ISSN 2071-4602 (Online)

SA HEART®

Journal of the South African Heart Association

2024
Volume 21 Number 2

Congress of the South African Heart Association

CARDIOLOGY CONNECTIONS
08 - 10 November 2024

SA HEART®
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Front cover:
Title: Little girl standing next to a life size model of a whales heart, taken at the Museum of New Zealand Te Papa Tongarewa.
Photo: Ruchika Meel

Editor-in-Chief, Professor Ruchika Meel
Sandton Mediclinic, Bryanston, Johannesburg, South Africa
University of the Witwatersrand, Johannesburg, South Africa

New chapter for the South African Heart® Journal

I hope this message finds you well. I would like to express my heartfelt gratitude for the opportunity to serve as the Editor of the SA Heart® Journal. I am truly honoured to take on this role and contribute to the advancement of cardiovascular research in our community. On behalf of the SA Heart® board I would like to thank the outgoing editorial team for their contributions to SA Heart® Journal.

I look forward to collaborating with the esteemed editorial team and authors to uphold the Journal's reputation for excellence. Together, I believe we can foster impactful research and insights that will benefit our readers and to the cardiology field.

As we embark on a new chapter for the SA Heart® Journal, I am both honoured and excited to introduce the Journal and our dedicated editorial team.

The SA Heart® Journal has long been a platform for sharing groundbreaking research and clinical insights in cardiovascular medicine. Our mission is to disseminate knowledge that improves patient care and advances the field, not only within South Africa but across the global medical community.

I am thrilled to announce our new editorial team, comprising experts from diverse backgrounds in cardiology, surgery, and research. Together, we bring a wealth of experience and a shared commitment to enhancing the Journal's quality and impact. We aim to foster an environment that encourages innovative research and robust discussions, ensuring that we stay at the forefront of cardiovascular health.

Our mission is to resurrect SA Heart® Journal so that it can be utilised as a voice for South African Heart® Association and the cardiology community. I would like to create a platform where experts share their knowledge and experience to improve the Journal impact factor. It aims to be the leading platform for the dissemination of novel research and progress in cardiovascular science.

SA Heart® Journal aims to disseminate novel research through publication of original research papers, review articles, case reports, and short reports relating to all aspects of cardiology. It aims to be all inclusive, enhance communication between cardiologist, technologists, basic research scientists, and allied health care professionals.

We are committed to promoting scientific excellence, facilitating knowledge exchange and contributing to the global effort to improve cardiovascular health outcomes.

The main goals of SA Heart® Journal are:

- Publish high quality research
- Advance clinical practice
- Encourage multi-disciplinary and transdisciplinary collaboration
- Enhance exchange of knowledge
- Promote open access and transparency
- Support emerging researchers
- Drive innovation in cardiovascular science
- Contribute to policy and public health
- Maintain high standard of ethical integrity

As we move forward, we invite contributions from researchers, clinicians, and thought leaders. Your insights are invaluable, and we are eager to showcase the latest developments in our field. We also encourage feedback and suggestions to help us continually improve the Journal.

Thank you for your ongoing support of the SA Heart® Journal. Together, let's make significant strides in advancing heart health.

Regards

Ruchika Meel
Editor-in-Chief, SA Heart® Journal

WELCOME NOTE

Guest Editor, Professor Eric Klug
University of the Witwatersrand, Johannesburg, South Africa
President, SA Heart® 2024

Welcome to the SA Heart® Congress 2024

As I conclude my term as President of the South African Heart Association (SA Heart®), I extend a heartfelt welcome to all of you as we embark on the 24th Annual SA Heart® Congress in Sandton, Johannesburg. This year's Congress holds a special significance as we celebrate the dawn of our 25th anniversary as an association.

SA Heart® has been steadfast in its commitment to serving as the official voice of cardiovascular matters in South Africa. We have maintained fiercely the clinical independence of our members, ensuring that their expertise and judgment are paramount. Moreover, we have dedicated ourselves to promoting education within our various cardiovascular specialities and among the public at large.

This Congress will embody these principles and provide a platform for engaging and thought-provoking discussions among our esteemed colleagues. Over the course of 3 days, we hope to foster a warm and invigorating atmosphere that will strengthen our community and advance the field of cardiology.

As we look ahead, I am pleased to introduce the new Editorial Board and Editor of the SA Heart® Journal, Prof Ruchika Meel. I encourage all of us to support Ruchika in re-establishing the Journal as a central hub of education for our association.

I would like to express my sincere gratitude to Dr Ahmed Vachiat for his exceptional leadership as the Congress Organising Committee Chair. His dedication and expertise have been invaluable in ensuring the success of this event. Additionally, I would like to commend Elouise Cloete and Shift Ideas for their professional support in providing the backbone for our annual Congress.

The SA Heart® Congress is a cornerstone of our landscape, an essential event that brings together our membership and visitors to share knowledge, network, and inspire one another. I am confident that this year's Congress will be a memorable and enriching experience for all.

Warm regards,

Eric Klug
Outgoing President, SA Heart®

WELCOME NOTE

Guest Editor, Dr Ahmed Vachiat
Wits Donald Gordon Medical Centre, Netcare Milpark Hospital, Parktown, Johannesburg, South Africa
Congress Convenor, SA Heart® 2024

Welcome to the SA Heart® Congress 2024

The SA Heart® Annual Congress will be held from 8 - 10 November 2024, at the Sandton Convention Centre in Johannesburg. This year's theme, "Cardiology Connections", reflects our commitment to fostering collaboration and dialogue among cardiology professionals. The Congress provides a unique opportunity for experts, practitioners, and researchers from around the world to converge, share knowledge, and explore the latest advancements, challenges, and innovations in cardiovascular medicine.

The event will feature a rich programme of keynote speeches, panel discussions, workshops, and networking sessions. Designed to cover a comprehensive range of contemporary cardiology topics and their practical clinical applications, the Congress agenda is tailored to offer insights from leading figures in the field. Attendees will gain valuable knowledge about the latest developments in cardiology and their potential impact on patient care.

A key focus this year is on strengthening connections among the various special interest groups within SA Heart®, including SASCI, CISSA, CASSA, HEFSSA, ISCAP, and SASCAR. Through joint sessions, these groups will collaborate on cardiovascular themes with the goal of improving healthcare outcomes for people across South Africa.

We are excited to welcome a distinguished faculty, both local and international. A highlight will be a cardiovascular team from the Mayo Clinic - featuring Prof Vuyi Nkomo (Imaging Cardiologist), Prof Soron Pislaru (Chair, Structural Heart Disease), and Prof Jean Crestanello (Chair, Cardio-thoracic Surgery) - who will lead an echocardiography workshop on Friday morning, 8 November. This workshop will incorporate innovative approaches to learning, sharing, and professional growth.

Dr Thomas Alexander from India will deliver an enlightening session on establishing STEMI networks in South Africa. Our national STEMI SA programme aims to enhance timely presentation, access to healthcare, and ultimately, reperfusion therapy. On the final day of the Congress, we will connect industry leaders, medical aid funders, and healthcare professionals at the Access to Health Care Imbizo to further these critical discussions. We are also privileged to host Prof Stylianos Pyxaras from Germany and Dr Andrew Ludwiniec from the United Kingdom, who are international experts on chronic total occlusions and complex coronary interventions. Additionally, Prof Thierry Lefevre from France will join our esteemed local experts in the interventional community to address these important topics.

In a new addition to the programme, we will hold an imbizo on rheumatology and cardiac diseases, offering updates from SASCAR on cardiomyopathies, research sessions, and discussions of over 40 submitted abstracts.

Our paediatric colleagues have also organised an excellent parallel programme, featuring Prof Krishna Kumar from India and Prof George McDaniel from the United States of America, with a pre-Congress workshop and highly interactive sessions that will incorporate insights from local experts.

This year, we are introducing a Heartbeat Stage, which will feature insightful talks, engaging presentations, and a special networking address. We are honoured to have Dr Imtiaz Sooliman from Gift of the Givers, who will share his thoughts on "Connecting Hearts and Social Responsibility".

At its core, SA Heart® has a united goal: To advance cardiovascular care through education, research, and advocacy. Connecting colleagues - whether in the private or public sectors, industry, government, as mentors, or students - will be central to achieving this aim.

Our vision is to improve cardiovascular care for all in South Africa by fostering these connections and supporting the next generation of healthcare professionals.

Ahmed Vachiat
Congress Convenor, SA Heart®

Meet the SA Heart® Sub-editors

RUCHIKA MEEL - EDITOR

Prof Ruchika Meel is a general cardiologist at Sandton Medi-Clinic and an associate professor at the University of the Witwatersrand, Johannesburg, South Africa. She has an interest in clinical cardiology and cardiovascular imaging. She has a passionate interest in research with to date 1 book publication, 4 book chapters and 47 research articles and over 60 congress presentations. Her Masters of Medicine research dissertation, awarded cum laude, was entitled "Time to fibrinolytics for acute myocardial infarction and reasons for delays at Steve Biko Academic Hospital, Pretoria". Her PhD thesis was an investigation of myocardial mechanics in chronic rheumatic mitral regurgitation. She is currently involved in research projects related to aortic aneurysms. She is actively involved in supervising and teaching MMED students, undergraduate and postgraduate medical students. She is a Fellow of European Society of Cardiology and European Association of Cardiovascular imaging. She is an executive member of the Cardiac Imaging Society of South Africa and education committee. She has received multiple awards for conference presentations and was the recipient of Carnegie doctoral and post-doctoral awards. She was awarded the prestigious T.H. Bothwell research prize in Internal Medicine at the University of the Witwatersrand school of clinical medicine annual awards ceremony. She has recently been appointed as the Editor-in-Chief of the South African Heart® Association Journal.

ASHLEY CHIN

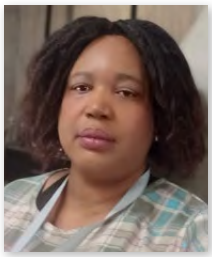
Prof Ashley Chin is a cardiologist and director of pacing and electrophysiology at Groote Schuur Hospital and UCT Private Academic Hospital. He is an associate professor at the University of Cape Town and an accredited electrophysiologist and device specialist by the International Board of Heart Rhythm Examiners (IBHRE). He is a Fellow of the Heart Rhythm Society (FHRS) and European Heart Rhythm Association (FEHRA). He is the immediate past president of the Cardiac Arrhythmia Society of Southern Africa (CASSA). He serves as an executive committee member of the African Heart Rhythm Association (AFHRA) and on the educational board of the World Society of Arrhythmias (WSA).

JOHN LAWRENSON

John Lawrenson is the former head of the paediatric cardiology service of the Western Cape Province. He is still actively involved in research and teaching at Red Cross Children's and Tygerberg Hospitals.

ELENA LIBHABER

Prof Elena Libhaber has a degree in Chemistry from the University of Buenos Aires, MSc in Biochemistry, University of Tel Aviv, MSc in Research Methodology and Statistics and PhD in Physiology from the University of the Witwatersrand. She is now a visiting professor of Research Methodology and Statistics at the Health Sciences Research Office and at the School of Clinical Medicine, Faculty of Health Sciences at the University of the Witwatersrand and honorary associate professor of the Department of Medicine at the Faculty of Health Sciences at University of Cape Town. To date she has supervised a multiple of PhD, MSc, and MMed students. She is in charge of the biostatistical support at the Wits Health Sciences Faculty Research Office. Also collaborates with the Cape Heart Institute of the Faculty of Health Sciences at the University of Cape Town. To date she has over 95 peer-reviewed published articles.



MAMOTABO MATSHELA

I am a qualified cardiologist and associate professor of medicine, and an advanced cardiovascular researcher. Apart from being a cardiologist with continued interest research, I'm a cardiovascular imaging specialist primarily focusing on advanced echocardiography and also cardiac MRI.

For at least a decade now I have been much focused on advanced research and special areas of interest among others include qualitative research, cardiovascular health disparities, cardio-oncology, cardio-obstetrics, pericardial diseases, heart failure, and pulmonary hypertension. I have presented and chaired both local and international sessions mostly on multimodality imaging. Most of my research presentations encompasses subclinical myocardial mechanical dysfunction (application of speckle tracking) in cardiovascular diseases particularly in pericardial diseases and heart failure.

I have been a Fellow of the American College of Cardiology (previously IAACC) and European Society of Cardiology for at least 7 years, actively participating within multiple committees and councils including stroke, cardio-oncology, heart failure, imaging (radiology), myo-pericardial and more. For a couple of years now I have consistently participated at both the ACC and ESC conferences, as an attendee, presenter and chairperson. In addition, I am a Fellowship of the pulmonary vascular research institute (FPVRI) since 2010 to-date.

Furthermore, I have been a regular member of the American Heart Association (AHA) since 2013, then subsequently a premier professional member of the AHA for 3 years now and active within the following councils i.e. Council on Clinical (CLCD, primary) and CVS radiology and Intervention (secondary), and also participate within the women forums.

I have been a member of the SAHA, previously part of the South Africa Heart Association's education committee before moving to the Mayo Clinic for my doctoral and post-doctoral studies. While away I continued as an international member of the SAHA. During my educational endeavours with the Mayo Clinic, I continued to serve within the education committee (MRFA) as an educational chair for the Mayo 2 Clinic International Fellows where I actively participated in multiple meetings and also involved with arranging conferences and other gatherings.

Ever since I also served as a tutor, lecturer, mentor and supervisor (co-supervisor) and expanded all these duties to South Africa where I continue as a mentor for B.Tech, Masters and PhD students.

Although I have just joined the "Joint Medical Holdings' group", I continue as a research collaborator with the Mayo Clinic (and University of KwaZulu-Natal) and also within the executive educational programme of the University of Minnesota while at the same time continuing to champion my collaborative research and clinical endeavours with others.

Last but not least, thank you for inviting me to be part of the SA Heart® Journal as a sub-editor. It will be an honour and privilege to be part of this organisation and wish to play my part and contribute immensely towards the mission of this Journal. I do understand the role and responsibilities of the sub-editor and looking forward to contributing, face challenges and forge growth moving forward.

Hopefully I will bring my skills, valuable interests and academic knowledge to the Journal.

Meet the SA Heart® Sub-editors

KEIR McCUTCHEON

I grew up in Johannesburg and completed my BSc, MSc and MBBCh (in 2003) at the University of the Witwatersrand. I then completed my FCP (SA) (Chris Hani Baragwanath Hospital and the Wits Academic Hospital circuit) and cardiology (Charlotte Maxeke Johannesburg Academic Hospital) in Johannesburg in 2012. I worked as a consultant cardiologist in Johannesburg for 3 years while completing my PhD research before moving overseas for further training. In 2018, I completed a 2-year fellowship in interventional cardiology in Belgium (University Hospitals, Leuven (UZL)). After my fellowship, I was appointed as permanent staff / interventional cardiologist at UZL and assistant professor at the Katholieke Universiteit Leuven (KUL). In mid-2021 I moved to Newcastle upon Tyne in the United Kingdom and after 18 months in the NHS, I opted to start my own cardiology practice in Windhoek, Namibia, where I live with my wife, Lindsay, and 2 daughters.

PHILASANDE MKOKO

Dr Philasande Mkoko is a European Heart Rhythm Association (EHRA) certified cardiac electrophysiology specialist. Philasande graduated with a MBChB degree at MEDUNSA in 2008 and did his internship at Groote Schuur Hospital from 2009 - 2010. He spent a year of community service at Livingstone Hospital and Dora Nginza Hospital in 2011. He returned to Groote Schuur Hospital and the University of Cape Town to train in Internal Medicine. He graduated with a MMed degree at the University of Cape Town in 2015 and an FCP (Internal Medicine) in 2015. In 2016, he spent time as a consultant physician and head of the Department of Medicine at Dora Nginza Hospital Internal Medicine in Gqeberha. He graduated with a Certificate in cardiology from the Colleges of Medicine of South Africa in 2019, a Certificate in interventional electrophysiology with the European Heart Rhythm Association in 2021 and a MPhil (Cardiology) in 2022. Philasande worked as a cardiologist and clinical lead in cardiac pacing and electrophysiology at Charlotte Maxeke Johannesburg Academic Hospital and the University of the Witwatersrand from 2022 - 2023. Philasande specialises in percutaneous treatment with catheter ablation of abnormal heart rhythms, including atrial fibrillation (AF), ventricular tachycardias (VT), premature ventricular complexes (PVCs) and advanced heart failure management with cardiac resynchronisation and implantable cardioverter defibrillators.

ARTHUR K. MUTYABA

Dr Arthur K. Mutyaba is a cardiologist at Charlotte Maxeke Johannesburg Academic Hospital where he is interventional cardiologist and director of the cardiac catheterisation laboratory. He completed undergraduate and postgraduate studies at the University of Cape Town before undertaking a fellowship in interventional cardiology at Sunninghill Hospital in Johannesburg, South Africa. In his current role, he oversees the daily clinical and administrative activities of the catheterisation laboratory as well as the training of 8 cardiology Fellows.

ANUPA PATEL

Dr Anupa Patel is a senior cardiologist and clinical lecturer at Charlotte Maxeke Johannesburg Academic Hospital and the University of Witwatersrand where she is the imaging lead in the Division of Cardiology. She has training and experience in advanced cardiac imaging including echocardiography and cardiac CT and has a special interest in structural heart disease.

DARSHAN REDDY

Dr Darshan Reddy is a cardiothoracic surgeon practicing at the Lenmed Ethekwini Hospital and Heart Centre in Durban.

Dr Reddy completed his undergraduate medical degree at the University of Cape Town and his cardiothoracic surgical training at the University of KwaZulu-Natal, completing both a Masters in medicine and the Fellowship of the Colleges of Cardiothoracic Surgeons of South Africa. Dr Reddy spent a year as a visiting clinical lecturer in paediatric cardiac surgery at the University of Michigan and has a special interest in the surgical treatment of paediatric and congenital heart disease.

Dr Reddy holds leadership positions in the Society of Thoracic Surgeons (STS), the World Society of Paediatric and Congenital Heart Surgery (WSPCHS), and the African Society of Paediatric and Congenital Heart Surgery (ASPCHS). His interests include complex neonatal cardiac surgery and rheumatic mitral valve repair.

MUHAMMED TALLE

Dr Muhammed Talle graduated with an MBBS from the University of Maiduguri (Nigeria) in 1998 and joined the services of the College of Medical Sciences, University of Maiduguri, as a medical research Fellow in 2002. He obtained a Fellowship from the West African College of Physicians in Internal Medicine / Cardiology in October 2008. He had 2 years of additional training in cardiology at Tygerberg Hospital / Stellenbosch University as a supernumerary international Fellow from 2008 - 2010. Dr Talle also obtained a MSc in human physiology from the University of Maiduguri (2007), and a MSc (MedSc) in cardiovascular sciences with distinction from the University of Glasgow (2015). He was awarded a PhD in medicine by Stellenbosch University in December 2023.

Currently, he is a professor of medicine at the University of Maiduguri and an honorary consultant physician / cardiologist at the University of Maiduguri Teaching Hospital. His areas of interest include hypertension, cardiomyopathy, heart failure, sudden cardiac death, cardiac imaging, biomarkers, and nephrocardiology. Dr Talle is involved in national and international collaborative research and has published more than 70 papers in peer-reviewed journals. In addition to serving on the editorial board of Borno Medical Journal and Nigerian Journal of Cardiology, he is a reviewer to numerous academic journals.

Dr Talle is an assessor at the West African College of Physicians. He served as a member of the National Research Fund Screening and Monitoring Committee (2019 - 2023), responsible for assessing proposals and monitoring the conduct / progress of research funded by TETFund in Nigeria; and is a member of the Standing Committee on Research and Development (TETFund, 2020).

Meet the SA Heart® Editorial Board

ANTOINETTE CILLIERS

Prof Antoinette Myrna Cilliers is the adjunct professor in the Department of Paediatrics, Chris Hani Baragwanath Academic Hospital, University of the Witwatersrand, Johannesburg, South Africa.

She is head of paediatric cardiology, Chris Hani Baragwanath Academic Hospital. Attended the University of Witwatersrand Medical School, specialised in paediatrics within the University of the Witwatersrand Hospital complex, and completed a 1 year fellowship in interventional cardiology at the Gasthuisberg University Hospital, Leuven, Belgium in 1999. Her clinical work focuses on the investigation and treatment of children with all forms of congenital and acquired heart disease with special interest in interventional cardiology, and echocardiography, and training paediatric cardiologists for South Africa. Fifty publications achieved to date.

ANTON DOUBELL

Prof Anton Doubell is an emeritus professor in the Division of Cardiology, Tygerberg Hospital, University of Stellenbosch and SUNHEART, a non-profit organisation promoting improved access to advanced cardiac care for all South Africans. Prior to his current appointment he served as head of the Division for 25 years.

Born and raised in Port Elizabeth, Prof Doubell is married with 3 children. He completed his clinical training (MBChB, MMed and FCP) at Stellenbosch University. Then followed 2 and a half years at the Clinical Research Institute of Montreal (IRCM) in Canada as a research Fellow. On his return to Stellenbosch University, he was awarded the degree PhD before qualifying as a cardiologist.

His current research interests include valvular heart disease, other inflammatory heart diseases, infective endocarditis, and pericardial disease. He has 161 publications to his credit as well as 166 published proceedings of national and international congresses. He currently serves on the excos of CISSA, the Cardiac Imaging Society of South Africa and the Western Cape branch of the South African Heart Association. He is a past president of the South African Heart Association and previously served as editor of SA Heart®, the official journal of the South African Heart Association.

