



The
Academy
NEWSLETTER

THE AMERICAN ACADEMY
OF
CARDIOVASCULAR PERFUSION
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SPRING 2017

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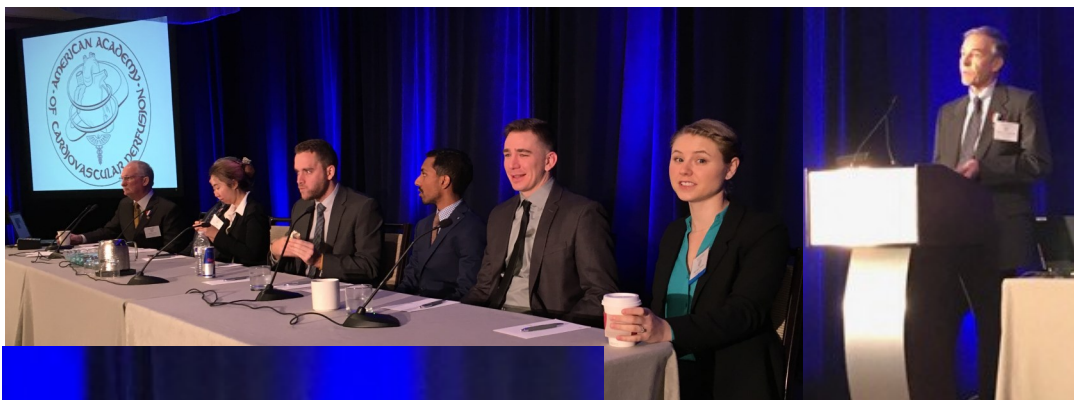
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Welcome to New Members

The American Academy of Cardiovascular Perfusion would like to welcome the following individuals whom were voted into membership at the Closing Business Meeting of our annual meeting in San Diego.

Fellows

Christine Chan
Nicole Michaud
Katie Moraglia
Kathleen Rezler
D. Bradford Sanders
Alfred Stammers
Richard Walczak

Student Members

Michael Alfieris
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Gideon Levitt
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Luisa Vergara
Shelly Walters
Ellen Webb
Marguerite Wellstein
Paul Williams
Amanda Williamson
Mesfin Yana
Justin Yong
Gene Yu
Zainab Zaindin

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Stanlin Alexander
Dennis Biggan
Jessica Crane
Mark Farrell
Lisa Jandwiak
Erick McNair
Brian Mejak
Justin Sleasman
Andrew Stasko
Antone Wright

ON BYPASS

CONVERSION FROM VENO-ARTERIAL TO VENO-ARTERIAL-VENOUS EXTRACORPOREAL MEMBRANE OXYGENATION IN A CARDIOGENIC SHOCK PATIENT WITH NEAR-INFRARED REFLECTANCE SPECTROSCOPY MONITORING: A CASE REPORT

Christine Chan CCP, James Beck CCP, Kenmond Fung CCP,
Koji Takeda MD, Hiroo Takayama MD
New York Presbyterian Columbia University Medical Center

Percutaneous veno-arterial (VA) extracorporeal membrane oxygenation (ECMO) with femoral cannulations may result in differential hypoxia after cardiac recovery with concomitant pulmonary dysfunction (1, 2).

A 45-year-old woman with severe interstitial pulmonary fibrosis and pulmonary hypertension was placed on VA ECMO with femoral cannulations during lung transplantation. On ECMO day two, the femoral arterial cannula dislodged and patient arrested. Patient received cardiopulmonary resuscitation (CPR) and ECMO was re-initiated. Bedside echocardiogram showed severely depressed left ventricle (LV) and right ventricle (RV) function, and pulmonary edema after CPR.

Upon re-initiation of ECMO, due to LV dysfunction and cardiogenic

shock, the cardiac output is greatly reduced. ECMO fully supported the patient, with retrograde flow up the aorta to the aortic arch, reaching the brain and the heart. The right radial arterial blood gas (ABG) pO₂ was 300-500 mmHg (Table 1). Within the next one-and-a-half hour, patient's cardiac function began to recover. Cardiac output competes with the ECMO flow, resulting in dual circulation. Her right radial ABG showed pO₂ of 79 mmHg. The mixing cloud, where cardiac output mixes with ECMO flow, can move distally if cardiac output increases or ECMO flow decreases (Diagram 1) (3).

