Gazette Issue 05/15

The AUSTRALIAN AND NEW ZEALAND COLLEGE of PERFUSIONISTS GAZETTE

MAY 2015

www.anzcp.org

ANZCP

TABLE OF CONTENTS

Page 2 A Message from the Editor, Molly Oldeen

Page 3 A Message from the President, Jane Ottens

Page 4 Registration Committee Report, Alison Horton

Page 4 The ABCP Board Report, Mark Mennen

Page 6 Around the Pump Room, Carla Zazulak

Page 8 Life Membership Award Speech, Jane Ottens

Page 9 31st Annual Scientific Meeting Award Winners

Page 10 Open Heart International: Rwanda, Nigel Slade

Page 14 Conference Corner ASM 2014, Taryn Evans and Shuja Zahidani

Original Articles

Page 17 Class of Perfusion 2015/2016, Casey Edwards

Page 18 Risk Factors for Renal Failure Post Heart Transplant Associated with Cardiopulmonary Bypass, Keith Adkins

Page 22 Review on the Usage of Mannitol During Cardiopulmonary Bypass, Sara Varghese

Page 26-40 Abstracts from the Annual Scientific Meeting Auckland 2014

Page 42 Calendar of Events

Patients come in a range of sizes. Now your oxygenator does too.

FX05

FX15

FX25

Prescriptive Oxygenation™ using CAPIOX® FX Family of Oxygenators

with Integrated Arterial Filter

Terumo Australia Pty Ltd
Macquarie Park NSW 2113 Australia T: 1800 837 866
Mount Albert Auckland 1025 New Zealand T: 0800 66 77 57
E: cs_australia@terumo.co.jp

TERUMO

The AUSTRALIAN AND NEW ZEALAND COLLEGE *of* PERFUSIONISTS GAZETTE

www.anzcp.org

EDITOR

Molly Oldeen, *CCP*
Perfusion Department
Lady Cilento Children's Hospital
Level 7F, Clinical Directorate
501 Stanley Street
South Brisbane QLD 4101
Tel: 07 3068 3692

ASSOCIATE EDITORS

Carla Zazulak, *CCP*
Lady Cilento Children's Hospital
Brisbane QLD
Carla.zazulak@health.qld.gov.au

Jane Ottens, *CCP*
Ashford Hospital
Ashford SA
Email: jane.ottens@acha.org.au

SUBSCRIPTIONS

Subscription is only available through membership of the ANZCP. Please visit www.anzcp.org for the latest membership rates, terms and conditions. Note that all monies quoted are in Australian dollars and are inclusive of GST. New Zealand Members: fees for Australian Members less GST. One year free subscription is available to student perfusionists enrolled in the ABCP course. For further information on membership/subscription, please contact the ANZCP Secretary: c/- PO Box 921, Parkville, Victoria 3025, Australia.

ADDRESS FOR SUBSCRIPTION

Change of address, including both the old and new addresses of the member/subscription should be forwarded to the ANZCP Secretary at least one month in advance.

ADVERTISING

To advertise in the Australian and New Zealand College of Perfusionists Gazette contact the Gazette Editor.
Tel. 07 3068 3692, email. gazette@anzcp.org.

EDITORIAL CORRESPONDENCE

Editorial correspondence should be addressed to the Gazette Editor, gazette@anzcp.org (postal address as above).

DISCLAIMER

All views expressed are that of an individual or institution and are not necessarily the expressed views of the Editors, the ANZCP Executive Committee or Members of the ANZCP.

EDITORIAL POLICIES

Manuscripts are accepted for consideration on the condition that the Editorial Committee has the final decision on publication. The Editorial Committee reserves the right to reject or edit any material submitted for publication without reason.

Preparing material for publication: Preferred delivery method is by e-mail using document attachment in Microsoft Word to the editorial correspondence address. Authors who do not have access to e-mail please mail material. Correspondence should be on A4 paper type written with double-spaced lines. Please do not fold mail; use an A4 sized envelope. Please supply direct contact numbers and address for the corresponding author. Material should contain (1) Title, (2) Subject, (3) Author(s), (4) Co-author(s), and (5) Institution(s). British/Australian English is the preferred language.

A MESSAGE FROM THE EDITOR

by Molly Oldeen, *CCP.*

It has been one year since my first edition of the Gazette, and I have enjoyed both the experiences and challenges that go along with this role. Mostly though, it has been rewarding getting to know and working with other members of the perfusion community as a result.

Due to events in my life over the last year, I have been thinking a lot about change and the challenges that come with it as well. Change is not especially welcome in the field of perfusion, however, at times, it becomes inevitable and/or necessary for advancement. Advancement can be in forms such as clinical skill sets or patient care. A famous quote by George Bernard Shaw states, "Progress is impossible without change, and those who cannot change their minds cannot change anything." At the same time, change for the sake of change is not beneficial either. One can find a balance between the two by making informed decisions. As perfusionists, this can be achieved by means of evidence-based practice and communication amongst colleagues to determine what is right for your individual practice.

A consequence of change may be the sacrifice of comfort. I can think of countless recent experiences when I have sacrificed comfort to do something that was outside of my comfort zone. I do not regret any of those times as they led to personal growth and development that I wouldn't otherwise have. Examples include my first mission trip just over a year ago to Cambodia, knowing I would be in a third world country using equipment without all of the 'bells and whistles' that I have been fortunate to have my whole, albeit relatively short, perfusion career. Or taking this role as editor being both new to Australia as well as the perfusion profession as a whole. I learned that I need to find comfort in being uncomfortable, and rather than fear change and new experiences, I embrace them. From those examples, I have gained courage, confidence, and optimism. I wouldn't have had those opportunities had I not taken the risk to move to Australia by myself almost three years ago today. The rewards are the achievements I have today.

As hard as it was to leave Brisbane and my first job as a perfusionist with an extremely supportive team, I hope to grow even more and take advantage of once again being closer to family and friends in the USA.

This edition brings a lot of great content thanks to members of the College. We have a large variety of Abstracts from last years ASM. Thank you to Taryn Evans for continuing her work with the meeting, by volunteering a conference report in addition to photos. For those members not in attendance, Jane Ottens has also kindly provided the Life Membership speech to congratulate two of our most successful and appreciated members.

I hope you enjoy this edition! As always, please contact me with comments or suggestions. I hope to hear from more of you for the next one. We would love to read any team updates, research, or interesting case studies. I'm looking forward to attending the ASM in Sydney this November where I can pass on this rewarding role to someone else.

Members - Please note that The Journal of ExtraCorporeal Technology is your Official Journal! Electronic access now available to all 47 volumes, including the most recent issue, to ANZCP members.

A MESSAGE FROM THE PRESIDENT

by Jane Ottens, *CCP.*

Collaboration

- The act of working together with one or more people in order to achieve something ;Team work/community/network.

In the field of Perfusion, most tasks we undertake are a collaboration - from working as a team in the operating theatre to provide the very best care to our patients, to individual perfusion departments who continually strive together to maintain a safe working environment and initiate research.

Outside of the operating theatre and our hospitals, we have Professional bodies and Associations who collaborate to provide a "voice" for its members, education and a regulatory body.

As the world had become increasingly more accessible with the digital age, international bodies are now working together. Groups such as the ICEBP (International consortium of evidence based perfusion) are developing guidelines, standards of practice and registries. Similarly the participation of surgeons, anaesthetists, perfusionists, researchers and epidemiologists to produce blood conservation clinical practice guidelines(1) to direct our clinical practice represents a remarkable achievement.

A more localised example of collaboration is the Perfusion Down Under collaboration (PDUC), which is a multi-centred perfusion based database.

Australian and New Zealand perfusion units submit their data (from what they do every day) and from the feedback of their results, have the ability to benchmark(2) and hence improve or change practice.

In this issue of the gazette, the abstracts from the three presentations given by members of the PDUC, in Auckland at the 31st annual scientific meeting are published.

With 10 plus units around Australia and New Zealand now contributing to this registry, it is wonderful to see their work being presented, which benefits all of perfusion in how we practice and what we do. The PDUC were awarded an "ANZCP Meritorious Award" for the work presented and was well deserved to this unfunded group.

Finally I would like to mention one other example of team work and participation….to our gazette editor who is on the other side of the world (USA), but had the commitment to continue to be involved with the gazette for this and the next issue.. Thank you Molly.

Jane Ottens
President ANZCP

1. *2011 update to the Society of Thoracic Surgeons and the Society of Cardiovascular Anesthesiologists blood conservation clinical practice guidelines. Society of Thoracic Surgeons Blood Conservation Guideline Task Force, Ferraris VA, Brown JR, Despotis GJ, Hammon JW, Reece TB, Saha SP, Song HK, Clough ER; Society of Cardiovascular Anesthesiologists Special Task Force on Blood Transfusion, Shore-Lesserson LJ, Goodnough LT, Mazer CD, Shander A, Stafford-Smith M, Waters J; International Consortium for Evidence Based Perfusion, Baker RA, Dickinson TA, FitzGerald DJ, Likosky DS, Shann KG. Ann Thorac Surg. 2011 Mar;91(3):944-82.*

2. *Developing a Benchmarking Process in Perfusion: A Report of the Perfusion Downunder Collaboration Robert A. Baker, PhD, CCP (Aust)et al JECT. 2012;44:26–33*

ANZCP STRUCTURE

The Executive

Jane Ottens - President
Jon Van Den Berg - Vice President
Matt Sheminant - Secretary
Carla Zazulak - Treasurer
Jon Van de Berg - NZ Representative
Tim Willcox - Registrar

The Board

Mark Mennen - Chairmain
Chris Morley - Member
Andrew Lahanas - Member
Vincent Rajkumar - Secretary
Sarah Varghese - Member

Sub-Committees

Alison Horton - Registration Committee
Jane Ottens - Simulation Committee
Tim Willcox - PIRS Editor
Andrew Sanderson - Webmaster

REGISTRATION COMMITTEE REPORT

by Alison Horton, *CCP.*

The registration committee has expanded to two members to include Keith Adkins who will assist Alison. Alison has been able to attend two of the three meetings with NASRHP members this year and has included excerpts of the last meeting minutes for ANZCP members to gain insight into the work being done. It is important for our College to keep abreast of any changes or development in Government policies concerning Allied health workers and the unregistered health professionals.

After twelve months on working on the accreditation standards NASRHP is now almost ready to present them to the relevant committees (for subsequent Board consideration). The eight founding members have reached a consensus on the structure, standards and governance of the proposed alliance.

We discussed the National Registration and Accreditation Scheme (NRAS) report due for release in April. There is an expectation the report will recommend five separate profession Boards (Medicine; Nursing; Psychology; Dentistry; and Pharmacy), with the remaining health professions to be regulated under a single entity. To date it is unclear as to if this will occur for only those professions described under NRAS, or by extension to all other health professions. There was consensus on the need to progress these standards in the context of this work, with a view for NASRHP to be ready to respond to the NRAS outcomes through these standards.

NASRHP Members discussed the issues resulting from government and other entities producing NRAS centric healthcare system changes which have unintended or adverse effects for non registered heath professions. There was majority support for the development of a standing position statement which could be provided initially to key stakeholders (e.g. governments, insurance bodies, philanthropic entities) for information; and subsequently used as an advocacy / lobbying platform.

In the context of NASRHP previously being approached by other self-regulating profession bodies, members agreed that as a minimum any potential additional membership should require the professional body to represent a health profession: possibly stipulating AHPA membership as a requirement. Examples of organisations possibly already eligible included the Australian Music Therapy Association and the Australian Society of Genetic Counsellors. We agreed this is an important topic to continue discussing; however the key piece of work is the Standards, after which NASRHP can consider processing this, and other work.

AASW, the Australian Association of Social Workers advised us that the Commonwealth is using a standardised risk profiling approach to evaluate the relative risk of each profession who are registered or seeking registration.

The BOARD REPORT APRIL 2015

by Mark Mennen, *Chairman ABCP*

The Diploma of Perfusion Course continues its ongoing content review, overseen by Clarke Thuys who has agreed to stay on as Course Coordinator. Any input from the perfusion community is always welcome. The course is now re-established to the point where we can now take enrolments commencing in term three to cater for those employed later in the year so candidates don't have to wait for the next year's intake. There have been seven students commence this term with three student ongoing including individuals from Hong Kong and Singapore.

Exams were again conducted in February where four candidates presented, all of whom were successful in gaining certification.

Recertification reminders have been sent to those individuals whose certification expires at the end of June this year. If you think you have been missed or have changed address, email or postal, don't hesitate contact the Board for clarification.

The Autotransfusion course is continuing to be very popular although the first term has seen fewer enrolments than the midyear which we believe is due to the difficulty for candidates to get information over the summer period. We are working towards a dedicated website to provide ready access to course details and allow easy online registration and payment.

Thank you to my fellow Board members for their work. Chris Morley and Andrew Lahanas have been particularly busy with the Autotransfusion course and IMOB conference with Daryl McMillan. Vincent Rajkumar has taken on the Secretary position which I'm sure will ensure a high standard is set for the Board's communication. Sara Varghese has offered her services to the board as an unelected contributor which is very much appreciated.

scan with your phone or tablet

ARROW AUTOCAT 2 WAVE

Cardiac Assist: ProActive CounterPulsation

- The AutoCAT 2 WAVE® is the first IABP System which proactively anticipates and determines AV closure
- Improved timing accuracy with regard to IAB inflation and deflation
- Optimum triggering during severe arrhythmias provided by the AutoCAT 2 Wave System and FiberOptix Sensor
- The AutoPilot mode consistently maintains timing and triggering
- **Can be used with ARROW FiberOptix & fluid-filled IAB catheters**

Teleflex Medical Australia Pty Ltd · Level 4 · Tower B · 201 Coward Street · Mascot · NSW · 2020
Customer Service: 1300 360 226 · www.teleflexmedical.com.au

Teleflex

AROUND THE PUMP ROOM

Boots on the Ground Perfusion visit... **www.circuitsurfers.com**

"Now continue saying, 'I want my surgery to be performed with the pump.' "

by Carla Zazulak

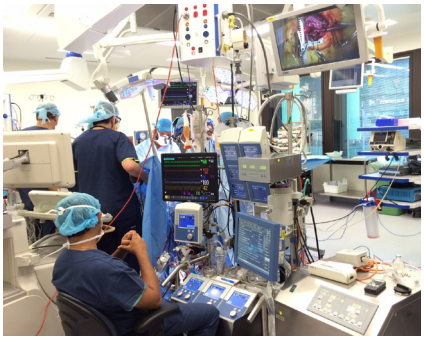
In December 2014 both the Mater Children's Hospital and The Royal Children's Hospital transitioned to the brand new Lady Cilento Children's Hospital in South Brisbane.

The Cardiac Service transitioned 2 weeks after the official opening of the new hospital and we have had a busy time settling in over the past 5 months.

We have an impressive 64m^2 state of the art operating theatre and a modest yet comfortable pump room as well as access to a lovely garden near our office area that comes complete with a BBQ and plenty of sunshine.

Our colleague Molly Oldeen took a job in Oklahoma City back in her native USA and while she is greatly missed by the entire service, we have taken the opportunity to move towards recruiting a Trainee Perfusionist which thankfully seems to be a trend and a much needed boost for our profession in Australasia as 'succession planning' becomes more topical.

Tony, Mahesh and myself look forward to catching up with colleagues at various conferences this year and hope to read 'Around The Pump Room' contributions from more of you soon.



CARDIOHELP

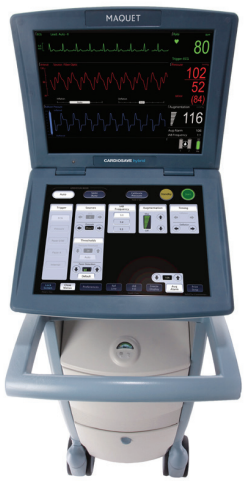
The world's **smallest[1] portable** heart-lung support system

MAQUET
GETINGE GROUP

Maquet has developed **CARDIOHELP** as a multi-therapy heart-lung assist system which can be rapidly deployed and used for a wide range of indications in Intensive Care, Emergency Medicine, Cardiology and Cardiac Surgery. The CARDIOHELP device is a compact and light weight system making it ideal for transporting patients whilst on respiratory and/or circulatory support.
The combination of a newly designed user interface and intuitive software optimises existing therapies and is compatible with the wide range of new upcoming therapies.

