Doxorubicin-induced cardiac dysfunction in breast cancer patients is associated with dysfunctional HDL particles

Carmelita Abrahams[1], Wanzhu Zhang[2], Karen Sliwa[1], Emmy Okello[3] and Sandrine Lecour[1]

[1]University of Cape Town, Observatory, South Africa

[2]Uganda Heart Institute, Kampala, Uganda and University of Cape Town, Observatory, South Africa

[3]Uganda Heart Institute, Kampala, Uganda

Background: Elucidating the mechanisms involved in doxorubicin (DOX)-induced cardiotoxicity is key to identify novel early biomarkers and cardioprotective strategies. Recent data suggest that DOX treatment is associated with dyslipidemia and our pre-clinical data suggest that DOX-induced cardiotoxicity is associated with a shift in high-density lipoprotein (HDL) particle subclasses / composition.

Objectives: To investigate a possible association between cardiac dysfunction and a shift in HDL subclasses distribution and composition in female breast cancer patients receiving DOX chemotherapy.

Method: Thirty-four African female breast cancer patients (18 - 65-years-old, anthracycline chemotherapy naïve with no co-morbidities) receiving 6 cycles of DOX every 3 weeks were included. Before chemotherapy (B) and 3 weeks after completion (C), serum samples were collected and left ventricular ejection fraction (LVEF) and global longitudinal strain (GLS) were assessed using echocardiography. In serum, total cholesterol (TC), triglycerides (TG), low-density lipoprotein-cholesterol (LDL-c) and HDL-c were measured with colorimetric assays. HDL subclasses were measured using the Lipoprint® system.

Results: Nine patients were diagnosed with DOX-induced subclinical cardiotoxicity. DOX treatment increased serum TC (4.6 ± 0.2mmol/L B vs. 5.1 ± 0.2mmol/L C, $p<0.001$), TG (1.2 ± 0.1mmol/L B vs. 1.7 ± 0.2mmol/L C, $p<0.001$), LDL-c (2.7 ± 0.1mmol/L B vs. 3.0 ± 0.2mmol/L C, $p<.0.01$) with no change in HDL-c. DOX reduced the intermediate HDL subclasses (52.5 ± 1.0% B vs. 48.6 ± 0.9% C, $p<0.001$), shifting the HDL subclasses towards large HDL particles known to be less cardioprotective. Most importantly, a reduction in LVEF from baseline to completion of anthracycline therapy correlated with a reduction in the intermediate HDL subclass 6 ($r=+0.29$, $p<0.05$).

Conclusion: In this pilot study, DOX shifted HDL particles from the intermediate to the less cardioprotective large HDL subclasses, an effect that was closely associated with reduced cardiac function. Our data therefore highlight a putative role for HDL particles in DOX-induced cardiotoxicity in cancer patients.

Predictors on in-stent restenosis in patients undergoing percuatanous coronary intervention

Jamila Khatoon Adam and Ameena Amod

eThekwini Heart Hospital, Durban, KwaZulu-Natal, South Africa

Background: Coronary artery disease is one of the leading causes of morbidity and mortality worldwide. Drug eluting stents have helped in the reduction of in-stent restenosis, but this still poses a problem for interventional cardiologists. In-stent restenosis is an independent predictor for mortality during follow up, together with other relevant clinical factors as age, sex, diabetes mellitus, smoke habit, previous bypass surgery, and left ventricular ejection fraction. The incidence of restenosis depends on several different factors and variables. These include patient-related factors, lesion, and procedure related factors. Drug eluting stents tend to drastically reduce the occurrence of severe neo-intimal proliferation, which is the dominant cause on in-stent restenosis. Drug eluting balloons have been considered as the treatment of choice for in-stent restenosis.

Objectives: The study aimed to determine the predictors of in-stent stenosis in patients undergoing percutaneous coronary intervention and to recommend measures to reduce the incidence of in-stent stenosis.

Method: This was a quantitative retrospective (June 2018 - February 2020) study focusing on patients 18 - 85 years who had in-stent restenosis after having percutaneous coronary intervention. The study was conducted at a single practice at the eThekwini Heart Centre, KwaZulu-Natal.

Results: Baseline characteristics showed diabetic (72%), hypertension (80%) and dyslipidaemia (78%) patients had a higher risk of in-stent stenosis as compared to other risk factors, such as age and smoking. Four out of 57 had acute and late stent thrombosis. Fifty-five percent showed it was the left anterior descending artery that was affected most.

