

The Sensor

Anesthetic Management of a Patient with Congenital Heart Disease Undergoing Electroconvulsive Therapy: A Case Report

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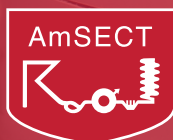
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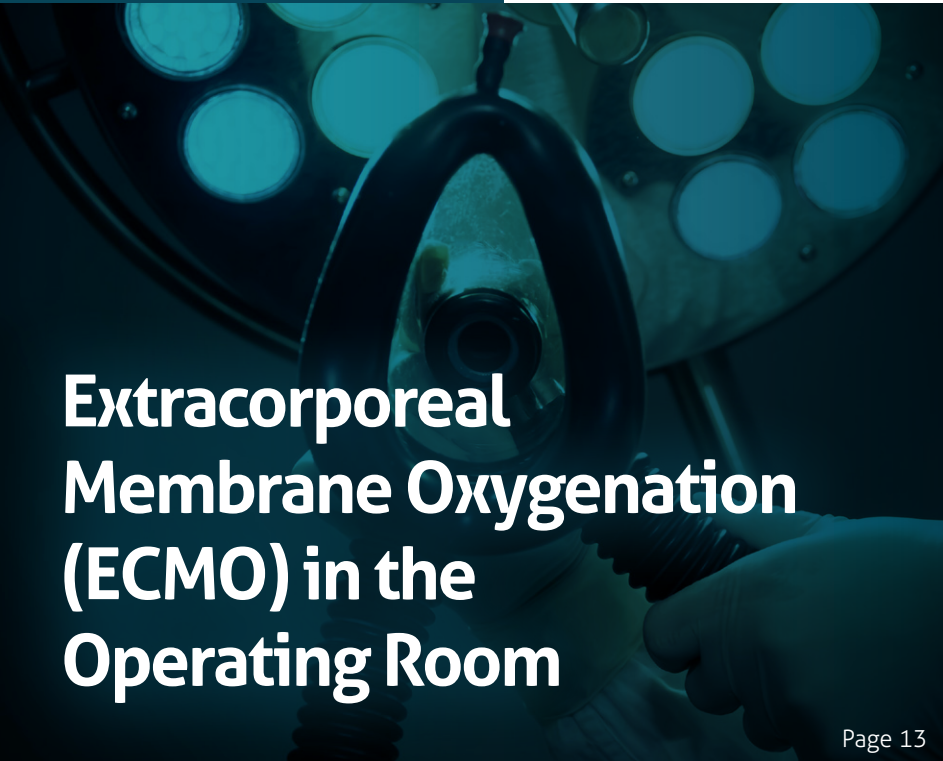
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Perspective

PRESIDENT'S LETTER



Greetings Anesthesia Technology Professionals,

As I step down from the Board of Directors and Executive Committee, I want to take a moment to reflect on my tenure and share my perspectives on our profession.

First, I would be remiss if I did not thank a few individuals.

I want to thank Victoria Reyes for being a mentor, demonstrating leadership for this profession, and helping me foster a desire to serve. I also want to thank David Foster for his challenge and passion, which brought me to the board in 2020. To everyone at headquarters, especially Jennifer Rzepka and Beth McVeigh, thank you for your pivotal support in operationalizing my vision and goals, as well as those of the board during my presidential terms. Finally, I want to thank the amazing board officers and directors I've had the privilege to serve with. Their trust in my abilities, passion, and desire to advance the profession has been humbling. Additionally, I want to thank you the professionals in this field who work daily and have supported the growth of this profession.

My entry into this profession was happen stance, I was a recent college graduate from Jackson, MS, looking for my next step. I was fortunate to find this profession and was brought into an internal training program, given time to develop and learn the clinical roles. During my early training, I remember the chair of our department encouraging me to get certified after two years. However, I also faced discouragement from my supervisor, an anesthesia technician, and fellow anesthesia techs who saw no value in certification, despite openly communicating that they felt

undervalued compared to other professions in the OR. This animosity delayed my pursuit of what I saw as a professional credential that validated my skillset.

However, my story did not end there. My wife and I moved to California, where I thrived, enhancing my training and skills in hepatic and cardiovascular surgery. Encouraged by my director and perioperative director (both nurses) to pursue certification as a mark of professionalism, I faced similar discouragement from fellow technicians. Despite this, a small, passionate contingent focused on becoming certified. I am proud to say almost every technician at that institution achieved certification ahead of the 2015 deadline.

At a subsequent facility, I found similar hostility towards certification among my peers, who saw it as worthless unless it directly led to increased compensation, despite the pay being markedly higher than previous roles I held. Over the years, as I transitioned into higher education and ASATT board service, I observed a shift, while subtle, towards valuing credentials as a mark of professionalism and expertise. However, a significant contingent, in my observations, still views certification solely as a means to secure a pay raise, asserting that if it does not do that it holds no value. It seems, by my estimation, that our own anesthesia tech colleagues' animosity toward certification and professional advocacy is what holds us back, not other professions. Throughout my career, the biggest supporters of my efforts to attain certification and be active in advocacy have largely been physicians, nurses, and other allied health professionals, not my own anesthesia tech colleagues.

I propose that those who dismiss certification or condition its value solely on its ability to provide increased monetary compensation, have missed the mark with what certification actually is, and in doing so have contributed to the

profession's stagnation. By imbuing certification with this expectation ignores what certification is truly meant to be and do for the profession, and this mindset hinders our growth compared to other allied health professions.

