length of stay. Even though pain scores were not reduced significantly, postoperative opioid requirements were reduced suggesting a difference that may be of clinical significance for other outcomes such as opioid-related side effects. Of note, we attribute the absence of prolonged emergence times to the utilization of a computer-aided optimization guiding intraoperative propofol and remifentanil dosing in the experimental group, but was not used in the historical control group. A single dose of methadone (0.25mg/kg) does not appear to prolong emergence from anesthesia in adolescents undergoing idiopathic scoliosis repair and decreases opioid requirements postoperatively. Additionally, the experimental group stayed 1 less day in the hospital, likely a function of better pain control, early mobilization, and improved return to function.

References:
Evaluation and Management of Post Partum Hemorrhage Using AWHONN Risk Factor Tool
Lauren Sylvester, MD
Insylvester@uams.edu 318-355-5199

In the United States, post-partum hemorrhage complicates 2.9% of all births, which translates to 125,000 women each year. Post-partum hemorrhage is the leading cause of severe maternal morbidity, and the most common cause of preventable maternal mortality. Maternal mortality reviews estimate that between 54-93% of maternal hemorrhage related deaths could have been prevented with improved clinical response. The Association for Women’s Health and Neonatal Nurses is the major professional organization for L&D nurses, and they are a key member of the Council for Patient Safety in Women’s Healthcare. They made hemorrhage risk assessment a top priority for their organization. They drew from a comprehensive literature search to identify all significant risk factors for postpartum hemorrhage and construct a risk assessment tool. The tool is designed to be used by nurses to assess the patient for risk factors for post-partum hemorrhage. Assessments are made at admission, pre-birth, and post-birth. The risk factors are further categorized in low, medium, and high risk for post-partum hemorrhage. According to the patient’s risk level, this tool then provides anticipatory interventions for risk-appropriate care.

Our concern in reviewing this tool was that many of the risk factors are extremely common. The risk factors are considered additive and cumulative, and women with at least two medium risk factors or one high risk factor are considered high risk. Our hypothesis was that implementation of the tool will double the population of women admitted to UAMS Labor and Delivery who qualify for preparation of erythrocytes.

We used the AWHONN risk factor tool and collected data on all patients admitted for delivery from September 1- October 31, 2016. We then used this information to categorize these patients into low, medium, or high risk for PPH according to the AWHONN risk factor tool. With our current practice, we prepared blood products for 78 of our 587 patients. The risk factor tool would have us prepare blood products for 421 patients. This would increase our blood product preparation rate from 13% to 72%. Our initial hypothesis was that implementation of the tool would double of product preparation rate.

In conclusion, UAMS serves a high risk population, and application of the current AWHONN tool would increase our rate of blood product preparation fivefold. We are also a trauma center, and have robust protocols for both emergency release and massive transfusion. UAMS has already committed to implement the AWHONN PPH risk factor stratification tool this coming fall. We anticipate that obsetricians and anesthesiologists will use information from the risk assessment tool to inform their clinical decisions about blood preparation. The risk stratification tool will be useful to enhance awareness and intraprofessional communication among the clinicians. However, we believe a large multicenter clinical database analysis is need to revise the tool to focus on significant risk factors for emergent blood transfusion, as well as risk factors for difficult cross match and prolonged blood product preparation.
References


Anesthetic Management of Combined Cesarean Section/Hysterectomy: A Case Series
Stefanie M. Vallancourt, DO; Adam Wendling, MD
Department of Anesthesiology, University of Florida College of Medicine, Gainesville, FL

Introduction: Hemorrhage is the leading cause of maternal death in Florida and placental disorders account for 21% of hemorrhage related deaths. Placenta accreta is a strong risk factor for maternal hemorrhage and the incidence of accreta is 1 in 533 pregnancies. In an attempt to prevent these hemorrhage related deaths, a number of obstetricians are planning combined cesarean section/possible hysterectomies in the operating room for patients with known or suspected abnormal placentation. At our institution, we have performed seven of these planned combined cases in less than three months, four of which required hysterectomy at the time of delivery. We discuss the anesthetic management of these cases and opportunities for improvement on future cases.

Case Presentations: Of the seven cases presented in this abstract, four were combined cesarean section/hysterectomies and three were cesarean sections only. Three were performed under general anesthesia, two were performed under regional anesthesia with conversion to general anesthesia after delivery of the baby, and two were performed under regional anesthesia only. Mean estimated blood loss was 2L (0.8-5L), and transfusion means were 2.1U PRBC (0-9U) and 1U FFP (0-3U). Three of the eight babies delivered required endotracheal intubation and NICU admission, all of which were exposed to general anesthesia prior to delivery.

Discussion: As early as 1962, combined cesarean section/hysterectomy has been described as a safe procedure with relatively low blood loss. While the procedure was initially described as a life-saving procedure and today serves the same purpose, it was once used as a means of permanent sterilization in women having repeat cesarean sections with a desire for sterility. One case review published in 1989 reviewed 46 combined cesarean/hysterectomies, 25 of which were scheduled and 21 were emergencies. Of the scheduled cases, 13 had neuraxial anesthesia, one of which converted to GA when the spinal was no longer effective. The remainder were performed under general anesthesia and 5 of the babies were born “depressed,” all of whom were delivered under general anesthesia. Not surprising, maternal outcomes were better in those cases that were scheduled versus emergency (less intraoperative hypotension, blood loss and blood transfusions). It has been discussed at our institution that obstetrical patients with known or suspected abnormal placentation be scheduled for cesarean section with possible hysterectomy rather than allow them to labor and deliver vaginally or via unplanned cesarean section for this reason, in addition to having a contingency plan in the event of an unplanned delivery. Based on our institutional experience and literature review, our recommendation is that risk assessment be performed and for those that are at high risk for having placenta accreta or other abnormal placentation, general anesthesia should be the first choice. Regional anesthesia may be considered for patients who are low risk for accreta. Methods to improve neonatal outcome have also been suggested, including using a regional technique until the baby has been delivered and subsequently converting to general anesthesia; if general anesthesia is initiated at the beginning of the case, minimizing time from induction to delivery by placing all invasive lines and monitoring prior to induction of anesthesia may also improve outcomes.