Cardiosave hybrid

CARDIOSAVE represents a giant leap forward in functionality and versality. With its large touchscreen display, dramatically smaller and ligther design, and seamless transition from in-hospital use to transport mode, this revolutionary pump redefines counterpulsation therapy.



Improved user interface for ease-of-use
- Backlit monitor display
- Backlit touchscreen control
- Improved help screen navigation

Improved patient interconnects for ease-of-use
- Better organized patient interface connections
- Easier access to connection panel
- Color coded and keyed connections

Improved user convenience attibutes
- Self retracting power cord
- Out-of-sight helium tank compartment

1 Data on file

ANZCP
LIFE MEMBERSHIP
AWARDS

On November 8th 2014, at the Gala dinner of the 31st Annual Scientific meeting of the ANZCP, in Auckland New Zealand, The ANZCP awarded two life memberships to Mr. Timothy Wilcox and Mr. Darryl McMillan.

These two individuals were nominated by the executive for this award and then unanimously voted by the membership to receive this honor.

This is a transcript of the speech made when giving these awards to Darryl and Tim.

Jane Ottens – ANZCP President

One of my person goals when becoming President back in 2011, was to undertake this role by example from some of the leaders of the college that have inspired me.

When I first started as a perfusionist back in the mid 1980's, individuals such as Paul Bernhard, Don Pastoriza and Sid Yarrow were forming our professional body. These three individuals were instrumental in laying the foundations of what the college is today, and were appropriately acknowledged by being awarded Life membership by the members of the "back then" Australasian society of cardiovascular perfusionists. Paul Bernhardt received his award in 1999, Don Pastoriza in 2001 and then Sid yarrow in 2006.

But it was the next generation of leaders that continued to drive our profession, which has had the greatest influence on me as a perfusionist. It was their vision and ability to find time outside their clinical commitments to further the college and hence perfusion in Australia and New Zealand.

Tonight I have the most amazing honor to present another two leaders, with the first ever "ANZCP" Life memberships for outstanding service Mr. Timothy Wilcox and Mr. Darryl McMillan. This award is voted upon by the membership, and in 2013, both were awarded this unanimously. And fittingly now both join the elite list of life members of the college.

While I am not going to present you with a "This is your life" synopsis of your careers and bring back old nemesis who you have worked with and I could have almost written an encyclopedia on both of your past achievements. I want to touch briefly upon your roles within the college over the past decades and your commitment to our profession.

Tim Wilcox...

- 1971 trained as an anesthetic technician at Greenland Hospital here in Auckland.
- Eventually transferred into perfusion and doing so for over the past 40 years.
- Currently Chief Perfusionist at Greenland/Auckland city and has been for many of those years and in this leadership role, continued into serving the Society/College.
- 1990 Vice president of ASCVP.
- 1991-94 President of ASCVP. Involved in the first standards and guidelines of the college perfusion news started, under his presidency which was the first formal communication for the college.
- 1995-2000 Editor of the gazette. The perfusion news morphed into a newer format Continued on the Editorial committee many years after that.
- 2003-2007 Member of the ABCP.
- 2005 – currently. Editor of PIRS. Took over from Owen Jenkins Perfusion incident reporting system editor 2005 PIRS at this stage went to a web based reporting system.
- His commitment to improving safety and standards and has actively promoted PIRS over those many years
- 1987,2000 Convener of two ASM in Auckland.NZ As well organizing the perfusion component of the Tongarirro meetings- which was mainly surgical until Tim came along to help out.
- Tim has been involved in research throughout his career. His first paper on "Residual ethylene oxide in tubing packs", when they made their own packs to more infamously his bubble work with Simon Mitchell, which questioned designs of venous reservoirs and venous air handling worldwide
- Awarded his research at these meetings.
- Continuing to encourage and inspire members in his unit to continue to do so and this involvement with research has also lead to his involvement with.
- The Perfusion Down Under meeting as chair and its development over the past 10 years.
- Involvement with the Perfusion Downunder Collaboration(PDUC) registry along with Rob Baker, the FMC team and the other units contributing data. This group is now producing valuable information that everyone in this profession can all use in their clinical practice.
- He has been involved with the New Zealand quest for registration, firstly with Len Cooper and currently with Jon Van Den Berg.
- Over the past decades Tim has always promoted perfusion locally, nationally and internationally in-between his clinical workload.

I would like you all to be upstanding as we thank Tim for your leadership and input into the college and hope that by awarding you this life membership "when you haven't retired" that you will continue to mentor and direct us all now and into the future.

Mr. Darryl McMillan.

- Darryl started in Perfusion back in 1979 after also being trained as an anaesthetic technician. " Also obviously a prerequisite for a life membership".
- Director of perfusion at Royal North Shore hospital in Sydney Australia and has had that for many years.
- 1996 Ordinary member on the Executive ASCVP.
- This was to be the start of an illustrious career on the exec where he would advance to:
- 1997 Vice President.
- 1998 -2006 President and was our longest serving President (8 years).
- 2001- 05 Editor of the gazette, which he took over from Tim when he finished.
- 1996,1997,1999 Convened 3 ASM meeting in Manly,NSW.
- Started using simulation as an education tool, with the Sydney simulator center and the Orpheus precursor and what you could call a "pioneer" in some early work in high fidelity simulation and perfusion.
  - Start of the ABCP simulator workshops.

- As a member on the Executive when Darryl was president, I can tell you Darryl always got things done, and inspired the rest of the exec members to follow his lead.
- He took the quest for registration, by the horns to try and advance our cause during that period.
- 2011 A valuable part of the scientific committee for the ASM Sydney.
- A leader in promoting blood management within the field of perfusion and surgery, Darryl has presented his work locally and internationally and once again has been awarded numerous times at these meeting that work. Darryl and his group are known to try perfusing anything or at least giving it a go. His enthusiasm for this topic has led to the development of the ANZCP International Meeting Of Blood meeting which he was the co convener this 2014 and for the meeting 2015 which is taking his passion of blood management to other disciplines.

Darryl is one of the most passionate Perfusionists I know who inspires all he works with whether that is his own unit, the college or when listening to one of his presentations.

So I again ask you to be upstanding to award the equally first ANZCP life membership to Mr Darryl McMillan.

and thank you for the enormous amount of work and commitment you have given to the college, and continue to do so....and as" the President" who developed the life membership awards "To acknowledge outstanding service to the college", it is most fitting that you yourself are the recipient of it as well.

31ST ANNUAL SCIENTIFIC MEETING
AWARD WINNERS

Terumo Award sponsored by Terumo - Ghaz Jabur, Greenlane Clinical Perfusion/ Auckland City hospital, Auckland. Integrated Arterial Filters in new generation oxygenators – do they cut they mustard?

The Encouragement Award sponsored by Medtronic Australasia - Keith Adkins, St Vincents Hopsital, NSW Renal Failure Post Heart Transplant

Meritorious Award sponsored by the ANZCP - Annette Mazzone, Flinders Medical Centre, SA Case Report: Suspected malignant hyperthermia clinical observations, treatment and precautions.

Meritorious Award sponsored by the ANZCP - Perfusion Down Under Collaborative (PDUC)*for the four papers presented.

1. The independent effects of anaemia and transfusion on mortality after coronary artery bypass: mutlicentre analysis using the perfusion downunder collaborative database R.Baker
2. Influence of oxygen delivery on acute kidney injury: a multi center analysis using PDU collaborative database T.Wilcox
3. The influence of timing of RBC transfusion on mortality following cardiac surgery: mutlicentre analysis using the perfusion downunder collaborative database. R.Baker
4. The influence of rewarming temperatures during cardiopulmonary bypass on acute kidney injury following cardiac surgery: multi centre analysis from the perfusion downunder database. A Mazzone

** PDUC is a multi centre perfusion database, non-funded and run by Flinders Medical Centre(SA)Perfusion and Research along with the other contributing hospitals around Australia and New Zealand.*

The Best Trade Display sponsored by the ANZCP - Maquet

The Gazette Award sponsored by the ANZCP - Jessica Ozdirik, Prince of Wales hopspital, NSW A trainee Experience- Gazette edition May 2014

The Best Student Award sponsored by the ABCP - Keith Adkins, St Vincents Hopsital , NSW

ANZCP Life membership sponsored by ANZCP - Mr Timothy Wilcox

ANZCP Life membership sponsored by ANZCP - Mr Darryl McMillan

Open HEART INTERNATIONAL

by Nigel Slade ACP (UK)
Princess Margaret Hospital, Perth

Open Heart International: Rwanda, November 2014.

ACP (UK), Princess Margaret Hospital, Perth.

During my visit to Kigali with Open Heart International I was reminded that the people of Rwanda had suffered staggering brutality, inflicting outrageous violence on each other. In the hundred days from April to July 1994, members of the Hutu ethnic majority murdered as many as 800,000 people, mostly from the Tutsi minority.

From the capital of Kigali, the genocide spread throughout the country, as ordinary citizens were incited by the Hutu government to take up arms against their neighbours.

By July, hundreds of thousands of Rwandans were dead and some 2 million more were refugees, creating a humanitarian crisis that went largely ignored by the international community.

Twenty years later the country and its people are united in the process of healing themselves but the memories of those dreadful events are still strong in the minds of the people of Kigali.

International aid is now coming in and is being used to develop and rebuild that which was lost during those terrible times.

Today, Kigali seems to be a vibrant developing city with newly emerging tourist industry.

There are many armed soldiers and police about the place but Kigali feels safe enough for the visitor.

I joined the Open Heart International team at King Faisal Hospital. We were a diverse group, coming from all around Australia, some newbies some old OHI hands but all with the common goal of repairing as many hearts as we could in a week of surgery.

From the fifty children who underwent the preliminary screening, eighteen children were selected for surgery.

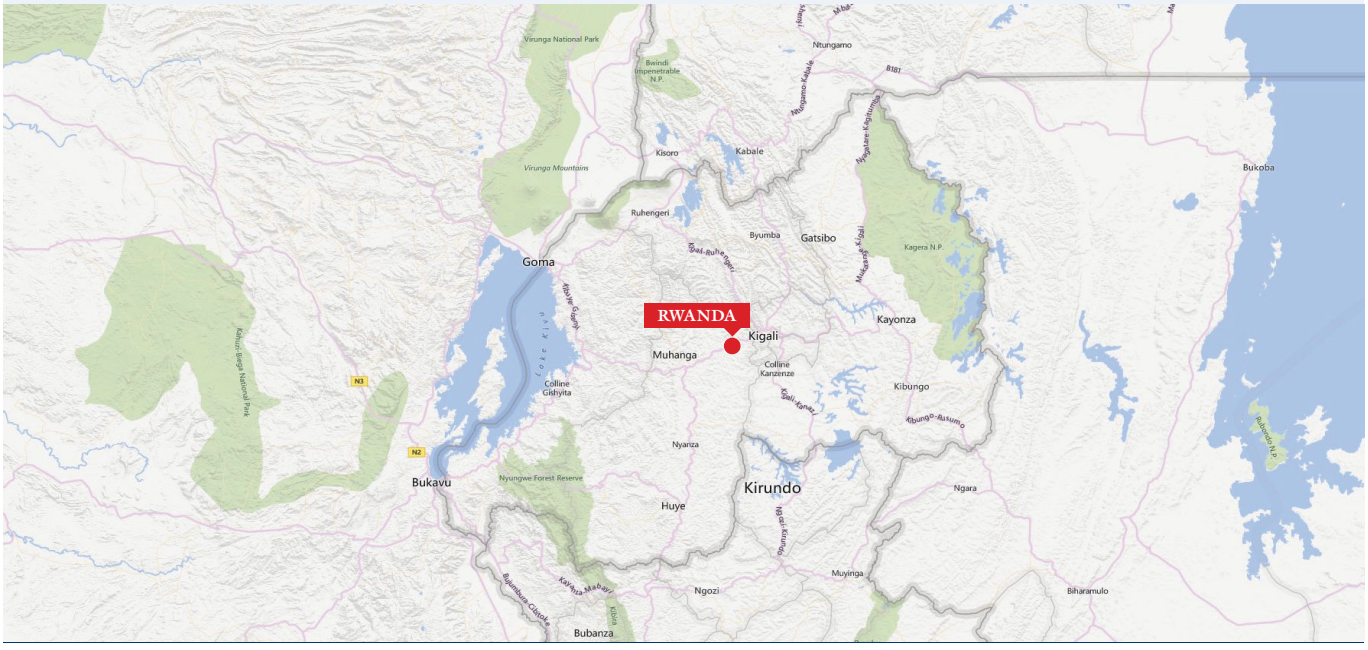
Rwanda has two dedicated cardiologists but no cardiac surgeon. The reality is that many children die waiting for surgery.

This was OHI's eighth visit to Rwanda, but my first. It's a long way from Perth to Kigali, Rwanda, central East Africa.

The Flight time from Perth to Doha to Entebbe to Kigali was just under 32 hours.

32 hours of personally keeping the 'plane in the air by sheer force of will is exhausting so I was more than ready for my bed when I arrived at the hotel.

After a busy night shuffling around my room battling jet lag and mosquitoes I was soon at the hospital unpacking oxygenators, tubing sets, fluids and introducing myself to the Cobe heart lung machine.



Allow me to digress for a moment.

Who, in your opinion, is the most important team member of a mission such as this?

The surgeon, the anaesthetist, scrub nurse or, dare I say perfusionist? All very important members of the team but none so more highly valuable than the biomedical engineer! In this case, the sainted Mr. La Vu, blessings be upon him.

Op day minus 1: the Cobe works, all the pumps spin, cardioplegia can be delivered. Confidence is high, no worries. Off for a refreshing ale followed by another sleepless night making friends with the jet lag daemons.

The next day I was up bright and early (or very, very late, depending on one's attachment to a particular time zone), feeling as crisp and refreshed as a 10 day old lettuce. I confidently plugged in the Cobe and switched it on, safe in the knowledge that I had performed my 'pre-flight' checklist the previous day.

The Cobe stopped; well, some of it stopped.

I had no functioning arterial pump and no way to deliver blood cardioplegia.

Fortunately this was before the first patient had been sent for.

Mr Vu helped me dismantle the Cobe and found one snapped drive belt in the arterial pump and burnt, corroded electrical connections in the cardioplegia pump.

He was of the opinion that we should find another HLM whilst he performed his magic on the Cobe. I agreed.

Luckily, we were able to utilise an old Sarns 7000, left behind by a visiting heart team from the USA and, after a little mix and match tinkering, this was soon pressed into service.

These sorts of trips always have their little hiccoughs, some more challenging than others. Pump problems, unfamiliar circuit design, uncertain essential supply, flooding air conditioners; all can seem somewhat magnified simply for the want of a good night's sleep.

Life can be interesting when you have to run a pump with yourself as the main alarm device. It reminds you to behave in a careful and considered manner and the value of a comprehensive check list. It teaches you to be grateful for what you have. It reminds you who your friends are.

The first couple of cases I didn't have a working bubble or level detector.

La, immersed in his dark arts, was soon able to produce functioning alarm units.

Another concern was the refusal (quite rightly) of the hospital to accept expired perfusion consumables. This caused a few problems towards the end of the week when supplies were low and circuit selection was sometimes less than optimal.

Using a larger circuit on a smaller patient is preferable to the alternative of struggling with an oxygenator operating above its rated flow. Haemodilution was comfortably dealt with by minimising prime volume as much as possible and by employing vigorous haemofiltration and MUFing.

Our goal as perfusionists is to provide safe and effective bypass enabling the surgeon to perform their repair.