Here is my philosophy of certification and its importance in cementing our role as a profession:

- 1. Certification is a mark of validated, standardized competency that can be applied broadly across the career, regardless of location.**
- 2. Certification signifies to others that we value this profession and commit to ethical standards and clinical standards of care.**
- 3. Certification creates advocacy, uniting disparate voices under one banner and standard to push the profession forward.**
- 4. Certification imposes a responsibility on the holder to advocate, engage in growth, and uphold standards and accountability.**

Certification is not designed to cause higher pay. Rather, through holding certification, growing the certified base and adhering to these values, pay increases, enhanced respect, interprofessional acceptance, and growth become natural byproducts of our collective decision to value this credential as our calling card. If we treat certification conditionally, we undermine ourselves as a profession, and create an image to our healthcare counterparts that we are not a profession.

If you have continued reading, you are likely polarized. You either agree with my perspective or are fundamentally opposed and angered. For those who agree, my statements are not meant for the choir, but for those that are opposed and angered. For those who disagree with my assertions on the state of the profession, I encourage you to research other professions. You will see that pay increases from holding a certification are a byproduct of the aforementioned value sets that result from individuals uniting around these core values and advocating for their profession's legitimacy.

My time on the board is ending by choice because I vehemently believe ASATT needs a multiplicity of voices to continue progressing. Therefore, to meet that ideological end, individuals, need to be willing to step away from board positions, mentor others to join in the profession, and advocate from the background. To those of you that have worked with me and to those I have had the honor of educating over my career, I hope that the value charge I laid out is one that you would readily identify with as true from your interactions with me. However, I will let you speak to that.

My final hope is that this message will inspire you to commit to getting certified, maintaining certification, and actively engaging with ASATT. This is a profession I truly love and one that has been a catalyst for my professional and personal growth, and one that I hope is or becomes a catalyst for you as well.

Warm regards,

Bryan Fulton, M.Ed., Cer.A.T.T.

ASATT Former President

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From the Executive Director



JENNIFER RZEPKA, CAE

EMBRACING CHANGE: LEADERSHIP LESSONS FROM THE CHANGING SEASONS

As the seasons shift from the warmth of summer to the crispness of fall, it's been a thought-provoking reminder that change is inevitable. Just as natural as the seasons change, so do our circumstances and values in our own personal lives. While changes can feel challenging and uncomfortable – they are also opportunities to embrace and learn from.


Just as nature transitions smoothly, shedding the old to make way for the new, effective leadership requires adaptability too. Trees don't cling to their leaves; instead, they prepare for what's next. Similarly, the leaders of WPRO are looking deeply into the activities, operations and finances of ASATT, to consider what may be pruned to allow space for innovation and new growth.

Each season has its purpose. At times Winter may seem harsh, but it's a time for reflection and planning. It's when ASATT will examine how the past year has played out, implement the new strategic plan and start budgeting, and setting plans in place for the coming year. Spring bursts forth with new opportunities, and those will be flush with

Committee resurgence. Summer is a period of growth and stability where the new strategic initiatives will receive high attention, and Fall is when the recertification and election processes occur, encouraging ASATT to reap the rewards of hard work while preparing for the future.

As leaders, we can draw inspiration from these cycles. By fostering resilience, encouraging change, and being open to new beginnings. The office, in tandem with the elected and appointed leadership of ASATT, work together to ensure that the Society continues to thrive through every season.

As these first cool breezes of autumn begin to blow, let's all remember: change, like the seasons, is a natural part of progress. Embrace it, learn from it, and we hope that you will consider stepping into a Committee role to join ASATT in confidently and stably, leading through this next growth cycle.

Jennifer Rzepka, CAE
ASATT Executive Director
j.rzepka@asatt.org 

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Spotlights

MEMBER SPOTLIGHT

Donald Fischer Cer.A.T.

University of Texas Southwestern University

Donald has been a Certified Anesthesia Technician since August of 1988. That's right...36 years! He has worked primarily in the Dallas, Texas area, St. Paul Medical Center for 18 years, Medical City for 10 years and UT Southwestern Hospital for 10 years. Several years working at two different hospitals.

Donald's current job title is Certified Anesthesia Technician and enjoys the profession. Some of the things he enjoys is the challenges of the higher acuity patients and the changes to technology over the course of his career. In the beginning, his team was recognized as "Monitor Techs". They were completely patient care focused assisting providers with very similar to what his daily responsibilities are today. They rarely turned over the OR suites since they were expected to be in each OR at the beginning of the case assisting anesthesia. He is impressed with the changes in technology, equipment and training over the course of his career.

Donald has been a member of ASATT for 12 years. About 20 years ago, the anesthesia techs that worked at St. Paul Medical Center were recruited to participate in a mock anesthesia technician exam. This was before ASATT had their National Certification exam. He felt honored to be considered

by his providers to be considered proficient enough to participate in this conference. There were only 2 out of 12 technicians that passed the exam, Donald being one of them.

Donald's proudest individual accomplishment is graduating Tarleton State University in Stephenville, Texas with a bachelor's degree in Science. But his overall proudest accomplishment is meeting his lovely wife and starting a family. He met wife at St. Paul where they both worked in OR, she as a secretary and him as an anesthesia technician. They fell in love, married and had two beautiful daughters. He has been married for 28 years!




As far as a favorite food...it is a tie between pizza and chicken fried steak. His favorite pizza is hamburger and cheese. Donald does have a favorite restaurant, the hospital cafeteria since he eats there 5 days a week!

A surprising fact about Donald is that he has a twin brother, who also works in healthcare as a patient care technician.

In his off hours, Donald enjoys fishing, traveling to the beach, gardening and hanging with his dogs, Honey and Oliver and a neighborhood cat, Lolita. Donald

is also quite the music aficionado! He enjoys a variety of musical genres, country music and classic rock especially.