References

2. ACOG Committee Opinion Number 529, July 2012, reaffirmed 2015.
Introduction:
Noise levels in the operating room (O.R.) and their effects on the anesthesia provider have been a historic area of interest. The National Institute for Occupational Health and Safety has recommended standardized noise level not to exceed 45 decibels. Prior studies have shown negative consequences associated with noise, such as impaired concentration, patient anxiety, and provider mistakes. This quality improvement project was designed to address elevated noise levels in the O.R..

Methods:
A total of 64 ORs were randomly selected based on accessibility. A Radio Shack® noise meter was then placed near the anesthesia provider during induction. Minimum, baseline, and maximum levels were recorded in decibels during induction of anesthesia. The provider was surveyed to assess anxiety level, cognitive difficulty, history of adverse or near adverse events, anesthesia quality decrease, and overall desired OR noise level. Providers were instructed to answer surveys based on experience during that current procedure. OR staff education was done following initial data collection, and post-education measurements were obtained 1 week after instruction.

Results:
34 anesthesia providers were surveyed prior to intervention. 47% described noise affecting communication with staff and/or patient, making them anxious, and causing distraction. 65% reported desiring a quieter OR. Average maximum noise level measured 70 decibels. 30 anesthesia providers were surveyed following education. 37% reported negative effects of noise. 57% reported desiring a quieter OR. Average maximum noise measured 65 decibels. Unpaired t-test measured p-value of 0.09 with standard deviation of 4.65 and 11.53 in pre and post-intervention groups, respectively. 95% confidence interval of -0.66 to 8.39.

Discussion:
OR noise comes from a variety of sources—such as monitors, patient and non-patient centered conversation, instrument organization and counts, staff entering and exiting, etc.. While noise levels and overall noise effects on providers decreased slightly following intervention, there is still room for improvement in the areas of OR situational awareness among staff (e.g. knowing when induction is occurring) and pause of extraneous activity during that time. Moreover, one notable confounder to the post-education data includes staff being aware of noise assessor in room. Nosie pollution continues to be an area requiring further improvement and awareness. Continued collaboration must be done to make the OR a quieter/less-distracting space during crucial points in the procedure.

References:
**Post Operative Visual Loss: is it our fault and can we do anything about it?**

**Introduction:** Post operative visual loss (POVL) is a rare but devastating perioperative complication. First described in 1950\(^1\), more cases began to appear in the literature over the following half century. While rates vary based on the literature referenced, it is most commonly reported in patients following prone spine surgery and cardiac surgery. Nevertheless, the etiology of POVL remains complex. Here we utilize a recent case of post operative visual loss to review the pathophysiology of the disorder, identify risk factors associated with POVL, and discuss what we can do as anesthesiologists to help prevent this dreaded complication.

**Case Description:** A 67-year-old Caucasian male with a past medical history of peptic ulcer disease and DVT presented from an outside hospital with chest pain and shortness of breath. A chest CT performed in the ER was negative for pulmonary embolism but showed pneumomediastinum with a dilated abnormal appearing esophagus. Follow up CT esophagram revealed a large 1.2cm perforation from the anterior esophagus just distal to the carina. He was subsequently intubated and taken to the operating room where he underwent emergent Ivor Lewis esophagectomy that took roughly 10 hours to complete. Postoperatively he was transported to the intensive care unit intubated and sedated. Immediately following extubation on post operative day 9, he complained of “dark blurry vision” and only seeing shadows. Ophthalmologic exam revealed a normal appearing optic disc, no light perception, fixed and nonreactive pupils, and total visual field deficiencies in both eyes. An orbital MRI revealed edema and hyper-enhancement of the intraorbital segment of the optic nerve bilaterally, confirming the diagnosis of posterior ischemic optic neuropathy (ION).

**Discussion:** The etiology of POVL remains complex and identifying definitive risk factors is problematic. Incidence after nonocular surgery ranges from 0.002% of all surgeries to as high as 0.2% of cardiac and spine surgery. Visual loss can occur anywhere along the visual pathway, including the anterior segment (corneal abrasions), retina (central retinal artery occlusion), retrochiasmal pathways (cortical blindness), and the optic nerve (anterior or posterior ION)\(^2\). The most common site of permanent injury to the visual pathways in the setting of general anesthesia for nonocular surgery is the optic nerve, and the most often presumed mechanism of injury in this location is ischemia. Identified risk factors for ION include: male gender, case duration, estimated blood loss, obesity, fraction of colloids given, and Wilson frame use.\(^3\) Unfortunately at this time there are no effective treatments for central retinal artery occlusion or ION. As such, it is crucial that we focus on prevention. Possible preventative strategies may include eliminating Wilson frame use, substituting colloid for crystalloid, and maintaining the patient’s head in neutral position and higher than the heart.