At its most basic level, the question I ask myself is, (when all about you have kept their heads but you are losing yours), can I safely access venous blood, oxygenate it, remove carbon dioxide and return it to the aorta? If the answer is "yes", then we're good to go.

We were fortunate to have an I-stat hand held blood gas monitor. Having almost instant access to arterial and

venous blood gas results is a very comforting luxury.

Over the next few days Mr David Andrews and the team successfully performed 15 open heart surgeries: VSD's, a couple of Tetralogy of Fallot repairs and an MVRepair on some very sick kids.

Due to their congestive heart failure the children were often distressed, malnourished and underweight suffering severe pulmonary hypertension with large overloaded hearts struggling away inside their little chests.

Coming off bypass could be a delicate procedure requiring a clear view of the CVP monitor and good communication between the Perfusionist, anaesthetist and surgeon

However, despite their poor start in life most of the children spent just a day in ICU and were soon on the ward playing with the nurses and physio's and soon after that outside playing football and flying kites.

I'm pleased to report that due to the excellent care provided by the whole OHI team all of our patients returned home to their families.

I also had the opportunity to do some teaching as the ultimate aim of this OHI missions is to allow the local heart team to perform autonomously. Emanuel and Peter were willing students, keen to learn and very helpful in setting up the pump and perfuse some cases under supervision.

I am sometimes unsure of my motives for doing these trips. I'm not religious and I'm not an activist and I suspect that I get more out than I put in.

The majority of OHI volunteers donate their precious annual leave and pay their own expenses to do these trips.

I know it is good to 'put back', to contribute something to the world, but are we actually achieving anything?

For the children on whom we operate, we don't know what these people are capable of becoming. What we are giving them is a chance to fulfil their potentials, perhaps as teachers, leaders or maybe even Perfusionists.

Through working with our colleagues in developing local centres such as the King Faisal Hospital, we are supporting them to achieve independence and begin a paediatric cardiac program of their own.

On a more personal level, meeting and overcoming the many challenges that trips such as these can present can be inspiring and build self-confidence.

There are many occasions for learning and teaching which can only help improve one's own practice back in the first world. Technical challenges aside this trip was great fun. It was a chance to meet new friends, share new experiences, as well as to further strengthen bonds with old friends.

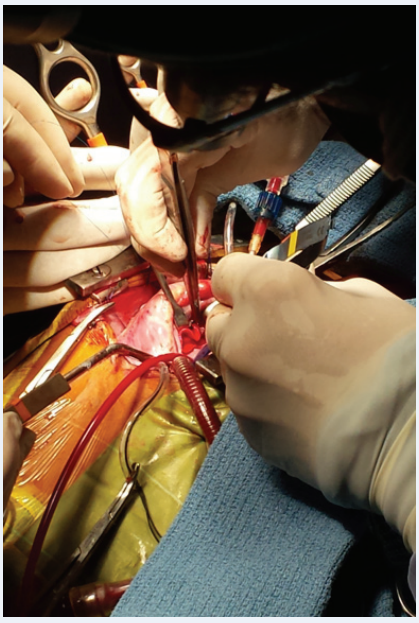
By the time we were ready to leave I had gotten use to the time difference and was sleeping through the night.

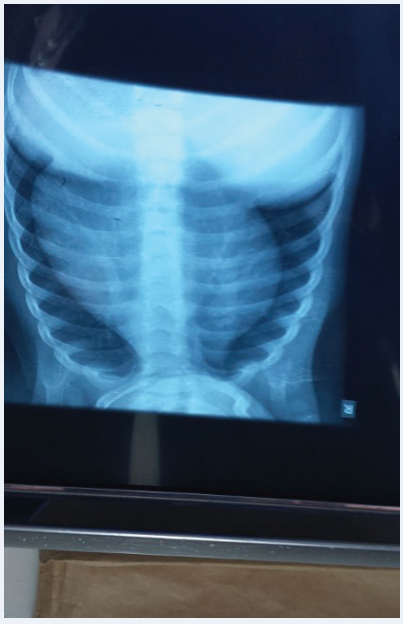
Just another 30 hours concerted effort and I'd be set to do it all again back home.

If you are offered the opportunity to go on one of these trips my advice would be to take it; just make sure you have Mr La Vu with you.

Thanks to Megan Townsend of OHI and Beth Chidlow, Princess Margaret Hospital for the use of some photographs.

www.ohi.org.au





REMEMBER SUBMIT TO...

PIRS

Perfusion Incident Reporting System

What is PIRS?

PIRS is a voluntary system for reporting perfusion related incidents and accidents, open to the international perfusion community. Confidentiality is assured by de-identification and anonymity. PIRS data will not be passed to any third party or regulatory body. For further information see www.anzcp.org.

TO SUBMIT TO PIRS VISIT

www.anzcp.org

...and hit the PIRS tab.

CONFERENCE CORNER

by Taryn Evans and Shuja Zahidani

The ANZCP 31st Annual Scientific meeting held in Auckland was a great success, Auckland turned on the weather and we enjoyed fun social events along with the outstanding academic program.

The meeting followed the new format and begun on Thursday afternoon with a 90 minute paediatric round table discussion lead by Jude Clark and Carla Zazulak. The relaxed set up encouraged audience participation and discussion around paediatric protocols across all units and we easily filled the 90minute time slot.

The next 45minute session, held over a glass of wine with cheese platters, was a PIRS update lead by Tim Willcox and Jane Ottens, as usual the Perfusion Incident reporting system generated several points of interest. One thing to note is that discussion lead to the development of an email alert for PIRS which most of you should receive. If you are not getting these emails please contact Tim or Jane to be added to the list.

Darryl McMillian lead a great interactive session on perfusion safety, these sessions are not only fun but informative and do generate discussion. We hope to see more of these types of sessions at upcoming meetings.

The Thursday sessions are no doubt a success and we understand that this format is here to stay so please remember this when planning to attend your next ASM.

Friday marked the beginning of the scientific sessions with presentations from both our invited speakers, Dr. Christian Stocker and Dr. Christa Boer. Dr Stocker talked to the paediatric brain after open heart surgery and ECMO whilst Dr. Boer gave her presentation on microcirculatory disturbances during CPB. These presentations, along with others by invited speakers and submitted abstracts lead to an interesting and varied day to which there was no lack of discussion and knowledge gained.

Friday evening, generously sponsored by Maquet, was spent at a private wine bar with great food and an all-female acappella performance from Molto!

Saturday's program consisted of 4 sessions, with a focus on acute kidney injury, anticoagulation, blood consumption and conservation, and arterial filters. Once again we saw both our international invited speakers take the podium; Dr Stocker talked about anticoagulation in neonates whilst Dr. Boer gave a fantastic talk on individualized heparin and protamine management and a second presentation on patterns in blood consumption in cardiac surgery.

We should not forget to thank our moderators, who are responsible for not only making sure the meeting runs on time but ensuring discussion is on topic. We do appreciate their time and input.

Saturday evening was stunning weather wise, and we were lucky enough to have pre dinner drinks on the deck of the floating pavilion overlooking the water to enjoy the sunset. After dinner we saw the awards presented and the highlight of the evening for many was the presentation of lifetime membership to the esteemed Tim Willcox and Darryl McMillian. Those of you who were lucky enough to have stuck around would have been treated to a Rolling Stones ensemble by none other than Mr Willcox to celebrate his award!

We must thank our corporate sponsors who not only financially support the meeting but join in the social events and really are a huge part of our perfusion world. Other thanks go out to Killian O'Shaughnessy, Tim Willcox, Jude Clark, Jane Ottens and Darryl McMillian for their support behind the scenes in bringing this meeting together.

From an organising committee point of view, the 2014 ASM was a huge success and we know that the 2015 committee will bring you another amazing meeting, hopefully we will see many of you there.


RBC Initiative


PALL Medical
What's In Your Water Safety Plan?
Instant protection against waterborne microorganisms
Pall-Aquasafe Water Filters

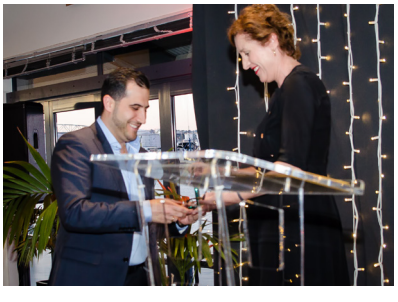

RBC Initiative


The Gold Standard
MAQUET
GETINGE GROUP


ANZCP
Australian and New Zealand College of Perfusionists


umcg
Nijmegen
angers


ANZCP
ANZCP



Medtronic

Fusion®

OXYGENATION SYSTEM

Designed by Perfusionists. Engineered by Medtronic.

Introducing the Fusion oxygenation system. Built on the input of more than 500 perfusionists worldwide, Fusion is the result of a unique collaboration between perfusionists and Medtronic. A fundamentally different design approach yielding 79 new design enhancements, including a fully integrated oxygenator and arterial filter. An advancement in oxygenation system design. To find out more, visit **www.fusionoxygenator.com** or contact your local Medtronic Australian or New Zealand Representative.

www.medtronic.com.au
www.medtronic.co.nz

Medtronic Australasia Pty Ltd
97 Waterloo Road
North Ryde, NSW 2113
Australia
Tel: +61 2 9857 9000

Original Article

INTRODUCING THE PERFUSION CLASS OF 2015/2016

by Casey Edwards, Trainee Perfusionist
at the Canberra Hospital

2015 sees eight new trainees joining the ranks of perfusion in Australia and New Zealand. In March, five members of the perfusion class of 2015/2016 were fortunate to attend a discussion and workshop hosted by Cellplex. We were treated to a very informative and educational experience. Cellplex management presented the history of the company and an overview of its products. Steritech staff explained the details of ethylene oxide and gamma irradiation sterilization techniques. We spent an afternoon constructing a tubing pack in the Cellplex clean room, which will arrive in our very own pump rooms ready for use in the near future. We all agreed that this experience heightened our appreciation for the complexity and intricacy of pack construction. We also learned that we should stick to the bypass and leave construction to the experts – we were rather messy and slow! A sincere thanks goes out to Cellplex for facilitating the event and for being wonderfully welcoming hosts.

A highlight of the trip was being able to meet the other perfusion trainees. We had many interesting discussions about the similarities and differences between our respective workplaces. Most importantly, we have begun to build a network of friendship and support to enhance our trainee experience. It was evident that we are all extremely excited about our careers in perfusion, keen to learn as much as possible from our mentors, and enthusiastic about becoming the best perfusionists we can be. We look forward to meeting you, the wider perfusion community, in the years ahead.

Casey Edwards, Trainee Perfusionist at The Canberra Hospital

From left to right: Steve Krithnakis (Cellplex), Majid Arammanesh (St George Hospital), Sarah Cullinan (St Vincent's Hospital), David Oxley (Cellplex), Casey Edwards (The Canberra Hospital), Nick Bopf (Cellplex), Adam Roshan (St Vincent's Hospital), Christian Bellato (Prince of Wales Hospital).

Original Article

RISK FACTORS FOR RENAL FAILURE POST HEART TRANSPLANT ASSOCIATED WITH CARDIOPULMONARY BYPASS

by Keith Adkins, CCP

Introduction

Risk of acute kidney injury (AKI) post cardiac transplant is much higher than conventional cardiac surgery, where the rate of AKI has been described as 1%-3%.1 AKI post-transplant has frequently been associated with nephrotoxic immunosuppression drugs.2 The purpose of this study was to identify any risk factors that cardiopulmonary bypass may contribute to post transplant AKI.

Methods

This was a retrospective observational study that included 50 continuous patients who received a heart transplant at Saint Vincent's Hospital Sydney from January 1st 2012 to 31st December 2013.

Classification of Renal failure

A modified version of the RIFLE criteria was used for this study. The risk category of an increased creatinine of 150% from baseline was used but day 1 post-transplant was used instead of the usual day 7. The reason for this is to eliminate as many variables other than CPB.

Only creatinine was assessed and not urine output.

Patients who received Continuous veno-venous haemodialysis filtration (CVVHDF) within 28 days of receiving heart transplant were also assessed using the same parameters.

Patients who fell into at least the first stage of the RIFLE category shall be referred as the RIFLE-R cohort from hereafter. Patients with a creatinine increase less than 150% shall be referred to as the non-RIFLE-R cohort.

Conduct of perfusion

All cases were performed on a Maquet HL20. Terumo RX25 oxygenators were used. A prime volume of 2000mls consisting of 1500mls Hartmann's solution, 500mls Albumin 4%, 25'000 IU of Heparin and 20mg of Frusemide.

Bicaval venous cannulation was employed, and the ascending aorta was cannulated.

The target flow rate was 2.4L/min/m².

Mild hypothermia of 28-32°C was used depending on surgical preference.

15 minutes of reperfusion for every hour of ischaemia was used.

Cyclosporine was not administered pre-operatively.

Results

RIFLE-R

During the study period 50 Heart transplants were performed. The age range was 14-70 and the mean age was 46 years +/- 13.1. 24 (48%) were redo-sternotomies and 20 (of the total number) (40%) were mechanical explants (16 ventricular assist devices (VAD), 3 BiVAD and 1 Total artificial Heart). Mean pre-op creatinine was 120µMol/L (+/-111.)

18 (36%) patients had a rise in creatinine of 150% or greater on day 1 post-transplant compared to the preoperative baseline.

When comparing the RIFLE-R cohort to those in the non-RIFLE-R cohort, the RIFLE-R cohort had a mean age of 40 (range 14-57) whereas the non-RIFLE-R cohort had a mean age of 49 (20-70) (p=0.01).

The mean BSA of the RIFLE-R cohort was 1.94m² and 1.81m² in the non-RIFLE-R (p=0.03).

Mean pre-op Cr was 95µMol/L (+/-31) in the RIFLE-R cohort and 135µmol/L (+/-135) in the non-RIFLE-R cohort.

72% of patients in the RIFLE-R cohort were redo sternotomies (p=0.01) and 67% were VAD explants (p=0.003).

The donor ischaemic time was found not to be significant p=0.73 (216 vs 209 mins).

The mean Cardiopulmonary Bypass time was 228 mins (+/-51) in the RIFLE-R cohort and 185 (+/-51) mins in the non-RIFLE-R cohort p=0.006.

The mean lowest recorded MAP was 46mmHg in both the RIFLE-R cohort and non-RIFLE-R cohorts p=0.9.

The mean Indexed Flow rate was 2.26 in the RIFLE-R cohort and 2.14 in the non-RIFLE cohort (p=0.69). However the DO^2 was found to be significantly different (p=0.03) when comparing the RIFLE-R cohort and the non-RIFLE-R cohorts, with DO^2 being 467 mls/min O2 and 522 mls/min O2 respectively. These values were then indexed to body surface area (BSA) and compared with the findings of Ranucci et al who suggested a value of 272 mls/min/m² to prevent acute kidney injury. The RIFLE-R cohort had a mean indexed DO^2 of 241 mls/

min/m² and the non-RIFLE-R cohort was 287 mls/min/m² (p=0.004).3

The pre CPB Haemoglobin (Hb) and final Hb during CPB were not found to be significant p=0.54 and p=0.1 respectively.

The Nadir Hb, which has been suggested to be a significant predictor of acute kidney injury, showed a non-significant trend (p=0.07) (mean Nadir Hb in RIFLE-R cohort 72g/L and 79g/L in the non-RIFLE-R cohort).

The RIFLE-R cohort received a mean of 380mls (+/-555) of transfused blood and the non-RIFLE-R cohort had a mean of 138 mls (+/- 344) (p=0.06).

After the CPB run the RIFLE-R cohort had a mean of 1153mls (+/-1061) of blood and the non-RIFLE-R cohort received a mean of 793mls (+/-813) (p=0.23).

Redo-sternotomies

48% of patients were redo sternotomies, and 72% of the RIFLE-R cohort were redo-sternotomies.

The mean CPB time for 1st time sternotomies was 169 minutes (+/-39) and 234 minutes (+/-49) for the redo-sternotomies (p=0.000004).