SAJIDAH KHAN

Professor Khan is the Head of Cardiology at the University of KwaZulu-Natal. She obtained her MBChB at the University of Natal in 1982. Following a research scholarship with the MRC, her postgraduate training in Internal Medicine and Cardiology were completed at the University of KwaZulu-Natal. Her PhD thesis examined the role of telomere biology in the pathogenesis of atherosclerosis.

Her clinical interests lie in the management of patients requiring cardiac intensive care as well as interventional cardiology. She has been a reviewer for several cardiology journals and an invited faculty member at over 300 national and international congresses.

She serves as the current president of SASCI (South African Society of Cardiovascular Intervention).

FAROUK MAMDOO

Dr Farouk Mamdoo graduated with an MBBCh from the University of Witwatersrand Medical School and obtained the FCP in South Africa (SA) and Certificate in Cardiology (SA), and was awarded the Jock Gear Memorial Award and SA Heart® Award for best oral Congress presentation.

He underwent training in interventional cardiology at the Washington Hospital Centre, in the United States of America (USA), advanced echocardiography at Aurora St. Luke's Medical Centre (USA), cardiac synchronisation therapy at Santa Maria Della Misericordia Hospital in Italy.

He was director of the Transoesophageal Echocardiography Unit and began the 3D echocardiography service at Chris Hani Baragwanath Hospital, publishing the TORCH Registry Data and various other publications / presentations in journals such as Circulation, the European Association of Cardiovascular Imaging, and the SA Heart® Journal.

Dr Mamdoo is a lecturer and co-ordinator for the Graduate Entry Medical Programme in the Unit for Undergraduate Medical School Education, the Department of Physiology and the Department of Internal Medicine at the University of the Witwatersrand as well as an external examiner.

He is a director for the Cardiovascular Research and Training Unit in Johannesburg and the Structural Heart Centre at the Netcare Alberton Hospital with proctoring roles for a number of multinational companies for interventional procedures including complex interventional coronary revascularisation, structural heart interventions e.g. TAVI, LAA Occlusion, balloon valvotomy, pacing, cardiac resynchronisation therapy, 3D transoesophageal echocardiography and cardio-oncology imaging.

His interests include acute coronary syndromes and heart failure management and structural heart disease.

He was Congress chair for the SA Heart® Annual Congress for 2022 and 2023 and is on a number of advisory bodies for device and pharmaceutical companies.

He is the current president of the Johannesburg Branch of SA Heart®.

KAREN SLIWA

Prof Karen Sliwa is the director of the Cape Heart Institute, Faculty of Health Sciences, University of Cape Town - a translational cardiovascular research Institute with 8 distinct research groups.

She is on a joint appointment as senior cardiologist working at the Division of Cardiology, Department of Medicine, Groote Schuur Hospital, University of Cape Town and at UCT Private Academic Hospital. Her special areas of expertise are heart failure, structural heart diseases such as cardiomyopathy and cardiac disease in pregnancy.

Prof Sliwa is widely recognised as a world expert in cardiovascular diseases (CVDs), with a special interest in reducing mortality in women with cardiac disease in maternity. She has contributed to better understanding on the pathophysiology, treatment options and awareness of peripartum cardiomyopathy (PPCM), a global disease particularly prevalent in African populations.

She led and still leads several inter-Africa and global research projects, which have had a major impact for creating knowledge about CVDs common in Africa and other middle-to-lower income regions, leading to changes in policy. Her considerable experience in setting up simple, cost-effective registries and web-based data entry platforms have had a major impact on planning several innovative research projects and has facilitated the training of physicians from several African countries, including Mozambique, Nigeria, Cameroon,

Meet the SA Heart® Editorial Board

Uganda, and Tanzania. Her translational research from bench-bed-to-population studies have led to a much better understanding of CVDs such as rheumatic heart disease and heart failure due to various causes and subsequently to improved patient care.

She holds numerous awards such as the German Cardiac Society Paul Morawitz Award for Exceptional Cardiovascular Research (2013), a honorary doctorate from the University Diderot-Sorbonne, Paris, France (2017), European Cardiac Society Geoffrey Rose Award for Population Sciences (2019) and the South African Medical Research Council Gold award (2021), and the University of Cape Town Alan Pifer Award for Research Excellence. Prof Sliwa has been named the most prolific cardiovascular researcher from Africa with more than 450 publications and her work is highly cited (H-index 108; >120 000 citations). She has trained more than 30 post-graduate students.

Prof Sliwa leads several high-profile special interest groups including a dedicated EORP Working Group on PPCM of the Heart Failure Association of European Society of Cardiology and the World Heart Federation Long COVID-19 & CVD Study. Over her distinguished career she has served in many notable roles, including chair of the South African Heart Failure Association (HeFSSA), president of the South African Heart Association (2014 - 2016), president of the World Heart Federation (2019 - 2020) and currently board member and treasurer of the Pan African Society of Cardiology (2021 - 2025).

LIESL ZÜHLKE

Professor Liesl Zühlke directs the Children's Heart Disease Research Unit focused on research into children's heart diseases of relevance in Africa, which includes the PROTEA project and multiple rheumatic heart disease projects. She has over 200 publications, conference proceedings and book chapters, her H-index is 55, she has been cited over 64 000 times and was recently shortlisted for the Women in Science Award of South Africa. She was the 2018 recipient of the MRC / Dfid African Research Leader Award, the winner of the NRF award for Social Impact in Research, the International Metrodora Award for Public Health and Research and the UCT Vice-Chancellor's Alan Pfifer Award for research. She was recently inducted into the prestigious UCT College of Fellows, UCT's highest academic honour and is a member of the South African Academy of Sciences (MAssaf) and is NRF-B1 rated.

She has achieved the highest leadership positions within cardiology in South Africa; internationally she serves as the president of Reach, is a member of the board of World Heart Federation and Non-Communicable Diseases Alliance, the international scientific advisory board of Children's Heart Link, and an executive member of SAVAC (Strep A Vaccine Global Consortium). As the only woman full professor of paediatric cardiology in the country, she is an active and vociferous advocate for the advancement and empowerment of equity and women in medicine, including being on the Lancet Commission for Women in Cardiovascular Disease. She is currently the vice-president of the South African Medical Research Council, Extramural Research and Internal Portfolio.

PETER ZILLA

Professor Peter Zilla is the emeritus professor of cardiothoracic surgery of the University of Cape Town (UCT). He held the Chris Barnard Chair at UCT / Groote Schuur Hospital for almost a quarter of a century and continues leading a 70 employee spin-off UCT enterprise dedicated to developing a replacement heart valve tailor-made for Africa.

He holds a MD of the University of Vienna, a DrMed degree of the University of Zurich; a PD of the University of Vienna and a PhD of the University of Cape Town. He has published 225 peer-reviewed full papers, holds 46 US / PCT patents, and has an H-index of 60. He also initiated the Cardiac Surgery Intersociety Alliance (CSIA), an umbrella body uniting all major cardiothoracic societies with the goal of fostering the cardiac surgical capacity of developing countries. He is also adjunct professor at the Medical University of Vienna where he had previously pioneered clinical cardiovascular tissue engineering in the 1990s culminating in >500 patients having received in-vitro grown replacement arteries consisting of the patients own cells.

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SA HEART® CONGRESS 2024
ALPHABETICAL LISTING OF FIRST AUTHORS

Changes in low-density lipoprotein profile is associated with cardiac abnormalities in tumour-bearing mice

Carmelita Abrahams, Vitaris Kodogo, Nkanyiso Hadebe, Nicholas Woudberg and Sandrine Lecour

Cape Heart Institute, Global Medicine, University of Cape Town, Observatory, South Africa

Background: The mechanisms associated with cancer-induced cardiac alterations are poorly understood. In this regard, dyslipidaemia is often observed in breast cancer patients and associated with a poorer prognosis. However, low-density lipoprotein (LDL) particles subclass distribution and its possible association with cardiac outcome in cancer patients is unknown.

Objectives: To investigate an association between changes in LDL particles subclass distribution and cardiac dysfunction in tumour-bearing mice.

Method: E0771 (breast cancer) cells were injected subcutaneously in the mammary fat pad of female C57/Bl6 mice (6 - 8 weeks old). Tumours became palpable 9 days after inoculation, and 5 weeks later, mice were euthanised. The control (C, n=17) and tumour (T, n=20) groups were considered. Cardiac function was assessed by echocardiography at baseline (B) and at endpoint (E). LDL particles subclass distribution was determined in serum using the Lipoprint® system. Platelet-activating factor-acetylhydrolase (PAF-AH) activity, an LDL-associated enzyme with anti-inflammatory and anti-thrombotic functionalities, was measured with an enzymatic assay.

Results: Tumour-bearing mice had reduced left ventricular anterior wall (LVAW) thickness [diastole: 0.81 ± 0.03mm (B) vs. 0.63 ± 0.05mm (E) and systole: 1.18 ± 0.05mm (B) vs. 0.87 ± 0.06mm (E); $p < 0.05$.

Conclusion: In mice, breast cancer induced cardiac abnormalities by reducing left ventricular wall thickness. The shift in the LDL subclass distribution towards large correlated with cardiac abnormalities and a change in LDL-associated enzyme activities. Our data suggest a role for the measurement of LDL particles subclasses as a potential biomarker to assess the risk of cardiovascular disease (CVD) in cancer patients. Further work will be undertaken to assess the possible role of LDL particles in the increased risk of CVD in cancer patients.

Analysis and impact of non-cardiac comorbidities on in-hospital outcomes of adult patients with heart failure with reduced, mildly reduced, and preserved ejection fraction: A case-control study

Umar Gati Adamu[1], Muzi Maseko[2] and Nqoba Tsabedze[1]

[1]Department of Internal Medicine, Division of Cardiology, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa
[2]Nutrition and Hypertension Laboratory, School of Physiology, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa

Background: Non-cardiac comorbidities are common among patients with heart failure (HF) and may affect the outcomes. However, among hospitalised patients with HF, the prevalence of non-cardiac comorbidities based on HF phenotypes and their impact on in-hospital outcomes remains unknown.

Objectives: To determine the prevalence of non-cardiac comorbidities in patients with HF with reduced, mildly reduced, and preserved ejection fractions (HFrEF, HFmrEF, and HFpEF) and to elucidate the impact of these comorbidities on in-hospital outcomes.

Method: This multicentre, prospective, case-control study recruited adult patients with HF admitted between 21 February 2023 - 30 November 2023 in Johannesburg, South Africa. Information on 10 non-cardiac comorbidities (chronic kidney disease, obesity, diabetes mellitus, anaemia, retroviral infection, chronic obstructive pulmonary disease, dyslipidaemia, thyroid disorders, systemic lupus erythematosus, and cancer) in addition to baseline clinical characteristics and outcomes was collected. Participants were categorised based on their left ventricular ejection fraction and number of non-cardiac comorbidities as 0, 1, 2, and ≥3. Univariate logistic and multivariate regression analyses were performed with in-hospital mortality as the dependent variable and clinical, electrocardiographic, and echocardiographic parameters as independent variables.

Results: There were 406 patients and 50 controls (mean age, 55.7 ± 15.8 years vs. 39.26 ± 11.40 years ($p<0.001$) respectively. Sixty one patients had HFrEF, HFmrEF 15%, and HFpEF occurred in 21% of the patients. All 10 non-cardiac comorbidities were more prevalent in patients with HF. Non-cardiac comorbidities included chronic kidney disease (46%), obesity (45%), diabetes mellitus (40%), anaemia (33%), retroviral infection (21%), chronic obstructive pulmonary disease (19.1%), dyslipidaemia (11%), thyroid disorders (10.1%), systemic lupus erythematosus (4.5%), and cancer (4.4%). Anaemia, obesity, and CKD were more prevalent in patients with HFpEF than in those with other HF subtypes. In-hospital mortality occurred in 3.5 % [95% confidence interval (CI): 2.0%-5.7%] and differed significantly among the LVEF phenotypes ($p<0.001$). Patients with ≥2 non-cardiac comorbidities had worse in-hospital outcomes.

Conclusion: Non-cardiac comorbid conditions are prevalent in patients with HF, differ according to the HF phenotype, and are associated with poor in-hospital outcomes. Future research should focus on identifying effective strategies to manage these comorbidities and improve patient outcomes.

A landscape analysis of paediatric and congenital heart disease services in Africa

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Background: There is geographic disparity in the provision of Paediatric and Congenital Heart Disease (PCHD) services. Combined, North America and Western Europe account for 74% of the world's cardiothoracic surgical capacity. In contrast, Africa accounts for only 1% of total global capacity. However, PCHD training and service provision in Africa has increased. As such, we conducted a cross-sectional electronic survey to evaluate PCHD services in Africa.

Method: Respondents were selected by purposive sampling and included paediatric and adult cardiologists and cardiothoracic surgeons, paediatricians, and medical officers, involved in PCHD care. The survey included respondent, institution and national-level queries related to human and infrastructure resources for paediatric cardiology, cardiac catheterisation, and cardiothoracic surgery. Institutions were ranked according to a composite score based on recommendations for low- and middle-income PCHD services.

Results: There were 124 respondents from 96 institutions in 45 African countries. Aggregated country data showed that 34 (78%) countries had some form of cardiac service, of these 18 (40%) provided a full PCHD service including interventional paediatric cardiology and paediatric cardiac surgery, 9 (20%) provided paediatric cardiac surgery services but no interventional paediatric cardiology service and 1 provided an interventional paediatric cardiology service but no cardiac surgery. Ten countries (22%) had no PCHD service. There were 0.04 (IQR: 0.00 - 0.13) paediatric cardiothoracic surgeons per million population and 0.18 (IQR: 0.03 - 0.35) paediatric cardiologists per million population. Thirteen (29%) countries report having both paediatric cardiology and cardiothoracic surgery Fellowship training programmes.

Conclusion: Only 18 (40%) of surveyed countries were able to provide a full PCHD service including cardiac surgery and interventional catheterisation, demonstrating inadequate care for African children with heart disease. Additionally, the number of paediatric cardiologists and cardiothoracic surgeons is below international population-based recommendations. Only Libya and Mauritius have the recommended 2 paediatric cardiologists per million population, and no country has the recommended 1.25 cardiothoracic surgeons per million population. No institution met all criteria for a level 5, national-level PCHD referral centre and only 8/87 (9.2%) met all criteria for a level 4 or regional PCHD referral centre. Furthermore, there is a significant shortage of fellowship training programmes which must be addressed if PCHD capacity is to be increased.

Long-term outcomes of patients with dextro-transposition of the great arteries after balloon atrioseptostomy at the Uganda Heart Institute: A 10-year review

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Background: Dextro-transposition of the great arteries (d-TGA) is one of the critical congenital heart defects (CHD) requiring early intervention in life to avert death. Performing Raskind balloon atrioseptostomy (BAS) is standard practice in critically-ill neonates with d-TGA having restrictive interatrial communication. This ensures adequate mixing and improves oxygen saturations before definitive surgery, which may be in the form of arterial or atrial switch procedure, depending on the status of left ventricular conditioning.

Objectives: To describe long-term outcomes of patients with d-TGA after BAS at the Uganda Heart Institute (UHI).

Method: This was a retrospective chart review of all patients with d-TGA who underwent BAS procedure at the UHI from January 2014 - June 2024.

Results: A total of 30 cases with d-TGA underwent BAS at UHI during the study period. The median follow-up period was 5 years (range: 3 months - 9 years). Males comprised 73.3% of cases (n=22). The majority of cases had intact ventricular septum (n=21, 70%). The mean weight at the time of BAS was 3.35kg (range: 2.6 - 4.5). The median age at BAS was 3.5 weeks (range: 12 hours - 10 weeks). All BAS procedures were successful.

Complications during the BAS procedure occurred in 2 cases (6.7%): One case had several episodes of supraventricular tachycardia that resolved with treatment and the other had persistent bradycardia and demised 12 hours after the procedure from aspiration. The rest of the cases (n=29, 96.7%) were discharged alive after the BAS. In the long term 6 cases (20%) were lost to follow-up and 10 (33.3%) remain alive and unoperated. The remaining 13 cases (43.3%) underwent definitive surgery (arterial switch procedure, n=5; atrial switch procedure=8). All surgeries were performed abroad except 1 arterial switch procedure done at the UHI during a visiting team mission with the child succumbing due to post-operative bleeding. The rest of the operated children are all alive, none has undergone re-intervention. One patient who had atrial switch procedure has significant systemic venous baffle obstruction.

Conclusion: Immediate outcomes following BAS for cases with TGA at the UHI are excellent. However, access to definitive surgical repair remains limited due to lack of local capacity.

A 4-year review of infective endocarditis in Namibia

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Background: Infective endocarditis (IE) remains a major public health concern. Contemporary data is needed to understand the epidemiology and outcomes of IE in low-resource settings.

Objectives: To describe the clinical characteristics and outcomes of patients with IE in Namibia.

Method: Prospective observational study of patients presenting to Windhoek Central Hospital with definite or possible IE from August 2021 - February 2024.

Results: Thirty seven patients were enrolled, median age 36 years and 70% lived more than 700km from a centre capable of performing cardiac imaging and surgery. Most frequent clinical manifestations of IE were arthritis (83.8%), heart failure (75.7%), clubbing (75.7%), fever (63.9%), and neurological sequelae (43.2%). Risk factors were rheumatic heart disease (n=22, 8 had previous valve surgery), congenital heart disease (n=9, no previous surgery), previous IE (n=2, 1 had a previous valve replacement), recent history of hospitalisation (n=3) and recent dental procedures without prophylactic antibiotics (n=2). No patient had a history of illicit intravenous drug use. IE was predominantly left sided. The only 3 patients with right sided IE had left heart involvement. Prosthetic valve endocarditis accounted for 24.3% (n=11) and occurred late. All transthoracic echocardiograms revealed vegetations (100%) causing regurgitant lesions in 89.2%, stenosis in 27%, perforations in 18.9%, root abscesses in 8% and fistulae in 2.7%. The causative organism was identified in only 11 patients (29.7%): Streptococcus species (n=4), enterococcus faecalis (n=4), staphylococcal species, Coxiella burnetti, and Bartonella henslae (each n=1). Each patient received appropriate duration of intravenous antibiotics. All patients had indication for IE surgery, only 23 were operated. Eight patients died (21%). Six were too high risk by for surgery. These patients had presented late with severe disease and died during index hospitalisation.

Conclusion: IE remains a life-threatening disease. This cohort highlights the challenge of late, severe presentation of IE and the urgent need to improve assessment and access to definitive diagnostics and treatments for IE in Namibia.

A battle of the sexes: Differences in cardiac pathophysiology between male and female obese (ob/ob) mice

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Background: Obesity is a global concern and a major risk factor for cardio-metabolic disease development. On a cellular level, obesity is associated with oxidative and endoplasmic reticulum (ER) stress, leading to cardiomyocyte dysfunction and death. Laboratory rodents are commonly used to model human diseases to understand these underlying molecular mechanisms of disease progression to inform novel treatment strategies. Previous studies emphasised the basic biological differences between males and females, yet the majority of metabolic animal studies include only male rodents. This underrepresentation of female rodents results in a sex bias that could have major implications for human health.

Objectives: This study aimed to investigate the sex-specific cardiac pathophysiological differences, especially pertaining to oxidative and ER stress, using the popular ob/ob (obese) mouse model of cardio-metabolic dysfunction.

Method: Male and female ob/ob mice were compared to their age- and sex-matched C57BL/6 healthy controls (n=9-10/group). Weekly body weight and fasting blood glucose (FBG) measurements were obtained from 10 - 16 weeks of age. Following euthanasia (16 weeks), plasma samples were collected for brain natriuretic peptide (BNP) measurements (ELISA). Hearts were weighed and prepared for protein quantification (western blot) and lipid peroxidation measurements (TBARS).

Results: In both sexes, ob/ob mice had greater body weights ($p<0.001$) and FBG levels ($p<0.001$). Female ob/ob mice displayed increased heart weights ($p<0.001$) and plasma BNP levels ($p=0.0588$), which was not observed in the males. Cardiac lipid peroxidation remained unchanged in both sexes; however cardiac superoxide dismutase 1 (SOD1) antioxidant levels were decreased ($p<0.01$) in the ob/ob males and unchanged in the ob/ob

females. Lastly, cardiac C/EBP Homologous Protein (CHOP) levels (ER stress-mediated apoptosis) were increased ($p<0.05$) in the ob/ob females, but unchanged in the males.

Conclusion: Although ob/ob males and females displayed overt obesity and hyperglycaemia, only the ob/ob females showed evidence of cardiovascular disease at 16 weeks. Furthermore, molecular differences on the level of oxidative and ER stress between males and females were noted. These sex-specific differences in cardiac pathophysiology observed in this study supports the inclusion of both males and females in animal studies of obesity and cardio-metabolic disease.

A novel 3D-cardiovascular model for rapid, high-throughput drug-screening applications

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Background: Three-dimensional (3D) in vitro cell culture models hold great promise for cardiotoxicity screening, because of increased intercellular communication, gap junctions between cells, and extracellular matrix (ECM) that lacks in traditional monolayer cells.

Objectives: The objective of this study was to utilise a 3D cardiomyoblast spheroid model to study drug uptake, cellular signalling and mitochondrial dynamics in hyperlipidemic-induced insulin resistance spheroids treated with and without metformin.