On ECMO day three, echocardiogram showed normal LV function, and ABGs drawn from the patient's right radial consistently showed pO₂ of 30-79 mmHg, indicating differential hy-

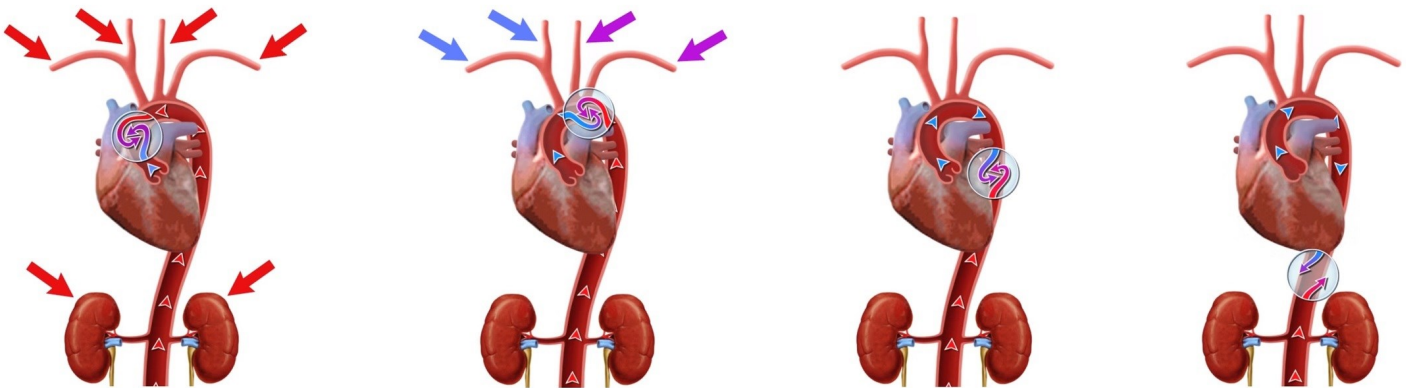


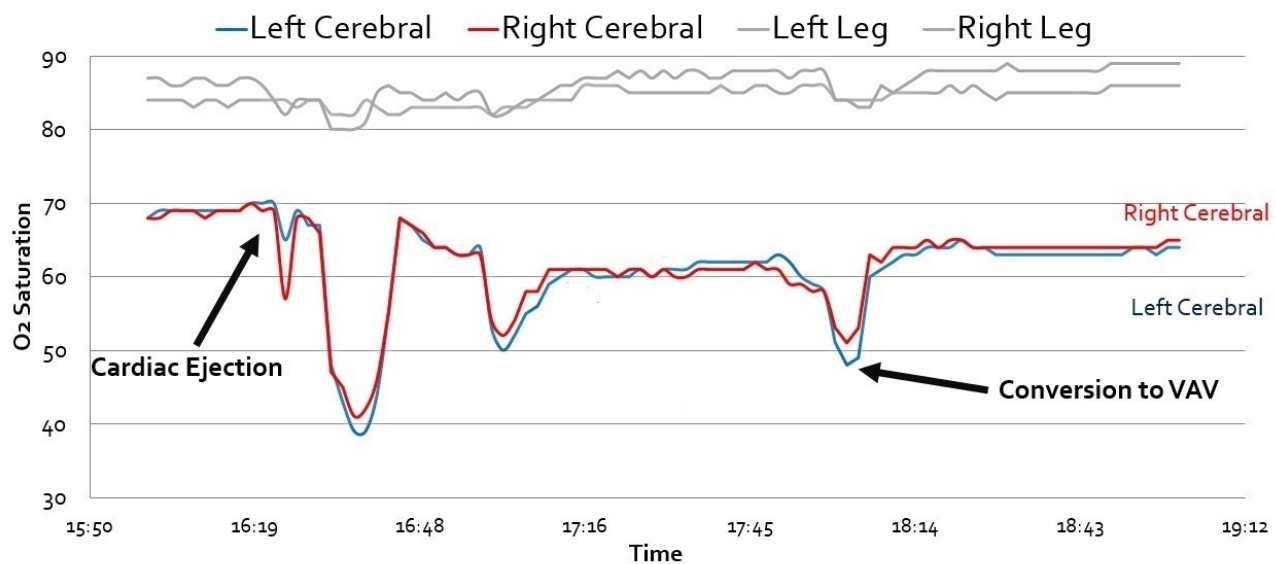
Diagram 1

poxia, which is caused by dual circulation when the poorly oxygenated blood from cardiac output competes with the highly-oxygenated blood from the ECMO flow (4). Patient had episodes of desaturation due to the poorly-oxygenated blood on the cardiac side of the mixing cloud supplying the coronary arteries and the brain. NIRS was placed on the patient's forehead and legs to monitor cerebral and peripheral saturations. The continuous monitoring of NIRS correlated with the low pO₂, showing cerebral saturations in the 48-55% (Table 1).