The 1st time sternotomies received a mean of 34mls (+/- 129) of blood and the redo-sternotomies received 432 mls (+/- 559) of blood (p=0.009) during CPB.

The redo-sternotomies received a mean 380mls (+/-923) post CPB and the 1st time sternotomies a mean of 138mls (+/- 492) of blood respectively (p=0.06).

VAD explants

20 of the 50 patients (40%) had a VAD explant.

The mean pre op creatinine was not significantly different (p=0.4) between the VAD explant cohort than the non-VAD explant cohort 105µmol/L (+/- 41.6) vs 135µmol/L (+/- 139.8) respectively.

The CPB time was significantly between (p=0.001) between VAD explant and non VAD explant cohorts, 230 minutes (+/- 52.3) and 180 minutes (+/- 47.9) respectively.

The Donor ischaemic time was not significantly different (p=0.6).

The RIFLE-R rate in the VAD explant cohort was 65%, and 20% in the non VAD explant cohort (p=0.001).

The CVVHDF rate in the VAD explant cohort was 50% and 27% in the non VAD explant cohort (p=0.9).

The DO^2 was found to be significantly different in both the non-indexed and indexed form. The mean non-indexed DO^2 was 443mls O^2/minute (+/- 100.9) in the VAD explant cohort and 536 mls O^2/minute (+/- 116.0) in the non-VAD explant cohort (p=0.00009). The mean indexed number was in the VAD explant cohort was 241 mls O^2/min/m² (+/-47.7) and 295 mls O^2/min/m² (+/-59.3) (p=0.00004).

The VAD explant patient did have a significantly lower pre CPB haemoglobin (p=0.003) 109 g/l (+/-16.4), vs 124 g/l (+/- 17.8) in the non-VAD explant cohort. The Nadir Hb was also significantly different 65 g/l (+/- 1.16 in the VAD explant cohort and 83 g/l (+/- 1.1)in the non VAD explant cohort (p=0.000001).

The blood transfusion rates were also significantly different; during CPB the mean transfused amount was 518 mls (+/- 576) of blood and 30 mls (+/- 120.8) of blood in the non-VAD explant cohort (p=0.00003). The transfusion rate post CPB was 1533 mls (+/-948) in the VAD explant cohort and 433 mls (+/- 547.7) in the non-VAD explant cohort.

CVVHDF

18 out of the 50 transplanted patients (36%) required CVVHDF. Nine of these fell into the RIFLE-R criteria on day 1 post heart transplant. Of the patients who required CVVHDF, 70% were redo-sternotomies (p= 0.02) and 58% (p=0.17) were VAD explants. The patients requiring CVVHDF had significantly longer CPB times compared to those who did not (mean 235 mins (+/- 53) vs 179 (+/-45) mins respectively (p=0.003).

Donor ischaemic time was not significant (209 mins vs 211 mins p=0.84).

DO^2 was also found to be significantly different p=0.02, in both the raw number (471mls/min cvvhdf vs 535 mls/min non cvvdhf), and the indexed number p=0.02 (235 vs 284 mls/min/m²).

Blood transfused during CPB showed a non-significant trend (p=0.07, 366mls in CVVHDF patients and 131mls in non CVVHDF patients). However, blood transfused post CPB was significantly different p=0.007, (1429mls cvvhdf, 535mls non cvvhdf).

Nadir Hb during CPB was strongly significant (p=0.001) when comparing CVVHDF (69.5 g/l) with non CVVHDF (81 g/l).

Discussion of results

This audit discovered that several were factors were associated with rise in creatinine of 150% or greater on day 1 post heart transplant (modified RIFLE-R) These were, longer CPB times, Redo-sternotomies, VAD explants, DO^2 below 272mls/min/m²), Nadir Hb, and blood transfusion rates during and after CPB. The same risk factors were also identified for patients requiring CVVHDF within 28 days of heart transplantation.

Our rate of RIFLE-R (on day 1) was 36%, this is higher than the rate of 25% that Gude et al suggested, in contrast Ortega et al described a rate 70% RIFLE-R on day 7 post surgery. 2,4

In this audit the patients in the RIFLE-R cohort were actually younger on average, 40 in the RIFLE-R group and 49 in the non-RIFLE-R cohort. Gude et al found a significant difference in age between those experiencing AKI and those not, but they discovered those suffering from AKI were older. Boyle et al did not find a significant difference in age.4,5

48% of all the patients in the audit had a redo sternotomy, which compares to 40% in Gude et al and 57% in Boyle et al. 72% of patients in the RIFLE-R cohort were redo sternotomies whereas 34% of non-RIFLE-R cohort were redo-sternotomies (p=0.01), which suggests that redo-sternotomy patients are at

greater risk of developing AKI. This contrasts with Gude et al who did not find a significant difference between AKI and non AKI groups with regards to redo-sternotomy, neither did Ortega et al. However, Boyle did describe redo sternotomy as a significant risk factor for post heart transplant AKI. Our audit also found that redo-sternotomies took significantly longer, and required a greater blood transfusion rate both during and after CPB.2,4,5

CPB time was found to be significantly associated with RIFLE-R, which echoes the findings of Boyle et al, Gude et al and Ortega et al.2,4,5

Our VAD explant rate was found to be 40% compared to 4% described by Gude et al. Ortega and Boyle did not publish their VAD explant rates. 65% of VAD explants patients were RIFLE-R on day 1, compared to 20% of non-VAD explants (p=0.003). Gude et al did describe VAD explant as a significant risk factor for AKI.2,4,5

Donor ischaemic time was found not to have a significant effect on AKI. Gude et al found no association between Donor ischaemic time and AKI, however Boyle et al did.2,4,5

Lowest recorded MAP was also found to be not significant in relation to AKI. This concurs with Azau et al who suggest that maintaining an increased MAP during CPB does not reduce the risk of risk of AKI.6

Indexed pump flow rates were not found to be significantly different between the RIFLE-R and non-RFILE-R cohorts. However delivery rates of oxygen (DO^2) were found to be significant. When using DO^2 indexed to body surface area, a significant difference was noted between the RIFLE-R and non-RIFLE-R cohorts. The patients in the non-RIFLE cohort had a mean DO^2 of 287mls/min/m^2 and the RIFLE-R cohort had a mean DO^2 of 241 mls/min/m2. This concurs with the findings of Ranucci et al who suggested an indexed DO^2 of 272mls/min/m^2 to prevent acute kidney injury.3

The pre CPB Hb was not significantly different, and neither was the final Hb when comparing the RIFLE-R and non-RIFLE-R groups. However the Nadir Hb displayed a non-significant trend p=0.07. Nadir Hb has been often been cited as a predictor for acute kidney injury. Interestingly the patients in the VAD explant cohort had a significantly lower pre CPB Hb than the non-VAD explant cohort.7,8

As well decreased DO^2 and anaemia, there is a link between blood transfusion rates during CPB and acute kidney injury.9 The patients in the RIFLE-R cohort received a mean amount of 380 mls of blood (+/-555) during CPB and the non-RIFLE-R cohort received a mean of 138 mls of blood (+/-344) (p=0.06). There was however no significant difference in the amount of blood transfused post CPB. The redo sternotomy patients received more blood both during and after CPB than the 1st time sternotomy patients.

18 patients out of 50 (36%) required CVVHDF within 28 days of transplantation.

9 of these patients had a RIFLE-R on day 1 post-transplant. Ortega et al published a dialysis rate of 29%, Gude et al described a CVVHDF rate was 12% and Boyle et al 6%.2,4,5

Again, our higher CVVHDF rates are higher than the findings of Gude et al and Boyle et al. However they are similar to Ortega et al. 2,4,5

The CVVHDF cohort were characterised by similar findings as the RIFLE-R cohort. A redo-sternotomy rate of 72% (p=0.03) and a VAD explant rate of 55% (p=0.17).

The CVVHDF cohort had significantly longer CPB times than the non-CVVHDF cohort.

They also had significantly lower indexed and non-indexed DO^2 rates and received more blood during and after CPB. The Nadir Hb was more significant in the CVVHDF vs non-CVVHDF cohorts (p=0.001) than the RIFLE-R vs non-RIFLE-R cohorts (p=0.07).

The significant findings of this audit are; longer CPB time, Redo operations, VAD explants, lower DO^2, lower haemoglobin, and higher rates of blood transfusion are significantly associated with both risk of acute kidney injury (RIFLE-R) and CVVHDF. It can be seen from this audit that maintaining an adequate haemoglobin and DO2 are paramount to preventing to AKI. Reducing haemodilution is the key to this as blood transfusion is also associated to AKI. Measures such as prime reduction/circuit minimisation, retrograde autologous priming, and limiting pre-CPB fluids and during CPB can all minimise haemodilution.

References

1. Ghosh S, Falter F, Cook D. Cardiopulmonary Bypass. 1st ed. Cambridge: Cambridge university press, 2009. p167.
2. Escoresca Ortega AM, Ruiz de Azua Lopez Z, Hinojosa Perez R, et al. Kidney Failure after heart transplantation. Transplantation procedings 2010, 42, 3193-3195.
3. Ranucci M, Romitti F, Isgro G. Oxygen delivery during cardiopulmonary bypass and acute renal failure after coronary operations. Ann Thorac surg 2005;80: 2213-2220.
4. Gude E, Andreassan AK, Arora S, et al. Acute renal failure early heart transplantation: risk factors and clinical consequences. Clin transplant 2010: 24: E207-E213.
5. Boyle J, Moualla S, Arrigain S, et al. Risks and outcomes of acute kidney injury requiring dialysis after cardiac transplantation. American Journal of Kidney diseases 2006: 48, No 5, pp 787 796.
6. Azau A, Markowicz P, Corbeau JJ. Increasing mean arterial pressure does not reduce the rate of postoperative acute kidney injury. Perfusion 2014, vol 29 (6) 496-504.
7. Gravlee G, (ed). Cardiopulmonary bypass: Principles and practice. 3rd ed. Philadelphia: Lippincott Williams and Wilkins 2008. p341.
8. Long D, Jenkins E, Griffith K. Perfusionist techniques of reducing acute kidney injury following cardiopulmonary bypass: an evidenced based review. Perfusion 2015; 30; 25–32.
9. Loor G, Rajeswaran J, Li L, et al Exposure to red blood cell transfusion, anemia or both? The journal of Thoracic and Cardiovascular surgery. 2013; 146:1480-1487.
10. Bank A, Mir S, Nguyen D, et al. Effects of of left ventricular assist devices on outcomes in patients undergoing heart transplantation. Ann Thorac surg 2000;69: 1369-1375.

No of cases	50
Age range (years)	14-70
Mean age (years)	46
Redo rate	48%
VAD explant rate	40%
Mean pre op Cr (micromol/l)	120

AUSTRALASIAN BOARD OF CARDIOVASCULAR PERFUSION

AUTOTRANSFUSION COURSE 2015

The ABCP invites all healthcare workers interested in Autotransfusion to enrol in the 2015 Autotransfusion Course.
The purpose of the course is to provide current and future autotransfusionists with the background information necessary to provide a safe and effective service.

The course runs for 10 weeks and is conducted three times per year at a total cost of $250.00 (free to ANZCP members).

We are currently registering students for 2015 course commencement dates:

16 February (applications close 9 Feb)
25 May (applications close 18 May)
31 August (applications close 24 Aug)

For additional information and enrolment details, please contact the course co-ordinator, Chris Morley at
Chrismo@barwonhealth.org.au

Original Article

REVIEW ON THE USAGE OF MANNITOL DURING CARDIOPULMONARY BYPASS

B.S.Varghese, Diploma of Perfusion (Australia), PGDiploma Perfusion (India), J. McMillan, CCP (Australia), CCP (USA), M McDonald CCP (Australia), CCP (USA).

Perfusion Services, Melbourne, Victoria.

Introduction

Mannitol is an inert, undissociated six-carbon polyhydric alcohol .It is an osmotic diuretic 1. With adequate rehydration, it increases diuresis in patients with acute renal failure. It reduces intra cranial pressure and therefore used for treatment of cerebral oedema2. It is also used in short-term management of glaucoma2.

Mannitol is used during cardiac surgery as it improves renal blood flow, minimizes extra vascular fluid shifts and reduces positive fluid balance. The adverse effects of mannitol are fluid and electrolyte imbalance including circulatory overload and acidosis at high doses.

Mode of action

Within minutes of administration, majority of mannitol diffuses into the interstitial fluid. Very little, if any, penetrates the cells and so the raised extra cellular tonicity results in the withdrawal of fluid from cells. It also acts to prevent further cellular oedema.

The plasma volume expansion due to mannitol has been reported to be 1mL to 3 mL per kilogram body weight per 5 grams of mannitol 3.

Mannitol in the kidneys is freely filtered at the glomerulus into the renal tubules. It cannot enter the cells of the renal tubules, it is poorly reabsorbed and it stays within the lumen of the tubules. The increased osmotic pressure caused by mannitol remaining in the proximal tubules reduces water reabsorption resulting in increased diuresis 3.

The dosage of mannitol varies according to practice. Commonly used dosage during cardiopulmonary bypass is 0.25 to 0.5 grams per kilogram body weight.

Distribution of mannitol

The distribution of mannitol occurs in two phases. The initial phase is quite rapid and represents primarily the movement from plasma phase into extra cellular phase with minimal renal loss. The second phase is much slower and represents a combination of renal loss, which depletes the plasma space leading to a secondary shift from extra vascular fluid space into plasma and a continuing expansion of volume of distribution 8.

The distribution of mannitol is confined to extra cellular fluid space. Equilibration within this space requires more than three hours; 83% of administered mannitol is eliminated during the succeeding twenty-four hours 8.

A review on the usage of mannitol during cardiopulmonary bypass was conducted for sixty-five consecutive patients in order to analyze the difference in urine out put and fluid balance.

Materials and methods

Our practice is not to use mannitol as a constituent of the prime, however mannitol is administered during cardiopulmonary bypass, at the discretion of the perfusionist, if required to augment diuresis and to minimise fluid movement to the extra vascular space.

A retrospective analysis was conducted on the usage of mannitol during cardiopulmonary bypass. Data was collected from sixty-five consecutive patients who underwent routine cardiopulmonary bypass procedures. All patients were perfused using membrane oxygenators; centrifugal pumps, patented bonded circuits and had online blood cell processing. The prime consisted of 1800 mL Hartmann's solution and 5000 IU heparin as per routine protocol. Anti fibrinolytic agent either trasylol or tranexamic acid was added to the prime for selected patients. Hartmann's solution was used to maintain safe volume during bypass.

The patients were divided into two groups. Group A did not receive any mannitol during the surgery; Group B received 0.25 g per kilogram body weight mannitol during surgery.

The parameters analyzed were age, pre operative hemoglobin, weight, renal function, intra operative hemoglobin, bypass time, urine output, volume added during bypass and the fluid balance.

Statistical analysis was performed with SPSS for windows V 13,SPSS Inc.

Results

Thirty two consecutive patients were analyzed in the no mannitol group; the average age of the patients was 64.88 years, three patients of the group had aortic valve surgery, twenty seven patients had coronary artery bypass grafting, one patient had coronary artery bypass grafting with aortic valve surgery and one patient had coronary artery bypass grafting with mitral valve repair.

The average bypass time was 88.09 minutes. The average urine output was 725 mL and the fluid balance was 3131.25 mL. Five patients did receive packed red blood cells during the procedure as the hemoglobin level during bypass was below 6.0 g/dl.

Thirty one patients were successfully weaned off bypass without any inotropic support; one patient required inotropic support to wean off bypass. No patients required intra aortic balloon pump or ECLS.

Thirty three consecutive patients were analyzed in the mannitol group; the average age of the patients was 69.39 years, nineteen patients had coronary artery bypass grafting, six patients had

coronary artery bypass grafting with aortic valve surgery, three patients had coronary artery bypass grafting with mitral valve replacement, three patients had aortic valve surgery, one patient had aortic root replacement and one patient had mitral valve replacement with aortic valve replacement.