Method: Rat cardiomyoblast cells were cultured under standard conditions and seeded at 4 x 105 cells / spheroid in ultra-low adherence plates with either control media (CM; 25mM DMEM, 10% FBS, 1% pen / strep) or IR media (IRM; 0.05mM palmitic acid, 0.025mM oleic acid, 100nM insulin, and CM) for 72 hours and treated with and without metformin for an additional 24 hours. The spheroids were harvested for mRNA expression levels (G6PD, PFK2, Cpt1) with quantitative PCR, and protein and phosphorylation level determination for metabolism (Akt, mTOR, PGC1-alpha) and mitochondrial dynamics (MFN2, Opa1, Drp1, LC3I/II) with western blotting. Surface and cellular ultrastructure were imaged with scanning and transmission electron microscopy (SEM and STEM), and drug uptake was determined with liquid chromatography–mass spectrometry (LC-MS).

Results: Metabolic manipulation decreased spheroid size, impacted surface morphology, and increased mitochondrial biogenesis and fragmentation. It also decreased phospho-Akt and phospho-mTOR compared to control spheroids, supporting an IR-phenotype. Metformin uptake was confirmed with LC-MS. Metabolic activity significantly increased in response to IRM but did not change in response to metformin, although increasing metformin concentration significantly decreased mitochondrial superoxide production.

Conclusion: This study established a rapid, high-throughput cardiomyoblast spheroid model that responds to metabolic and drug treatments, and resulted in measurable changes in metabolism, mitochondrial dynamics, and viability. Therefore, this model provides a viable and improved alternative to traditional monolayer models for cardiotoxicity studies.

Adding insult to injury: A sex-specific investigation of chronic stress on heart function after regional ischaemia

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Background: Chronic stress is an important risk factor for cardiometabolic diseases, but the underlying mechanisms responsible for sex-based differences in stress-related cardiometabolic complications remain poorly understood. This study investigated whether chronic stress triggers sex-dependent cardiac dysfunction in isolated rat hearts exposed to regional ischaemia.

Objectives: To identify potential sex-based mechanisms of chronic stress on heart function pre- and post-simulated ischaemia.

Method: Ten-week-old male and female Wistar rats underwent chronic restraint stress (CRS) for 4 weeks (1 hour daily) vs. matched controls. Blood samples were collected before and after the CRS protocol for the analysis of various circulating biomarkers. Ex vivo isolated hearts were then subjected to regional ischaemia (25 minutes), and functional parameters were assessed.

Results: Compared to controls, chronic restraint stress (CRS) males displayed decreased plasma brain-derived neurotrophic factor (BDNF) levels ($p<0.05$), while CRS females exhibited elevated plasma adrenocorticotropic hormone (ACTH) ($p<0.01$) and reduced corticosterone ($p<0.001$) alongside lower serum estradiol ($p<0.001$) and estradiol / progesterone ratio ($p<0.01$). Of note, CRS females showed increased serum cardiac troponin T ($p<0.05$) and tumour necrosis factor-alpha (TNF-α) ($p<0.01$) with suppressed interleukin (IL)-1α, IL-1β, IL-6, and IL-10 levels ($p<0.05$) when compared to controls. Ex vivo Langendorff perfusions revealed that CRS female hearts displayed impaired post-ischaemic functional recovery for baseline stroke volume ($p<0.01$), work performance ($p<0.05$), aortic output ($p<0.05$), coronary flow ($p<0.01$), and overall cardiac output ($p<0.01$) when compared to matched controls and CRS males ($p<0.05$). High-resolution respirometry analysis on frozen ischaemic and non-ischaemic tissue

revealed altered mitochondrial respiratory dynamics in CRS males vs. controls, with minimal effects in females. Downstream proteomics analysis of the female hearts revealed distinct proteome profiles between non-ischaemic and ischaemic zones, and between control and CRS groups.
Conclusion: Our findings reveal intriguing sex-specific responses at both the systemic and functional levels in stressed hearts. Here, the dysregulation of stress hormones, pro-inflammatory state, and potential underlying cardiomyopathy in females following the stress protocol renders them more prone to damage following myocardial ischaemia. Moreover, unique proteomic profiles of reperfused samples highlight potential preclinical mechanisms for the increased risk for adverse cardiac events in chronically stressed individuals observed in clinical settings.

Prevalence associated factors and effect on short-term outcome of hyponatremia among HF patients admitted at National Cardiac Institute

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Background: Hyponatremia is a common electrolyte imbalance seen in patients with heart failure (HF), and previous studies have found hyponatremia to independently predict short- and long-term poor outcomes regardless of the primary HF cause or health status of the patient. However, the prevalence of hyponatremia and its association with clinical outcomes among HF patients has not been studied in Tanzania.
Objectives: The objective of the study is to determine the prevalence, associated factors and effect on short-term outcomes of hyponatremia among patients admitted with HF at the National Cardiac Institute.
Method: This was a hospital-based prospective cohort study in which patients admitted at JKCI with a diagnosis of HF were consecutively recruited and followed-up for a period of 1 month. The sample size required was 348 patients. Structured questionnaire was used to collect information on demographic characteristics as well as clinical profile. Plasma sodium concentration was analysed within 24 hours of admission for all patients included in the study. Hyponatremia was defined as serum sodium concentration of <135mmol/L, and was classified as mild (130 - 134mmol/L), moderate (125 - 129mmol/L) and profound (<125mmol/L). Patients were followed up for in-hospital outcomes that included coronary care unit admission, length of hospital stay, in-hospital mortality, and hospital overstay, as well as one 30 days outcomes.
Results: In total, 348 participants with HF were enrolled. Mean age (SD) of the cohort was 51.7 (18.7) years, and 159 (45.7%) were males. In this population, hyponatremia at admission was present in more than half (60.3%, 95%CI=54.99-65.5) of participants. Hyponatremia was associated with poorer in-hospital outcomes.
Conclusion: In this study findings, prevalence of hyponatremia among HF patients at admission was high, estimated number over half of patients admitted with HF at JKCI. Recommend need to routinely screen patients with HF for presence of electrolyte abnormalities specifically hyponatremia and provide intervention when needed.

Identifying appropriate sites for timely reperfusion of STEMI in South Africa using isochrone maps

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Background: A disparity regarding access for STEMI patients to hospitals with cath labs is observed in South Africa across regions with differing population densities. This may be explained by paucity of surveillance data, a shortage of cardiologists, and a lack of structured referral pathways for STEMI management. There is a need to identify under-resourced areas and barriers to timely access to STEMI treatment facilities.
Objectives: The objectives are to assess the coverage of public and private P-PCI facilities, specifically in remote and under-resourced areas, and to identify locations for additional PCI facilities. It also investigates the dispersion of regional, tertiary and district public hospitals, and identifies hospitals for stand-alone fibrinolysis / pharmaco-invasive approach, to assist PCI-capable hospitals in establishing structured regional referral networks.
Method: Maptitude Mapping Software 2023 (Caliper Corporation, 1172 Beacon St., Suite 300 Newton MA 02461, USA) was utilised for the isochrone modelling and map visualisation. Distance and drive-time attributes for accurate and precise isochrone modelling were sourced from the Maptitude data package for South Africa and OpenStreetMap place names. Travel times were measured and visualised as drive-time rings (minutes) superimposed on a population density layer.
Results: Approximately 70% of the South African population live in underserviced areas regarding optimal STEMI care – these are the Northern Cape, Limpopo, large parts of the North West, KwaZulu-Natal, and the Eastern Cape. Seven regional hospitals were identified for an upgrade to a PCI-capable hospital (Upington, Vryburg, Thoyandou, Bethlehem, Newcastle, Komani, and Lusikisiki) to ensure intervention within 90 minutes after symptoms onset or diagnosis of STEMI. Twenty eight tertiary hospitals were earmarked for lysis, in addition to all regional hospitals and specific district hospitals in remote areas with low population densities.
Conclusion: The maps and geospatial analyses add value by establishing what could be done to improve STEMI management in South Africa. The primary aim is to turn non-pPCI centres into 24/7 pPCI centres. The current focus is to ensure that mandatory resources are available, that all role players are suitably trained and that quality metrics are applied for the best outcome for STEMI patients.

Outcomes of pregnant women with congenital heart disease attending a multi-disciplinary cardio-obstetric clinic in Cape Town, South Africa

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Background: Congenital heart disease (CHD) patients are at risk for cardiovascular complications during pregnancy. Despite being the leading cause of maternal death in high-income settings, evidence from low- and middle-income countries is lacking. We aimed to characterise outcomes of pregnant women with CHD referred to a multi-disciplinary combined cardio-obstetric clinic (CCOC), between 2017 - 2023.

Objectives: (1) To characterise the obstetric and cardiac outcomes in women with CHD/RHD attending the multidisciplinary cardio-obstetric clinic. (2) To investigate the maternal and foetal outcomes among women with CHD/RHD. (3) To identify the prevalence of pre-existing conditions in women with CHD/RHD

Method: Pregnant women with CHD were invited and consented to participate in the PROTEA (partnerships for children with heart disease) registry. Demographics, obstetric and surgical history, WHO classification, and pre-partum, peri-partum, and post-partum complications and events were recorded.

Results: Fifty eight participants were enrolled over 7 years; median age was 27 years (IQR: 24 - 32). Median booking BMI was 27 (IQR: 23 - 35), with 29% overweight (BMI: 25.0 - 29.9), and 34% obese (BMI ≥30). Predominant diagnoses included Ventricular Septal Defect 33% (20/61 total diagnoses), Tetralogy of Fallot 20%(12/61), Atrial Septal Defect 15%(9/61), Pulmonary Stenosis 5%(3/61), Aortic Coarctation 5% (3/61), and Atrial Ventricular Septal Defect 3% (2/61). Forty participants (69%) had a history of cardiac surgery. Most (98%, 57/58) participants had pre-existing cardiac diagnoses, however only 53% (31/58) of participants received pre-pregnancy counselling. In multigravida participants, 58% (14/24) had a history of obstetric complications, with 75% (18/24) of pregnancies complicated by spontaneous abortion (9), therapeutic abortion (6), or intrauterine death (3). Comorbidities included angina (9), hypertension (7), asthma (4) and HIV (3). At enrolment, 23% (13/57) of participants presented in NYHA heart failure class 2, 9% in class 3, and 2% in class 4. During their pregnancies, 19% (11/58) experienced obstetric complications for which 21% (12/58) required admission. Additionally, 12% (7/58) were admitted for cardiac complications. Median gestational age at delivery was 38 weeks (IQR: 35 - 40), 44% by elective caesarean section, 7% by emergency caesarean section. There were no maternal events during delivery; 2 experienced infective complications post-delivery. There were 0 maternal mortalities, 2 foetal mortalities and 0 neonatal mortalities.

Conclusion: Despite suboptimal preconceptual counselling in our population of pregnant women, we present excellent outcomes for pregnant women with a variety of CHD diagnoses treated in a multi-disciplinary cardio-obstetric clinic. Future interventions should optimise preconceptual counselling, awareness of healthy weight and consolidation of the multi-disciplinary heart team approach.

Can antibiotics inhibit the progression of abdominal aortic aneurysms? A meta-analysis of randomised controlled trials

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Background: Antibiotics may protect against chlamydophila pneumoniae, implicated in abdominal aortic aneurysm (AAA) development, and inhibit matrix metallopeptidase-9, neutrophils, cytotoxic T cells, and other inflammatory markers associated with AAA.

Objectives: This meta-analysis synthesizes data from randomised controlled trials (RCTs) to evaluate antibiotics' impact on AAA progression.

Method: This meta-analysis followed the Cochrane Handbook for Systematic Reviews of Interventions guidelines. We searched PubMed, Embase, Cochrane Library, Web of Science, and Scopus until 15 May 2024. We included RCTs involving patients with small AAAs (diameter <55mm for males and <50mm for females) treated with antibiotics vs. placebo, reporting changes in AAA maximum transverse diameter. Mean difference (MD) and risk ratio (RR) compared outcomes.

Results: Six RCTs with 497 patients (49.9%) in the antibiotic group and 498 (50.1%) in the placebo group were included. There was no significant difference in AAA progression at a mean follow-up of 2.2 years (MD=-0.28mm/year, 95% CI [-0.92, 0.36], p=0.39), with macrolides (MD=-0.62mm/year, 95% CI [-1.39, 0.14]), or tetracyclines (MD=0.22m/year, 95% CI [-0.54, 0.97]). No differences were found in mortality or AAA rupture (RR=0.93, 95% CI [0.69, 1.25], p=0.62). Subgroup analyses showed no differences for macrolides (RR=0.89, 95% CI [0.59, 1.36]) and tetracyclines (RR=0.93, 95% CI [0.69, 1.25]).

Conclusion: Macrolides and tetracyclines do not significantly inhibit the progression of small AAA.

Global trends and networks in the last 20 years of rheumatic heart disease research: A bibliometric analysis

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Background: Despite advances in eliminating rheumatic heart disease (RHD) in some parts of the world, RHD remains endemic in low- and middle-income countries. Tackling this burden requires a global effort and a multidisciplinary approach. Bibliometrics, the statistical analysis of bibliographic data, may illustrate the landscape of RHD research at present.
Objectives: To perform a bibliometric analysis of the last 20 years of RHD research.
Method: RHD-related documents published between 2004 - 2023 were extracted from Scopus, as was a comparison group of documents between 1984 - 2003. The Bibliometrix package of R was used to generate bibliometric statistics and perform conceptual analyses.
Results: The 2004 - 2023 search yielded 12 028 documents, with an annual growth rate of 4.5%. International collaboration was observed in 18%. In contrast, 4 938 articles were published in 1984 - 2003, with a growth rate of 1.45% and a lower rate of international co-authorship (2.8%). The USA produced the most scientific outputs. Of the 10 most influential articles, most were reviews or guidelines. Only 1 of these papers, the REMEDY study, was led by a team outside of Australia, USA or Europe. A wide global network was observed, in sharp contrast to 1984 - 2003, a period of markedly less international cooperation. The USA, UK, Australia, France and South Africa were the top 5 ranking countries in terms their influence on other networks. The University of Cape Town was the most productive institution; network analysis uncovered a complex system of universities, hospitals and medical schools that clustered somewhat along geographical lines. Of the top 25 authors, 14 / 25 were from lower- or middle-income countries and 8 were from Africa. Thematic mapping revealed follow-up and cross-sectional studies concerning treatment outcomes and epidemiology as core, well-developed topics. Prevention, control and epidemiology in Africa and studies in children and adolescents were less well-developed. Immunology has become a niche field over time, whereas the genetics of RHD has become less of a niche area.
Conclusion: The past 20 years has seen a rapid expansion in RHD-related scientific outputs and global collaborative efforts. Although USA dominates in scientific outputs, low- and middle-income countries are well represented in RHD networks.

Mobitz type 1 heart block: A retrospective descriptive review from Tygerberg Hospital, Western Cape

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Background: The practice of pacing patients with Mobitz type 1 atrioventricular (AV) block that present with symptomatic bradycardia or who are older than 65 years of age is well established. There is limited evidence that guides the management of younger asymptomatic patients presenting with Mobitz 1 AV block.
Objectives: To describe the natural history of Mobitz 1 AV block in patients aged 45 - 64 years, and to assess the need for pacing.
Method: This was a retrospective descriptive analysis conducted at Tygerberg Hospital, Cape Town, South Africa. Patients with electrocardiograms (ECG) showing Mobitz type 1 AV block in 2016 were followed up after 6.5 years to observe the natural history of unpaced patients.
Results: A total of 15 141 ECGs and 1 506 cardiology admissions were screened. Fifteen patients with Mobitz type 1 AV block were identified and reviewed. There was a near even male to female distribution, 8:7, with a mean age of 59.4 ± 17.8 years. Six patients were aged 45 - 64, and their unpaced (n=5) 5-year survival rate was 80%. One patient died, but the cause of death was end stage heart failure and not progression of heart block.
Conclusion: Both this study and other notable publications in this field feature small sample sizes. Caution is therefore warranted in drawing definitive conclusions. Nevertheless, our findings suggest a potentially more benign natural history for Mobitz 1 AV block in this age group compared to existing literature.

Pericardial segmentation: A proposed model to quantify disease burden

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Background: Cardiovascular magnetic resonance imaging (CMR) has the unique ability to evaluate pericardial tissue characteristics that underpin constrictive haemodynamics. A pericardial segmentation model that can be applied to accurately quantify reversible and non-reversible burden of pericardial constriction would have important clinical implications and is currently lacking.

Objectives: To develop a pericardial segmentation model that is validated against anatomic specimens and can be acquired using standard CMR views, while maintaining equal weighting of individual segments for each ventricle to ensure ease of use.

Method: Post-mortem cardiac specimens of presumed healthy individuals with non-cardiac cause of death were studied at the Tygerberg Division of Forensic Medicine. Measurements were obtained on standard cardiac short-axis forensic dissection slices. The percentage pericardial cover for individual LV and RV segments were directly measured and compared to an idealised pericardial segmentation model in which respective LV and RV segments are identical in size, and can be acquired on standard CMR views.

Results: A total of 100 cardiac specimens with equal gender distribution were assessed. On average, the LV and RV contributed 49.9% and 50.1% of the total ventricular surface area respectively. The LV surface area was well represented by those 11 segments of the standard 16-segment American Heart Association model with abutting pericardium (4.51 ± 0.2% pericardial cover per segment). The RV surface area was best represented by 9 equal ventricular segments (5.54 ± 0.3% pericardial cover per segment). The difference in the measured pericardial cover for the LV and RV, compared to the idealised model, respectively showed a mean difference of 0.04% and 0.02% per segment.

Conclusion: We have developed a pericardial segmentation model that is validated against anatomic specimens, is easy to acquire on standard CMR views and is simple to interpret, as respective LV and RV segments are of equal size. This model will allow clinicians to evaluate individual pericardial segments to accurately quantify pericardial disease burden.

Outcomes of infective endocarditis surgery in Angola: Initial experience of a young local team

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Background: Infective endocarditis (IE) involving multiple cardiac valves is uncommon. The majority of echocardiographically demonstrated endocarditis occurs on a single valve; the involvement of 2 valves occurs much less frequently, and triple- or quadruple-valve involvement is extremely rare.

Objectives: Here, we describe and analyse our results in patients with endocarditis in one of newest cardiovascular services in sub-Saharan Africa.

Method: A retrospective database review was carried out from January 2022 - June 2024.

Results: A total of 26 patient with endocarditis. The mean age was 30 ± 15-years-old varying from 6 to 55; 18 were female (69.2%). Nineteen (73.1%) cases of valve involvement were observed, of which 8 (30.8%) were mitroartic, 6 (23.1%) mitral, 1 (3.8%) aortic and 4 (15.4%) tricuspids. In another 7 (26.9%) cases, valve prostheses were involved (5 [19.2%] biological prostheses in the mitral position and 1 [3.8%] in the aortic position) and 1 [3.8%] case of ventricular septal defect (VSD). The mean ejection fraction was 63% ± 14 (81 - 22%). The mean EUROSCORE II was 10.96% (3.04 - 39.34). The mean pulmonary artery pressure was 42 ± 13mmHg (25 – 63mmHg). All patients with mitral or mitral-aortic valve involvement underwent valve replacement. Two mitral-aortic patients underwent the Ozaki procedure. Fifty percent of patients with tricuspid valve involvement underwent valve replacement using biological mitral prosthesis, the other 50% underwent valve repair. All patients with affected prostheses underwent replacement of the prosthesis for a new one. The patient with an interventricular septal defect underwent correction with a bovine pericardial patch. The mean cardiopulmonary bypass time was 102 ± 36min (45 - 175 minutes) with mean cross-clamping time of 91 ± 32 minutes (39 - 197 minutes). The extubation time was 19 hours 59 minutes ± 55 hours 34 minutes. The mean intensive unit care and hospital length of stay were 4 ± 3 (2 - 4) and 60 ± 45 (196 - 30) days, respectively. The mortality was 11.5%.

Conclusion: Multivalvular endocarditis is not a rarity in our reality. Valve replacement is the most common treatment in cases of endocarditis with valve involvement. In 50% of cases was not possible to preserve the tricuspid valve. The Ozaki procedure is safe and reproducible in some cases of endocarditis.

Ozaki procedure for adolescents and young adults with rheumatic heart disease

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Background: Many adolescents and young adults with rheumatic heart disease (RHD) require cardiac surgery due to the lack of primary prevention. As known, repair is better than replacement. Although the Ozaki procedure is an alternative for aortic valve disease, little is known about it in this population.

Objectives: To describe our initial experience in treating adolescents and young adults with severe rheumatic aortic valve using the Ozaki technique.

Method: A retrospective database review was carried out from June 2022 - May 2024 to analyse our results of Ozaki procedure for adolescents and young adults with RHD.