Donald was not able to name a favorite movie, but does enjoy Clint Eastwood films due to his acting prowess. He likes all types of movies, as long as he is entertained.

His long term goal is to own a beach home so he could fish every day! 

2024 ASATT CALENDAR

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Quarter 4: December 14, 2024
12:00 pm – 4:00 pm CT

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2024 SENSOR

Quarter 4

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2024 ANNUAL BUSINESS MEETING

The 2024 ASATT Annual Business Meeting will be held on **Saturday, December 14th** from **11:00 am – 12:00 pm CT** virtually via Zoom held prior to the Q4 Webinar.

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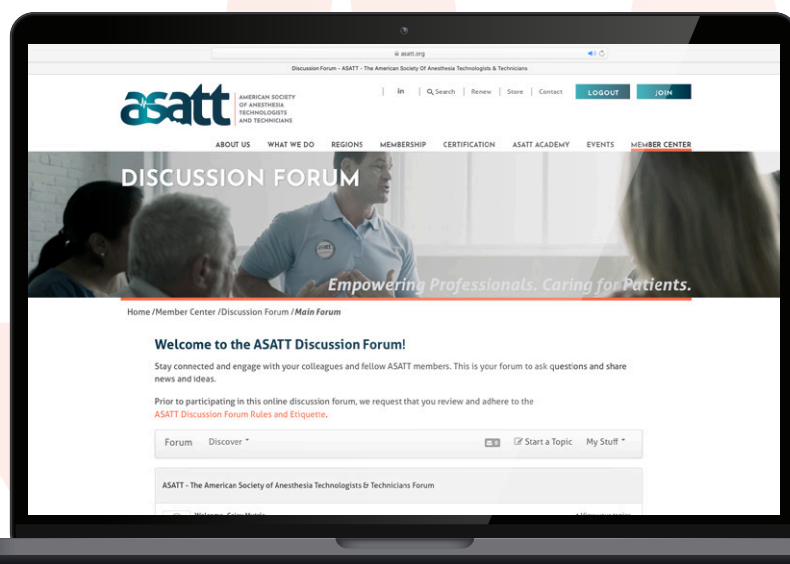
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Anesthetic Management of a Patient with Congenital Heart Disease Undergoing Electroconvulsive Therapy: A Case Report



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ACKNOWLEDGMENTS: The author would like to thank Huong Giang Brown, MD, Anesthesiologist and Chief of Clinical Operations, Neuroanesthesiology, Department of Anesthesiology and Pain Management at the University of Texas, Southwestern Medical Center, Dallas, Texas and Daiwai Olson, Ph.D., R.N. Research Nurse, Neurocritical Care Department at the University of Texas, Southwestern Medical Center, Dallas for providing guidance and support in the creation of this manuscript.

CONFLICT OF INTEREST: There is no conflict of interest.

AUTHOR STATEMENT: The author meets the authorship criteria, has read and approved this submission's final version, and agrees with the manuscript's content.

ABSTRACT

Objective: Electroconvulsive Therapy (ECT) is an effective treatment for mood disorders, particularly treatment-resistant depression and several psychiatric illnesses. The physiological effects of ECT profoundly impact the cardiovascular system, even in healthy patients. There are few case reports of successful ECT for patients with congenital heart disease. This article aims to discuss a case report of a patient with congenital heart disease who has undergone ECT treatment, focusing on anesthetic management.

Method: This article reports the anesthetic management for a patient with left-sided hypoplastic heart syndrome status post stage III Norwood procedure with major depressive disorder exacerbated by catatonia, who underwent ECT treatment.

Results: The patient received 14 acute bitemporal treatments followed by six maintenance bitemporal treatments, which significantly improved catatonia without any complications.

Conclusion: ECT was administered to a patient with congenital heart disease without any cardiovascular complications, reinforcing the safe use of ECT for patients with congenital heart disease.

KEYWORDS: Congenital heart disease, anesthetic management, electroconvulsive therapy

INTRODUCTION

ECT is a procedure in which an electric current is passed through the brain using electrodes to generate generalized cerebral seizures to manage treatment-resistant depression and several other psychiatric illnesses, including catatonia.¹ Catatonia is a psychomotor syndrome associated with

several mental illnesses and some medical conditions characterized by verbigeration and waxy flexibility.^{2,3}

Urgent medical attention is crucial due to the lack of communication, poor oral intake, electrolyte imbalances, hypokinesia, physical deterioration, potential risk of skin ulceration, and venous thrombosis.^{2,3} Benzodiazepines

and ECT are the effective treatment options for catatonia.^{2,3} Fontan surgery is a staged palliative procedure for a single ventricle congenital heart disease, in which the single ventricle pumps blood systemically, whereas the venous system drains passively into the pulmonary circulation.⁴ ECT is known to increase the workload of the heart due to the surges in the parasympathetic and sympathetic nervous system caused by the electric stimulus, potentially detrimental to patients with preexisting heart disease.^{5,6} The case report examines ECT administration and anesthetic management of a patient with congenital heart disease.

CASE REPORT

A 26-year-old male with a complex congenital hypoplastic left heart status post Norwood and Glenn procedure in 1997, whose case was complicated by cardiac arrest with frontal brain anoxic injury, followed by Fontan procedure with stenting for coarctation of the aorta and pulmonary artery

stent placement in 1999, presents with major depressive disorder (MDD) and catatonia in August 2022. The patient also has a history of autism and hypertension (HTN), which was treated with Lisinopril 10 mg daily. Before developing catatonia, he functioned independently with minimal assistance while living in assisted care. On admission, he was non-verbal with limited oral intake and required a feeding tube for nutrition. The patient was admitted to the inpatient psychiatric unit for further management. Despite some improvement with intravenous lorazepam, ECT was initiated to achieve complete resolution of catatonia. Consent for procedure and anesthesia was obtained by a court-appointed guardianship.