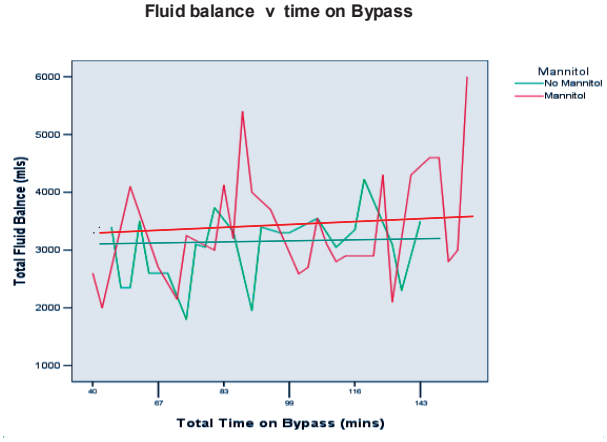
The average bypass time was 109.79 minutes ($p<0.05$). The average urine output was 806.67 mL and the fluid balance was 3341.82 mL Three patients did receive packed red blood cells during bypass as the hemoglobin level was below 6.0 g/dl.

Twenty seven patients were successfully weaned off bypass without any inotropic support; six patients required inotropic support to wean off bypass. No patients required IABP or ECLS.

The demographics show that two groups of patients were similar in all respects except for the bypass time ($p<0.05$) which was significantly longer in the group that had mannitol and refers to the complexity of the cases in this group.

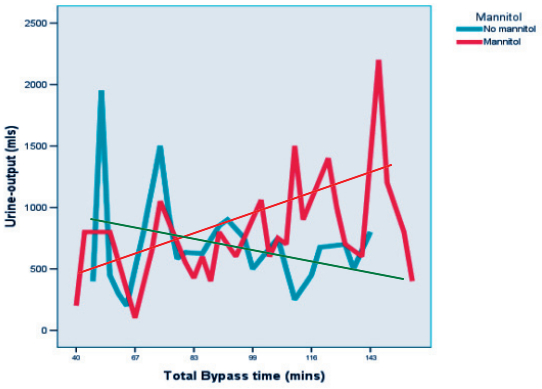
	Group A (no Mann)	Group B (Mann)	p value
Age	64.9(±12.5)	69.4 (± 12)	0.14
Hb (pre-op)	134(± 18.4)	137.8 (±17.4)	0.40
Weight	79.5(± 14.4)	78.6 (±14.6)	0.79
Urea	7.23(± 2.9)	9.2 (±12.1)	0.36
Creatinine	89.4 (± 31.8)	91.8 (±28.8)	0.76
Fluid balance	3131.3 (± 840.4)	3341.9 (±1064.4)	0.38
Bypass time	88.09 (±23.2)	109.8 (±41.9)	0.01
Urine output	725 (±467.3)	806.7 (±516)	0.51
Hb (bypass)	76.1(± 15.3)	77.7 (±12.1)	0.63

Graphical representation of fluid balance against time on bypass shows that fluid balance was on a higher side in group that had mannitol as compared to no mannitol group. This was not significant statistically.



Graphical representation urine output against time on bypass shows that the urine out put decreases as the bypass time increased in the no mannitol group and vice versa in the mannitol group this was not significant statistically.

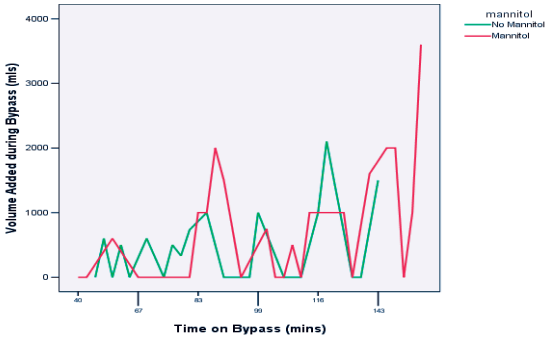
Total urine output (mls) v Time on Bypass



Graphical representation of fluid balance against time on bypass shows that fluid balance was on a higher side in group that had mannitol as compared to no mannitol group. This was not significant statistically.

Graphical representation of volume added on bypass -

Volume added during Bypass



As the bypass time increases the volume added on bypass increases in both the groups however

this was not significant statistically. The graph on urine output showed that as the bypass time increased the urine out put increased in the group that had mannitol. Even though the volume added on bypass increased in both the groups this was compensated by the increased urine out put in the group that had mannitol hence the net fluid balance was not significantly different in the group that had mannitol despite the prolonged bypass time.

Discussion-

This study analyzed the effects of mannitol on the fluid balance and urine output in patients undergoing routine cardiopulmonary bypass procedures.

Rationale for usage of mannitol during bypass are-

1. It improves renal blood flow secondary to the release of intrarenal vasodilating prostaglandins (reduces renal vascular resistance) 6. Studies have reported use of mannitol during cardio pulmonary bypass reduces incidence of postoperative renal failure3, 8.

2. Crystalloid prime of the bypass circuit lowers the plasma oncotic pressure resulting in extra vascular fluid shifts requiring additional fluids in order to maintain safe operating levels in the reservoir. Mannitol may help reduce these effects 3, 4

3. Decreased plasma oncotic pressure and increased capillary permeability results in net flux of fluid from intra vascular to extra vascular space. Vasodilation results with an increased intravascular volume thus increasing the need for additional fluid on bypass, which in turn increases the positive fluid balance; which in turn has several negative effects like oedematous patients with peripheral oedema and increased lung water. Mannitol may help reduce these effects 4.

4. Oxygen free radicals are associated with ischemia - reperfusion injury involving many organs. Mannitol with its free radical scavenging properties may reduce the extent of ischemic injury 7.

5. Renal function may be impaired by cardiopulmonary bypass and this impairment may further be compounded by superimposition of secondary insults such as prolonged bypass time and postoperative hemodynamic dysfunction3. The most important underlying factor for renal impairment is hypo perfusion during bypass with resultant ischaemic cell damage. Renal blood flow decreases between 15-50% of pre operative level9. Mannitol, when given before the ischaemic event, reduces any cellular swelling resulting in improved diuresis3.

The results of the analysis could not prove statistically that addition of 0.25 grams per kilogram body weight mannitol during bypass reduced the positive fluid balance or increased the urine output.

However

1. The two groups reviewed were identical except for the bypass time which was significantly longer in the mannitol group. The group that did receive mannitol was more complex and is one of the reasons behind prolonged bypass time. Addition of mannitol in these cases perhaps reduced the fluid shifts and or increased the urine out put hence the fluid balance was not different significantly between the groups.

2. Graphical representation of the urine output against time on bypass shows that addition of mannitol increases the urine out put in patients with bypass time greater than eighty minutes. This was not significant statistically.

3. Adequate dose of mannitol?

4. Mannitol was not added to the prime, it was added during bypass on adhoc basis at the discretion of perfusionist to either augment urine out put or to reduce the fluid shifts, perhaps contributing to the result of the analysis.

5. The power of the study was not strong enough to discern any differences.

Conclusion

The results of the review showed no significant difference in fluid balance and urine out put with the addition of mannitol. There was a trend for increased urine output in patients with prolonged bypass time. A prospective randomized control trial with larger patient group and addition of mannitol either in the prime or at a discrete time during bypass in order to reduce the variability between the groups is recommended.

References:

1. Priming fluids for cardiopulmonary bypass.
Author- Shah M.V
Techniques in extracorporeal circulation-3 rd edition

2. Mannitol drug information
http://www.drugs.com/MMX/Mannitol.html

3. The influence of mannitol on renal function during and after open-heart surgery.
Authors- Fischer A., Jones P; Barlow P et all Department of Anesthetics and Department of surgery, Hare field hospital, Hare field, Middlesex.
Journal- Perfusion, 1 March 1998, vol 3, pp 181-186

4. The combination of mannitol and albumin in the priming solution reduces positive intraoperative fluid balance during cardiopulmonary bypass.
Authors- I R Jenkins and A P Curtis Intensive care unit, Fremantle Hospital, Fremantle, Western Australia.
Journal- Perfusion 1995, volume 10 pages 301-305

5. Removal of Glucose from cardiopulmonary bypass prime: A prospective audit
Authors-RF Newland, RA Baker et al, Department of cardiothoracic surgery; Flinders Medical centre, South Australia.
Journal- JECT 2004 Volume 36; Pages 240-244.

6. Prevention of postoperative acute renal failure.
Author- Reddy VG, Department of anaesthesia and critical care, College of Medicine, Sultan Qaboos University Hospital, Sultanate of Oman.
Journal – J Post grad Medicine 2002; 48: 64-70

7. Mannitol in cardioplegia as an oxygen free radical scavenger measured by malondialdehyde.
Authors-Larsen M et all, Department of Clinical perfusion, The South West Cardiac Centre , Derriford hospital, Plymouth, Devon, United Kingdom
Journal- Perfusion 2002; 17: 51-55.

8. Mannitol hemodilution-Perfusion: The kinetics of mannitol distribution and excretion during cardiopulmonary bypass.
Authors- Porter G A et al
Journal- Journal of surgical research 1967; 7: 447-456.

9. An experimental study on the effect of mannitol during bypass.
Authors-Schuster SR et all
Journal- Circulation 1964; 29: 72-76.

10. Mannitol drug information http://www.drugs.com/MMX/Mannitol.html

Tubing Packs & Packaging Solutions

Intelligent Convenience
Right out of the Box

MAQUET
GETINGE GROUP

Fully preconnected customized tubing packs: Maquet is dedicated to designing unique perfusion circuits in close cooperation with the perfusionists who depend on an optimum, efficient set-up for extracorporeal circulation. After analysing and defining together the customer's needs, Maquet develops a prototype tubing pack for clinical testing and then assembles an individually tailored tubing pack. The result is a sophisticated product that perfectly fits the customer's specific clinical needs.

Maquet | The Gold Standard

The following pages contain the abstracts from the 31st Annual Scientific Meeting, Auckland.

THE INDEPENDENT EFFECTS OF ANAEMIA AND TRANSFUSION ON MORTALITY AFTER CORONARY ARTERY BYPASS: MULTICENTRE ANALYSIS USING THE PERFUSION DOWNUNDER COLLABORATIVE DATABASE.

Baker RA, Newland RF, Chew D. On behalf of the Perfusion Downunder Collaboration.
Flinders Medical Centre and Flinders University, South Australia, Australia.

Purpose

The interaction of anaemia and transfusion has been reported to be associated with an increased hazard of late mortality in a single centre study. Using multi-centre perfusion registry data, this study aims to evaluate the interaction of anaemia and red blood cell transfusion on in-hospital mortality in patients undergoing coronary artery bypass graft (CABG) surgery.

Methods

Data from 8204 adult patients undergoing isolated on pump CABG procedures was collected using the Perfusion Downunder Collaborative Database. 7700 patients with complete datasets were analysed using a mixed effect logistic regression model panelled by centre.

Results

Variables found to be independent predictors of mortality included age (Odds ratio [OR] 1.06 per year increase [95% confidence interval (CI) 1.04-1.09]; P < 0.001), emergency surgery ([OR] 2.38 [(CI) 1.12-5.04]; P = 0.023), preoperative myocardial infarction ([OR] 1.83 [95% confidence interval (CI) 1.13-2.95]; P = 0.013), severe left ventricular dysfunction ([OR] 3.8 [95% confidence interval (CI) 2.18-6.61]; P < 0.001), preoperative dialysis [OR] 2.55 [95% confidence interval (CI) 1.12-5.79]; P = 0.025), CPB duration [OR] 1.01 per minute increase [95% confidence interval (CI) 1.01-1.02]; P < 0.001), duration of CPB arterial blood pressure <50mmHg ([OR] 1.01 per minute increase [95% confidence interval (CI) 1.00-1.02]; P = 0.049) and anaemia/transfusion interaction ([OR] 12.1 for transfusion without anaemia [(CI) 4.57-32.26]; P < 0.001, [OR] 16.4 for transfusion with anaemia [(CI) 5.86-45.99]; P < 0.001, compared with patients without transfusion or anaemia). Perioperative timing of RBC transfusion was also found to be an independent predictor of AKI ([OR] 1.9 for intraoperative [(CI) 1.47-2.47]; P < 0.001, [OR] 2.01 for postoperative [(CI) 1.72-2.36]; P < 0.001, and [OR] 2.5 for intraoperative + postoperative [(CI) 1.98-3.16]; P < 0.001, compared with patients without RBC transfusion).

Conclusions

This multi-centre study supports the finding that the interaction of anaemia and red blood cell transfusion was associated with in-hospital mortality.

BLOOD CONSERVATION AND PRACTICES IN CARDIAC SURGERY

Darryl McMillan
Cardiopulmonary Perfusion and Autotransfusion Unit, Department of Anesthesia and Pain Management, Royal North Shore Hospital, Sydney, Australia.

Over the last ten years the importance of blood conservation in cardiac surgery has been brought to the forefront in the literature. There are those authors who state that the benefits of blood transfusion have never been conclusively demonstrated, but evidence of transfusion related harm continues to accumulate. There is little doubt that blood transfusions have saved many lives in cases of acute hypovolemia and anaemia since its conception yet the studies continue to report transfusion related harm that may be associated with an increase in patient morbidity and mortality. The current literature is suggesting that in cardiac surgical patients are often faced with the prospect of transfusion because of preoperative anaemia coupled with hemodilution from anaesthesia management and pump primes. It has also been stated in the literature, that the evidence is growing that there is a need to limit or to avoid transfusion.

The aim of this presentation is to discuss a number of NO or LOW cost blood conservation techniques that could be initiated in your unit on your return to the work place.

How many of us see our patients preoperatively and look for a history that may suggest that the patient may bleed. Should relevant question be asked, such as do they bruise easily, suffer from mucosal bleeding, spontaneous soft tissue bleeding or delayed healing and do they take any herbal medicines? Pre-operative preparation and assessment of the elective patient is essential in optimizing a patient for surgery.

What is the right balance heparin and protamine? Since the beginning of CPB in the 1950's, there have been many changes in the cardio pulmonary bypass system including the oxygenator, and circuit and surface coatings, yet little has changed in what is considered a safe level of heparinization. If heparin has a half-life of 2 hours and a patient has been on cardio pulmonary bypass for 3 hours with no further heparin added, what should be the reversing dose of Protamine? Perhaps we should consider giving half or less of the require Heparin to Protamine ratio of 2 : 1 and 3 : 1 rather than the standard 1 : 1 that is most often given regardless of when the last heparin dose was given. Protamine is a pro coagulant and is often the reason for post-operative bleeding in our experience. It appears from the literature that the appropriate protamine dosage is still unclear and its role in post-operative bleeding is still being identified.

Retrograde autologous priming (RAP) of the pump circuit prior to the initiation of bypass replaces the priming solution with the patient's own blood. Rap is an effective, easy and cost effective way to decrease the hemodilution from the pump prime which has been shown to reduce the rate red cell transfusion. RAP offers benefits but requires a team approach as the surgeon, anaesthetist and perfusionist must work together for the best result.

Blood conservation doesn't require large amounts of money nor the latest technology but simply everyone working together to achieve the same goal and the willingness to change practices.

THE BRAIN AFTER PAEDIATRIC OPEN HEART SURGERY

Christian Stocker, Paediatric Intensivist
Mater Children's Hospital, Brisbane

Long before the Boston circulatory arrest trial has the brain been at the centre of concerns in paediatric open heart surgery. Historically, opening the heart was delayed by technical limitations to simultaneously protect the heart and the brain. Not until facilitation of deep hypothermic circulatory (DHCA) arrest by cardiopulmonary bypass has open heart surgery in newborns and infants become possible. Brain injury arising from DHCA in these patient groups was described very early on, but the true extent of the damage and its clinical sequelae has only been unmasked in the last decade or so. Vigorous multicentre and predominantly North American research efforts have now identified a number of independent perioperative risk factors for brain injury and long term neurodevelopmental impairment in paediatric open heart surgery post-DHCA aera. This has led to a remarkable shift from traditional scapegoating cardiac surgical teams to shared responsibility of mitigating modifiable risk factors across all disciplines involved in perioperative care of the child undergoing cardiac surgery.