Results: A total of 7 adolescents or adults with RHD underwent Ozaki procedure. The mean age was 18 ± 2-years-old varying from 15 - 20; 5 were male (71.4%). All of them had severe aortic valve regurgitation. In addition, 5 (71.4%) had mitral valve (MV) regurgitation and 1 (14.3%) had ventricular septal defect (VSD). The mean ejection fraction was 66% ± 4 (61 - 72%). The mean EUROSCORE II was 1.74% (0.75 - 3.18). The mean pulmonary artery pressure was 42 ± 24mmHg (14 - 84mmHg). Five underwent MV replacement, in 1 was necessary tricuspid repair, and 1 (14.3%) underwent VSD closure; only 1 underwent isolated Ozaki procedure. The mean cardiopulmonary bypass time was 171 ± 38 minutes (122 - 223 minutes) with mean cross-clamping time of 159 ± 34 minutes (115 - 205 minutes). The extubation time was 4 hours 20 ± 27 minutes. The mean intensive unit care and hospital length of stay were 2 ±1 (2 - 4) and 18 ± 7 (10 - 32) days, respectively. No mortality was registered. The mean follow-up time was 14 ± 7 months. Five presented trivial or no regurgitation. Two presented severe regurgitation requiring aortic valve replacement.

Conclusion: Ozaki procedure is a safe and reproducible procedure for adolescents and young adults with RHD. Although the results are encouraging, should be observed with caution. Long follow-up is required.

Atrial strain: A potentially sensitive marker for cardiovascular disease in HIV-infected persons

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Background: People living with HIV-infection (PLWH) have a higher risk of cardiovascular disease (CVD), with evidence of early cardiac abnormalities secondary to inflammation. Detecting these abnormalities is hindered by limited access to advanced imaging. The long-term impact of these abnormalities and their interaction with antiretroviral treatment (ART) are still unclear. The ability of left atrial (LA) strain analysis to detect early cardiac abnormalities has not been fully investigated.

Objectives: We set out to evaluate if the assessment of LA function by means of strain analysis can be utilised for the detection of underlying subtle cardiovascular disease in persons.

Method: ART naïve persons with HIV-infection were recruited, along with HIV-uninfected, age- and sex-matched controls. All patients and controls underwent comprehensive 2D transthoracic echocardiography including atrial strain analysis. The HIV group commenced ART and was reassessed 9 months later. LA strain was measured and compared using both paired and unpaired samples t-test as appropriate.

Results: Thirty three ART-naïve HIV-infected participants and 22 HIV-uninfected controls were included. Following 9 months of antiretroviral therapy (ART), all HIV-infected participants completed follow-up assessments. Compared to controls, ART-naïve individuals demonstrated significantly reduced peak atrial longitudinal strain (PALS or reservoir function) (28.35 ± 6.51 vs. 34.52 ± 6.48, p=0.00012), Compared to the controls, after 9 months on ART the PALS essentially normalised (34.52 ± 6.48 vs. 37.05 ± 4.21, p=0.13).

Conclusion: Subclinical myocardial abnormalities may be evident at the time of HIV diagnosis, indicated by abnormal atrial strain prior to ART initiation. Short-term administration of ART resulted in improvements in atrial reservoir function. The left atrium (LA) plays a crucial role in modulating left ventricular (LV) filling, suggesting that LA strain assessment could serve as an early indicator of subclinical cardiovascular dysfunction in PLWH. Strain analysis of LA function may represent a valuable tool for detecting and following up underlying cardiovascular disease in this population.

Assessment of ventricular function in paediatric patients with chronic kidney disease using multiple echocardiography modalities

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Background: Cardiovascular disease (CVD) is the most common cause of mortality and morbidity in children with chronic kidney disease (CKD). CVD in children with CKD may be subclinical. Transthoracic echocardiogram (TTE) evaluation of ventricular function is crucial in the diagnosis, management, and prognosis of CVD. Echocardiography is the primary tool in the assessment of cardiovascular structure and function with newer methods providing more accurate assessments and early detection of subclinical systolic and diastolic dysfunction.

Objectives: The study aimed to describe biventricular function using multiple echocardiographic modalities in children with CKD.

Method: A retrospective, descriptive analysis of transthoracic echocardiography data for CKD patients attending renal clinic at Nelson Mandela Children's Hospital (NMCH) was performed. Permission to utilise existing data from the NMCH cardiology and renal database was granted by the Medical Advisory Committee of the hospital. Data source included clinical notes and echocardiography reports. Data for ventricular function was obtained using current American guidelines for M-mode, pulsed and tissue dopplers and 2D strain.

Collected data was entered onto Excel spreadsheet and analysed using Excel statistical package for basic descriptive statistics.

Results: A total of 10 children with CKD (70% girls, 30% boys; age range: 7 - 18 years [mean=11.4, standard deviation=0.96]) were enrolled. All children had hypertension and stage 5 CKD on dialysis (60% haemodialysis, 30% peritoneal, 10% combination of haemodialysis and peritoneal). Forty percent (40%) of children had reduced LV systolic function. Diastolic dysfunction was present in all children. Regional wall motion abnormalities (RWMA) were present in 90% of children (hypokinesia 88%, akinesia, and dyskinesia equally distributed [77.8%]).

Conclusion: Children with hypertension and stage 5 CKD presents with significant diastolic dysfunction and notable RWMA before the onset of overt systolic dysfunction.

Implanted device-related infection: An analysis of the impact of additional preventative measures on the rate of device-related infection at Tygerberg Hospital

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Background: Cardiac implantable electronic devices (CIED), such as pacemakers, implantable cardioverter defibrillators, and cardiac resynchronisation therapy devices, are indicated in patients with brady- and tachyarrhythmias or advanced systolic heart failure. The burden of cardiovascular disease continues to increase globally, thus the amount of CIED implantations increases, and so does the risk of developing CIED-related infection. The Division of Cardiology at Tygerberg Hospital has identified an increase in device-related infection and subsequently implemented a range of additional preventative measures aimed at reducing the frequency of device-related infection.

Objectives: To determine whether there was a decrease in the rate of CIED-related infection by comparing the rates before and after implementing additional preventative measures.

Method: This retrospective study was conducted in the Division of Cardiology at Tygerberg Hospital, Bellville, South Africa. We included 239 patients in our pre-preventative measures group (control group), who received a CIED-related procedure between January 2022 - December 2022. A 3 month period followed to monitor for uptake of and adherence to the additional preventative measures that had been implemented. One hundred and four patients were then recruited for the post-preventative measures group (study group), who received CIED-related interventions between March 2023 - September 2023.

Results: Ten of the 239 patients in the control group developed CIED-related infection and 3 of the 104 patients in the study group developed CIED-related infection (4.18% vs. 2.88%; p=0.76). Within the first 6 months since the last CIED-related procedure, 4 patients in the control group developed infection, compared to none in the study group (2% vs. 0%; p=0.32).

Conclusion: This interim analysis failed to demonstrate a statistically significant reduction in CIED-related infection following the implementation of a range of additional measures aimed at reducing infection rates. The absence of infections in the first 6 months after receiving a CIED-related procedure in the study group may be a chance finding but is worth pursuing in a larger cohort. The study is therefore on-going with an emphasis on improving the adherence to the measures implemented to reduce infection.

Electrocardiographic parameter changes of newly-diagnosed HIV-infected persons: A prospective cohort study before and after the initiation of antiretroviral treatment

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Background: People living with HIV-infection (PLWH) are at an elevated risk of cardiovascular disease (CVD) with early cardiac abnormalities often linked to inflammation. Advanced imaging limitations hinder the detection of these abnormalities. The long-term impact of these abnormalities and their interaction with antiretroviral treatment (ART) remain unclear. The capability of the 12-lead electrocardiogram (ECG) to detect and monitor subtle myocardial abnormalities in newly diagnosed PLWH has not been thoroughly investigated.

Objectives: We set out to evaluate subtle cardiovascular abnormalities using the ECG that could be used to detect and track subclinical CVD in PLWH.

Method: ART-naive PLWH were recruited alongside HIV-uninfected, age- and sex-matched controls. All participants underwent a standard 12-lead ECG using a MAC 2000 unit (General Electric, USA). The HIV group commenced ART and was reassessed 9 months later. Heart rate, QT-interval (QT), and corrected QT-interval (QTc) were measured and compared using one-way ANOVA and paired samples t-test as appropriate.

Results: Eighty five ART naïve participants and 22 HIV-uninfected controls were recruited. Seventy three HIV-infected participants completed 9 months follow-up. The QTc showed a trend to be longer in the ART naïve group compared with controls (419 ± 22ms vs. 410 ± 23ms; p=0.06). This difference was not evident after 9 months of ART. A significant decrease in the heart rate was observed when comparing the ART naive group and the 9 months ART group (73 ±15bpm vs. 64 ± 13bpm; p<0.001). Correcting for the decreased heart rate, the QTc of the 9 months ART group was 7ms shorter compared to the ART naïve group (95% CI: -2 to -12ms; p=0.004).

Conclusion: A trend towards a longer QTc was observed in newly diagnosed, ART-naive PLWH compared to controls. After 9 months of ART, the QTc reduced significantly, suggesting a favourable electrophysiological effect of ART on the heart, potentially due to decreased myocardial inflammation. Further research is needed to explore the potential role of this electrical biomarker in the prospective evaluation of myocardial inflammation.

Our founding fathers and the heart diseases they brought to South Africa

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Background: Cardiomyopathies are a leading cause of heart failure in South Africa, yet significant knowledge gaps persist. To address this, the IMHOTEP (African Cardiomyopathy and Myocarditis Registry Programme) was established to clinically and genetically characterise South African cardiomyopathy patients. Our research identified several probands sharing the same variant, indicating potential founder variants, potentially introduced by the various European colonisations.

Objectives: (1) Screen and validate core family members of probands with 3 recurrent variants using High Resolution Melt (HRM) and Sanger sequencing. (2) Design primers for microsatellite markers and conduct microsatellite analysis on probands and their families. (3) Construction and analysis of haplotypes. (4) Trace founder variants genealogically using vital statistical records.

Method: Clinical and baseline data of probands and their family members were recorded upon enrolment in IMHOTEP. Allele frequencies were determined via gnomAD and ClinVar. Variant classifications were determined by using the American College of Medical Genetics (ACMG) guidelines. Haplotypes were constructed using a combination of single nucleotide polymorphisms (SNPs) and microsatellites, with 3 informative microsatellite markers designed for each variant. Genealogical tracing was performed using standard methods, and all data were stored on Legacy v.9.0.

Results: Three potential founder variants were identified: PKP2 c.1162C>T in 12 probands and 29 family members, BAG3 c.925C>T in 3 probands and 8 family members and LMNA c.568C>T in 3 probands and 3 family members. All 3 variants were found in individuals of European and mixed-race ancestry. These recurrent variants are pathogenic / likely pathogenic according to ACMG criteria. Allele frequencies (≤0.00001) supported the founder effect possibility. Common haplotypes emerged for all 3 variants. Genealogical tracing was successful for families with the PKP2 c.1162C>T variant and a family with the BAG3 c.925C>T variant. We successfully traced families harbouring the PKP2 c.1162C>T variant to their 17th century progenitors.

Conclusion: Our research provides evidence of the founder effect for PKP2 c.1162C>T, BAG3 c.925C>T, and LMNA c.568C>T variants. We genealogically traced the PKP2 c.1162C>T variant to the 17th century, suggesting a French or Dutch origin.

Bartonella endocarditis: An important cause of blood culture-negative endocarditis in South Africa

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Background: The Duke diagnostic criteria for the diagnosis of infective endocarditis has recently been modified. The revision recognises Bartonella species as an important and identifiable cause of blood culture-negative endocarditis (BCNE). There is a paucity of epidemiological, clinical, echo-cardiographic, and outcome data in Bartonella endocarditis with only a few case series reported worldwide.

Objectives: Provide a comprehensive description of 30 cases identified with Bartonella endocarditis managed at Tygerberg Hospital, Bellville, South Africa.

Method: The Tygerberg Endocarditis Cohort Study is an on-going prospective study evaluating the impact of a standardised protocol for organism detection in patients with infective endocarditis. Data captured between 1 October 2019 - 1 May 2023 were evaluated and a comprehensive description of 30 cases with Bartonella endocarditis is presented.

Results: Fifty eight patients were identified with BCNE during the study period. Of these, 30 patients (51.7%) were identified with Bartonella endocarditis. Seven patients (23.3%) were either homeless or lived in informal housing. Seventeen patients (76.6%) were identified with an alcohol-use disorder. Eight patients (26.6%) were infected with human immunodeficiency virus (HIV). Patients typically presented symptomatic with advanced valvular destruction. Blood serology for Bartonella was positive (1≥256) in all patients. Valvular tissue was available for polymerase chain reaction (PCR) testing in 18 cases. Of these, Bartonella quintana was identified in 16 cases and Bartonella henselae in 1 case. The most common isolated valve lesion on echocardiography was severe aortic regurgitation (n=13;43.3%). Surgery was successfully performed in 22 (60%) patients. The 1-, 3- and 6-month mortality in the operated cohort was 0%, 4.5% and 4.5% respectively. In the unoperated cohort with a surgical indication for surgery (n=7), the mortality was 100%.

Conclusion: In this contemporary study of IE in South Africa, we report Bartonella as the most common cause of BCNE (51.7%). The patient risk factors together with the clinical- and echocardiographic-features were often consistent with the reported literature of a subacute onset and highly destructive endocarditis. Most patients in this study were managed surgically and had a good outcome. This study highlights the importance of Bartonella infection in our region and the need to routinely perform serology and PCR in BCNE.

Time to reperfusion therapy for ST-elevation myocardial infarction patients: An analysis of the Tygerberg STEMI Registry

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Background: The mortality rate of patients with ST-elevation myocardial infarct (STEMI) is directly related to time to reperfusion. The majority of patients within the Tygerberg Hospital (TBH) referral network present at facilities where percutaneous coronary intervention (PCI) is not available and are treated with a pharmaco-invasive strategy.

Objectives: This study assessed STEMI care within the TBH referral network, focusing on the time-intervals delaying reperfusion for patients undergoing a pharmaco-invasive strategy or primary percutaneous coronary intervention (PCI).

Method: All patients presenting with STEMI within the TBH referral network are referred to TBH for definitive care and entered into the STEMI database. This is a retrospective analysis of STEMI patient data from 1 June 2023 - 31 May 2024. Time intervals recorded included the times from onset of chest pain to first medical contact (FMC), FMC to primary-PCI, FMC to thrombolysis and failed thrombolysis to rescue-PCI.

Results: Three hundred patients were included, with in-hospital mortality in 28 patients (9.3%). The median time from onset of chest pain to FMC was 3 hours (IQR: 5.3 hours). The majority of patients (247) underwent a pharmaco-invasive strategy (82.3%), with 215 (87%) being successfully reperfused with thrombolytic therapy. The time from FMC to lysis in patients treated with a pharmaco-invasive strategy was 63 minutes (IQR: 90 minutes). Of the 215 participants that had successful thrombolysis, 208 had PCI post-thrombolysis 27 hours (IQR: 35.7 hours) after FMC. Patients with unsuccessful thrombolysis (32) received rescue PCI 5 hours (IQR: 3 hours) after failed lysis. A primary PCI strategy was utilised in 16 patients. The time to reperfusion

in patients presenting at TBH (4 patients) was 46 minutes(IQR: 42 minutes) compared to 8.2 hours (IQR: 8.2 hours) in patients received from facilities who referred patients without administering lytic therapy. Patients categorised as auto-reperfused or missed STEMI (37) had PCI 49.2 hours (IQR: 38.8 hours) after FMC.

Conclusion: Patients presenting with STEMI within the TBH referral network are predominantly managed with a pharmaco-invasive strategy, culminating in early PCI in the majority of patients. Time from FMC to lysis (62 minutes) is outside the guideline recommendation of 30 minutes. Other major delays targeted for improvement include patient delays (chest pain to FMC), time from failed lysis to rescue-PCI and time to primary-PCI for patients from facilities not administering lytic therapy.

The character of infective endocarditis at Chris Hani Baragwanath Academic Hospital: A large tertiary hospital in South Africa

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Background: Infective endocarditis is the infection and inflammation of cardiovascular structures, including the endocardium and valves (both native and prosthetic). There is a paucity of data regarding this condition from sub-Saharan Africa, including South Africa.

Objectives: To characterise the clinical manifestations of this potentially deadly condition at Chris Hani Baragwanath Academic Hospital, a large tertiary referral facility that serves the community of Soweto and surrounding areas.

Method: Consecutive, consenting patients above the age of 18 presenting to Chris Hani Baragwanath Academic Hospital with a clinical diagnosis of infective endocarditis were recruited for the study.

Results: Over a 10 month period, 39 patients were recruited to the study. The mean age was 34,5 (±10,2) years. 85% were male. 13% of participants suffered from hypertension, 74% were smokers, and 56% were HIV positive. Of those living with HIV, only 43% were on antiretroviral treatment. Eight percent of participants had previous infective endocarditis, whilst 3% had previous cardiac surgery. A staggering 69% of patients were persons who inject drugs. In 49% of participants, Staphylococcus aureus was the causative organism. In 28% of cases, blood cultures were negative. Thirteen percent of cases were complicated by embolisation to the brain, whereas in 26% of cases embolisation to the lung was documented. Whilst the majority were treated with antibiotics, 15% of patients underwent surgery as well.

Conclusion: These preliminary results from Chris Hani Baragwanath Academic Hospital, show that most of our patients with infective endocarditis are young males, who use intravenous recreational drugs. Staphylococcus aureus was the most common causative organism. Most of the patients were treated medically with antibiotics. Only 15% underwent surgery.

Distribution and frequency of congenital heart disease in patients with genetic syndromes or dysmorphism at Charlotte Maxeke Johannesburg Academic Hospital over a 10-year period

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Background: Congenital heart disease (CHD) is the most common birth defect, occurring in 9 per 1 000 births worldwide, and is a significant contributor to morbidity and mortality. Approximately one third of patients with CHD have an underlying genetic cause or association, yet South African data on these associations remains limited.

Objectives: To describe the prevalence and types of CHD in dysmorphic and syndromic patients presenting to Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) Paediatric Cardiology, and to identify associations between CHD subtypes and syndromes and isolated major congenital abnormalities within this cohort.

Method: A retrospective analysis of an existing paediatric cardiology database and patient records from January 2010 - December 2020 at a tertiary hospital in Johannesburg, South Africa. Participants were aged birth to 16 years old with dysmorphic features, confirmed genetic syndromes or isolated major congenital abnormalities.

Results: A total of 1 024 patients were enrolled in the study, with a median age of 41 days at diagnosis, and gender distribution of 56% male and 44% female. Documented deaths accounted for 7% of the cohort, with the highest proportion occurring in patients with cyanotic CHD (31% of this subgroup). CHD was diagnosed in 37% (n=379) of patients, with a predominance of acyanotic (82%) over cyanotic (18%) CHD. The commonest lesion

overall was ventricular septal defect (VSD) (31%), followed by atrioventricular septal defect (AVSD) (25%). A genetic syndrome was diagnosed in 48% of patients, the commonest being trisomy 21 (T21) (27%). The highest frequency of CHD was found in trisomy 18 (T18) (94% of patients). Patients with isolated major congenital abnormalities had a CHD incidence of 7%.

Conclusion: This study offers insight into the clinical epidemiology of CHD in syndromic children and those with isolated major congenital abnormalities, emphasising the need for timely CHD screening in these patients. Further research on CHD in specific syndromes would enhance our understanding of these associations.

Analysis of patients undergoing electrophysiology studies (EPS) at Chris Hani Baragwanath Academic Hospital (CHBAH): A large tertiary hospital in South Africa

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Background: For many years, electrophysiology studies (EPS) has only been accessible to patients in the private healthcare sector in South Africa (SA). For indigent patients dependent on the public healthcare sector, this service is scarce, with the capability existing only within 1 or 2 tertiary hospitals. We established an EPS programme at Chris Hani Baragwanath Academic Hospital (CHBAH) in 2019 just before the COVID pandemic, which negatively impacted on its progress. Post-COVID we continued and have since made great strides providing EPS to poor indigent patients unable to afford private healthcare.

Objectives: To characterise and analyse the profile of patients undergoing EPS at CHBAH, a large tertiary hospital in Soweto, Sout Africa, which also serves other rural provinces in South Africa.

Method: Retrospectively reviewed all records of patients who underwent EPS over a 4-year period (2019 - 2023). We used appropriate statistical tools to analyse demographic, clinical, echocardiographic, and electrocardiographic data in order to understand the profile of patients requiring EPS.

Results: A total of 60 patients (♀ 63%), age 44,1 ± 15.5, underwent EPS over this period. The indications for EPS were: AVNRT (28%); Atrial flutter (23%); WPWS (22%); Unspecified SVT (15%); AVRT (3%); and VT (9%). 87% were in NYHA functional class 1; 10% were in NYHA functional class 2; and 3% were in functional class 3. During the arrhythmic episode, the heart rate was 174.2 ± 27. In terms of procedural outcome, 55 (92%) patients were successfully ablated and in 4 (7%) patients the procedure was unsuccessful. Over a period of up to 4 years, 54 (90%) patients have remained clinically well without recurrence, 5 (8%) patients have reported being unwell due to development of heart failure and 1 (2%) has demised due to an unspecified cause.

Conclusion: EPS is feasible with high success rate even in resource constrained environment and can make a big difference to patients' symptoms and outcome. Consistent with the literature, we found a predominance of females in our cohort. Most of our patients had AVNRT and had quite a high success rate of ablation.