Preoperative assessments included echocardiography, electrocardiography (EKG), and consultations with cardiology and neurology. Patient was adequately optimized and cleared for ECT from a cardiac perspective. A cardiac anesthesiologist was consulted to formulate an anesthetic plan and was

present for the first several treatments of ECT, given the uncertainty of the patient's hemodynamic response to ECT. Due to the concern of the dilated neo-aorta and hypertension, an awake arterial line and a pacer pad were placed for the initial ECT session to monitor and treat the acute hemodynamic

alteration with autonomic activation. The goal was to have tight control of blood pressure. In addition, a filter was placed on the intravenous line, and caution was taken to avoid air in the lines as the patient had a patent atrial septectomy. After adequate preoxygenation, the anesthetic induction was achieved with etomidate 10 mg and succinylcholine 60 mg. During the first session, blood pressure was controlled with a total dose of 3.75 mg of nicardipine. The airway was managed with a bag valve mask. The patient was hemodynamically stable with no significant arrhythmia or hypertension. Since the patient could tolerate the first ECT without complications, the arterial line and pacer pads were not placed for the subsequent ECTs. However, the patient required a combination of antihypertensive agents like esmolol, labetalol, nicardipine, and clevidipine (ultrashort short-acting calcium channel blocker), with etomidate increased to 14 mg during the series of treatment. The intravenous fluid was given judiciously to maintain preload. The patient tolerated the acute and maintenance phase of

The case report examines ECT administration and anesthetic management of a patient with congenital heart disease.

ECT without any complications. The cardiac anesthesiologist was on standby for at least the first eight ECTs at the request of the family and to ensure safety. The patient successfully underwent 14 acute bitemporal treatments followed by six maintenance bitemporal treatments (09/12/22-10/14/22) with significant improvement in catatonia.

DISCUSSION

The physiological effects of the brief session (15-20 minutes) of ECT treatment are profound in the cardiovascular system.^{6,7} The acute hemodynamic changes are triggered by the activation of the autonomic nervous system (ANS) by the electrical stimulus.⁵⁻⁷ The initial response is a parasympathetic discharge, lasting for 10-15 seconds, resulting in bradycardia, hypotension, or even asystole, followed by an exaggerated sympathetic surge, peaking in 3-5 minutes, leading to a transient increase in systolic blood pressure (SBP) by 30% to 40% and an increase in heart rate by 20% or more.⁵⁻⁷ One of the risk factors that increase the risk of bradycardia and asystole during ECT is pre existing heart disease.⁶ Increased tissue oxygen consumption with seizure activity can precipitate myocardial ischemia and infarction in patients with compromised hearts.^{5,6}


Decreases in left ventricular systolic and diastolic function may persist for 20 minutes and up to 6 hours following ECT, even in patients without cardiac disease.^{5,6}

Arrhythmia is one of the most common cardiac complications of ECT, manifested as bradycardia, premature atrial contractions, supraventricular tachycardia, premature ventricular contractions, and ventricular tachycardia or even asystole.⁶ There are incidences of varying degrees of heart blocks, including Wolf-Parkinson syndrome⁸ and new-onset atrial fibrillation with ECT.⁹ Reversible contractile dysfunction of the myocardium, referred to as myocardial stunning, that continues after an episode of ischemia, despite coronary reperfusion, has also been reported after ECT.⁶ The increase in vascular permeability caused by the catecholamine discharge from the sympathetic surge can potentially lead to cardiogenic pulmonary edema, which could threaten one with preserved heart function.¹⁰ Takotsubo Cardiomyopathy (TCM), a reversible heart failure characterized by left ventricular hypokinesis and apical ballooning, can also be precipitated by significant emotional and physical stress related to procedures such as ECT.^{10,11}

There are very few case reports of ECT for patients with congenital heart disease. Grover et al. reported successful ECT treatment for a patient with atrial septal defect.¹² Yet another case reported on ECT treatment for a patient with Marfan Syndrome by Rao et al.¹³ There are no absolute contraindications for ECT, and it is considered a low-risk procedure. During ECT, pre-treatment with anticholinergics, like glycopyrrolate or atropine, to prevent bradycardia and asystole is routinely not given except for the seizure thresholding, a process of determining the lowest energy required to evoke a seizure lasting a minimum of 25 seconds on electroencephalogram (EEG)⁷ as the response from the parasympathetic surge is very brief and the catecholamine release compensates it.⁶ The sympathetic surge resulting in hypertension and tachycardia is routinely treated with beta-blockers and antihypertensives.⁷

Having an understanding of the physiological effects of ECT helps to manage the potential complications effectively. A thorough preoperative evaluation, assessment of the functional status, labs, tests, and medical clearance are imperative for the safe administration of ECT. In addition to standard monitoring, such as EKG, pulse oximeter, end-tidal cardio dioxide (ETCO₂), and blood pressure, invasive monitoring like arterial line may also be required in patients with severe cardiac comorbidities. A cardiac anesthesiologist may be a great resource to formulate anesthetic plans. Even though several potential complications are possible, adequate optimization of any preexisting conditions, judicious selection of medications, meticulous monitoring, and an expert team can ensure the safety for the patients.

CONCLUSION

ECT is the standard therapy for treatment-resistant depression and other psychiatric illnesses, including catatonia.¹⁴ The physiologic effect of ECT is significant, and the acute hemodynamic changes can be potentially detrimental to patients with comorbidities, especially pre existing heart disease. A multidisciplinary approach with careful evaluation and monitoring with the right choices of drugs enables the safe administration of ECT for high-risk patients. 