THE BRAIN AFTER NEONATAL AND PAEDIATRIC EXTRACORPOREAL LIFE SUPPORT

Christian Stocker, Paediatric Intensivist
Mater Children's Hospital, Brisbane

Data on short-term outcomes and complications in newborns and children undergoing extracorporeal life support (ECLS) treatment are readily available from the registry of the Extracorporeal Life Support Organisation (ELSO). However, data on long-term functional health outcomes including physical health, neurodevelopment, cognitive performance, psychological functioning, social functioning and quality of life in ECLS survivors are sparse in the literature and not collected by ELSO. From what is known, up to 70% of ECLS survivors may have impairments in one or more of the functional health domains. Understanding the mechanisms, timing and consequences of brain injuries in neonates and children undergoing ECLS treatment is essential for designing strategies aimed at prevention and treatment thereof.

ANTICOAGULATION STRATEGIES AND DIFFICULTIES IN NEONATAL & PAEDIATRIC EXTRACORPOREAL LIFE SUPPORT (ECLS): AN UPDATE

Christian Stocker, Paediatric Intensivist
Mater Children's Hospital, Brisbane

The increase in anticoagulation related complications in neonatal and paediatric ECLS worldwide was previously reported, and probable causes revealed. In brief, current recommendations for anticoagulation management do not match the pathophysiological complexity of haemostasis on ECLS. The eventual solution to the problem is the design of end-to-end integrated, finely tuned and validated ECLS systems that include pathophysiology-based drugs and their monitoring tools for management of coagulation. In the meantime, neonatal and paediatric ECLS centres should vigorously audit their own anticoagulation related complications, identify institutional risk factors, and adapt anticoagulation strategies.

NEW DIMENSIONS IN PERFUSION STANDARDS: CLINICAL USE OF M4 SPECTRUM MEDICAL MONITORING SYSTEM

James McMillan CCP(AUS, USA), Michael McDonald CCP(AUS, USA), Kyriakos Angus Anagnostou MSc, CCP(Europe), Kamala Priyadarshini Garfield BSc, CCP(India), Smita Gavande MSc, CCP(AUS)

Safe and successful conduct of CPB and ECLS requires continuous and real-time monitoring so that the perfusionist has uninterrupted updates as to the patient's changing physiologic state and depiction of trending of major parameters. This has led to the development of online monitoring devices. We at Perfusion Services have incorporated the Spectrum Medical M series for the last four years into our ECC and ECLS circuit. With the Spectrum M4 monitor for the first time, a non-invasive measurement of pCO2 and pO2 is possible along with measurements of SaO2, SvO2, HCT/Hb DO2, VO2, O2ER, Arterial and Venous Flow, Cardiac Index as well as detection of gaseous Emboli.

This presentation includes an overview of the product and how it has performed during clinical use as a patient monitoring system during CPB and ECLS. Performance characteristics of this system are comparable, reproducible and the level of accuracy is acceptable. Operating principle of this device and data to validate claims will be discussed during this presentation.

Conflict of Interests Statement

The author is not associated with any other organization with a commercial interest in the content of this paper.

Key words

Spectrum Medical, Cardiopulmonary bypass(CPB), Extra corporeal life support(ECLS), Arterial Oxygenation of the haemoglobin (SaO2), Venous oxygenation of the haemoglobin(SvO2), Hematocrit(Hct), Haemoglobin(Hb), Partial pressure of oxygen in the arterial line(PO2), Partial pressure of carbon dioxide in the arterial line (pCO2), Oxygen consumption(VO2), Oxygen delivery (DO2), Oxygen extraction ratio (O2ER)

CURRENT PERFUSION PRACTICES IN AUSTRALASIA: 2014 SNAPSHOT

Darryl McMillan

Cardiopulmonary Perfusion and Autotransfusion Unit, Department of Anaesthesia and Pain Management, Royal North Shore Hospital, Sydney, Australia.

This presentation aim is to provoke discussion on what are the current practises and techniques being utilized by Perfusionists within Australia and New Zealand, thereby establishing important trends that may be referred at a later date to compare current and past practices.

A total of 15 questions have being set with each question having a number of alternative answers to choose from giving each participant the answer that closely reflects their opinions and practices.

It is my belief that these types of audience surveys are beginning to play an important role in its ability to track the changes in practices that occur over time. By recording the results we will be able to compare the uptake of new techniques and procedures along with the redundancies of other techniques and procedures.

It is my hope that this presentation will provide a snapshot into current Perfusion practices with you, the audience, responding directly to the questions being proposed. Your answers will be then collated for a result with the result being opened for discussion. Responses are completely anonymous there is no way of identifying any individual using the remote provided.

I would like to take this opportunity to thank both Mr. Jeff Riley for his assistance in the construction and use of the audience response surveys and Medtronic Australasia for providing the technology to make it all possible.

Before leaving this session could you please hand in your remote or leave it where you were sitting as they will not change the channel of your TV at home.

TOTALLY THORACOSCOPIC ATRIAL FIBRILLATION ABLATION

Alex Peterson, Clinical Perfusionist
Auckland City Hospital

Atrial Fibrillation is the most common cardiac arrhythmia. In the 1990's it was estimated that over 5 million people worldwide suffered from AF with nearly 1 million more patients being diagnosed annually (AHA). The incidence of AF increases with age to around 10% in the 80+ age group (Go, A et al JAMA 2001).

Minimally invasive surgery provides a viable alternative to catheter ablation for lone Atrial Fibrillation and may prove helpful in freeing patient of anti-arrythmetic drugs.

A report of cases from Auckland City Hospital shows that Totally Thoracoscopic Maze Surgery can have outstanding results for patients with Paroxysmal, Persistent and Long Term Persistent Atrial Fibrillation.

OUR EXPERIENCE IN DEL NIDO CARDIOPLEGIA

Angel Johnes Vilayil BSc, CCP(India), Prof. Prsanna Simha Mohan Rao M.S., Mch, Praveen Billava Koti BSc, CCP(India), Vinayakumar Shankar Albal BSc, CCP(India), Narasimharaja Bidalapura Narasimhappa BSc, CCP(India), Anand Ankalkoti BSc, CCP(India)
Sri Jayadeva Institute of cardiovascular Sciences & Research, Bangalore, India-560069

Myocardial preservation is an integral part of cardiopulmonary Bypass. Post-surgery myocardial damage is a common cause for morbidity and mortality of the patient undergoing cardiac surgery. There are many myocardial protection techniques used with successful result. We at Sri Jayadeva Institute of cardiovascular Sciences started using del Nido Cardioplegia for past Nine months.

In my paper I would like to discuss more on the technical aspects, advantages and disadvantages of this solution. I wish to share the experience we got while using del Nido cardioplegia during valve repairs and replacement. This solution could be a safe alternative when compared to the other routinely used cardioplegic solutions.

TEN-YEAR TRENDS IN BLOOD MANAGEMENT DURING CARDIAC SURGERY

Christa Boer, Department of Anaesthesiology, VU University Medical Centre, De Boelelaan
1117, 1081 HV Amsterdam, the Netherlands (c.boer@vumc.nl)

About 10 to 15 percent of the overall supply of allogeneic blood products is consumed for treatment of perioperative bleeding during cardiac surgery. Due to increased awareness, allogeneic blood consumption has decreased over the years by application of blood conservation techniques. However, the scientific evidence for most blood conservation techniques is limited, and best practices are not widespread. International guidelines focusing on blood conservation strategies provide a broad range of recommendations, including treatment of preoperative low hemoglobin levels, a patient-dependent transfusion threshold, preoperative discontinuation of anticoagulation drugs, the use of coated extracorporeal circuits, minimization of extracorporeal circuit priming volumes, individualized heparin and protamine management, use of cell salvage, avoidance of hemodilution by infusion of crystalloids and colloids and cessation of intraoperative hypothermia.

An analysis of predictors for blood loss and allogeneic blood consumption patterns can be of help in understanding key factors for improvement of perioperative blood management, especially since allogeneic blood transfusion has frequently been related to increased mortality. In this lecture, different blood conservation strategies over the last decade will be discussed and related to perioperative blood loss and transfusion requirements.

INDIVIDUALIZED HEPARIN AND PROTAMINE MANAGEMENT

Christa Boer, Department of Anaesthesiology, VU University Medical Centre, De Boelelaan
1117, 1081 HV Amsterdam, the Netherlands (c.boer@vumc.nl)

Perioperative haemostasis is a complex and multifactorial process, in particular in cardiothoracic surgery with cardiopulmonary bypass. In addition to blood loss, hypothermia, consumption coagulopathy, the administration of heparin and protamine may further deteriorate perioperative haemostasis.

Haemostatic abnormalities following cardiopulmonary bypass require normalization of coagulation factors to prevent bleeding. Classical coagulation tests, like the activated partial thromboplastin time (aPTT) and prothrombin time (PT) are however time-consuming, and their use is often restricted to post-hoc decision-making in acute perioperative haemostatic abnormalities. In our hospital we use rotational thromboelastometry to guide perioperative fresh frozen plasma transfusion in case of signs of clinical bleeding.

The use of heparin and protamine affect haemostasis by extending the clot formation time. First, residual heparin after protamine administration may still prolong the clot formation time. Second, protamine overdosing may further extend the clot formation time. Although rotational thromboelastometry provides a clot formation test with heparinase to study the effects of residual heparin on the clotting time, we found that this test is also affected by protamine overdosing.

A haemostasis management system is supportive in tailor-made heparin and protamine dosing, and may prevent overdosing of protamine. It is however unknown whether heparin management is also beneficial for post-bypass haemostasis when compared to the classical activated clotting time (ACT) test. We therefore performed a randomized controlled study where we investigated the influence of the implementation of a haemostasis management system on perioperative haemostasis compared to an ACT-based anticoagulation strategy. Moreover, the results will be presented of a randomized controlled trial where we compared a high versus low protamine-to-heparin dosing ratio with respect to postoperative bleeding and transfusion requirements. Our work shows that protamine overdosing might be more harmful for perioperative haemostasis then we previously assumed.

MICROCIRCULATORY DISTURBANCES DURING CARDIOPULMONARY BYPASS

Christa Boer, Department of Anaesthesiology, VU University Medical Centre, De Boelelaan
1117, 1081 HV Amsterdam, the Netherlands (c.boer@vumc.nl)

Disturbances in microcirculatory perfusion are a hallmark of critical conditions like sepsis or hemorrhagic shock and in patients undergoing cardiac surgery with cardiopulmonary bypass (CPB). Using sublingual sidestream dark field imaging and tissue oxygenation measurements we were able to study the microcirculation in patients undergoing cardiac surgery with or without the use of cardiopulmonary bypass. While off-pump cardiac surgery was mostly associated with preserved microcirculatory perfusion throughout the perioperative period, extracorporeal circulation induced a clear decrease in microvascular perfusion and oxygenation. Deterioration of microcirculatory blood flow was paralleled by hyperdynamic capillary flow profiles and loss of endothelial integrity, leading to a reduced oxygen off-loading capacity of the microvasculature. Moreover, cardiopulmonary bypass-induced impaired microcirculatory perfusion continues to exist in the first 3 postoperative days. Persistent microcirculatory dysfunction might contribute to the development of organ failure and unfavorable patient outcome, and therefore warrants preventive interventions that protect the microvasculature. This however requires better understanding of the pathophysiology underlying acute microcirculatory perfusion disturbances, which is currently lacking.

The aforementioned observations led to our ongoing research focusing on mechanisms that underlie the reduction in microvascular perfusion during cardiac surgery with cardiopulmonary bypass. We focused on the influence of systemic blood pressure and flow characteristics (non-pulsatile or pulsatile) on microvascular perfusion. In a rat model for extracorporeal circulation that was combined with intravital microscopy of the cremaster muscle, we further investigated whether hemodilution influences the perfusion of the microvasculature.

In this lecture I will present our most recent findings that provide new insight in the pathophysiology underlying microcirculatory dysfunction during cardiopulmonary bypass. Moreover, novel interventions will be presented that may be supportive in preservation of the microcirculation in cardiac surgery.

THE INFLUENCE OF REWARMING TEMPERATURES DURING CARDIOPULMONARY BYPASS ON ACUTE KIDNEY INJURY FOLLOWING CARDIAC SURGERY: MULTICENTRE ANALYSIS FROM THE PERFUSION DOWNUNDER COLLABORATIVE DATABASE

Newland RF, Baker RA, Quinn S, Chew D. On behalf of the Perfusion Downunder Collaboration.
Flinders Medical Centre and Flinders University, South Australia, Australia.

Purpose

Acute kidney injury (AKI) following cardiopulmonary bypass (CPB) is associated with increased mortality, requirement for dialysis, and longer intensive care unit (ICU) and hospital length of stay. In our previous single centre study, arterial outlet temperature > 37 oC was found to be a predictor of AKI, however the influence of temperature < 37 oC has not been reported. Using multi-centre perfusion registry data, this study aims to evaluate the role of rewarming temperatures during CPB on AKI following cardiac surgery using the RIFLE (renal Risk, Injury, Failure, Loss of renal function and End-stage renal disease) criteria.

Methods

To determine the influence of rewarming temperatures (measured as the cumulative time arterial outlet temperature >36, 36.5 and 37 oC) on AKI, data from 7743 adult patients undergoing isolated on pump coronary artery bypass graft (CABG), valve repair and/or replacement and valve/CABG procedures was collected using the Perfusion Downunder Collaborative Database. 6797 patients with complete datasets were analysed using a mixed effect logistic regression model panelled by centre. AKI was defined according to the RIFLE criteria as an increase in serum creatinine > 50% from baseline to peak value postoperatively.

Results

Overall 11.8% of patients developed AKI with a 9 fold increase in-hospital mortality. Duration of outlet temperature > 36 or 36.5 oC were not found to be associated with AKI. Variables found to be independent predictors of AKI included CPB hyperthermia (Odds ratio [OR] 1.05 per minute increase [95% confidence interval (CI) 1.01-1.08]; P = 0.01), minimum CPB nasopharyngeal temperature (Odds ratio [OR] 1.06 per degree increase [95% confidence interval (CI) 1.003-1.11]; P = 0.04), age ([OR] 1.02 per year increase [(CI) 1.01-1.02]; P < 0.001), chronic pulmonary disease ([OR] 1.52 [(CI) 1.22-1.88]; P < 0.001), hypertension ([OR] 1.34 [(CI) 1.11-1.62]; P = 0.002), diabetes ([OR] 1.49 [(CI) 1.26-1.77]; P < 0.001), emergency surgery ([OR] 2.84 [(CI) 1.83-4.42]; P < 0.001), red blood cell transfusion ([OR] 1.27 [(CI) 1.21-1.34]; P < 0.001), and procedure type other than isolated coronary artery grafting ([OR] 1.59 for valve repair/replacement [(CI) 1.3-1.94]; P < 0.001, and [OR] 1.33 for valve repair/replacement [(CI) 1.04-1.7]; P = 0.02).

Conclusions

Rewarming temperature > 37 oC was found to be an independent predictor of AKI. These findings from multi-centre data support our previous results, that avoiding an arterial outlet temperature > 37oC may help decrease AKI following cardiac surgery using CPB.

HEPARIN RESISTANCE: MANAGEMENT STRATEGIES FOR CARDIOPULMONARY BYPASS

Dr Holder Kuehne

Heparin resistance during cardiac surgery is the failure of an adequate heparin dose to achieve a target ACT. It is a multifactorial disorder that is complicated by the variability in heparin's anticoagulant effect and the fact that the ACT is not specific to heparin. Depending on the definition used, heparin resistance is reported in up to 25% of patients undergoing cardiopulmonary bypass. Severe forms seem to be associated with adverse outcome.