The effects of Aspalathus linearis (Rooibos) in Angiotensin II-induced hypertrophy and apoptosis

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Background: Cardiovascular diseases are a growing global concern especially in developing countries such as South Africa. Medicinal plants such as Aspalathus linearis (Rooibos) are gaining attention as alternative therapeutic agents for chronic diseases of lifestyle in this context. Rooibos is a shrub-like plant that has been associated with several health benefits including cardioprotective effects. In isolated cells, it improved high glucose-induced apoptosis and in isolated perfused hearts it reduced infarct size. However, rooibos has never been tested against cardiomyoblast hypertrophy and apoptosis.

Objectives: The aim of this study was to investigate the effects of rooibos (RB) against Angiotensin II (ANG-II) induced hypertrophy and apoptosis.

Method: Undifferentiated H9C2 cardiomyoblasts were treated with Ang-II (20μM), RB (100μM) and ANG-II+RB for 48 hours, n=3. The following experimental procedures were performed: HPLC analysis and IC-50 of the rooibos extract, cell size, cell viability, superoxide (SOD) activity, catalase (CAT) activity, levels of oxidative stress (TBARS), ATP levels, high-resolution respirometry as well as western blotting for markers of hypertrophy, apoptosis, and mitochondrial energetics.

Results: Rooibos attenuated the effects of Angiotensin-II by reducing cell size ($p<0.01$) and increasing cell viability ($p<0.01$), ATP levels ($p<0.05$) and SOD activity ($p<0.05$). Rooibos did not affect CAT activity ($p>0.05$). Rooibos reduced the expression of Bax ($p<0.05$), a marker of apoptosis and VDAC1 ($p<0.01$), a mitochondrial gatekeeper. Rooibos also restored complex 1-linked leak respiration ($p<0.05$), beta oxidation ($p<0.05$) and glucose oxidation related oxidative phosphorylation ($p<0.05$).

Conclusion: Rooibos counteracts Angiotensin II-induced hypertrophy and apoptosis via the improvement of antioxidant pathways and mitochondrial energetics.

Comparing non-invasive Qp/Qs and mean pulmonary artery pressure to aemodynamic measurements in complete atrioventricular septal defects

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Background: An atrioventricular septal defect is a congenital heart defect that has a common AV valve off setting with a large atrial and ventricular defect. Untreated, patients are at a risk of developing pulmonary vascular obstructive disease and Eisenmenger syndrome. Echocardiography can now estimate the presence and severity of pulmonary hypertension with good correlation shown in some studies to invasive assessment.
Objectives: Compare non-invasive echocardiographic measurement of mean pulmonary artery pressures and Qp/Qs to cardiac catheterisation estimation of patients with AVSD to determine operability of patients.
Method: Twelve patients with complete AVSDs undergoing cardiac catheterisation had echocardiograms done before catheterisation under sedation or general anaesthesia. Qp/Qs and mean PA pressure were measured according to established guidelines using both modalities.
Results: The study involved a total of 12 patients. Five patients (41%) with incomplete data (absence of TR jet for analysis in patients suspected to have Eisenmenger) were not included in the final analysis. There were comparable Qp/Qs and mean pulmonary artery pressure values obtained invasively and non-invasively for all the patients. There was 100% similarity in the interpretation (operable vs. inoperable) of data obtained from both methods.
Conclusion: The preliminary findings suggest consistency in interpretation of Qp/Qs and mean PA pressure between echocardiography diagnostic cardiac catheterisation in this group. More robust studies are required to confirm these findings.

Heart failure in South Africa: When to refer a patient for LVAD?

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Background: Heart failure remains an increasing dilemma in the world. Although cardiac transplantation has demonstrated excellent outcomes over the years, this is limited due to donor organ supply. However, LVAD implantation has now outcomes that are equal to transplantation at least in the first 2 years. The attraction to VAD technology is that it is readily available and does not require anti-rejection medication. For these reasons, 3 times more LVADs are implanted internationally than transplantation. This treatment is also available in South Africa and has gained significant momentum in Cape Town.
Objectives: To demonstrate that the outcomes of VAD implantation in South Africa compare favourable with that of the international community. To review the indications of LVAD implantation with referring cardiologists. To give an update on the management and echo guidance in the optimisation of device performance.
Method: A review of 100 VAD implants in Cape Town over a 24-year period. To review international guidelines for LVAD implantation. An update of ongoing management and echo findings will be visited. New development and research avenues will be discussed.
Results: This demonstrated that that the outcomes of a single centre VAD programme in Cape Town compare favourable with that of the international community. Significant less VADs are implanted per capita in South Africa than internationally. The current international guidelines for LVAD referral are heart failure patients with more than one of the following: >3 admissions over a 12-month period, EF <25%, inotropic dependance, progressive end-organ dysfunction, absence of RV dysfunction.
Conclusion: VAD treatment is available in South Africa with satisfactory outcomes. More patients in South Africa can benefit from this treatment and guidelines for referral should be considered. VAD implantation is an excellent option in the management of end-stage heart failure especially in the presence of poor organ referral numbers.

Prevalence of lower extremity arterial disease in people with HIV attending Parirenyatwa Centre of Excellence Clinic

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Background: HIV is a chronic inflammatory state that is associated with the accelerated development of atherosclerosis and an increased risk of myocardial infarction and stroke due to HIV- and drug-related factors. Lower extremity arterial disease (LEAD) heralds the presence of atherosclerosis in the coronary and cerebral arteries. LEAD is easy to screen for by use of the ankle-brachial index (ABI).
Objectives: Primary: Determine the prevalence of LEAD in people with HIV (PWH) attending Parirenyatwa Centre of Excellence Clinic (PCOEC). Secondary: Identify socio-demographic and clinical factors associated with LEAD.
Method: PWH aged 18 years and above were consecutively recruited into a cross-sectional study. Critically-ill patients and individuals with lower limb swelling, ulcers, or amputation were excluded. Baseline demographic and clinical data were collected. Blood pressure, height, and weight were measured. Random blood glucose was measured in non-diabetic participants. Intermittent claudication was assessed by the use of the Edinburgh claudication

questionnaire. An 8Hz vascular Doppler probe was used to determine the ABI. LEAD was defined as an ABI less than or equal to 0.9. The prevalence of LEAD was determined. Univariate and multiple logistic regression analyses were performed to identify significant and independent factors associated with LEAD, respectively.

Results: Two hundred and ten participants were recruited. The mean age was 43 years. Two-thirds of the participants were female (n=139). 63.8% of the participants had been on antiretroviral therapy (ART) for a median duration of 9 years and 68.6% were on first-line ART. The prevalence of LEAD was 15.7%. Independent factors associated with LEAD were age (OR 1.05, 95% CI [1.02-1.09], p=0.005), smoking (OR 4.7, 95% CI [2.36-7.58], p=0.039), obesity (OR 3.72, 95% CI[1.28-10.85] p=0.016), and hypertension (OR 1.11, 95% CI[1.14-2.08], p=0.004).

Conclusion: The prevalence of LEAD at PCOEC in adults aged 18 years and above was 15.7%. LEAD was associated with traditional risk factors for atherosclerosis. There was no independent association between LEAD and HIV- or ART-related variables i.e. duration since HIV diagnosis, viral load, CD4 count, duration on ART, current ART regimen, exposure to drugs, and protease inhibitors.

Glucocorticoids alleviate inflammation but do not improve left ventricular diastolic dysfunction in collagen-induced arthritic rats

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Background: Systemic inflammation in rheumatoid arthritis (RA) significantly contributes to left ventricular (LV) diastolic dysfunction. Although glucocorticoids (GCs) are effective in managing RA inflammation, their long-term use may affect cardiovascular disease risk. There is limited direct evidence on the impact of GC treatment on the inflammation-induced LV function impairments.

Objectives: This study investigated the effects of GCs on LV function in a collagen-induced arthritis (CIA) rat model.

Method: Sprague Dawley rats were divided into control, CIA, GC, and CIAGC groups (n=10 each). The CIA group received bovine type-II collagen, while the CIAGC and GC groups were administered 10mg/kg prednisolone daily for 6 weeks. At termination, circulating high-sensitivity C-reactive protein (hs-CRP) concentrations were measured by ELISA. LV function was assessed using echocardiography and LV collagen accumulation was assessed histologically using the picrosirius red stain.

Results: The hs-CRP concentration was lower in the CIAGC group compared to the CIA group (p=0.02). LV mass indexed to body weight was higher in the CIA group compared to the control (p=0.01) and GC groups (p=0.02), however no differences were observed between the CIA and CIAGC groups (p=0.11). Compared to controls, all groups had lower lateral e' and e'/a' ratios (p<0.01). Compared to controls, all groups had higher relative wall thickness (p<0.05), E/e' ratios (p<0.01), and collagen area fraction (p<0.05). No differences were observed between the CIA and CIAGC groups for all echocardiographic and histological markers.

Conclusion: Systemic inflammation induced concentric hypertrophy, impaired LV relaxation, and increased LV filling pressures. GC treatment reduced inflammation but did not improve LV geometry or function.

Infective endocarditis-associated glomerulonephritis and renal failure in a child with ventricular septal defect

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Background: Acute renal failure associated with infective endocarditis (IE) is reported to occur in approximately 10% of paediatric IE cases. Mechanisms underlying the renal failure include infection-related immune complex glomerulonephritis, haemodynamic instability from sepsis and heart failure, renal infarction from septic emboli, and renal cortical necrosis.

Objectives: To describe the outcome of a patient known with a small ventricular septal defect (VSD) who developed infective endocarditis complicated by immune-complex mediated glomerulonephritis and acute renal failure.

Method: We retrospectively reviewed all the patient's hospital records.

Results: An 8-year-old female, previously well, with a background history of trisomy 21, restrictive perimembranous VSD and well-controlled hypothyroidism on levothyroxine, was referred for evaluation of non-specific constitutional symptoms. On admission, she was pale, febrile, tachypnoeic, tachycardic, hypertensive, and had a petechial rash prominent in the lower limbs, hepatosplenomegaly, and a 3/6 ejection systolic murmur. Her initial blood results showed elevated inflammatory markers and impaired renal function which subsequently peaked at a urea of 25.2mmol/L and creatinine 265µmol/L. After echocardiography showed vegetations on the tricuspid valve and moderate tricuspid regurgitation, a diagnosis of infective endocarditis with associated immune-complex glomerulonephritis was made (based on low C3 / C4 and absence of renal infarcts on ultrasound). She had 4 negative blood cultures and 1 which grew Staphylococcus hominis. A multidisciplinary discussion recommended surgery for resection of vegetations, tricuspid

valve and VSD repair rather than dialysis as the appropriate treatment to resolve the renal impairment. Surgery was done after 3 weeks of renal-adjusted doses of antibiotics. A good repair was achieved, with minimal post-operative tricuspid regurgitation and no residual VSD. Post-operatively, she completed a total of 6 weeks antibiotics and her renal function improved to a urea of 10.9mmol/L and creatinine 103µmol/L. She was discharged on post-operative day 24 with a plan to review in 1 month with repeat renal function tests.

Conclusion: Antibiotic treatment and surgery can successfully resolve renal dysfunction in patients with infective endocarditis-associated renal failure, without the need for dialysis.

Co-supplementation with coenzyme Q10 and simvastatin protects cultured heart cells against dyslipidemia-induced oxidative damage

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Background: Dyslipidemia remains a key factor contributing to cardiovascular complications in individuals with type 2 diabetes (T2D). Current medications such as statins are effective at lowering cholesterol to improve cardiovascular outcomes in people with dyslipidemia. However, long-term use of statins has been associated with the depletion of coenzyme Q10 (CoQ10), an important intracellular antioxidant and mitochondrial membrane component found in abundance within heart cells, which may explain increased oxidative stress-associated damage within the myocardium in individuals with T2D.

Objectives: Is to explore whether supplementation with CoQ10 can enhance the therapeutic efficacy of simvastatin in protecting against oxidative stress-associated damage in cultured heart cells.

Method: Here, H9c2 cardiomyoblasts, a widely utilised experimental model to study heart cell physiology, were pre-treated with CoQ10 (2.5µg/ml) and simvastatin (2.5µM) before exposure to palmitic acid (0.25mM) for 24 hours. Thereafter, prominent markers of oxidative stress and cellular damage were evaluated, including mitochondrial oxidative capacity, reactive oxygen species (ROS) production, intracellular antioxidants, and apoptotic markers. Cholesterol content and lipid peroxidation were other markers that were analysed following the supplementation of heart cells with CoQ10 and simvastatin.

Results: Co-supplementation with CoQ10 was effective in protecting against dyslipidemia-associated oxidative damage in cultured heart cells. This was associated with improved efficacy of simvastatin in reducing cholesterol levels, and lipid peroxidation products, while also improving mitochondrial respiration, and decreasing oxidative stress-induced cellular damage following the exposure to palmitic acid. Reduction of toxic ROS was associated with enhanced mRNA expression of nuclear factor erythroid 2-related factor 2 (Nrf2), an essential antioxidant response element. Moreover, this study uniquely demonstrated the ability of CoQ10 supplementation to directly decrease mRNA expression levels of lanosterol synthase, suggesting that CoQ10 may regulate cholesterol production without compromising endogenous CoQ10 biosynthesis.

Conclusion: Preliminary findings suggest that CoQ10 supplementation could provide cardioprotective benefits by potentially improving the efficacy of statins in alleviating dyslipidemia-associated oxidative damage in cultured heart cells. However, further research, including in vivo studies, is essential to confirm these observations and determine the most effective treatment protocols.

Filamin-C (FLNC) as a cause of disease in a large South African family diagnosed with restrictive cardiomyopathy

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Background: Restrictive cardiomyopathy (RCM) is a rare cause of cardiomyopathy in developed countries, although its prevalence may be more common in certain tropical regions. The aetiology of RCM remains poorly understood and may result from inherited or acquired predispositions and disease, or a combination thereof. Familial RCM usually has autosomal dominant inheritance, with most identified genes encoding sarcomere or Z-disk proteins. This study aimed to determine the disease-causing variant in this South African family diagnosed with RCM.

Objectives: We exome sequencing to detect the variant.

Method: A South African family was screened at Groote Schuur Hospital. The DNA of the affected individuals was captured and amplified using the TWIST Library Kit and run on the NovaSeq 6000 platform. Pathogenic variants were selected according to the ACMG / AMP guidelines. Primers were designed, and the Sanger sequencing method was used for variant validation. Segregation analysis was performed after the disease-causing variant was identified.
Results: The family was initially diagnosed with Noonan syndrome-associated cardiomyopathy based on suggestive clinical findings. However, panel screening for Noonan's found no causative gene. The diagnosis was revised, and an alternative cause of RCM was considered. Exome sequencing found a heterozygous missense FLNC c.6031G>A (p.Gly2011Arg) variant in all affected individuals. The variant is located in the FLNC protein R18 Ig-loop of the rod 2 domain and has been associated with severe RCM.
Conclusion: This study highlights that accurate clinical phenotyping is critical for identifying pathogenic genetic variants. Our research successfully identified the disease-causing variant in a South African family with RCM. This discovery will aid in identifying other family members at risk and facilitate early diagnosis and treatment.

A case of refractory atrial flutter in a Fontan patient

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Background: Intra-atrial reentry tachycardia (IART) is the most common arrhythmia seen following total cavo-pulmonary connection (TCPC) which can result in heart failure, stroke, or sudden cardiac death. Catheter ablation can be attempted but recurrence is common. Atrial pacing, to prevent premature atrial ectopics that could trigger IART, in combination with high-dose sotalol and atrial anti-tachycardia pacing (ATP) has been described as an effective management option.
Objectives: To outline the clinical outcome of a patient with TCPC and IART managed at Red Cross War Memorial Children's Hospital (RCWMCH).
Method: A case review of patient management over a 9-year period.
Results: The patient was diagnosed at age 2 years with pulmonary atresia / intact ventricular septum. Initial management was with a left modified Blalock-Taussig-Thomas (LMBTT) shunt. Radiofrequency perforation of the pulmonary valve was unsuccessful. Attempted bi-ventricular repair with RV-PA reconstruction at age 3 years failed. This was followed by a pulmonary artery band and central shunt. At age 4 years, a bidirectional Glenn shunt was performed with takedown of the central shunt. The LMBTT shunt was occluded with a vascular plug. At age 8 years, a fenestrated, external conduit TCPC was performed, followed by stenting of a left pulmonary artery stenosis. She developed recurrent IART at age 10 years. Aspirin was changed to warfarin, and cardioversion performed twice. Due to IART recurrence, sotalol was added. IART was suppressed but led to sinus node dysfunction and bradycardia. Discontinuing sotalol resulted in IART recurrence. Ablation was not possible as no 3D electroanatomical mapping is available at RCWMCH. A transvenous atrial pacemaker was implanted through the Fontan fenestration. High-dose sotalol and warfarin were continued. At medium-term follow-up, transvenous atrial pacing, combined with high-dose sotalol has been successful in preventing further IART.
Conclusion: High-dose sotalol in combination with atrial pacing can successfully prevent IART post-TCPC.

Transcatheter interventions in the management of ventricular septal defects: A 20-year single centre South African experience

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Background: Ventricular septal defects (VSDs) are one of the most common congenital heart defects. Traditionally, VSDs have been closed surgically. However, since the first reports of transcatheter VSD closures in 1988, percutaneous VSD closure has increasingly become an alternative to surgical closure.
Objectives: Describing the characteristics and outcomes of children who underwent percutaneous VSD closure at Chris Hani Baragwanath Academic Hospital.
Method: A retrospective, descriptive analysis was conducted at Chris Hani Baragwanath Academic Hospital in South Africa to evaluate patients who underwent transcatheter VSD closure between 2003 and 2023.
Results: There were 22 patients who underwent transcatheter VSD closure, 13 (59%) females and 9 (41%) males. Successful closure was achieved in 19/22 (86%). Of the 3/22 (14%) who did not have successful closure, 1 went for surgery, 1 had a spontaneous closure during follow up and 1 is still being followed up. Most of the VSDs were muscular 18/22 (82%) with the remaining 4/22 (18%) being perimembranous VSDs. Complications included transient mild aortic regurgitation and tricuspid regurgitation (3/12), transient residual VSD flow through the device in (4/12) , transient arrhythmias (2/12), a clot in the right ventricle during the procedure which resolved with heparin infusion (1/12), transient left ventricular dysfunction (1/12) and 1 child (1/12) developed asymptomatic premature ventricular contractions 6 years later. There were no complications in the remaining 10/22 (45%).
Conclusion: With careful selection of patients, percutaneous VSD closure is a safe procedure in our setting with good outcomes and minor complications in most cases.

Afterload mismatch: A state of decompensation from progressive aortic stenosis disease

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Background: Afterload mismatch (AM) in severe aortic stenosis (AS) refers to the maintenance of a high gradient (>40mmHg) despite a low left ventricular ejection fraction (LVEF<50%). The mechanism underlying the low LVEF in AM is not known, nor is its place in the natural history of severe AS disease.

Objectives: To characterise left ventricular (LV) remodelling, function and afterload in AM compared to patients with high-gradient severe AS and preserved LVEF using cardiovascular magnetic resonance (CMR) imaging.

Method: Participants with high-gradient severe AS were prospectively recruited from Tygerberg Academic Hospital and divided into 2 groups based on LVEF below (AM) or above 50%. Those with other haemodynamically significant valve lesions, structural heart diseases, and / or significant coronary artery disease were excluded. All participants underwent CMR imaging using a Siemens Magnetom Aera 1.5 T scanner for evaluation of LV geometry, function and end-systolic wall stress (ESWS). Images were post-processed using Circle Cardiovascular Imaging (CVI42) software.

Results: Of 50 patients with high-gradient severe AS, 18 (36%) had AM (LVEF 27 ± 9%) and 32 (64%) had NEF (LVEF 67 ± 9%). Significantly larger (LVEDVi 125 ± 26 vs. 75 ± 16ml/m^2; p<0.0001) and heavier [LVMi 105(31) vs. 73(30)g/m^2; p<0.0001)] ventricles were observed in AM. Non-invasive ESWS was significantly higher in AM (175 ± 69 vs. 78 ± 28 x103 dynes/cm^2; p<0.0001) and correlated inversely with LVEF (r=-0.74 with 95% CI -0.86 to -0.55; p<..0001). More severe stenosis was observed in AM (AVA 0.49 ± 0.2 vs. 0.7 ± 0.2cm^2; p=0.0006 and mean gradient 60 ± 12 vs. 55 ± 18mmHg; p=0.1) that correlated with higher degrees of LV remodelling (AVA and LVEDVi r=-0.47 with 95% CI -0.69 to -0.17; p=0.004 and AVA and LVMi r=-0.46 with 95% CI -0.69 to -0.14; p=0.005) and ESWS (AVA and ESWS r=-0.49 with 95% CI -0.71 to -0.19; p=0.003).

Conclusion: AM was characterised by more severe degrees of AS and more advanced LV remodelling. Adaptive LVH is likely outweighed by the excessively high afterload in AM resulting in decompensation characterised by a self-perpetuating cycle of increased ESWS, cavity dilation, and reduced LVEF.

Infantile pericardial teratoma

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Background: Teratomas are rare congenital tumours that are derived from the embryonic germ cell layers. They mainly occur in the sacrococcygeal area but the anterior mediastinum is the most common extragonadal site. Cardiac teratomas are mostly found extracardiac in the intrapericardial space. They frequently present with cardiac tamponade and cardiovascular collapse.

Objectives: We present a rare case of a 3-month-old infant with a pericardial teratoma who presented with cardiac tamponade.