Decision was made to convert the patient to veno

-arterial-venous (VAV) ECMO, by cannulating the internal jugular vein. Upon VAV conversion, patient's NIRS immediately increased to 60-70 mmHg, with correlated ABGs from the right radial showing pO₂ of 66-73 mmHg (Table 1). Patients with femoral VA ECMO that developed pulmonary dysfunction and differential hypoxia benefits from ECMO conversion to VAV ECMO (5).

Differential hypoxia can be diagnosed by ABGs drawn from the right radial, which will be poorly-oxygenated compared to post-oxygenator blood gases (Table 2). NIRS may be advantageous in earlier



ECMO Day#	Time	pH	pCO ₂	pO ₂	HCO ₃	BE	SaO ₂	ECMO BQ	L Cerebral Sat	R Cerebral Sat	L leg Sat	R leg Sat
2	16:58	7.41	40	201	26	0.8	99.7%	1.78				
	18:00	ECMO cannula dislodged						0				
	18:30	ECMO re-initiated						2.29				
	18:32	6.97	54	514	12	-19	99.5%	2.28				
	18:45	7.20	48	359	19	-9	100.0%	2.23				
	19:04	7.36	39	368	22	-3	100.0%	2.27				
	19:51	7.28	45	79	21	-6	95.0%	2.98				
3	0:17	7.43	38	55	25	0.9	89.3%	3.06				
	8:22	7.37	45	79	26	0.4	95.9%	2.82				
	9:00	7.35	48	43	27	0.9	77.2%	2.87				
	16:31	7.30	53	30	26	-0.7	53.2%	1.57	48	47	82	80
	16:50	7.31	49	47	25	-2	81.2%	2.22	55	55	82	86
	17:45	ECMO VAV Conversion										
	18:25	7.40	37	71	23	-1.6	95.6%	3.05	64	64	86	88
4	20:43	7.45	33	66	23	-1.3	95.0%	3.22	59	60	84	87
	0:17	7.38	38	67	23	-2.5	93.9%	3.37	66	66	88	89
	8:12	7.43	33	73	22	-2.8	95.7%	3.54	63	63	88	90
	17:51	7.39	36	86	22	-3.2	93.9%	3.36	60	60	81	77

Table 1

Continued on Page 6

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detection of potential differential hypoxia for patients on peripheral VA ECMO, by providing continuous monitoring of cerebral perfusion.

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ECMO – Mayo Clinic (2013, August 23). [Video file]. Retrieved from <https://www.youtube.com/watch?v=NGGA-8zXVGE>

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Choi J, et. al. Application of veno-arterial-venous extracorporeal membrane oxygenation in differential hypoxia. *Multidisc Res Med* 2014; 9: 55-59.

The full manuscript of this article has been submitted to the journal Perfusion for possible publication.

[Mayo Clinic]. Femoral cannulation and veno-arterial

ECMO Day#	ABG Types	Time	pH	pCO ₂	pO ₂	HCO ₃	BE	SaO ₂	ECMO BQ
1		1:38	ECMO ON						2
	Patient	1:49	7.29	48	67	30	0.5	90.0%	2
	Post-oxy	1:58	7.42	40	567			100.0%	2
2		18:00	ECMO cannula dislodged						
		18:30	ECMO re-initiated						
	Patient	19:51	7.28	45	79	21	-6	95.0%	2.98
	Post-oxy	22:27	7.54	31	611		4	100.0%	2.93
3	Patient	0:17	7.43	38	55	25	0.9	89.3%	3.06
	Patient	9:00	7.35	48	43	27	0.9	77.2%	2.87
	Post-oxy	9:06	7.40	45	574		4.2	100.0%	
		17:45	ECMO VAV Conversion						
4	Post-oxy	7:13	7.48	30	566		-0.7	100.0%	3.41
	Patient	8:12	7.43	33	73	22	-2.8	95.7%	3.54

Table 2

STUDENT PERFUSIONISTS' IMPRESSION OF THE ANNUAL MEETING

- The AACP meeting was fantastic! I really enjoyed how welcoming everyone was towards students and how dedicated everyone was to furthering perfusion science. It was a lot of fun to meet and network with other perfusion students and perfusionists from across the country.
- In general I was extremely happy I was able to attend this conference, especially as a first year student! It was helpful to hear about topics that we don't get exposure to as a student very often, such as ECMO, transport, and when things go wrong. It was also very helpful to hear from perfusionists who have been in the field for 25+ years on how the field has evolved and where they see the future of perfusion going. Listening to the passion people had about this profession has re-motivated my efforts to learn and grow as much as I can as a student before I go out into the real world!
- I had an awesome time at the conference and I appreciate everything you and Rich did for the students. I know my Army of MUSC students loved the *Students Only Forum* the most. I learned so much at the meeting and can't wait for next year's meeting!
- I really enjoyed the conference. It was great to network with perfusionists from all across the country while learning about the latest trends in perfusion. Also, the *Student Only Fireside Chat* was fantastic.