Heparin's primary mechanism of action is mediated through catalyzing the anticoagulant effect of antithrombin (AT), an endogenous inhibitor of thrombin, factor Xa, and other factors. AT mediated and non-AT mediated causes of heparin resistance have been described.

Current treatment options include additional heparin and/or antithrombin supplementation. As an alternative management strategy the concept of „balanced anticoagulation" with supplementation of a direct thrombin inhibitor will be discussed.

INTEGRATED ARTERIAL FILTERS IN NEW GENERATION OXYGENATORS – DO THEY CUT THE MUSTARD?

Ghaz NS Jabur MSc CCP (Aust), Karishma Sidhu, Tim W Willcox CCP (Aust)
Green Lane Clinical Perfusion, Auckland City Hospital, Auckland, New Zealand

Background

Cardiopulmonary bypass (CPB) related emboli have been investigated for several decades. The majority of studies have used in vitro models of CPB. The "final line of defence" against emboli in the CPB circuit is the arterial line filter (ALF) which is an optional addition to the CPB circuit. New generation hollow-fibre membrane oxygenators have integrated arterial filtration to reduce circuit size and priming volume.

Methods

51 adult patients undergoing surgery were perfused using a CPB circuit containing either a non-integrated oxygenator with a stand-alone 20 µm AFL or an integrated filtration oxygenator. The Emboli Detection and Classification quantifier was used to count emboli upstream and downstream of the oxygenator-filter combination throughout CPB. The mean proportion of emboli removed by the filter was compared between the groups.

Results

The non-integrated new generation oxygenator with 20 µm ALF had the highest percentage reduction of total emboli counts per minute (96.77%, p=<0.0001) compared to all other oxygenators/filter combinations (range 96.77% - 61.75%). This advantage was true for each 10 micron emboli size groups up to 70 microns.

Conclusion

In this comparison new generation integrated oxygenators were variably efficient at removal of emboli and were out performed by the new generation non-integrated oxygenator with a stand-alone 20 µm ALF.

DOES REMOVING MANNITOL AND VOLUVEN FROM THE PRIMING FLUID OF THE CARDIOPULMONARY BYPASS CIRCUIT HAVE CLINICAL EFFECTS?

Matthew Haydock

Background

Auckland Hospital Cardiothoracic unit recently removed Mannitol and Voluven from its Plasma-lyte based cardiopulmonary bypass (CPB) priming fluid. As with any change to practice, a comprehensive audit should be performed to identify positive or negative effects. The aim of this retrospective analysis was to investigate the effect of changing the CPB prime constituents on fluid balance and clinical outcome parameters.

Method

Clinical records were reviewed for 100 consecutive patients undergoing primary, isolated coronary artery bypass grafting (CABG), 50 patients before the prime change and 50 after. All data was collated into a central database for analysis.

Results

Mean arterial pressure while on bypass was higher in the new prime group (61.5 mm Hg vs. 57.5 mm Hg, p = 0.002). While there was a tendency for hematocrit and hemoglobin to be higher among the new prime group, this was not statistically significant. There was no significant difference in serum sodium, potassium or creatinine post-operatively between groups. In regards to important outcomes such as post-operative weight and fluid balance, time on ventilation, length of stay in ICU or hospital and mortality there were no significant differences. Interestingly, new prime group spent a smaller proportion of their time in ICU on mechanical ventilation (23% vs. 36%, p = 0.022).

Conclusion

Mannitol and Voluven, as with all drugs, carry their own potential adverse effects. This study demonstrates that removing Mannitol and Voluven from priming fluid did not have any detrimental effect on electrolytes, fluid status and other important outcomes in this consecutive series of patients having primary isolated CABG surgery. The risk, benefit balance combined with the obvious economic benefit clearly favors removing Mannitol and Voluven from priming fluids.

CARBON DIOXIDE INSUFFLATION IN OPEN-CHAMBER CARDIAC SURGERY: A DOUBLE-BLIND, RANDOMIZED CLINICAL TRIAL OF NEUROCOGNITIVE EFFECTS

Krish Chaudhuri, Geraldine Lee, Elsdon Storey, Enjarn Lin, Arthur Preovolos, Silvana Marasco
Department of Cardiothoracic Surgery, The Alfred Hospital, Melbourne, Australia.

Introduction

The aims of this study were first to analyze neurocognitive outcomes of patients after open-chamber cardiac surgery to determine whether carbon dioxide pericardial insufflation reduces incidence of neurocognitive decline (primary end point) as measured 6 weeks postoperatively and second to assess the utility of carbon dioxide insufflation in cardiac chamber deairing as assessed by transesophageal echocardiography.

Method

A multicenter, prospective, double-blind, randomized, controlled trial compared neurocognitive outcomes in patients undergoing open-chamber (left-sided) cardiac surgery who were assigned carbon dioxide insufflation or placebo (control group) in addition to standardized mechanical deairing maneuvers.

Results

125 patients underwent surgery and were randomly allocated. Neurocognitive testing showed no clinically significant differences in z scores between preoperative and postoperative testing. Linear regression was used to identify factors associated with neurocognitive decline. Factors most strongly associated with neurocognitive decline were hypercholesterolemia, aortic atheroma grade, and coronary artery disease. The number of perfusionist interventions was not associated with neurocognitive decline. There was significantly more intracardiac gas noted on intraoperative transesophageal echocardiography in all cardiac chambers (left atrium, left ventricle, and aorta) at all measured times (after crossclamp removal, during weaning from cardiopulmonary bypass, and at declaration of adequate deairing by the anesthetist) in the control group than in the carbon dioxide group ($P < .04$). Deairing time was also significantly longer in the control group (12 minutes [interquartile range, 9-18] versus 9 minutes [interquartile range, 7-14 minutes]; $P = .002$).

Conclusion

Carbon dioxide pericardial insufflation in open-chamber cardiac surgery does not affect postoperative neurocognitive decline. The most important factor is atheromatous vascular disease.

RENAL FAILURE POST HEART TRANSPLANT; THE ROLE OF THE PUMP

Keith Adkins
Saint Vincent's Hospital, 390 Victoria Street, Darlinghurst, NSW 2010.

The purpose of this study was to investigate the risk factors for renal failure post heart transplant and what role specifically the heart-lung machine plays in post-transplant renal failure.

This was a retrospective observational study of all 50 patients that underwent heart transplantation from 1st January 2012 to 31st December 2013.

Risk factors include; Redo sternotomy (especially VAD explants), increased CPB time, decreased DO2, lower Nadir haemoglobin, and increased transfusion rates.

The risk of renal failure is greatly increased by redo surgery especially VAD explants. Lower haemoglobin and DO2 are also significantly associated with renal failure. Techniques that avoid haemodilution may help prevent renal failure in the post-operative patient.

TRUE INTEGRATED ARTERIAL DEPTH FILTER OXYGENATOR SHOWS SIGNIFICANTLY BETTER AIR REMOVAL CHARACTERISTICS COMPARED WITH SCREEN FILTER OXYGENATORS

Marco Stehouwer BSc, Kristina Legg BSc, Tamara Roosenhoff BSc, Roel de Vroege PhD.

The development of hollow fiber membrane oxygenators with integrated arterial filters enables reduction in membrane surface area and reduces priming volume. Four contemporary oxygenators with an integrated filter concept are all designed differently. Besides difference in the design of the oxygenator module, also the concepts of the integrated filters vary strongly. The Medtronic Affinity® Fusion oxygenator may be considered as a 25 µm filter because of the proprietary fiber winding process with an interlaced pattern removing particles and air. The Terumo Capiox® FX25 oxygenator is developed with a 32 µm screen filter surrounding the fibers of the oxygenator, capturing air and particles. The integrated arterial filter of the Sorin Inspire® M8F consists of a 38 µm screen filter and the housing is constructed around the oxygenator. The Maquet Quadrox® i Adult with integrated filter is constructed with a 40 µm screen filter housed on the outflow of the oxygenator. The effect of different design of oxygenators with integrated arterial filter on gaseous microemboli (GME) handling is unknown.

This study aims to demonstrate whether a difference in design of the oxygenators with integrated arterial filter influences the GME handling. Also detailed GME removal will be assessed, which may show difference in fractionation and distribution of GME size and their reduction.

Eighty patients scheduled for elective cardiac surgery are randomly assigned to be perfused with one of the four oxygenators with integrated arterial filter. The quantity and volume of GME will be accurately measured before and after the devices.

The data obtained up to now show that the Terumo Capiox FX25 and the Medtronic Affinity® Fusion show almost similar volume reduction rates (95.6 ± 3.6 % and 95.1 ± 3.2 %, respectively) and reduce GME volume significantly better compared with the Maquet Quadrox IF and the Sorin Inspire M6F (85.2 ± 5.1 % and 82.7 ± 15.5 %)($p < 0.05$).

All oxygenators with a screen filtration design, Terumo Capiox, Maquet Quadrox and Inspire, showed fractionation of larger bubbles into more smaller GME.

In conclusion, the Medtronic Affinity Fusion and the Terumo Capiox FX25 oxygenators show significantly better air removal characteristics compared with the Sorin Inpsire M6F and Maquet Quadrox IF oxygenators. This may be the result of the depth filter properties of both the Terumo Capiox FX25 and Medtronic Affinity Fusion devices caused by the woven structures of their fibers. A secondary finding is that screen filtration may lead to fractionation of larger bubbles into more small GME.

INTRAVENOUS FLUID THERAPY AFTER CARDIOPULMONARY BYPASS - JUST HOW WET ARE OUR PATIENTS AND CAN WE GIVE LESS?

Rachael Parke, RN, PhD

For the last four years a programme of research has been underway in the Cardiothoracic and Vascular ICU at Auckland City Hospital evaluating fluid administration to cardiac surgical patients.

This programme of research has involved three studies so far. A single centre and a multi-centre observational study have been completed to determine how much fluid patients receive postoperatively and the reasons for administration. This data was then used to develop an interventional study designed to assess the effect of a novel intervention to rationalise fluid administration in the ICU postoperatively. The study utilised a protocol based on stroke volume variation to guide fluid administration in patients following cardiac surgery and found that less fluid was given when this approach was used and that there was no increase in acute kidney injury when this approach was used.

CASE REPORT: SUSPECTED MALIGNANT HYPERTHERMIA CLINICAL OBSERVATIONS, TREATMENT AND PERFUSION PRECAUTIONS

Annette L Mazzone BSc (Hons) , Dip Perf, CCP (Aust).
Flinders Medical Centre, Bedford Park, South Australia, Australia

A 58 year old male presented for coronary artery bypass grafting following admission with acute coronary syndrome and history of myocardial infarction on the 4th August 2014. No past history of anaesthetic problems was reported. An arterial intravenous fluid and central venous catheter were inserted uneventfully. Following administration of suxamethonium the patient was intubated and sevoflurane administered for blood pressure control. The patient's nasopharyngeal temperature at intubation was 37.2°C. Over the next few minutes, the nasopharyngeal temperature steadily increased, heart rate and the end tidal CO2 increased and blood gases showed developing acidosis. Malignant hyperthermia (MH) was suspected. Immediate treatment included discontinuation of sevoflurane and dantrolene administration. The procedure was abandoned and the patient was transferred to the intensive care unit and extubated after 5 hrs.

The patient was rescheduled for operation on 12th August 2014. Anaesthetic and perfusion precautions taken for malignant hyperthermia included removal of the vaporiser on the heart lung and anaesthetic machines and replacement of disposable gas line tubing. The gas delivery circuit in the heart lung machine was flushed with 100% oxygen at 10L/min for 20 minutes. Hartmann's solution routinely used in our prime was replaced with 0.9% saline. The procedure was carried out uneventfully and after a prolonged period in ICU (72 hrs) due to the development of hospital acquired pneumonia and new atrial fibrillation the patient was discharged on 18th August 2014. A subsequent systematic search for reports about MH and cardiopulmonary bypass was undertaken. The search identified avoidance of trigger agents including volatile anaesthetics and suxamethonium, use of decontaminated anaesthetic and heart lung machine gas supply components and avoidance of aggressive rewarming, as rapid and exaggerated rewarming was considered to be a trigger in two reported cases.

Malignant hyperthermia susceptibility is an important risk factor during general anaesthesia and is a potentially lethal disease. The classic early symptoms of MH episodes most often occur during the induction of anaesthesia after administration of the triggering agent, however cases have been reported where administration of the triggering agent occurs on CPB. Recognition of the symptoms and immediate treatment is vital to reduce impact of its morbidity and mortality.

CURRENT PERFUSION PRACTICES IN AUSTRALASIA: 2014 SNAPSHOT

Darryl McMillan
Cardiopulmonary Perfusion and Autotransfusion Unit, Department of Anaesthesia and Pain Management, Royal North Shore Hospital, Sydney, Australia.

This presentation aim is to provoke discussion on what are the current practises and techniques being utilized by Perfusionists within Australia and New Zealand, thereby establishing important trends that may be referred at a later date to compare current and past practices.

A total of 15 questions have being set with each question having a number of alternative answers to choose from giving each participant the answer that closely reflects their opinions and practices.

It is my belief that these types of audience surveys are beginning to play an important role in its ability to track the changes in practices that occur over time. By recording the results we will be able to compare the uptake of new techniques and procedures along with the redundancies of other techniques and procedures.

It is my hope that this presentation will provide a snapshot into current Perfusion practices with you, the audience, responding directly to the questions being proposed. Your answers will be then collated for a result with the result being opened for discussion. Responses are completely anonymous there is no way of identifying any individual using the remote provided.

I would like to take this opportunity to thank both Mr. Jeff Riley for his assistance in the construction and use of the audience response surveys and Medtronic Australasia for providing the technology to make it all possible.

Before leaving this session could you please hand in your remote or leave it where you were sitting as they will not change the channel of your TV at home.

THE INFLUENCE OF TIMING OF RED BLOOD CELL TRANSFUSION ON MORTALITY FOLLOWING CARDIAC SURGERY: MULTICENTRE ANALYSIS USING THE PERFUSION DOWNUNDER COLLABORATIVE DATABASE

Baker RA, Newland RF, Chew D. On behalf of the Perfusion Downunder Collaboration.
Flinders Medical Centre and Flinders University, South Australia, Australia.

Purpose

Red blood cell (RBC) transfusion in patients undergoing cardiopulmonary bypass (CPB) and cardiac surgery is associated with increased mortality and acute kidney injury (AKI). Using multi-centre perfusion registry data, this study aims to evaluate the influence of the perioperative timing of red blood cell transfusion on mortality and AKI following cardiac surgery using the RIFLE (renal Risk, Injury, Failure, Loss of renal function and End-stage renal disease) criteria.

Methods

To determine the influence of the perioperative timing of RBC transfusion on mortality and AKI, data from 13853 adult patients undergoing isolated on pump coronary artery bypass graft (CABG), valve repair and/or replacement and valve/CABG procedures was collected using the Perfusion Downunder Collaborative Database. Excluding patients with preoperative dialysis or chronic kidney disease, 12287 patients with complete datasets were analysed using a mixed effect logistic regression model panelled by centre. AKI was defined according to the RIFLE criteria as an increase in serum creatinine > 50% from baseline to peak value postoperatively.

Results

Variables found to be independent predictors of mortality included age (Odds ratio [OR] 1.05 per year increase [95% confidence interval (CI) 1.03-1.07]; P < 0.001), emergency surgery ([OR] 2.84 [(CI) 1.83-4.42]; P < 0.001), severe left ventricular dysfunction ([OR] 2.93 [95% confidence interval (CI) 1.78-4.82]; P < 0.001) preoperative creatinine [OR] 1.005 per umol/l increase [95% confidence interval (CI) 1.001-1.008]; P = 0.003), CPB duration [OR] 1.009 per minute increase [95% confidence interval (CI) 1.006-1.012]; P < 0.001), and perioperative timing of RBC transfusion ([OR] 5.08 for intraoperative [(CI) 2.29-11.26]; P < 0.001, [OR] 5.56 for postoperative [(CI) 3.14-9.86]; P < 0.001, and [OR] 12.9 for intraoperative + postoperative [(CI) 6.68-24.99]; P < 0.001, compared with patients without RBC transfusion). Perioperative timing of RBC transfusion was also found to be an independent predictor of AKI ([OR] 1.9 for intraoperative [(CI) 1.47-2.47]; P < 0.001, [OR] 2.01 for postoperative [(CI) 1.72-2.36]; P < 0.001, and [OR] 2.5 for intraoperative + postoperative [(CI) 1.98-3.16]; P < 0.001, compared with patients without RBC transfusion).