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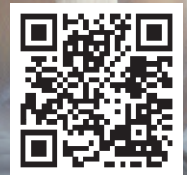


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Attention! Recertification begins November 1st, 2024, and ends December 31st, 2024. Learn how you can qualify for recertification before the deadline.

Recertification Overview

- **All CEUs must be earned prior to the certification expiration date.**
- Extra credits **do not** roll over to the next period.
- Recertification is open from **November 1st through December 31st.**
- If your certification expires on **December 31, 2024**, it's crucial not to miss the deadline. We are halfway through 2024, and all your Continuing Education Units (CEUs) must be earned within your two-year certification period before year-end (no exceptions):
 - » **20 CEUs for Certified Anesthesia Technician (Cer.A.T.)**
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- Click "VIEW MY CEUs" in the center of the screen or at the bottom of the "Quick Links" menu on the right.
- Enter the date range as **1/1/23 through 12/31/24** on the left side of the screen.
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- Two numbers will appear at the top center of the screen.
- Ignore the "Event/Session Total" number and use only the "Hours Total" number.
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**BETH
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Sensor Quizzes - Each Sensor Quiz is worth 1 CEU (exception: the 2023 Summer Quiz is worth 2 CEUs). Sensor Quizzes can be taken online or printed and submitted via mail. ASATT members may be entitled to free Sensor Quizzes included in their membership.

- **Note: Any quiz that you have already taken for credit during this recertification period or a past one cannot be submitted for credit a second time.*

Access Sensor Quizzes

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Questions? Email asatt@asatt.org

Beth McVeigh

ASATT Coordinator

asatt@asatt.org 

Extracorporeal Membrane Oxygenation (ECMO) in the Operating Room

AUDREY STONE



**SREEKANTH
CHERUKU, MD, MPH**
CO-MEDICAL
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UT SOUTHWESTERN
MEDICAL CENTER

ABSTRACT

In this review, we discuss the management of patients supported by extracorporeal membrane oxygenation (ECMO) in the operating room. We will review the mechanics of ECMO, indications for veno-arterial (VA) and veno-venous (VV) ECMO, management of patients who are supported by ECMO, and troubleshooting common complications. We will also discuss practical considerations for transporting patients who are supported by ECMO to and from the operating room. ECMO is an established modality to support the heart and lungs with expanding utilization. It can be used as a bridge to organ recovery, organ transplantation and even to temporarily support surgical procedures. The successful management of patients supported by ECMO requires medical expertise as well as vigilance by the entire perioperative team including the anesthesia technician.

HISTORICAL OVERVIEW

The development of modern ECMO has its origins in the early 20th century when the first dialysis machines and

cardiopulmonary bypass circuits were being developed. In 1944, Willem Kolff and colleagues, who were pioneers in the field of hemodialysis, noted that blood became oxygenated across a semi-permeable membrane. John Gibbon was a surgeon who utilized membrane oxygenation to build the first cardiopulmonary bypass machines for cardiac surgery in 1953. In 1972, cardiopulmonary bypass was used outside the operating room to support a patient who developed acute respiratory distress syndrome (ARDS) after aortic surgery. Over the next few decades, cardiopulmonary bypass machines were increasingly used to support patients outside the operating room with heart and lung failure. During the recent pandemic, ECMO was used to support thousands of patients with severe pneumonia associated COVID-19 (1).

THE ECMO CIRCUIT

The ECMO circuit uses an inflow cannula to extract blood from the venous system using an external pump and returns the blood into a large artery (VA ECMO) or a large vein (VV ECMO) with outflow cannulas. The ECMO inflow cannula is typically inserted into the femoral or internal jugular veins and functions to drain venous blood into the pump. The most commonly used pumps are centrifugal pumps, which use rotational energy to move blood forward. Blood also flows into an oxygenator where gas exchange occurs. Modern oxygenators use gas-permeable materials like polymethylpentene to facilitate the transfer of oxygen to the blood and carbon dioxide out of the blood. Because carbon dioxide is much more diffusible than oxygen, it is far easier to remove a patient's carbon dioxide than to add oxygen. Increasing the sweep gas flow, or the flow of oxygen through the oxygenator, will remove more carbon dioxide. Because oxygen is less diffusible, the most efficient way to add oxygen to the patient's blood is to increase the fraction of oxygen in the sweep gas (FSO₂) and to increase the flow of ECMO through the ECMO circuit, which acts to expose more blood to the oxygenator.

In VA ECMO, blood is returned to the body through a large cannula which is typically inserted in the femoral artery. In VV ECMO, it can be returned into another large vein. VV ECMO can also be accomplished using a single dual-lumen cannula placed in the internal jugular vein, which extracts and returns blood using different lumens. Patients with larger body surface area may require more than one inflow or more than one outflow cannulas as well.

INDICATIONS FOR ECMO AND CANNULATION

VV ECMO is utilized for patients who are experiencing primary respiratory failure that is not amenable to conventional therapies such as mechanical ventilation. Some conditions necessitating VV ECMO include acute respiratory distress syndrome (ARDS), bronchopleural fistula and status asthmaticus. VV ECMO provides the advantage of complete pulmonary support while the patient's lungs are allowed to rest on minimal ventilator settings. VV ECMO is also used in patients with end-stage lung disease awaiting lung transplantation. Since VV ECMO only provides respiratory support, it is not indicated in patients with heart failure. Heart failure patients who also have problems with oxygenation or ventilation should be managed with VA ECMO instead.