Conclusion: This study correlated with other research findings found in the literature. Nonetheless, longer-term work is required, and further imaging of vessels should be used as well as studies to prove if this will help with eliminating further in-stent restenosis.

Aetiology of dilated cardiomyopathy at the Paediatric Cardiology Unit of Inkosi Albert Luthuli Central Hospital

Della Adzosii

African Paediatric Fellowship Programme, University of KwaZulu-Natal, Inkosi Albert Luthuli Central Hospital, Durban, South Africa

Background: Dilated cardiomyopathy (DCMO) is characterised by progressive dilatation and systolic dysfunction of the ventricles (predominantly left ventricle) with or without congestive cardiac failure. It is the commonest myocardial disease in children and is associated with significant morbidity and mortality. There are a number of aetiological factors known to cause dilated cardiomyopathy. In a significant number of patients, however, the cause is idiopathic. Identifying the aetiological agent is important for targeted treatment, prognostication, as well as effective counselling and possibly prevention.
Objectives: To identify the causes of dilated cardiomyopathy presenting to the Paediatric Cardiac Unit at Inkosi Albert Luthuli Central Hospital (IALCH) from January 2015 - December 2022.
Method: Hospital records were searched for patients diagnosed with dilated cardiomyopathy. These records were reviewed, and the causes of DCMO were identified and data analysed.
Results: There were 335 new cases of dilated cardiomyopathy seen over the study period. Most were classified as idiopathic (48.5%). Viral myocarditis was the diagnosis in 26.4%; 4.3% had a virus isolated whiles in 13% the diagnosis was made on clinical suspicion. 0.4% were diagnosed as COVID MIS-C. Other aetiologies include arrhythmia (9.3%), ALCAPA (8.7%), chemotherapy and toxins (2.2%), neuromuscular disorder excluding DMD (1.3%), bacterial myocarditis (1.3%), familial (1.3%), collagen disorder (1.0%), and syndrome complex (1.0%). 0.7% had more than 1 aetiological factor e.g. viral myocarditis in a child with neuromuscular disorder.
Conclusion: DCMO is a disease of the myocardium with many known aetiological agents. Majority of our patients had no identifiable cause. Viral myocarditis was the most common identifiable aetiology. The findings are consistent with data from most international studies. The absence of advanced genetic testing; endomyocardial biopsy as well basic laboratory services in developing countries may account for the large percentage of idiopathic cases worldwide.

Obesity and cardiovascular disease: A promising approach

Manal Mohamed Elsayed Ahmed

Pharmacology Department, Medical Research and Clinical Studies Institute, National Research Centre, Cairo, Egypt

Background: Cardiovascular disease (CVD) has been the major cause of death worldwide for many years. Comorbidities include obesity, altered lipid profiles, and insulin resistance are frequently linked to CVD. For obesity, it is one of the largest and fastest growing public health problems in the world. The pharmacological options for obesity treatment remain quite limited. Recently, one of the potential exciting research areas is the development of innovative therapeutic molecular vaccines and immunoglobulins.
Objectives: Here, we aimed to develop novel immunoglobulins against obesity.
Method: Anti-ghrelin O-acyltransferase (anti-GOAT) immunoglobulins were generated using IgY technology for blocking the activity of the appetite-stimulating hormone "ghrelin". Its preliminary pre-clinical evaluation was applied into 3 mice groups, (A) was fed standard pellet chow, (B) was fed a high-fat diet with metabolisable energy contents of 13% kcal from fat and (C) was fed a high-fat diet with metabolisable energy contents of 45% kcal from fat.
Results: Oral immunisation with this biologics successfully induced beneficial responses that attenuated body weight gain by decreasing food intake and increasing energy expenditure.
Conclusion: Anti-GOAT IgY is a promising approach for the treatment of obesity by oral administration but further studies are still required before entry into clinical trials as its effect on physical activity and visceral adipose tissue.

Ethnicity and geographic origin of patients with truncus arteriosus seen at the Uganda Heart Institute: A 5-year review

Twalib Aliku, Judith Namuyonga, Hilda Tumwebaze, Emma Ndagire, Bernard Obongonyinge, Sulaiman Lubega and Peter Lwabi

Uganda Heart Institute, Kampala, Uganda

Background: Truncus arteriosus (TA) is a rare complex congenital heart defect (CHD) associated with poor prognosis if unrepaired. There are reports of a high prevalence of TA in our cohort of patients with CHD at the Uganda Heart Institute (UHI) than reported elsewhere. Surgical repair for TA is currently unavailable within the country.