Conclusions

Perioperative timing of RBC transfusion was found to be an independent predictor of mortality and AKI. Patients receiving both intraoperative and postoperative red blood cell transfusion had a 12 fold increase in the likelihood of mortality than those without transfusion.

CARDIAC SURGERY ASSOCIATED ACUTE KIDNEY INJURY

Shay McGuinness

Cardiac surgery-associated acute kidney injury (CSA-AKI) is common and is associated with adverse short and long-term patient outcomes. The pathophysiology of CSA-AKI is complex and few interventions have demonstrated effectiveness in reducing its incidence.

We will discuss the definition, epidemiology, pathogenesis and outcomes of CSA-AKI and review the current evidence supporting strategies to minimise both the incidence and adverse outcomes of CSA-AKI.

THE INDEPENDENT EFFECTS OF ANAEMIA AND TRANSFUSION ON MORTALITY AFTER CORONARY ARTERY BYPASS: MULTICENTRE ANALYSIS USING THE PERFUSION DOWNUNDER COLLABORATIVE DATABASE

Baker RA, Newland RF, Chew D. On behalf of the Perfusion Downunder Collaboration.
Flinders Medical Centre and Flinders University, South Australia, Australia.

Purpose

The interaction of anaemia and transfusion has been reported to be associated with an increased hazard of late mortality in a single centre study. Using multi-centre perfusion registry data, this study aims to evaluate the interaction of anaemia and red blood cell transfusion on in-hospital mortality in patients undergoing coronary artery bypass graft (CABG) surgery.

Methods

Data from 8204 adult patients undergoing isolated on pump CABG procedures was collected using the Perfusion Downunder Collaborative Database. 7700 patients with complete datasets were analysed using a mixed effect logistic regression model panelled by centre.

Results

Variables found to be independent predictors of mortality included age (Odds ratio [OR] 1.06 per year increase [95% confidence interval (CI) 1.04-1.09]; P < 0.001), emergency surgery ([OR] 2.38 [(CI) 1.12-5.04]; P = 0.023), preoperative myocardial infarction ([OR] 1.83 [95% confidence interval (CI) 1.13-2.95]; P = 0.013), severe left ventricular dysfunction ([OR] 3.8 [95% confidence interval (CI) 2.18-6.61]; P < 0.001), preoperative dialysis [OR] 2.55 [95% confidence interval (CI) 1.12-5.79]; P = 0.025), CPB duration [OR] 1.01 per minute increase [95% confidence interval (CI) 1.01-1.02]; P < 0.001), duration of CPB arterial blood pressure <50mmHg ([OR] 1.01 per minute increase [95% confidence interval (CI) 1.00-1.02]; P = 0.049) and anaemia/transfusion interaction ([OR] 12.1 for transfusion without anaemia [(CI) 4.57-32.26]; P < 0.001, [OR] 16.4 for transfusion with anaemia [(CI) 5.86-45.99]; P < 0.001, compared with patients without transfusion or anaemia). Perioperative timing of RBC transfusion was also found to be an independent predictor of AKI ([OR] 1.9 for intraoperative [(CI) 1.47-2.47]; P < 0.001, [OR] 2.01 for postoperative [(CI) 1.72-2.36]; P < 0.001, and [OR] 2.5 for intraoperative + postoperative [(CI) 1.98-3.16]; P < 0.001, compared with patients without RBC transfusion).

Conclusions

This multi-centre study supports the finding that the interaction of anaemia and red blood cell transfusion was associated with in-hospital mortality.

THE MATTER OF PRIME REDUCTION

Baker RA, Newland RF, Chew D. On behalf of the Perfusion Downunder Collaboration.
Flinders Medical Centre and Flinders University, South Australia, Australia.

This presentation, which will assume some end-user experience with fluid management and flow dynamics, will focus upon contemporary clinical enhancements regarding "right-sizing" extracorporeal circuits; discuss acuities enveloping large-team dynamics of change; and contrast some of the disputed discernments of circuit reduction with the benefits of reduced prime volumes.

THE SOCIETY OF THORACIC SURGEONS, THE SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS, THE AMERICAN SOCIETY OF EXTRACORPOREAL TECHNOLOGY CLINICAL PRACTICE GUIDELINES FOR CARDIOPULMONARY BYPASS: TEMPERATURE MANAGEMENT DURING CARDIOPULMONARY BYPASS

Rob Baker for the STS/SCA/AmSECT Clinical Practice Guidelines 2014 Writing Group.

Draft Executive Summary

Class I Recommendations:

a) The oxygenator arterial outlet blood temperature is recommended to be utilized as a surrogate for cerebral temperature measurement during CPB. (Class I, Level C)

b) To accurately monitor cerebral perfusate temperature during warming, it should be assumed that the oxygenator arterial outlet blood temperature under-estimates cerebral perfusate temperature. (Class I, Level C)

c) Surgical teams should limit arterial outlet blood temperature to <37°C to avoid cerebral hyperthermia. (Class 1, Level C)

d) Temperature gradients between the arterial outlet and venous inflow on the oxygenator during CPB cooling should not exceed 10°C to avoid generation of gaseous emboli. (Class 1, Level C)

e) Temperature gradients between the arterial outlet and venous inflow on the oxygenator during CPB rewarming should not exceed 10°C to avoid outgassing when blood is returned to the patient. (Class 1, Level C)

Class IIa Recommendations:

a) Pulmonary artery or nasopharyngeal temperature recording is reasonable for weaning and immediate post-bypass temperature measurement. (Class IIa, Level C)

b) Rewarming when arterial blood outlet temperature ≥30°C:

i. To achieve the desired temperature for separation from bypass, it is reasonable to maintain a temperature gradient between arterial outlet temperature and the venous inflow of ≤ 4°C. (Class IIa, Level B)

ii. To achieve the desired temperature for separation from bypass, it is reasonable to maintain a rewarming rate ≤ 0.5°C/min. (Class IIa, Level B)

c) Rewarming when arterial blood outlet temperature <30°C: To achieve the desired temperature for separation from bypass, it is reasonable to maintain a maximal gradient of 10oC between arterial outlet temperature and venous inflow. (Class IIa, Level C)

No Recommendation

No recommendation for a guideline is provided concerning optimal temperature for weaning from CPB due to insufficient published evidence.

INFLUENCE OF OXYGEN DELIVERY ON ACUTE KIDNEY INJURY: MULTICENTRE ANALYSIS USING THE PERFUSION DOWNUNDER COLLABORATIVE DATABASE

Robert A Baker, PhD, CCP (Aust), Richard F Newland, BSc, CCP (Aust), Timothy W Willcox
for the Perfusion Downunder Collaboration

Preoperative risk factors for acute kidney injury (AKI) for patients undergoing cardiac surgery have been reported, however intraoperative risk factors for patients undergoing cardiopulmonary bypass (CPB) are not as clearly defined. Two previous reports have identified minimum oxygen delivery index (DO2i) during CPB as an independent predictor of AKI, for patients with the Acute Kidney Injury Network class II criteria, and patients requiring renal replacement therapy respectively. This study aims to support these findings by evaluating a larger patient population from a multi-centre setting.

Methods

Influence of DO2i was evaluated in 12102 adult patients undergoing isolated on pump coronary artery bypass graft (CABG), valve repair and/or replacement and valve/CABG procedures using multicentre data from the Perfusion Downunder Collaborative Database (SACHREC approval 332.14). Minimum DO2i during CPB was calculated according to the formula; 10 x average cardiac index (l/min/m2) x oxygen content, where oxygen content was calculated as; (minimum haemoglobin (g/dL) x 1.34 x minimum oxygen saturation (%)) + (0.003 x minimum pO2 (mmHg)). 10580 patients with complete datasets were entered into a mixed effects logistic regression model panelled by centre to identify independent predictors of AKI according to the RIFLE class Risk or greater and Injury or greater criteria.

Results

1439 patients (11.9%) developed AKI at the Rifle level of risk or greater. Patients developing AKI were more likely to be older, female, have higher body mass index, history of chronic obstructive airway disease, previous cardiac surgery, emergency surgery, diabetes, hypertension, congestive heart failure, infective endocarditis, ejection fraction < 30% and have a lower preoperative haemoglobin. Intraoperatively they had longer cardiopulmonary bypass time, lower minimum CPB haemoglobin, spent more time with an cardiac index < 1.6 l/min/m2 on bypass, and lower minimum DO2i. Minimum DO2i (10 ml/min/m2 increments) was found to be an independent predictor of AKI for the RIFLE classification of Risk or greater (OR 0.98 CI 0.96-0.99), but not for RIFLE class Injury or greater. Other independent predictors of AKI for the RIFLE classification of Risk or greater were; age, gender, body mass index, diabetes, chronic pulmonary disease, severe left ventricular dysfunction, procedure type, emergency surgery, arterial outlet temperature > 37°C, and units of red blood cells transfused. Independent predictors of AKI for the RIFLE classification of Injury or greater were; age, gender, body mass index, diabetes, hypertension, arterial outlet temperature > 37°C, and units of red blood cells transfused.

Conclusions

These results support the findings that oxygen delivery during CPB is an independent predictor of AKI following cardiac surgery. In this multicentre analysis, oxygen delivery was found to predictive of RIFLE classification of Risk or greater AKI.

INSPIRED CHOICE

PERSONALIZED PERFUSION,
BECAUSE NO TWO OF YOUR PATIENTS ARE THE SAME

EQUIPPED TO PERFORM

SORIN | INSPIRE™

A complete new family of adult oxygenator systems raising performance expectations and ease of use, while providing clinicians an unprecedented choice of new solutions to improve outcome in cardiopulmonary bypass.

PERFUSION SOLUTIONS

www.sorin.com
info.cardiacsurgery@sorin.com

SORIN GROUP
AT THE HEART OF MEDICAL TECHNOLOGY

Proudly distributed by CELLPLEX PTY/LTD

CALENDAR *of* EVENTS

MAY 2015

7-10
EuroELSO 4th International Congress
University Medical Centre Regensburg
Regensburg, Germany
http://www.regensburg-euroelso2015.com/

14-17
Mechanisms of Perfusion
Omni Orlando Resort at Championsgate
Orlando, Florido
http://mechanisms.com/

JUNE 2015

10-13
16th European Congress on Extracorporeal Technology
International Convention & Events Centre ICE
Krakow, Poland
http://fecect.org/

10-13
11th International Conference Pediatric Mechanical Circulatory Support Systems and Pediatric Cardiopulmonary Perfusion
University of Verona School of Medicine
Verona, Italy
http://pennstatehershey.org/web/pedscpb/home/conferenceinfo

17-20
The New Orleans Conference
Practices in Cardiac Surgery and Extracorporeal Technologies
http://www.theneworleansconference.com/home.html

24-27
ASAIO 61st Annual Conference
Chicago Hilton Hotel
Chicago, Illinois
https://asaio.com

25-26
6th International Congress on ECMO
Paris, France
http://www.paris-ecmo.org

AUGUST 2015

6-8
Perfusion Down Under
Novotel Barossa Valley Resort
Barossa Valley, South Australia
http://perfusiondownunder.com/

OCTOBER 2015

3-7
29th EACTS Annual Meeting
Amsterdam RAI
Amsterdam, The Netherlands
http://www.eacts.org/annual-meeting/

3-4
15th European Conference on Perfusion Education and Training in Conjunction with EACTS Congress
Amsterdam RAI
Amsterdam, The Netherlands
http://www.ebcp.org/news/single/15th-european-conference-on-perfusion-education-and-training.html

7-10
AmSECT Quality and Outcomes
Marriot Rivercenter
San Antonio, Texas
www.amsect.org

16-18
2nd Meeting of the Federation of Asian Perfusion Societies in conjunction with 41st ASM of JaSECT
Kobe Convention Center
Kobe, Japan
http://www2.convention.co.jp/faps2015/index.html

NOVEMBER 2015

5-7
32nd Annual Scientific Meeting of the ANZCP
Manly, NSW

FEBRUARY 2016

24-28
CREF 36th Annual Cardiothoracic Surgery Symposium
Hyatt Regency Long Beach
Long Beach, California
http://crefmeeting.com

MARCH 2016

15-19
54th International Conference
The Broadmoor Resort
Colorado Springs, Colorado
www.amsect.org

京都

KYOTO

APELSO2015

The 2nd Conference of Asia-Pacific Chapter of Extracorporeal Life Support Organization

Under the Auspiced of: Japan Society of Respiratory Care Medicine

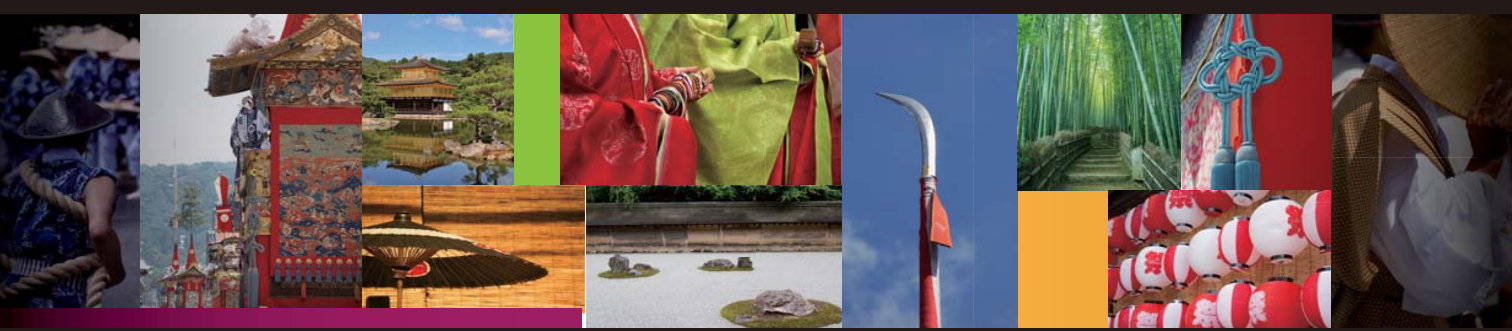
Under the Joint Auspiced of: Japanese Society of Intensive Care Medicine

Jointly hosted with: The 37th Annual Meeting of the Japan Society of Respiratory Care Medicine

Period: July 17-18, 2015

Venue: Kyoto International Conference Center、Kyoto, JAPAN

President: Satoru HASHIMOTO Intensive Care Medicine, Kyoto Prefectural University of Medicine, JAPAN



Period: July 17-19, 2015

Venue: Kyoto International Conference Center, Kyoto, JAPAN

President: Ryoichi OCHIAI

Anesthesia and Intensive Care Medicine, Toho University, Faculty of Medicine, JAPAN

http://apelso2015.com/

AMERICAN SOCIETY OF EXTRACORPOREAL TECHNOLOGY

AmSECT

Quality and Outcomes

October 7-10, 2015

Marriott Rivercenter
San Antonio, Texas

www.amsect.org




SAN ANTONIO

AmSECT National Headquarters
2209 Dickens Road • Richmond, VA 23230-2005 • (804) 565-6363 • Fax (804) 282-0090

ANZCP

Australian and New Zealand College of Perfusionists

THE 2015 ANNUAL SCIENTIFIC MEETING IS COMING TO SYDNEY!

To be held at the Novotel Sydney Manly Pacific.

Mark your diaries for the 5th-7th November 2015.

Perfusion Downunder

The Barossa Valley, South Australia

6-8th August 2015