VA ECMO is indicated for patients with cardiogenic shock which has not improved with medical management. Common conditions which require VA ECMO include decompensated heart failure, acute myocardial infarction, myocarditis, malignant arrhythmias and failure to separate from cardiopulmonary bypass after cardiac surgery. Because VA ECMO requires a cannula to be placed in the arterial system, it is associated with significant morbidity and mortality. Data from the Extracorporeal Life Support Organization (ELSO) registry has consistently reported a survival to hospital discharge of less than 50% for adult patients supported by VA ECMO. In contrast, survival to discharge in VV ECMO patients approaches 60% (1).

A special case of VA ECMO is extracorporeal cardiopulmonary resuscitation (ECPR) which requires transitioning to ECMO in cardiac arrest patients who cannot be resuscitated. While there are few good studies evaluating outcomes with ECPR, patients with a witnessed cardiac arrest who have few comorbidities and a reversible cause of cardiac arrest are more likely to survive.

TRANSPORTING PATIENTS ON ECMO

Patients supported by ECMO often require procedures in the operating room to facilitate necessary procedures or transition from ECMO to recovery, alternative mechanical support or organ transplantation. Transporting these patients to and from the operating rooms requires a team-based approach to enable monitoring and management. In addition to the perioperative team, ELSO recommends that a team member dedicated to monitoring the ECMO circuit – often a

perfusionist or ECMO specialist – accompany ECMO patients who are transferred within a hospital (2). Prior to transport, the perioperative team should ensure that adequate battery life is present in all devices including the ECMO console. Adequate oxygen to support both the ECMO oxygenator and the ventilator should be packed for transport. The use of an ICU ventilator is recommended to avoid inconsistent ventilation and atelectasis associated with disconnection of the endotracheal tube from the ventilator (3). Some patients may require transport with a defibrillator, other mechanical circulatory devices, a Nitric Oxide delivery system, and other equipment. During transport, both the ECMO console and vital signs monitor may require attention. Vasoactive medications and fluids may have to be delivered to maintain stability. After reaching the transport destination, meticulous care is necessary to ensure that the equipment is attached to durable oxygen and power sources.

INTRAOPERATIVE MONITORING AND MANAGEMENT

All patients supported by ECMO in the operating room require standard American Society of Anesthesiologist (ASA) monitors. Additionally, these patients will likely have one or more invasive pressure monitors which include arterial lines, central venous lines and pulmonary artery catheters. Frequent laboratory tests are required to assess the patient's hemoglobin, electrolytes and coagulation profile. Transesophageal echocardiography can also be used to evaluate cardiac function, monitor volume status and to guide surgical procedures. Because patients with end-stage lung disease supported by ECMO may not be able to impair the delivery of volatile anesthetics, a total intravenous anesthesia (TIVA) approach or a balanced approach with infusions of propofol, opioids or benzodiazepines may be used. Regardless of the choice of anesthetics, depth of anesthesia monitoring is recommended to ensure that the patient is sufficiently anesthetized for the procedure. Near infrared spectroscopy (NIRS) monitors should also be considered to ensure perfusion to the brain.

Arterial blood gas (ABG) testing on arrival to the operating room and at frequent intervals is necessary to ensure that the combination of the ventilator and ECMO oxygenator are adequately performing gas exchange. Activating clotting time (ACT) is also used to ensure that anticoagulation goals are being met. The ECMO console can serve as an important intra-operative monitor, providing real-time ECMO flow, circuit pressures and some laboratory tests. These laboratory

tests can include hemoglobin and right atrial oxygen saturation.

Patients supported by VA ECMO frequently require systemic anticoagulation (often with heparin or bivalirudin) to reduce clot formation in the circuit and arterial embolization of blood clots. Anticoagulation in VV ECMO patients varies by institution with some using systemic anticoagulation, some using subcutaneous heparin as the sole anticoagulant and some using no anticoagulation. While anticoagulation in the ICU is monitored using a range of tests such as the anti-factor Xa assay and chromogenic factor II level, ACT remains the most common point-of-care test to assess anticoagulation in the operating room. The therapeutic target level of ACT for ECMO ranges from 160 to 200 depending on the type of ECMO (VA vs. VV), as well as patient and procedural factors.

TROUBLESHOOTING THE ECMO CIRCUIT

Problems with flow

The flow of blood on ECMO is analogous to cardiac output and is measured in liters per minute. Increasing the pump speed, measured in rotations per minute (rpm), should increase flow. On VA ECMO, higher flow results in a higher augmentation of cardiac output and better oxygen delivery. On VV ECMO, higher flows simply result in better oxygen delivery. In both ECMO configurations, flow is dependent on preload, or the blood draining from the patient and sensitive to afterload, which is the pressure against which the ECMO circuit has to pump. A common scenario in the operating room is low flow associated with very negative venous pressures reported on the ECMO console, suggesting low preload. This can also result in 'chattering' or visible vibration of the inflow portion of the ECMO circuit, which results from suction forces transmitted from the inflow cannula. This problem can be corrected by administering fluids. Kinking or compression of the tubing coming from the ECMO towards the outflow cannula can result in low flows as well, accompanied by elevated arterial pressures reported by the console.

Problems with oxygenation and carbon dioxide removal

Hypoxemia on ECMO may be difficult to detect using conventional pulse oximetry, as some patients who are supported with VA ECMO and have poor native heart function will not have any arterial pulsatility. Frequent

arterial blood gas sampling may be necessary to ensure that these patients are adequately oxygenated. Cerebral oximetry using NIRS may provide an early warning sign that perfusion or oxygenation in the brain may be inadequate. In patients who are hypoxemic, the FSO₂ and ECMO blood flow should be increased until the oxygenation goals are met.