Method: A 3-month-old girl presented to our hospital with severe respiratory distress. On examination she was apyrexial, in severe respiratory distress, hypotensive with weak volume pulses. She was in CCF, with a displaced apex beat, soft heart sounds, a tachycardia with an S3 gallop rhythm, and no audible murmur. HIV, cardiotoxic viruses and TB were excluded. A CXR showed a mediastinal mass, cardiomegaly with opacification of the entire left lung. An echocardiogram showed massive pericardial effusion with features of cardiac tamponade and a cystic mass in the pericardial sac. An urgent pericardiocentesis was done and she was optimised for surgery. Pericardial fluid analysis showed a transudate fluid. Chest CT scan showed a mediastinal mass with enhancing septations and calcifications. CRP, BHCG and AFP levels were normal.

Results: Intraoperatively there was a smooth and lobulated mass covering the right atrium and ventricle which was adherent to the ascending aorta. The mass was successfully dissected and completely excised. Gross histological assessment showed a well circumscribed and nodular tumour. Microscopically, a teratoma with elements derived from all 3 germ cell layers was seen. Approximately 2% of the tissue was composed of immature neural tissue with no features of malignancy. Postoperatively the patient improved remarkably and echocardiogram showed no residual teratoma or pericardial effusion. Follow up BHCG and AFP remained normal.

Conclusion: Intrapericardial teratomas are rare pericardial tumours of infancy and usually present with pericardial effusion like in our patient. They are usually benign and total resection is usually the definitive treatment. They require follow up to exclude recurrence and malignant transformation.

Rheumatic heart disease control programmes in Africa: A systematic review

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Background: Rheumatic heart disease (RHD) is a significant cause of heart failure globally. Sub-Saharan Africa accounts for 23% of RHD cases worldwide, with the highest prevalence rate of 8.64 cases per 1 000 people. To address the diverse challenges in prevention and management of RHD in African countries, it is crucial to establish and subsequently monitor RHD programmes in each country. This approach aligns with the 2018 World Health Assembly Resolution on Rheumatic Fever and Rheumatic Heart Disease.
Objectives: This review aims to provide a comprehensive mapping of RHD control programmes within the WHO AFRO region.
Method: Five databases were searched from January 2012 - February 2024 for published reviews. The data were categorised and analysed according to the 25 domains of the Core Conceptual Framework for Comprehensive Rheumatic Heart Disease Control Programmes. To reduce bias, article screening, data, and critical appraisal were conducted in duplicate.
Results: We retrieved 49 reviews conducted in 38 of the 47 AFRO countries with 22 countries reporting burden of disease data. Of the 16 countries reporting RHD prevalences from school-based studies, 3 countries (Namibia, Nigeria and Cote d'Ivoire) were classified as being at low-risk populations for RHD. Twenty two countries had evidence of tertiary cardiac services, with only 7 reporting local teams with RHD-specific services. Ten countries reported either partial or full reliance on surgical services external to the country. Notably, South Africa was the only country with published primary and secondary prevention guidelines for RHD.
Conclusion: This comprehensive mapping of RHD Control Programmes in Africa indicates that no single country provided sufficient information across all 25 domains; 11 countries had no published information in any domain, thus highlighting the numerous gaps in profiling the RHD programmes in the AFRO region, emphasising the need for more data. A search of primary studies would be useful to identify information not included in a review. Further, this review of reviews provides a framework for future formal studies or targeted supplementary data collection. Conducting interviews with key contacts in each country is recommended to assist in mapping the scope and effectiveness of RHD programmes.

Chemotherapy-induced cardiotoxicity: Targeting the ferroptosis pathway as a therapeutic option

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Background: Post-transfusion iron (Fe) overload is a common reaction in cancer therapy due to (i) regular blood-transfusions to treat anemia, (ii) the absence of a Fe secretion physiological mechanism and (iii) the use of Fe-chelating chemotherapeutics, like doxorubicin (Dox). Excessive Fe levels promote cardiac Dox-retention by forming Dox-Fe complexes which trigger Fe-induced oxidative damage via the ferroptosis pathway.
Objectives: To investigate the role of a polyphenolic compound C (CC) against ferroptosis as a therapeutic target of chemotherapy-induced cardiotoxicity (CICT) and its effect on the efficacy of cancer treatment.
Method: An in vitro model of CICT was established by treating H9c2 cells with either Dox (0.5μM) or co-treatment with CC (1μM) plus Dox (0.5μM) for 6 days. The in vitro data were validated in a neoplastic animal model, whereby mice were intraperitoneally treated with 5mg/kg Dox or co-treated with 25mg/kg CC plus 5mg/kg Dox for 5 weeks. The suitability of CC in the management of CICT and cancer therapy were determined through gene expression studies by quantifying markers of ferroptosis [ferritin, transferrin, carbonyl reductase 1 (CBR1), ROS, lipid peroxidation, glutathione (GSH), GPx4 and NOX], oxidative phosphorylation and cell death. Tumour progression and survival outcomes were also monitored.
Results: In vitro data analysis shows that CC exhibits anti-ferroptosis effects against CICT by scavenging hydroxyl radicals (24.08 ± 3.87 vs. 32.81 ± 5.28) and lipid peroxides (38.50 ± 2.05 vs. 80.50 ± 1.66) via GSH (17.52 ± 1.11 vs. 7.13 ± 1.01) activity relative to Dox-treatment. As a co-treatment, CC additionally improved oxidative phosphorylative parameters [ATP-linked respiration (23.92 ± 0.86), maximal-respiration (12.77 ± 0.21), and respiratory control (36.86 ± 7.82)]. These preliminary benefits were further shown by the differential expression of ferritin, transferrin, CBR1, GPx4 and NOX in mice co-treated with CC relative to the Dox-treated animals. The anti-ferroptosis effect of CC were confirmed through the reduction of p53 expression. In vivo findings also revealed that Dox's anti-tumour effects were augmented by CC co-treatment, as seen from increased tumour-regressions (513.7 ± 526.7 vs. 638.6 ± 599.6: Dox-treatment) and survival outcomes.
Conclusion: The data offers promising scientific insights into the therapeutic benefits of CC which was not limited to its cardioprotection, through the ferroptosis pathway, but were also shown in its ability to enhance the efficacy of cancer treatment.

Risk profile and early outcomes for female TAVI patients in South Africa

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Background: TAVI implants have been available for >10 years in SA and data has been collected since 2014 in a national registry.
Objectives: Evaluating local TAVI outcomes against international best practise using data captured in the SHARE TAVI registry, can provide an evidence base to inform appropriate patient selection in subgroups such as females.
Method: Clinical and demographic data of 4 249 aortic stenosis patients (pts) has been captured into a national web-based prospective registry, outcomes are reviewed at 30 days and annually (to 10 years) post-implant (VARC2 definitions). From September 2014 - June 2024, 2 996 of these patients received TAVI implants, aggregated procedural and 30-day outcomes data from all 31 participating sites has been analysed by sex.
Results: Patient populations and outcomes are similar to other registries and studies (GARY, Corevalve, PARTNER 1) in early TAVI programmes. Female pts are less represented in TAVI implant data in SA, 41.45% (n=1242/2996), and the percentage of females has gradually dropped from 52.94% in 2014 to 39.9% in 2023. Females are on average slightly older than males, 79.964 vs. 78.854 years, have higher STS risk score 6.139% vs. 5.329% and are more often frail 28% vs. 19% of men. Most comorbidities occur similarly between sexes, exceptions are: **Females:** Prior CABG 9.18%, permanent pacemaker 6.84%, extracardiac arteriopathy 9.02%, DM 20.13%. **Males:** Prior CABG 27.31%, permanent pacemaker 11.97%, extracardiac arteriopathy 16.99%, DM 26.97%. Females have higher mean gradient across valve (49.25 vs. 46.62mmHg), and more pts in NYHA class III+IV (61.22% vs. 55.75%). Lower procedural success in females (96.86%) vs. 97.95% in males is partly due to higher female intraprocedural mortality 1.93% vs. 0.68%, and similarly 30-day mortality 6.04% vs. 3.71% is higher in females. Mortality outcomes by 1-year (11.93% vs. 12.71%) and 2-year (22.10% vs. 23.16%) favour females.
Conclusion: Differences in baseline echo measurements, risk scores, comorbidities and periprocedural outcomes between sexes do not always track to obvious changes in longer term outcomes, and further study of this data is needed to review additional factors influencing mortality outcomes between sexes.

Valve longevity and long term 8-year outcomes for TAVI patients in South Africa

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Background: TAVI implants have been available for >10 years in SA and data has been collected since 2014 in a national registry.
Objectives: Evaluating local TAVI outcomes against international best practise using data captured in the SHARE TAVI registry, can provide an evidence base to inform national health policy and improve access to appropriate care.
Method: Clinical and demographic data of 4 249 patients (pts) has been captured into a national web-based prospective registry since 2014, outcomes are reviewed at 30 days and annually (to 10 years) post-implant (VARC2 definitions). Eight-year post-TAVI outcomes are available for 173 patients from September 2014 - June 2016, implanted at 11 sites, 16.2% were implanted in public hospitals.
Results: Patient populations and outcomes are similar to other registries and studies (GARY, Corevalve, PARTNER 1) in early TAVI programmes (Schaafsma, et al. 2022). Risk scores are higher than more recent cohorts, because of earlier guideline recommendations that TAVI only be available to inoperable or high-risk patients. STS 7.602 ± 8.442%. Log Euroscore 22.236 ±14.818%. Euroscore II 6.622 ±4.898%. Procedural success of 91.9% and 2.89% intraprocedural mortality, and 1-year mortality of 18.5% have previously been reported for this group. 2- and 5-year mortality are 30.0% and 59.0% respectively. 24.85% of patients survived to 8 years. Mortality cause is currently unavailable in 45.4% of deceased patients (n=59/130), and must be assumed to be of cardiac origin, cardiac mortality is specified in 22.3% (n=29/130), while COVID 3.08% (n=4/130) and other non-cardiac causes 29.23% (n=38/130) account for the remainder of the deceased patients. 3/173 (1.73%) patients have had a second TAVI implant, at 8, 7, and 4 years after the first TAVI. The patient with the 4-year gap survived for a further 3 years after the 2nd TAVI, and the other 2 patients are still alive after their 2nd procedure earlier this year.
Conclusion: Despite their higher operative risk, SA's earliest TAVIs had good outcomes and survival over the longer term, with nearly 25% of patients alive at 8 years post implant. Patients requiring further aortic valve intervention are uncommon, but still have good outcomes post the 2nd implant. Local registry data may be used to support access to TAVI as AS treatment in SA, SHARE TAVI data evidences clear benefit to patients with TAVI implants i.t.o. life expectancy across all risk categories, and high procedural success and extended life expectancy benchmark favourably with international best practice.

Exploring mitochondrial function in people living with HIV: Preliminary findings from the Mito-SAKen Study

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Background: HIV-infection has been associated with altered mitochondrial function, and it is well known that mitochondrial dysfunction can lead to metabolic disturbances. However, the role of mitochondria in HIV-associated cardiometabolic disease (CMD) is poorly described in sub-Saharan African populations.

Objectives: To explore mitochondrial function in PLWH with and without CMD.

Method: Participants were recruited from a clinic in Worcester, and divided into 4 sub-groups based on HIV and CMD status: HIV- / CMD- (n=28), HIV- / CMD+ (n=33), HIV+ / CMD- (n=32), HIV+ / CMD+ (n=34). CMD was defined as ≥3 of the following: obesity, hypertension, diabetes, low HDL, high triglycerides, smoking, high CRP. Medical history, anthropometric and blood pressure measures were obtained, and blood and urine samples collected for biochemistry. Mitochondrial function analyses were performed in peripheral blood mononuclear cells via high-resolution respirometry (HRR) on an Oroboros® O2K instrument.

Results: The cohort is young (~39.5 years), consisting of ~72% females and ~60% smokers. HRR showed that routine respiration (0.00 [0.0 - 0.07] vs. 2.11 [0.4 - 3.4] pmol/min/10^6 cells/mL; pmol/min/10^6 cells/mL; p=0.008) were lower in HIV+ vs. HIV-. The following mitochondrial parameters were impaired in CMD+ vs. CMD- participants: Electron Transport System capacity (ETS): 0.32 (0.13 - 0.82) vs. 0.7 (0.27 - 1.41) pmol/min/10^6 cells/mL (p=0.007); beta-oxidation-linked oxidative phosphorylation (OxPhos): 0.17 (0.01 - 0.62) vs. 0.53 (0.11 - 1.05) pmol/min/10^6 cells/mL (p=0.005); complex II-linked OxPhos: 0.24 (0.01 - 0.62) vs. 0.47 (0.06 - 1.22) pmol/min/10^6 cells/mL (p=0.03); and glycerophosphate dehydrogenase respiration: 0.12 (0.0 - 0.53) vs. 0.39 (0.10 - 1.08) pmol/min/10^6 cells/mL (p=0.01). Routine respiration was lower in HIV+CMD- and HIV+CMD+ vs. HIV-CMD- and HIV-CMD+ respectively (p cytochrome-C response was lower in HIV+CMD- vs. HIV-CMD- (p=0.02), whereas ETS and beta-oxidation-linked OxPhos were lower in HIV-CMD+ vs. HIV-CMD- (p=0.01). Glycerophosphate dehydrogenase respiration was lower in HIV+CMD+ vs. HIV-CMD- (p=0.04).

Conclusion: Our preliminary data suggest that HIV-infection, CMD and HIV-associated CMD exert inhibitory effects on oxygen consumption in various mitochondrial respiration states. These results warrant further investigations to assess whether altered mitochondrial function acts as a mechanism in the development of CMD in PLWH.

A cross-sectional study of patients with prosthetic mitral valves at a tertiary centre in Johannesburg

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Background: There is a high incidence of rheumatic valvular heart disease involving the mitral valve in Soweto, Johannesburg. Many of these patients go on to have mitral valve replacement (MVR). Data regarding clinical and echocardiographic characteristics of patients with prosthetic mitral valves is scarce in South Africa.

Objectives: To document the clinical and echocardiographic profiles of contemporary patients with MVR.

Method: Clinical, electrocardiographic, and echocardiographic data in these patients were collected prospectively from March 2020 - August 2021 at Chris Hani Baragwanath Academic Hospital prosthetic valve clinic.

Results: The study included 186 participants with a median age of 52 years (IQR: 41 - 60). Ninety six percent were of black African ethnicity (79% female). The median body mass index (BMI) among participants was 27 (IQR: 23.5 - 30.4), with 29% of participants classified as obese (BMI greater than 30kg/m^2). Eighty two percent of patients had New York Heart Association class I dyspnoea. The most common complications were atrial fibrillation (AF, 39%), stroke (23%), and heart failure (HF, 25%). There were 2 cases of prosthetic valve thrombosis, 2 cases of prosthetic valve endocarditis, 2 of paravalvular regurgitation, and 1 structural valve deterioration. Seventy percent of patients had subtherapeutic international normalised ratios (INR), with a median INR of 2.55 (IQR: 2.03 - 2.92). Forty seven percent of patients had a left ventricular ejection fraction (EF) of less than 40%. Seventy four percent of participants were on some combination of guideline-directed medical therapy for HF with reduced EF, although only 12% were on at least 3 medications. Pulmonary hypertension was present in 37% of patients, with a median pulmonary artery systolic pressure of 28.5mmHg (IQR: 17 - 41).

Conclusion: The contemporary patients with MVR were middle-aged obese females with significant atrial fibrillation burden, residual left ventricular dysfunction, and subtherapeutic INR.

Changes in cerebral haemodynamics and tissue oxygenation during hypothermic reduced-flow compared with moderate hypothermia with full-flow cardiopulmonary bypass during cardiac surgery in neonates

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Background: Neurologic injuries remain a problem in neonates and infants undergoing cardiac surgery with cardiopulmonary bypass. The most important risk factor with high incidence is inadequate oxygen supply to the brain. This study investigates the effect of temperature and pump flow during cardiopulmonary bypass on cerebral oxygenation and perfusion.

Objectives: We hypothesised that moderate hypothermia and full-flow CPB will improve cerebral haemodynamics and oxygenation in neonates undergoing arterial switch operation (ASO).

Method: Newborns (n=20) with D-Transposition of great arteries (D-TGA) undergoing primary surgery were randomised to receive either deep hypothermic reduced-flow CPB (T<20°C, CPB-flow 100ml/kg/min, Group 1) or moderate hypothermia with full-flow (T=28°C, CPB-flow 180 - 200ml/kg/min, Group 2). Regional cerebral tissue oxygen saturation (rSO2) by near-infrared spectroscopy and cerebral blood flow velocity (CBFV) using paediatric transcranial Doppler sonography were measured at defined stages during surgery and CPB.

Results: After onset of cardiopulmonary bypass (CPB), there was a continuous increase in rSO2, reaching maximum values at the lowest temperature with significant differences between groups ($p<0.05$). After CPB, rSO2 was lower in Group 1 compared to Group 2. The difference reached a significant value at the end of the operation ($p<0.05$). During rewarming and offset of CPB, mean maximum velocity (Vmean) and pulsatility index (PI) differed significantly between Groups ($p<0.05$). At the end of CPB, an initially reduced diastolic flow velocity pattern was present, resulting in higher PI and lower Vmean in Group 1.

Conclusion: In summary, this study shows that regional cerebral oxygenation and intracranial haemodynamics are significantly influenced by temperature and pump flow. Measured indices of cerebral blood flow velocity and cerebral oxygen saturation were significantly improved after full-flow CPB with moderate hypothermia compared with deep hypothermic reduced-flow CPB in neonates with transposition of the great arteries.

Cholesterol pericardial effusion in a 12-year-old girl

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Background: Cholesterol pericarditis is a rare a form of chronic pericardial effusion characterised by high concentrations of cholesterol, cholesterol crystals, or both in the pericardial space. It can present as constrictive pericarditis, cardiac tamponade, or an asymptomatic course. Differential diagnoses of chronic pericardial effusion include hypothyroidism and systemic lupus erythematosus.

Objectives: We present a rare case of cholesterol pericardial effusion.

Method: A 12-year-old girl presented with a silent large heart referred by a local clinic. She had a cough, shortness of breath, malaise for a period of 4 days. She had been losing weight over the last few months. She was previously treated for pulmonary tuberculosis (PTB) in 2018 for 6 months and was HIV negative. Her mother was on PTB treatment for 3 months. Family history of hypercholesterelemia was not explored and serum levels of cholesterol were not measured. She had no clinical symptoms of connective tissue disease. Chest X-ray showed a large heart and was referred to Dora Nginza for further management. On examination she had severe thinness, was saturating at 100% on face mask oxygen, and mildly tachypneic. The heart sounds were muffled. An echocardiogram showed a large pericardial effusion with no evidence of cardiac tamponade. Pericardiocentesis was performed, and about 170ml of blood-stained fluid was aspirated. She was started on TB treatment and steroids. Post pericardiocentesis, she developed a large pneumopericardium. A differential diagnosis of hydatid cyst was suspected and computed tomography (CT) of the chest was done to exclude the cyst. The CT chest showed large pneumopericardium with no cysts. Evidence of malignancy and TB was negative in the pericardial fluid. A pericardial window was done. Histology demonstrated cholesterol crystal and foamy macrophages containing cholesterol with no evidence of TB. The patient was well after the surgery, was discharged on TB treatment while awaiting histology result but she was lost to follow up.

Results: A 12-year-old girl with a silent large heart was referred to Dora Nginza Hospital by local clinic. She presented with cough, shortness of breath, malaise for 4 days. She has been losing weight over the last few months. She was previously treated for pulmonary tuberculosis (PTB) in 2018 for 6 months and was HIV negative. Her mother was on PTB treatment for 3 months. Family history of hypercholesteremia was not explored and serum cholesterol and thyroxine levels were not done. She had no clinical symptoms of connective tissue disease. Chest X-ray showed a large heart and was referred to Dora Nginza for further management. On examination she had severe thinness, she was saturating at 100% on face mask oxygen and mildly tachypneic. The heart sounds were muffled. Echocardiogram showed a large pericardial effusion with no evidence of cardiac tamponade. Pericardiocentesis was performed and about 170ml of blood-stained fluid was aspirated. She was started on anti-TB treatment and steroids. Post pericardiocentesis, she developed a large pneumopericardium. A hydatid cyst was suspected and computed tomography (CT) of the chest was done to exclude the cyst. CT chest showed large pneumopericardium with no cysts. Evidence of malignancy and TB were negative on the pericardial fluid. Pericardial window was done. Histology demonstrated cholesterol crystal and foamy macrophages containing cholesterol and there was no evidence of TB was negative. Patient was well after the surgery, was discharged on TB treatment while awaiting histology result but she was lost to follow up.

Conclusion: This case represents a rare presentation of pericardial effusion in children. Very few cases have been reported in literature.

Radiation safety culture: A mobile appplication

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Background: The occupational radiation safety culture was researched and evaluated (2019 - 2021) with an audit checklist at 3 cath labs for optimal compliance, especially regarding wearing dosimeters, protective devices, methods to optimise occupational radiation protection and exposure to the eyes, thyroid, hands, and feet of the team. The audit checklist tool successfully determined areas at each site where improvements are needed to optimise the safety culture in terms of the radiation protection principles of distance, time, shielding, and dose monitoring. The practical site recommendations of 1 site will be shared.

Objectives: To maintain and optimise a radiation safety culture, using a mobile application to engage all staff in a regular review process.