Objectives: The study aimed to describe the ethnic and geographic origin of patients with TA presenting to the Uganda Heart institute (UHI).

Method: A retrospective chart review of patients enrolled in the TA register from January 2016 - September 2020. All patients with echo confirmed diagnosis of TA were included. Genetic testing was not done.

Results: A total of 227 cases with TA were seen during the period (3 cases excluded because of missing echo data, 244 were included in this analysis). Most patients were female (n=130, 58%), with a median age at diagnosis of 4 months (IQR1.5 - 11.8). Collett-Edward's type I was the commonest type seen (n=180, 80.4%) followed by type II (n=35, 15.6%) and type III was least common (n=9, 4%). A majority of cases were born to parents from the Bantu ethnic group (n=155, 69.2%) followed by Nilotics ethnic group (n=37, 16.5%) and mixed ethnic parentage (n=16; 7.1%). Only 4 cases (1.6%) came from the Sudanic ethnic group. The birth month of TA cases was evenly distributed throughout the year with only a slight dip in the month of July. While cases were diagnosed from nearly all the four regions of the country (Northern, Eastern, Central and West), the majority of cases were clustered in the Central region (n=135, 60%) especially in the districts of Kampala (where the study site is located), and its neighbouring districts of Wakiso and Mukono.

Conclusion: The majority of cases came from the central region of Uganda, clustered around the districts neighbouring Kampala, where UHI is located mostly attributable to Increased access to diagnosis. Most cases were from the Bantu ethnic group, which is the largest ethnic group in the country.

A case report: Emergency bedside balloon atrial septostomy in low income setting: Tanzania, East Africa

Amanda Anyoti

Jakaya Kikwete Cardiac Institute, Dar es Salaam, Tanzania

Background: Balloon atrial septostomy (BAS) was first described by Raskind and Miller in 1966. It is a lifesaving procedure done in neonates with critical congenital heart disease such as transposition. It is typically performed in the catheterisation laboratory under fluoroscopic guidance with haemodynamic monitoring.

Objectives: The objective of this case report is to demonstrate how feasible bedside atrial septostomy can be in settings like ours.

Method: A 5-week-old male baby, current weight of 3.3kg, presented to our clinic with difficulty in breathing and bluish discoloration. An echo was done, revealed dextro transposition of the great arteries with restrictive atrial septal defect a tiny patent ductus arteriosus. Prostaglandin E1 was administered with a rise in saturation to 91%.

The patient was prepared for emergency bedside balloon atrial septostomy. Done under transthoracic echocardiographic guidance; apical 4 chamber view was used to delineate the interatrial septum and guide the catheter from the right atrium to the left atrium via tiny atrial septal defect <2mm. Balloon septostomy catheter, with a single latex balloon at the tip was used. Venous femoral access was obtained, the catheter was then advanced through the sheath up to the right atrium and through the atrial communication to the left atrium. The balloon was then inflated in the left atrium with the balloon reached approximately 2cm in diameter then pulled into the right atrium using a rapid and forceful jerk. The deflated catheter was advanced to the left atrium and the procedure was repeated, an adequate atrial communication was with shunt of 5mm was achieved and no resistance was felt during passage of the inflated balloon across the defect.

Results: The patient had a peripheral oxygen saturation of 95% with 5mm of the atrial septal defect.

Conclusion: Bedside echocardiographic guided atrial septostomy has been shown to be safe, cost-effective with minimal complications.

A diagnostic approach to anomalous origin of the left coronary artery from pulmonary artery: A case report

Amanda Anyoti

Jakaya Kikwete Cardiac Institute, Dar es Salaam, Tanzania

Background: Bland-White-Garland described a syndrome associated with autopsy findings of anomalous left coronary artery arising from the pulmonary artery (ALCAPA) in 1933. They estimated that ALCAPA is present in 1 in 300 000 live births or 0.5% of children in congenital heart disease.
Objectives: The objective of this case report is to provide clinicians with the diagnostic pathway for anomalous origin of the left coronary artery.
Method: A 6-months-old, 4.4 kg baby girl, referral from general hospital, presented with chief complaint of recurrent cough for 2 weeks. On examination she was alert, afebrile temp. 36C, pale, not cyanosed, not dyspneic, no finger clubbing, no oedema.
Vitals Spo2=98% in room air, PR=114b/min, RR=30 b/min, Temp=36C, BP=91/59mmhg. The cardiovascular system: The apex was palpable at the 6th ICS mid clavicular line and grade 3 systolic murmur at the mitral area.
Results: Chest X-ray showed increased pulmonary markings and in both lungs fields. Echo showed enlarged left ventricular size with echo enhancement of the papillary muscle, antero-lateral and posterior wall which was hypokinetic with reduced function. Apical 4 chamber view showed mitral regurgitation. Parasternal short axis showed left coronary artery arising from the main pulmonary artery with a dilated right coronary artery. Parasternal short axis showing retrograde flow of blood to the pulmonary artery and numerous collaterals in between the right coronary artery and left coronary artery. Retrograde flow in the left coronary artery to the main pulmonary artery, absence of the LCA ostium in the aorta. An ECG showed ischaemia with Q waves in lead I and AVL and ST-T segment changes in the lateral anterior leads, V4 - V6.
Conclusion: At the age of 1 year, more than 90% of the patients die. However, with the surgical options available are lifesaving. Early diagnosis is paramount.