ON BYPASS

AN UNUSUAL EVENT WITH VACUUM ASSIST VENOUS DRAINAGE: Case Report

The objective of this report is to describe an event that took place with VAVD and how to prevent such occurrences in the future.

The Sorin Inspire 8 oxygenator and reservoir were used for a routine coronary artery bypass graft (CABG) x 5. An experienced perfusion assistant had assembled the pump and the circuit was verified acceptable in the pre-bypass check and also during bypass by the primary perfusionist. The vacuum was tested prior to bypass and showed a negative pressure of -13mmHg, proving functional. Following blood sequestration, cardiopulmonary bypass (CPB) was initiated.

After initiation of CPB, VAVD was applied to the Hard Shell Venous Reservoir (HSVR), but what would be considered a normal increase in venous return was not seen. Full CPB could not be maintained therefore, partial CPB was continued until drainage increased. The perfusionists checked obvious sites for issues that would normally affect venous return.

However, upon close inspection, a hissing air sound was heard coming from the top of the HSVR. The sound indicated the escaping of the intended suction from the top of the HSVR. It appeared as if the top of the HSVR had become dislodged from the

reservoir and the suction effect was being lost. The use of well-placed surgical tape secured the top of the reservoir to the side of the reservoir, and vacuum was available for VAVD. Thus, allowing full CPB to resume with no effect to the patient.

The event was reviewed again at the completion of the procedure, and it was confirmed the top of the HSVR became dislodged from the HSVR main canister. This was caused by using a bracket that was not designed for the specific model (bracket was originally designed for use with LivaNova's Primox oxygenator). After this event, the bracket was taken out of service and no longer used with Inspire 8 devices.

However, this single episode was a preventable one. All equipment should undergo a risk/benefit analysis. With continued quality improvement (CQI), incidents such as this one can easily be prevented. When it comes to using instrumentation optimal for patient care, the perfusionist must construct a risk/benefit analysis that supersedes the financial effect. All medical professionals must do their best to limit the number of preventable errors in order to obtain favorable outcomes for their patients.

The full manuscript of this article has been submitted to the journal Perfusion for possible publication.

Ryan Kar, CCP

Specialty Care

East Brunswick, NJ

2018 Annual Academy Meeting



New Orleans, Louisiana
January 18-20, 2018

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Awards Committee Selects Winning Paper Presentations



Three students received **Lawrence Awards** for their paper presentations at the Annual Seminar in San Diego.

Sophat Del - Results of a Modified del Nido Technique Using More Blood

Killian Patton-Rivera - Using NIRS to Assess Distal Limb Perfusion on VA ECMO Patients

Kali Jean Towner - LVAD Pump Thrombosis: A Vicious Cycle of Cascading Thrombosis

The Lawrence Award is a \$500 cash award for the best student papers presentations.



In addition, *Al Stammers* was awarded the **Best Paper of the Conference** - a \$750 cash award funded by the journal *Perfusion* for his presentation entitled, "The Effect of Ultrafiltration on End-CPB Hematocrit During Cardiac Surgery."

The C. N. Lee Pediatric Presentation Award was given to *Vincent Olshove* for his paper entitled, "Comprehensive Blood Conservation Program in a New Congenital Cardiac Surgical Program." This \$500 award is supported by a generous grant from the New Foundation For Perfusion Education.



ON BYPASS

Personal Clinical Experience With A Modified del Nido Cardioplegia Solution

Microplegia is a technique that consists of mixing blood from the cardiopulmonary bypass circuit with small quantities of concentrated additives to arrest the heart and provide myocardial protection from ischemia and reperfusion. Large amounts of blood cardioplegia can be delivered with relatively minimal volumes of crystalloid being used. One of the major debates among clinicians is if blood cardioplegia is superior to crystalloid cardioplegia and how much blood is needed to optimize a technique. Currently, no major focus has been attempted in the study of using more blood in the del Nido cardioplegia solution. In this study, this practice is achieved through the use of a Quest Medical MPS cardioplegia delivery system.