Hypercarbia is rare on ECMO because of the efficiency of the oxygenator in removing carbon dioxide. In patients without severe lung disease, carbon dioxide removal may be performed both by the lungs on the ventilator and the ECMO oxygenator. However, it is preferable to use the oxygenator rather than the lungs to allow for lung-protective ventilation at low pressures and volumes. In patients with elevated carbon dioxide levels, the sweep gas flow on ECMO can be increased to remove additional carbon dioxide.


WEANING FROM ECMO AND DECANNULATION

Patients are frequently weaned from VA ECMO in the operating room because it allows the surgical team to repair the artery used for ECMO cannulation and evaluate heart function using intraoperative echocardiography. Patients supported by VV ECMO can frequently be decannulated at bedside in the ICU. VV ECMO patients are decannulated when there is evidence of good lung function. This often requires a PaO₂/FiO₂ ratio of at least 200 and a normal carbon dioxide level when the ECMO sweep gas is turned off.

Patients supported by VA ECMO can be decannulated when their native heart function improves or when they transition to a durable mechanical support device such as a left ventricular assist device (LVAD) or undergo heart

transplantation. The process of weaning a patient from VA ECMO involves gradual reduction of ECMO blood flow while evaluating the native heart function using echocardiography and invasive pressures. A recovered heart will accept additional preload as the ECMO blood flows are weaned and pump that preload forward resulting in a normal blood pressure and low left (PA catheter) and right (CVP)-sided filling pressures.

CONCLUSION

ECMO is an established technology for providing cardiac and/or pulmonary support and its use has increased significantly in the last several decades. It is common for patients supported by ECMO to undergo cannulation and decannulation in the operating room and also undergo necessary procedures. The ECMO circuit, which consists of the pump, oxygenator, cannulas and tubing have important functions and require monitoring throughout the perioperative period. The transport of ECMO patients within the hospital is a complex logistical task which requires special equipment and expertise. Patients supported by ECMO require additional monitors in the operating room to monitor oxygenation and perfusion. Volatile anesthetics may not be effective in patients with end-stage lung disease and these patients will require alternative anesthetic techniques and depth of anesthesia monitoring. Problems with flow and gas exchange occur frequently and require vigilance and prompt management. The increasing frequency of patients supported by ECMO requires the perioperative team, including the anesthesia technician, to be familiar with ECMO equipment, patient management and potential complications. 

Works Cited

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president@asatt.org

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treasurer@asatt.org

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Michael Kosanke, Cer.A.T.T.
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The President-Elect works closely with the President, co-chairs the Annual Educational Meeting, and prepares to succeed as the next leader of ASATT.



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secretary@asatt.org

The Secretary ensures accurate record-keeping of all meetings, including Board and Executive Committee sessions, and distributes minutes promptly to the Board.

MEET ASATT REGIONAL DIRECTORS!

Meet ASATT's Regional Directors! These dedicated leaders report directly to the President, ensuring effective communication and organization within their regions. They are responsible for hosting at least one annual meeting, securing speakers and sponsors, and promoting the Annual Educational Conference.

Regional Directors also actively participate in Board meetings and conference calls, leading the charge in representing ASATT and fostering connections among members. They submit regular reports, manage attendance, and support the ASA booth during events.



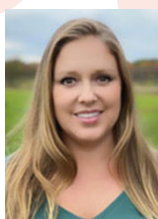
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Notes

REGIONAL UPDATE


REGION 1



Hard to believe that we will be seeing the beautiful fall leaves soon. If you have never experienced the colors in New England in the fall, I highly recommend doing a trip up to see what nature's true beauty looks like. I hope you all stayed safe this summer and please remember to get your flu shots and are up to date on your Covid vaccinations.

The Q4 Regional Educational Webinar will be on Saturday, December 14th, 2024, from 12pm-4 pm CT. If this is something that you would like to attend, you will earn 4 CEU's for \$40.00 Great way to earn CEU's for a bargain price and you can do it directly from home.

Now on to some more excitement, The Practical Experience Pathway. It is an alternate way for Anesthesia Technicians to get certified. Check out the website under the Cert.A.T./ Cert.A.T.T. tab, it says specifically "The Practical Experience Pathway". It will let you download the brochure, and it is very informative. Check it out and let me know what your thoughts are. The second item is, if you want to become more involved, please feel free to volunteer to be on a committee. It allows you to see how the BOD runs and if you want to become more involved then we will always welcome new participants.

Respectfully Submitted,
Jonnalee Geddis, Cer.A.T.
region1@asatt.org 

REGION 2



Hello Region 2 Members,

I would like to say thank you for letting me be your Region 2 Director!! I have enjoyed being in this position and helping our members get the support and knowledge needed for our profession to move forward. Each of our members should be proud of who we are and what

we do daily for our patients!! With that being said, I would like to introduce your new Region 2 Director, Wendi Slusser. I would like to congratulate her on this accomplishment as she steps into this position.

Remember to check the website in late December or early January for our upcoming Quarterly Webinar Conferences. Remember you can earn up to 4CEUs for attending. If you have any questions or concerns, please feel free to reach out to your new region director at region2@asatt.org.

Don't forget if this is your year to re-certify, the certification link will open in November, it is very easy following the link. Please don't wait to the last minute to get this done because we have all worked too hard for it to expire! Remember being a member has many benefits and discounts. You can get access to the sensor, ASATT updates and discounts to Educational, Regional conferences and many more valuable benefits. Make sure you check out the membership page at ASATT to see the different tiers that are offered we even have a student membership.

Don't forget to visit our ASATT website it has very useful information and updates about our zoom meetings and articles on healthcare news. And remember to check the quarterly sensor publication, remember you can earn CEUs from the quizzes. It's one of many perks for being a ASATT member.