Isolated infective pulmonary endocarditis and patent ductus arteriosus in a child: A case report

Amanda Anyoti

Jakaya Kikwete Cardiac Institute, Dar es Salaam, Tanzania

Background: The pulmonary valve endocarditis accounts for 1.5% - 2% of all cases of infective endocarditis. This rarity can be attributed to the early corrective surgery of congenital heart defects, which include the patent ductus arteriosus. The patent ductus arteriosus accounts for 5% - 10% of the congenital heart defects.
Objectives: The objective of this case report is to illustrate the uncorrected patent ductus arteriosus as a predisposition to infective endocarditis, in low- to middle-income areas where corrective heart surgery is limited.
Method: An 8-year-old, girl, has a history of poor weight gain since age of 1 year, easy fatiguability, awareness of heartbeat, dry cough, fevers and difficulty in breathing. She has a history of intravenous use of antibiotics 1 week prior. On examination, alert febrile temp. 39°C, slightly dyspneic, pale, not jaundiced, no oedema. Cardiovascular system: A grade 4 machinery murmur, best heard in left upper sternal border. Respiratory system: Bilateral air entry, bilateral crepitation heard in the mid and lower zones. The blood work revealed neutrophilia, anemia and elevated CRP. Echocardiography: Restrictive patent ductus arteriosus shunt and multiple vegetations in main pulmonary trunk and pulmonary valve.
Results: Septic emboli demonstrated in the chest X-ray showing multiple patchy, large lesions with cavity. Echo showed multiple vegetations, largest measuring 15mm by 10mm in the main pulmonary trunk and oscillating vegetations attached to the pulmonary valve. Treatment was with intravenous Ceftriaxone 1.8g once a day and Gentamycin 80mg once a day with supportive therapy. The temperature normalised and patient improved clinically with no vegetations seen in the pulmonary trunk after 6 weeks of treatment with no pulmonary regurgitation. Blood cultures were taken that did not isolate any organism.
Conclusion: Due to unavailability of early surgery in our setting, congenital heart disease lesions do predispose to morbidity and complications of infective endocarditis.

The SA Heart® Atrial Fibrillation / Flutter Registry: A report from a cohort of patients from Groote Schuur Hospital

Herman Bagula

University of Cape Town, Observatory, South Africa

Background: Atrial fibrillation (AF) is a prevalent cardiac arrhythmia worldwide and is linked to an increased risk of stroke and mortality. Despite limited research on AF in Africa, valuable information about its clinical features and management can be obtained from registries.

Objectives: The SA Heart® AF / Flutter Registry is a national registry in South Africa aimed at studying the risk factors, treatments, and outcomes of patients with AF / Flutter. This report focuses on the baseline characteristics of a subset of patients from Groote Schuur Hospital.

Method: Categorical variables were presented as proportions and numerical variables as median and interquartile range. Chi square test and Fisher's exact were used to determine differences between categorical variables and Mann-Whitney U test was used to determine differences between numerical variables. P value 0.05 of less than 0.05 was considered as significant.

Results: The analysis included 50 patients with AF / AFL, with 54% being female. Females had a higher median age compared to males (64 vs. 53, p=0.005), and hypertension was the most common risk factor (54%). Among the patients, 28% had diabetes, and 12% had a history of coronary artery disease. The distribution of AF types was as follows: 50% had permanent AF, 28% had persistent AF, and 6% had paroxysmal AF. A significant portion (72%) of the patients had a CHA2DS2-VASc score of ≥2, and 16% had experienced a previous stroke or transient ischaemic attack. Valvular heart disease was present in 36% of the patients, with mitral regurgitation (24%) and mitral stenosis (16%) being the most common valve pathologies. A history of rheumatic heart disease was reported in 16% of the patients. Additionally, 54% of patients had a history of heart failure, and 40% had left ventricular systolic dysfunction. Most patients (72%) received anticoagulation therapy, primarily with warfarin as the only prescribed anticoagulant. Beta-blockers were the most commonly prescribed drugs (68%) for rate control.