Method: (1) The standards of the radiation safety culture audit checklist criteria were benchmarked to measure the radiation safety culture (habits). (2) The checklist was converted into a mobile application (2021 - 2023) with report features by involving application specialists and physicists. (3)The mobile application was piloted at 3 sites. A dedicated administrator (radiographer / cardiologist) had access to all the reports embedded in the application.

Results: (1) The mobile application engaged all staff in a regular review of measurable actions, recording technical factors such as tube angulation, exposure factors, distance from the X-ray source, fluoroscopy duration, and lead shielding thickness.The dose was measured with real-time dosimeters. (2) The staff received feedback to indicate compliance by means of a progress meter on the application. (3) The progress meter indicated the gaps in radiation protection actions and occupational exposure monitoring during interventional procedures. (4) The results tracked the progress of distance, time, shielding, and dose monitoring. (5) The satisfaction survey indicated awareness of daily radiation safety habits and radiation exposure to staff.

Conclusion: By engaging all staff, the application can improve compliance, and maintain real-time optimisation of radiological techniques, and best practice radiation safety techniques.

Characteristics of heart failure with a preserved ejection fraction in black South African patients

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Background: Heart failure with a preserved ejection fraction (HFpEF) is common in the elderly (≥75 years) and associated with arterial stiffness.The mean age of HFpEF presentation is lower (40 - 55 years) in sub-Saharan Africa. No clinical study has been conducted on HFpEF in identifying and characterising this phenotype at a younger age, moreover in a South African black population where the risk of HFpEF is 2 times higher than in other ethnic groups.

Objectives: This study investigated the characteristics of HFpEF in a black South African population, the biochemical markers that predict HFpEF and cardiac structural changes in this HF phenotype.

Method: Sixty six participants with HFpEF and 213 controls were enrolled. All participants gave informed consent and completed a standardised questionnaire. Echocardiographic, anthropometric, central haemodynamic measurements, pulse wave velocity (PWV), and biomarker analysis were done.

Results: The mean age of HFpEF participants was 54.88 ± 13.51 years. Most of the participants (76%) were between 20 and 64 years, while only 24% were older. HFpEF participants were hypertensive, and more obese with increased incidence of alcohol consumption. PWV was increased in HFpEF (9.97 ± 2.78m/s) when compared to participants without HFpEF (6.11 ± 2.18m/s), $p<0.0001$. There were no significant associations between central haemodynamic parameters, N-terminal pro B-type natriuretic peptide (NT-proBNP) ($p=0.9746$), and galectin-3 ($p=0.2166$). NT-proBNP, but not galectin-3, was associated with left ventricular hypertrophy ($p=0.0002$) and left atrial diameter ($p=0.0005$).

Conclusion: HFpEF in South Africa is predominant in obese young to middle-age individuals with arterial stiffness and who consume alcohol regularly. NT-proBNP could be used to diagnose HFpEF, however, should be interpreted with caution in populations with a high prevalence of obesity.

Determining the normal range of left ventricular tract (LVOT) diameters by 2D echocardiography of Patients according to height: Lessons learnt from a false start

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Background: Left ventricular outflow tract (LVOT) diameter is a crucial measurement in echocardiographic assessment of aortic stenosis. LVOT measurements are challenging if image quality is poor. Knowing the expected LVOT range for a specific patient will be useful. We set out to determine the correlation between LVOT diameter and patient height in a South African population and to provide a reference range for the predicted LVOT measurement in a patient of a known height

Objectives: (1) Determine the range and distribution of LVOT diameters in a South African population. (2) Determine the mean LOT diameter for a specific patient. (3) Determine the correlation between patient height and LVOT diameter.

Method: This retrospective study was conducted in the Division of Cardiology at Tygerberg Hospital. One thousand consecutive patients, assessed between January 2022 - June 2024, in whom the LVOT could be accurately measured by echocardiography and who's height had been recorded on the echocardiography request form were included. The LVOT measurements were performed in the parasternal long axis view.

Results: The cohort included 449 males and 555 females. The mean LVOT diameter was 21mm (+1.8mm) (males 21mm; females 20mm). The recorded mean height was 167cm (+8.3cm) (males 174cm; females 164cm). When determining the median LVOT diameter for every height category it was noted that 47% of all patients clustered in only 10 heights namely 150cm, 155cm, 160cm, 165cm, 170cm, 175cm, 180cm, 185cm, 190cm and 195cm. The clear implication of estimated heights meant that a correlation analysis, as well as determining the median LVOT diameter for every height category, would be invalid.

Conclusion: The data provides reference values for the spectrum of LVOT diameters in a South African population. However, the data could not be used to determine the correlation between height and LVOT diameter nor range of LVOT diameters for a given height. The distribution of the heights recorded in this busy echocardiography service clearly indicate that in many cases the heights filled in on the request forms were estimates rather than measured values with major implications for indexed measurements e.g. indexed aortic valve area. We recommend implementing a policy of measuring patients in your echocardiography service and not relying on the heights provided by the referring clinician. To achieve the original objectives of this study we have initiated a prospective version of this study.

Autonomic imbalance, vegetative stress and anxiety in women with heart rhythm disturbances

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Background: Heart rate variability (HRV) is currently considered to be a relevant indicator of the autonomic nervous system (ANS) function. Autonomic imbalance is associated with various pathological conditions not only somatic but also psychological.

Objectives: The purpose of the study was to assess the state of the ANS activity and the level of anxiety in women with atrioventricular nodal reentrant tachycardia (AVNRT).

Method: Thirty-five women with AVNRT, no pharmacologically treated, (mean age 47) were included in the research group. The control group consisted of 35 women (mean age 45) who had no history of any heart rhythm disturbances. In all subjects, other diseases that could potentially affect ANS activity and mental status had been excluded. All of the subjects had 24-hour ECG monitoring with Holter's method in order to evaluate the ANS, based on HRV with frequency analysis and also underwent psychological assessment in order to calculate level of vegetative stress using the State-Trait-Anxiety-Inventory (STAI X1 and X2-Test) as well as by the Perceived Stress Scale (PSS-10).

Results: ANS activity showed higher LF, LF/HF and lower TP value in AVNRT group, but they were not statistically significant ($p>0.05$). Women with AVNRT declared significantly higher ($p<0.05$) emotional tension and stress (PSS-10). The level of anxiety, understood as a transient state of the individual (STAI X1), was also higher in AVNRT women, but not statistically significant. An association between ANS activity and reported feelings of emotional tension in the group with AVNRT was found. Higher LF spectral power and a higher LF/HF power ratio positively correlate with increased feelings of stress understood as a state and trait, while HF spectral power showed a negative relationship with the measured variables (STAI X1, STAI X2). Furthermore, we found no statistically significant correlation between HRV indices and subjective stress experience (PSS-10).

Conclusion: (1) Women with AVNRT tend to have autonomic system imbalance with an advantages of sympathicotonia. (2) The increase in perceived emotional tension in women with heart rhythm disturbances depends on the cardiac autonomic profile expressed by the relative or absolute predominance of the sympathetic nervous system.

ECG Quiz 65

CASSA
CARDIAC ARRHYTHMIA SOCIETY OF SOUTHERN AFRICA
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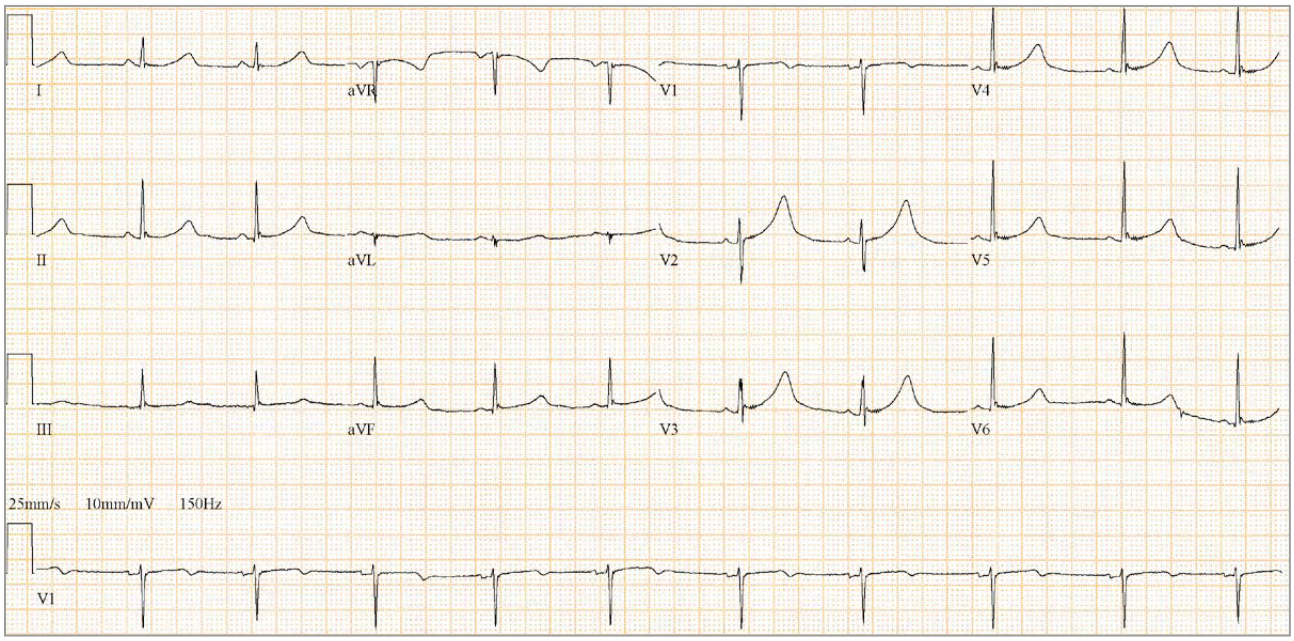

QUESTION 1: Which of the following diagnoses are compatible with this ECG?

a. Metabolic derangement

b. Congenital Long QT Syndrome

c. Subarachnoid haemorrhage

d. Drug-induced QT prolongation

e. All of the above

QUESTION 2: Which of the following will be the most useful in elucidating the cause?

a. Detailed history and physical examination

b. Another ECG

c. Stress ECG

d. CT scan

Please analyse the ECG carefully and commit yourself to an answer before checking the explanation.

ANSWER on page 133

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SA HEART®

OVERVIEW OF THE ECG

At first glance, there are no very obvious abnormalities, aside from some peaking of the T waves.

MORE DETAILED ANALYSIS OF THE ECG

The rate is 60bpm and is regular. There are P waves before every QRS which are upright in Lead II and inverted in aVR, compatible with normal sinus rhythm. The PR interval is normal (130msec). The QRS complex is 80ms wide with a normal axis of +60°. There are tiny non-pathological Q waves in the inferior leads and septal Q waves in the lateral leads. There are small J waves in the inferior and lateral leads. The ST segments are normal, as is the T wave axis. The T waves are somewhat peaked in the chest leads. The QT interval is difficult to measure accurately, but is prolonged in all 12 leads (Figure 1). The longest is in V1 - 2 at 590ms. The average R-R interval is 1 second and the QTc is therefore 590ms (Figure 2) – considerably prolonged.

Measurement of QT can be difficult in the event of flat or inverted T waves or prominent U waves. Make use of multiple simultaneous leads to get the best estimate of the end of the T wave. Always measure the longest QT interval (usually V2 - V4). While some advocate using a tangent to the downslope of the T to estimate where it would reach the baseline (the tangent method), Professor Peter Schwartz, who has studied the congenital LQTS for more than 50 years, recommends trying to define the actual end of the T where it intersects the isoelectric line (the threshold method). Another problem is the individual variation in measurement of the QT; diurnal variation in the QT interval is also a factor. The QT interval must be corrected for heart rate. Bazett's formula is the most commonly used. A useful website is www.qtcalculator.org.

The causes of QT prolongation are legion (Figures 3 and 4).

Drugs are far and away the most common culprits. The QT drugs list.[1] (www.crediblemed.org) contains 535 drugs, 66 of which are proven to cause torsade de pointes ventricular tachycardia (Figure 5). Most of these drugs affect the I_{Kr} potassium channel which has been labelled "promiscuous".

Metabolic causes include: Hypokalaemia, hypomagnesaemia, hypocalcaemia and hypothermia.

Cardiovascular causes include: Bradycardia, stroke or other cerebral injury, heart failure, and acute myocardial ischaemia.

The congenital long QT syndrome (LQTS) is a less common but vitally important cause, as it is associated with a significant risk of sudden cardiac death in young people.

In the absence of clinical information, it is difficult to reach a definitive diagnosis from this ECG alone. There are, however, features which make some diagnoses more or less likely.

Hypokalaemia causes T wave flattening and prominent U waves, and is therefore excluded. Isolated hypomagnesaemia is uncommon and is usually associated with hypokalaemia. The main findings are a prolonged QTc and increased P wave duration.[2] Hypocalcaemia causes a characteristic prolongation of the ST segment and the QTc, unlike this ECG. Hypothermia also prolongs the QTc, together with bradycardia and a prominent J (Osborne) wave – more marked than in this ECG.

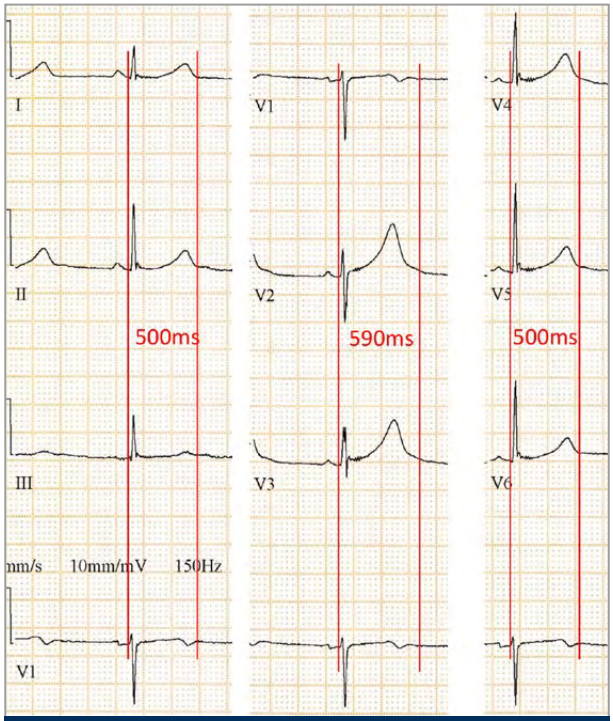

FIGURE 1: Measurement of the QT interval using the threshold method in different leads. It is possible that the longer QT measured in V1 - 3 incorporates a U wave, but the minimum QT/QTc (heart rate 60) is considerably prolonged at 500ms.

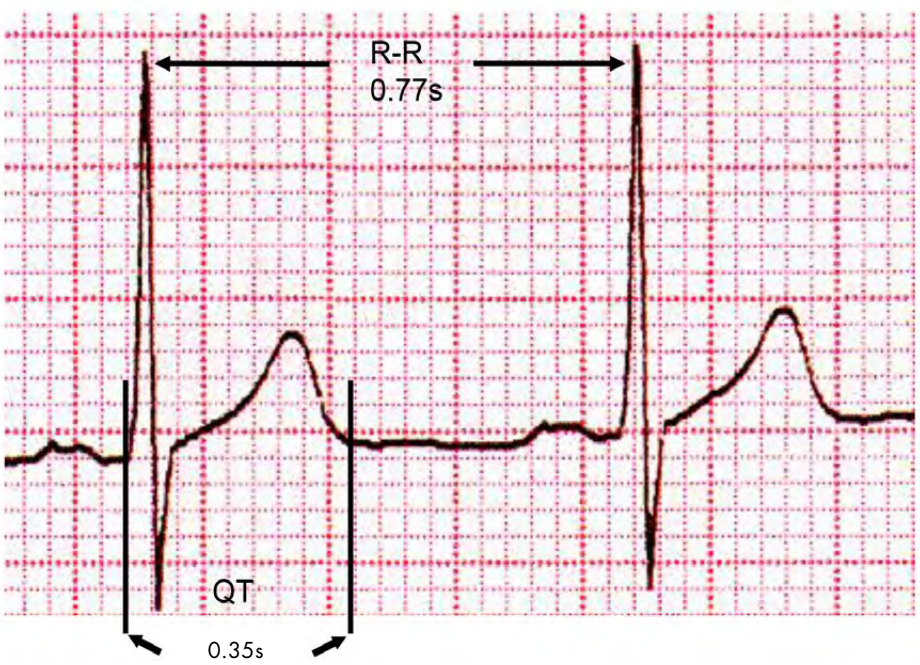

FIGURE 2: Measuring and correcting the QT interval (threshold method).

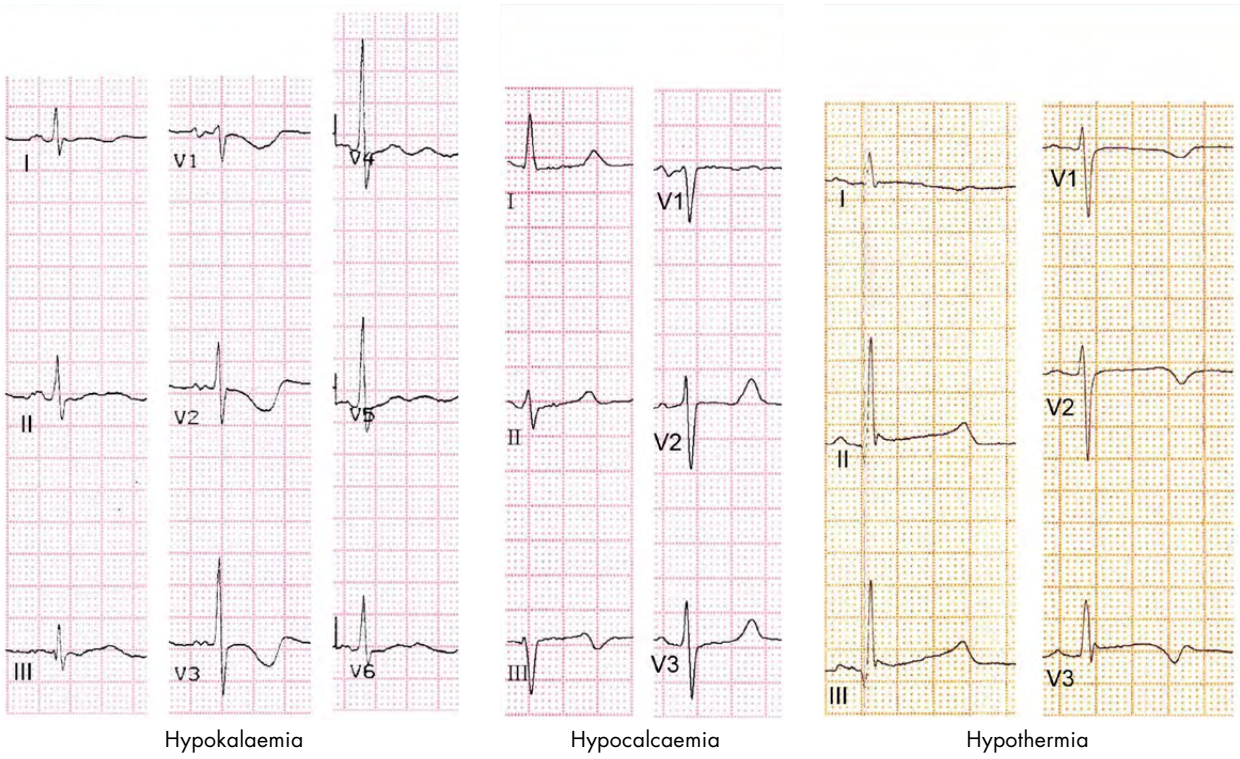

FIGURE 3: Metabolic causes of QT prolongation.
Hypokalaemia: QT/QTc 430/490ms; hypocalcaemia: QT/QTc 670/540ms; hypothermia: QT/QTc 670/540ms. The QT is particularly difficult to measure in hypokalaemia because of the prominent U wave.