See Table 1

Fifty patients undergoing valve surgeries were selected in the study. Inclusion criteria were age between 30-70 years and left ventricular ejection fraction greater than 40%. Exclusion criteria were for CABG procedures or other surgical procedure in addition to the planned valve surgery. Patients were randomized to the modified del Nido solution or the traditional del Nido cardioplegia solution group (n = 25 each). The perfusionists either used the Quest Medical Myocardial Protec-

tion System (MPS) to deliver the modified del Nido or the Sorin Vanguard Cardioplegia System to deliver the traditional del Nido cardioplegia solution.

Overall, initial results demonstrate earlier extubation time by 2-3 hours (3.27 hours vs 5.74 hours), shorter length of ICU stay by 24-36 hours (58.32 hours vs 88.8 hours), and less hemodilution among patients undergoing cardiopulmonary bypass (5.8% vs 10.25%) among patients who received the modified del Nido cardioplegia solution. The P values for all three metrics measured were all statistically significant (P value <0.05). P values were calculated using the unpaired t test. In addition, in the modified del Nido solution group, none of the cases performed required blood transfusion and 4% of the cases performed required a hemoconcentrator. In the other group, 36% of the cases performed required blood transfusion and 76% of the cases performed required the use of a hemoconcentrator. However, a more accurate finding regarding blood transfusion rates and hemoconcentrator use can be further assessed with a larger sample size.

The full manuscript of this article has been submitted to the journal Perfusion for possible publication.

Sophat Del, BSN, RN, CCRN

North Shore University Hospital -
LIU

*School of Cardiovascular
Perfusion*

Great Neck, New York



Table 1. Modified Components of del Nido Cardioplegia Solution

25% Mannitol	10.4mL
50% Magnesium Sulfate	3.2mL
8.4% Sodium Bicarbonate	10mL
Potassium Chloride (2meq/mL)	13mL
1% Lidocaine	11mL

Table 1. Instead of the traditional 1:4 ratio (blood to crystalloid), the patient's pure blood is mixed with the modified components of del Nido cardioplegia solution designed to arrest, protect, and optimally maintain myocardial protection throughout the procedure via the Quest Medical MPS. The Plasmalyte A solution component is not used and substituted with the patient's own blood.

Important Academy Dates

The ACADEMY ANNUAL MEETING DEADLINES

ABSTRACT DEADLINE	October 15, 2017
MEMBERSHIP DEADLINE	November 17, 2017
PRE-REGISTRATION	December 17, 2017
HOTEL REGISTRATION	December 17, 2017
2017 ANNUAL MEETING	January 17-20, 2018

Others Meetings

Sanibel Symposium 2017

April 5-8, 2017
 Sanibel Harbor Resort & Spa
 Fort Myers, FL
 Phone: 239-243-9171
 Website: <http://www.perfusion.com/symposium>
 Contact Name: Marco Polizzi
 Contact Phone: 239-243-9171 ext. 105
 Contact Email: symposium@perfusion.com

Pennsylvania State Perfusion Society Spring Conference

April 21-23, 2017
 Omni William Penn Hotel
 Pittsburgh, PA
 Phone: 412-281-7100
 Website: <https://www.omnihotels.com/hotels/pittsburgh-william-penn/meetings/pennsylvania-state-perfusion-society>
 Contact Name: John Haddle
 Contact Phone: 215-687-9803
 Contact Email: john.haddle@uphs.upenn.edu

27th Annual SEECMO Meeting

June 2-4, 2017
 Children's Hospital Colorado Conference Center
 Denver, CO
 Phone: 720-777-6948
 Website: <http://cmetracker.net/CHCOL/Login?FormName=RegLoginLive&Eventid=36148>
 Contact Name: Alex Wilkinson
 Contact Phone: 720-777-6948
 Contact
 Email: Alexandria.Wilkinson@childrenscolorado.org

17th European Congress on Extracorporeal Circulation Technology

Marseille, France
 June 14-17, 2017
 Website: www.fecect.org/invitation

BACK TO FRONT

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Uniform flow distribution

Back to front flow – created by the placement of the venous inlet at the back of the CVR – minimizes areas of stagnation. The result – horizontal blood flow proactively managing suboptimal conditions such as air, fibrin, or particulate that may be present in the blood stream.

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2018 Annual Academy Meeting Host Hotel



New Orleans Marriott Hotel New Orleans, Louisiana

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504-581-1000

Please mention that you will be attending the Annual Conference of The American Academy of Cardiovascular Perfusion when making your reservations.