Conclusion: The registry offers valuable insights into the clinical characteristics and management of AF patients at a public hospital in South Africa. Although the majority of patients received anticoagulation and rate control, the limited utilisation of direct oral anticoagulants highlights the restricted access to these medications among healthcare professionals in the public sector. Hypertension was identified as the most common risk factor in this cohort of AF patients.

A novel 3D-cardiovascular model to characterise mitochondrial dysfunction in cardio-metabolic disease development

Marguerite Blignaut[1], Bernie Groenewald[1], Barbara Huisamen[1] and Nireshni Chellan[2]

[1]Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

[2]Biomedical Research and Innovation Platform, South African Medical Research Council, Tygerberg, South Africa

Background: Extensive cell-culture (in vitro) based studies suggest that the dynamic nature of the mitochondrial network can be used as a biomarker for cardiometabolic disease development and drug response. However, 2D-in vitro studies have several limitations that can impact mitochondrial dynamics. These can be overcome by 3D-spheroid or organoid models where increased intercellular communication, formation of gap junctions between cells and extracellular matrix (ECM) is observed, which lacks in 2D.

Objectives: The objective of this study was to establish and extensively characterise a novel cardiomyoblast model to study cellular signalling and mitochondrial dynamics in hyperlipidemic-induced insulin resistance.

Method: Rat cardiomyoblast cells (H9c2) were cultured under standard conditions and seeded at 4 x 105 cells / spheroid in ultra-low adherence plates with either control (CM; 25mM DMEM, 10% FBS, 1% pen / strep) or IR media (IRM; 0.1mM palmitic acid, 0.1mM oleic acid, 100nM insulin, and CM) for 96 hours, where after the spheroids were harvested for mRNA expression levels (G6PD, HIF1-α, PFK2) with qPCR, and protein and phosphorylation level determination for metabolism (AMPK, Akt and mTOR) 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 TEM).

Results: SEM showed ECM on the surface of the spheroids, whilst TEM showed actin-formation, gap junctions, and a healthy mitochondrial population with well-organised cristae structure, indicating metabolically active cells. Spheroids did not respond to 15 minutes insulin stimulation and had significantly decreased phospho-Akt and phospho-mTOR compared to control spheroids, supporting an IR-phenotype.

Conclusion: This study established a novel, insulin-resistant cardiomyoblast spheroid model that can be grown rapidly and used to measure mitochondrial dynamics. The spheroids are sensitive and respond to their environment whilst the dynamic mitochondrial population response can be utilised as readouts for drug uptake and response.

Cardiac tuberculosis: Patterns of myocardial and valvular involvement detected on echocardiography

Andrea Booyens

Tygerberg Hospital, Bellville, South Africa

Background: Cardiac tuberculosis (TB) is a rare but deadly disease often only diagnosed post-mortem. The lack of tissue for analysis to make a definitive diagnosis, makes this diagnosis heavily dependent on imaging. Our group identified and reported on the typical echocardiographic patterns of cardiac involvement associated with cardiac TB.

Objectives: To analyse echocardiography records of patients with either confirmed or probable cardiac TB. To determine if an identifiable pattern of cardiac involvement is observed to improve the recognition of cardiac TB on echocardiography.

Method: A retrospective study was conducted in the Division of Cardiology, Tygerberg Hospital, between 2010 - 2022. Twelve patients with confirmed or probable cardiac TB were identified. The echocardiograms were evaluated by 2 experienced cardiologists (AD, AP). Patient records were screened for evidence of TB by identifying the organism (stain / culture), detecting granulomas on histology and assessing the response to anti-TB therapy.

Results: The mean age was 31 years (13 - 44 years). Most patients had extensive valvular destruction (n=7) without vegetations and myocardial involvement was common (n=9), often in the form of a sub-mitral aneurysm (n=5). Involvement of the anterior mitral valve leaflet included perforated aneurysms resulting in a typical wind-sock deformity (n=4). Aortic involvement occurred in 3 cases with aneurysm formation causing aortic regurgitation. None had significant pericardial effusions.