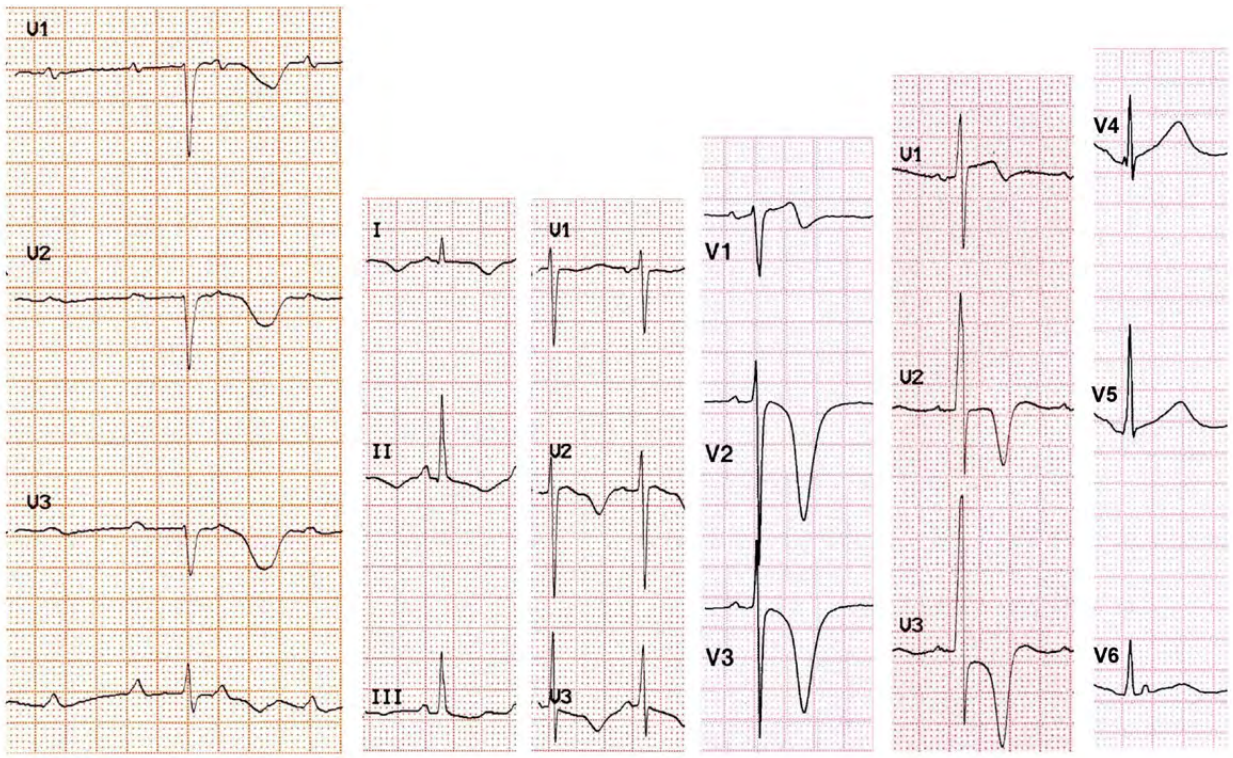

FIGURE 4: Miscellaneous causes of QT prolongation.
A: Bradycardia due to complete heart block: QT/QTc 720/540. The extremely long QT makes torsade de pointes very likely (see Figure 5). B: Subarachnoid haemorrhage: QT/QTc 475/590. C: Wellens' syndrome: QT/QTc 510/505ms. D: Apical hypertrophic obstructive cardiomyopathy. QT/QTc 450/490ms. E: Sotalol, one of many drugs known to prolong the QT and cause torsade de pointes: QT/QTc 580/630ms.

Bradycardia, especially when caused by heart block, prolongs the QT and often the QTc. A QT of 590ms at a rate of 60bpm cannot be explained by bradycardia. There is no other evidence of acute ischaemia. Cerebral insult may cause bradycardia and QT prolongation but is usually accompanied by T wave inversion and / or ST segment deviation.

Drug-induced QT prolongation must always be strongly considered, with females more susceptible than males. Often, more than one drug is involved, either because both prolong the QT or one interferes with the metabolism of the other. Additional hypokalaemia may be an aggravating factor and may precipitate torsade de pointes.

The answer to question 1 is therefore (e): All of the above is an acceptable answer, the most likely are drug-induced or the congenital Long QT Syndrome (LQTS).

The patient was a young woman with genetically proven LQTS type 1.

The correct answer to question 2 is therefore (a): A detailed history is clearly vital.

In her case, there was a family history of sudden cardiac death. An uncle had died suddenly as a child and a cousin had died while water-skiing. She had had episodes of syncope related to exertion; the most recent occurred while swimming from which she was resuscitated from near drowning.

Examination was normal. A stress ECG was not performed. The expected response during effort would be the failure of the QT interval to shorten appropriately.

COMMENT

The congenital LQTS first came to clinician's attention in the 1957 with the description of the Lange-Jervell-Nielson syndrome.[3] They described syncope and sudden death in children with congenital deafness and noted the long QT on their ECGs. Later, Romano and Ward described a similar dominantly inherited syndrome without deafness.[4,5] Much work followed

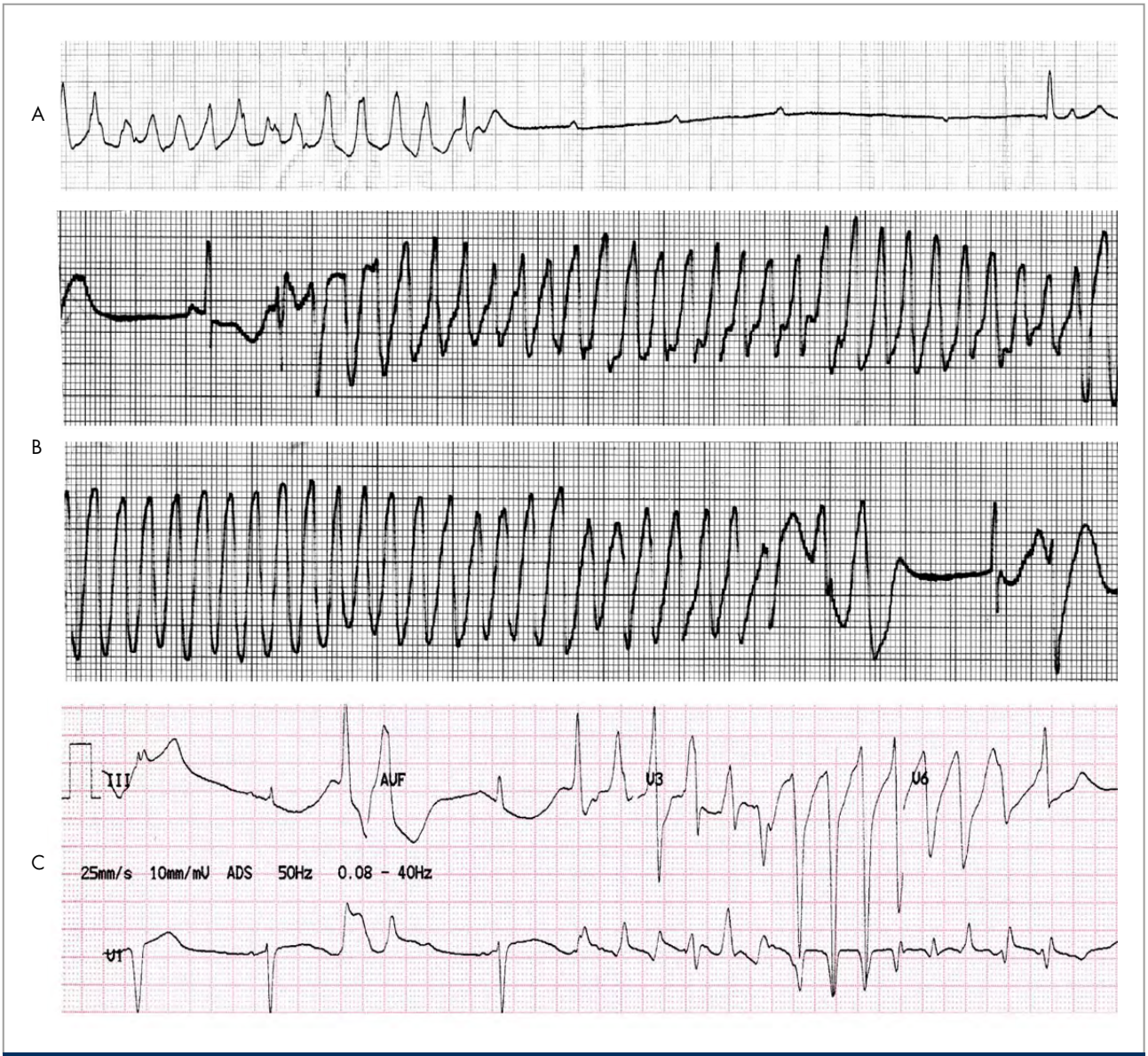

FIGURE 5: Examples of torsade de pointes (TdP) ventricular tachycardia related to QT prolongation. Note the twisting pattern of the QRS complexes.
A: complete heart block; TdP is followed by ventricular asystole, either of which may be fatal. B: TdP due to quinidine used to cardiovert atrial fibrillation. C: TdP caused by sotalol, a Class III antiarrhythmic agent with a relatively high risk of TdP, particularly at higher doses, in the presence of hypokalaemia or when another QT prolonging drug is added.

to elucidate the cause. Professor Peter Schwartz and colleagues from Pavia, Italy, demonstrated that QT prolongation and electrical instability could be induced by stimulation of the left stellate ganglion in cats.[6] Subsequent research established the efficacy of both beta blockade and left cervical sympathectomy in preventing syncope and reducing the risk of sudden death.

The condition has proved a Rosetta Stone in the elucidation of the function of cardiac ion channels and their mutations. There are currently 16 known types of congenital LQTS, the most common of which is LQTS type 1. Most of the South African patients are type 1, the result of a founder effect from a Portuguese man who landed here in the late 17th century. Occasional local patients with LQTS types 2 and 3 have been seen. Subtle differences in the ECG findings, other than the QT interval, exist between the different types (Figures 6 and 7).

An international LQTS registry was set up in 1979 by Arthur Moss and Peter Schwartz.[7] This has been an important source of ongoing information about all aspects of the syndrome.

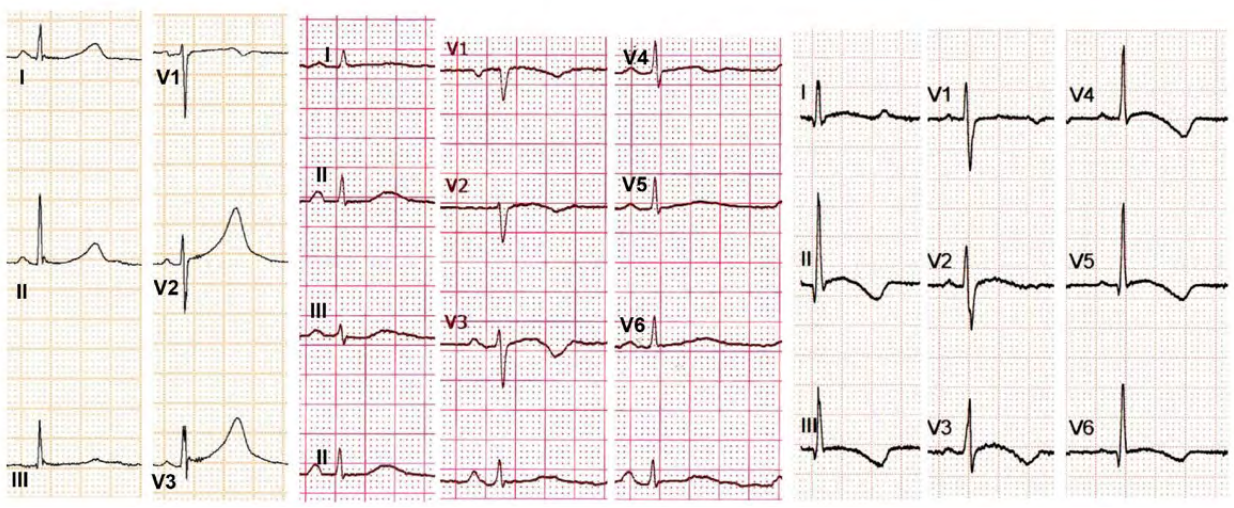

FIGURE 6: Examples of the 3 most common types of LQTS from Groote Schuur Hospital (genetically proven).
LQT1 QT/QTc 590ms; LQT2 QT/QTc 550/570ms; LQT3 QT/QTc 550/595ms.

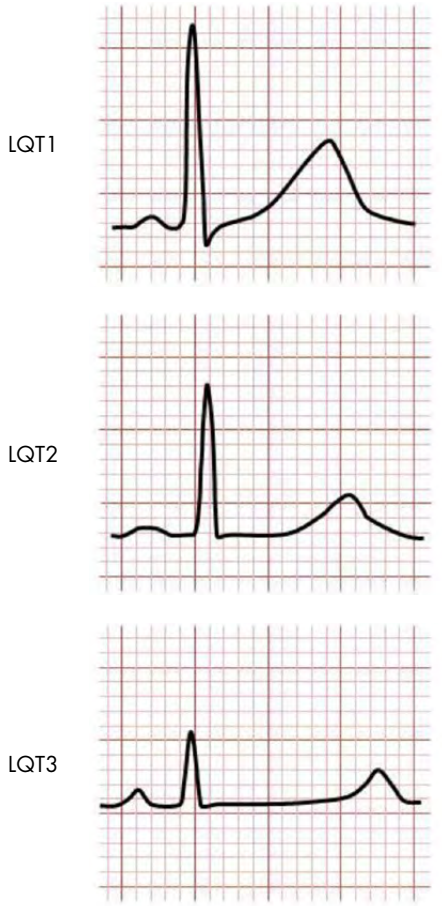

FIGURE 7: The classical patterns of the ST segment and T waves of LQT1-3. (Wikipedia creative commons)

TABLE I: Diagnostic criteria for congenital LQTS (after Schwartz 2012)

		Points
ECG findings		
A. QTc (Bazett's formula)	≥480	3
	460 - 479	2
	450 - 459 (men)	1
B. QTc, 4th minute of recovery from exercise stress test	≥480ms	1
C. Torsade de pointes		2
D. T wave alternans		1
E. Notched T wave in 3 leads		1
F. Low heart rate for age		0.5
Clinical history		
A. Syncope	With stress	2
	Without stress	1
B. Congenital deafness		0.5
Family history		
A. Family members with definite LQTS		1
OR		
B. Unexplained sudden cardiac death younger than age 30 among immediate family members.		0.5

LQTS: Long QT Syndrome.
QTc in the absence of drugs or other causes of prolonged QT.
Torsade de pointes and syncope are mutually exclusive.
Resting heart rate below the 2nd percentile for age.
The same family member cannot be counted in A and B
Score: *<1 point: low probability of LQTS. 1.5-3 points: intermediate probability. >3.5 points: high probability of congenital LQTS.*

A scoring system for diagnosing congenital LQTS was developed in 1993, updated in 2012[8] (Table I). Her score is 5.5, which is an unequivocal diagnosis of LQTS, later confirmed to be type 1 by genetic testing.

A comprehensive review of LQTS was published in 2022.[9] I would recommend all cardiologists to read it because of the importance of this relatively rare condition. A heightened awareness of this potentially lethal ECG / clinical diagnosis should help to prevent misdiagnosis, particularly as "epilepsy" in a child.

LESSONS AND CONCLUSIONS

- QT prolongation is a common and important ECG finding.
- Numerous causes and aggravating factors exist.
- Drugs are the most common culprits, many of which can cause torsade de pointes and sudden death.
- The congenital LQTS is a vital diagnosis to make as a potential cause of sudden cardiac death in children and young adults.

Conflict of interest: none declared.

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ECG and **QUESTION** on page 132

SA HEART®

CARDIAC IMAGING QUIZ

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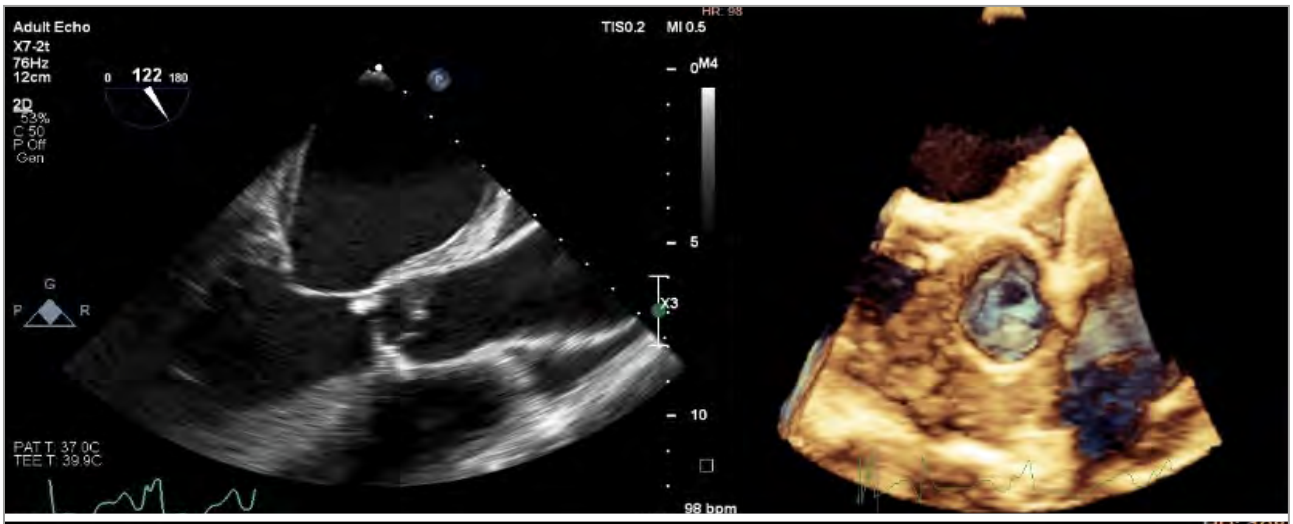

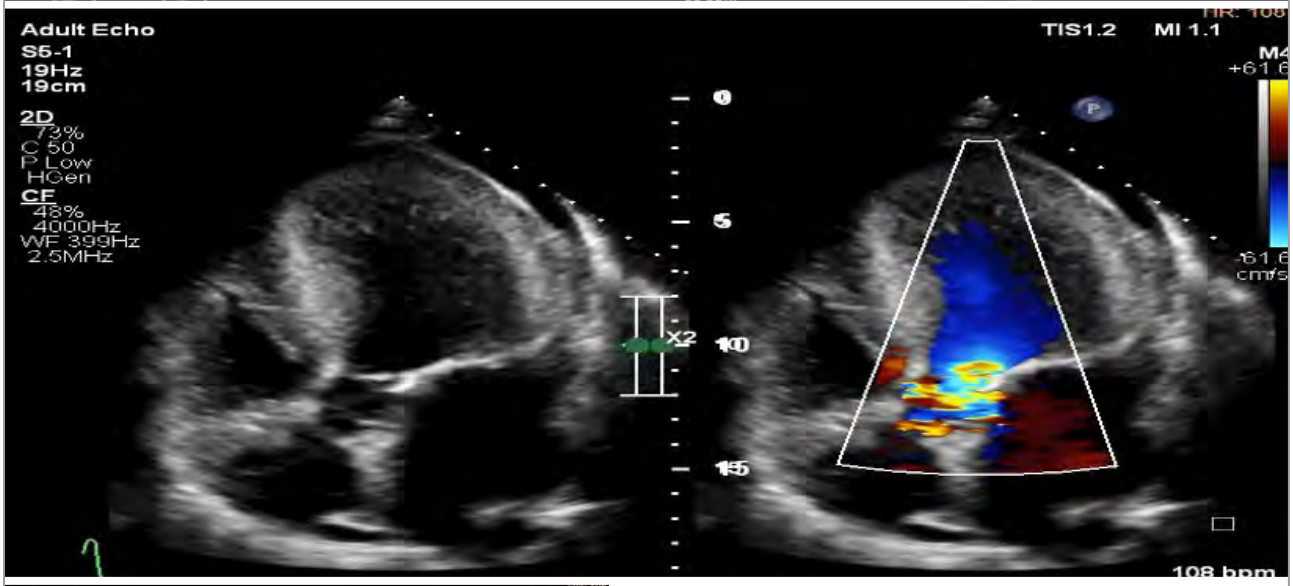

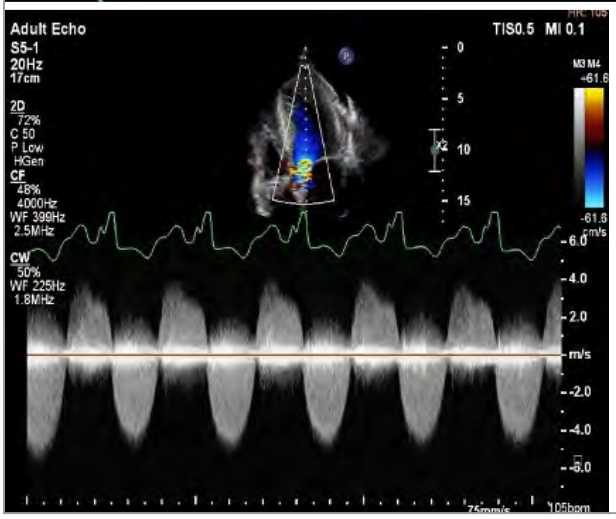

QUESTION: What is the diagnosis?

a. Mixed aortic valve disease
b. Aortic regurgitation
c. Aortic stenosis
d. None of the above

ANSWER

None of the above.

Subvalvular aortic stenosis due to a discrete subaortic membrane complicated by aortic regurgitation.

The echocardiographic images belong to a young male who presented with syncope. Subvalvular aortic stenosis has a prevalence of 6.5% and is one of the common adult congenital heart diseases. Transthoracic echocardiography plays an important role in the diagnosis and management of adults with subvalvar stenosis. Subaortic membrane (SM) is a condition characterised by the presence of a fibrous membrane or obstruction located just below the aortic valve. In this case it resulted in severe left ventricular outflow tract (LVOT) obstruction and aortic regurgitation. The mechanism of aortic regurgitation is related to an increase in LVOT pressure gradient and direct deformity of the valve from the high velocity jet through the stenotic orifice. Once a subaortic membrane is identified, it is important to rule out other congenital heart defects. Treatment consists of surgical excision of the membrane and close follow-with echocardiographic imaging for recurrence.

Conflict of interest: none declared.

SUGGESTED READING

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