Thank you again for letting me serve as your regional director!

Karen Patrick, Cer.A.T. 

REGION 3



First, I want to thank you all for coming out to the National Conference. I was so excited to see all of you. During the National Conference, I was able to connect with some of you regarding some of your concerns and ideas. Because of this, I am planning to do an in-person meeting in April or May 2025.

This meeting will be a little

different, however I would love to hear some of your ideas on what you would like to see. Please email me at region3@asatt.org. Also, did you know we have many committees within ASATT? Have you ever wanted to get involved with ASATT? Be a part of change? Here is your opportunity. We

need your fresh new ideas and feedback. Ask me how to join. Region 3 will you answer the call? Let's get to work!

Just to give a few updates. I am still working on forming a relationship with the local AORN in Georgia and Tennessee. Building this relationship will help bring recognition to our profession in all ORs. If anyone would like to get involved with this, I would love your help. It will take all of us to make the changes we want to see. Keep in mind these things do take time. You start helping by talking to some of your leaders to see if they are a part of the AORN leadership. I will be happy to talk with them.

Oh, you better start shopping for holidays!

Sincerely,

Phillip Hood, Jr., Cer.A.T.

region3@asatt.org 

REGION 4



Hi All,

I wanted to take a moment to reflect on the wonderful experience we had at the national conference in Oklahoma City. It was truly inspiring to meet so many dedicated professionals from across the country. I personally

want to thank everyone for including our CEU scanners (my daughters) during the event!

Looking forward to the next year, I'm eager to engage our professional community within the region. I'd love to hear your thoughts on organizing some in-person events in the coming months. What kind of advocacy would you like to pursue? How can we work together to accomplish our goals? How can we amp up engagement and increase involvement within ASATT?

I'm also curious about what you'd prefer for future gatherings- education, networking, smaller events in various locations or a centralized larger regional meetup? Let me know how you'd like to connect!

Lastly, I want to ensure that we're addressing topics that matter most to you. Please share any ideas you have for upcoming webinars. What would you like refreshers on? What new hot topic would you like to learn about?

It was truly wonderful chatting with everyone in OKC, and I'm grateful to be part of such a fantastic group of professionals. Let's continue building this momentum as we bring this year to a close and into an exciting year ahead!

As our region starts to cool off and head into the holidays, I wish you all the best! Stay warm!

Sincerely,

Samantha Groshek, Cer. A.T.T.

region4@asatt.org 

REGION 6



Hello Region 6,

It has been a wonderful start to fall. The weather in Oklahoma City was perfect for a conference. If you came to OKC, we had a wonderful time. The city is vibrant with dedicated spaces for young and old to have fun. The river walk area is

reminiscent of San Antonio, TX. The food was great and our conference was at an excellent venue with the Omni Hotel. Our conference was also wonderfully organized. The lectures I attended were excellent. I heard the same from the ones I missed. Overall, a great conference.

On a personal note, it has been a wonderful time to serve Region 6 for the last two years. As I step away from the

region director role, I want to say THANK YOU. All the best to each of you as we continue to move forward.

I ask a final favor. Let us all welcome our new Region 6 Director, Sara Paraspolo. She will need your and my support.

Lastly, keep in touch with ASATT. Remember to submit your ASATT certification renewals in a timely manner. Do not wait until the last minute. ASATT will continue to offer various educational offerings moving forward. The web Zoom seminars seem to be favored and will continue.

I wish you all well as we are heading toward the holiday season. May you all be blessed with family and friends' company.

Sincerely,

Otoniel Castillo BA, Cer.A.T.T. 

REGION 7



Hello Region 7!

I want to introduce myself. I am Seong Unti. I live in the Pacific Northwest. I am looking forward to being your Region 7 Director. I enjoy running and I am in a bowling league. I like to spend time with family and friends. I have two fur babies who I also

spend time with, Beau and Eleanor.

Thank you to all who joined us at the national conference. It was a great time for learning. We had many wonderful speakers and learned a lot of great things.

I am looking forward to this upcoming year. We will be hosting a webinar in the first quarter so please keep checking the website for updates.

If you have any questions or comments. Please feel free to reach out!

Sincerely,

Seong Unti, Cer.A.T.

region7@asatt.org 

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REMINDER: ACLS CERTIFICATION REQUIREMENT FOR CERTIFIED ANESTHESIA TECHNOLOGISTS



**BETH
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ATTENTION Cer.A.T.T. holders!

Since 2015, holding ACLS (Advanced Cardiovascular Life Support) certification has been a requirement outlined in the Scope of Practice (SOP) for all Cer.A.T.T. holders. This certification is a fundamental requirement to ensure the safe and effective delivery of anesthesia care.

As part of our ongoing commitment to professional development and adherence to industry standards, ASATT has updated the ACLS certification requirement for Cer.A.T.T. holders. It is required to have your ACLS certification documented on file by December 31, 2024.

Please review the previously sent memo about ACLS [changes here](#).

[Click here](#) to upload a current copy of your ACLS certification card, obtained through the American Heart Association or the American Red Cross, in PDF, JPEG, or PNG format. Upon receipt, ASATT will process each submission and update membership profiles prior to your Recertification expiration date.

Beth McVeigh

ASATT Coordinator

asatt@asatt.org 

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ASATT would not be what it is today without your support. The conference was a huge success, providing valuable networking opportunities, CEUs, and a great environment for all attendees. We hope you have a wonderful rest of the year, and if you are interested in getting involved with ASATT, please reach out—we are always looking for volunteers!

Best regards,
Bryan Fulton, MEd, CHSE, CerATT

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