Conclusion: Cardiac TB often causes a characteristic pattern of cardiac involvement. Valvular involvement usually causes extensive destruction with an absence of vegetations in contrast with bacterial infective endocarditis. Myocardial involvement is commonly present with submitral aneurysms being most common. Aortic involvement commonly leads to aneurysm formation with aortic regurgitation. Both leaflets of the mitral valve are affected. Perforation of the anterior leaflet characteristically results in a wind-sock deformity. Recognition of these patterns of cardiac involvement should put TB high on the differential diagnosis.

Correlation between carotid intima-media thickness and patient outcomes in coronary artery disease in central South Africa

Lezelle Botes[1], Stephen Brown[2] and Francis Smit[2]

[1]Central University of Technology, Bloemfontein, Free State, South Africa

[2]University of the Free State, Bloemfontein, Free State, South Africa

Background: CIMT measurement has been used as a marker to establish the presence, risk and extent of cardiovascular disease. Several studies have validated the application of this imaging technique because it can detect slight changes associated with future cardiovascular events.

Objectives: Carotid intima medial thickness (CIMT) is a non-invasive tool used to detect atherosclerosis and diagnose cardiovascular disease. This study aimed to determine whether pre-operative CIMT measurements correlated with intra- and post-operative outcomes in patients with acute coronary syndrome (ACS) undergoing coronary artery bypass graft (CABG) surgery.

Method: This retrospective analytical cohort included 89 patients diagnosed with ACS who received CABG surgery. Patients were divided into 2 cohorts: Group 1 (normal CIMT <0.07cm) and Group 2 (abnormal CIMT ≥0.07cm). B-mode ultrasound was used to measure the CIMT in all patients. Pre-, intra- and post-operative data and complications were recorded for each patient.

Results: The study included 77 (86.5%) males and 12 (13.5%) females. Pre-operative mean body mass index (BMI) was significantly higher (p=0.03) in Group 2 than in Group 1. Group 2 had significantly increased diabetes (p=0.008), hypertension (p=0.009) and NT pro-BNP (p=0.02). Intra- and post-operative outcomes between groups were comparable, with no significant differences.

Conclusion: The study showed no correlation between abnormal CIMT and increased adverse intra- and post-operative patient outcomes. Therefore, the results of this study show CIMT should not be considered a tool to predict adverse events in patients undergoing CABG surgery.

Contemporary risk factors associated with ischaemic heart disease in central South Africa: A single-centre study

Stephen Brown[1], Michelle Butler[2], Lezelle Botes[2] and Francis Smit[1]

[1]University of the Free State, Bloemfontein, Free State, South Africa

[2]Central University of Technology, Bloemfontein, Free State, South Africa

Background: Non-communicable deaths are increasing in sub-Saharan African over the years with limited data on coronary artery disease (CAD) and the risk factors thereof.

Objectives: To investigate modifiable and non-modifiable risk factors in central South Africa.

Method: Patients with angiographically confirmed CAD who were evaluated in the catheterisation laboratory for the first time over a 2-year period (2016 - 2017) were included. Data was extracted from the patients' medical records.

Results: Four hundred and eighty-two patients met the inclusion criteria, presenting at a mean age of 58.4 ± 10.8 years and were predominantly male (66%). Females were significantly older than males (60.3 ± 9.6 vs. 57.4 ± 11.1 years; $p<0.05$). The mean age at presentation was comparable between ethnic groups, except Asian patients who presented at a significantly younger age compared to Caucasians (49.8 ± 10.5 vs. 59.1 ± 10.8 years; $p<0.05$). Hypertension (91%) was the most common risk factor, followed by smoking (67%) and obesity (41%). Black Africans demonstrated a higher incidence of hypertension when compared to Caucasians (96% vs. 87%; $p<0.05$). Smoking was more prevalent in Caucasians than Black Africans (68% vs. 55%; $p<0.05$) and occurred more commonly in males than females (73% vs. 55%; $p<0.05$). Most patients presented with acute coronary syndrome (ACS) (72%), mainly with ST-elevation myocardial infarction (STEMI) (36%). The majority of patients presenting with ACS were in the age interval 51 - 60 years. The ACS risk factor profile was similar to the total study group.

Conclusion: CAD is present in all ethnic groups, and modifiable and non-modifiable risk factors are similar to the classical risk factors described worldwide. Minor interracial differences were observed and hypertension was the most prevalent risk factor recorded in central South Africa. Most patients with CAD presented with ACS, particularly STEMI. The identification of the risk factors associated with CAD will contribute to improved planning of health care systems and increasing awareness of CAD.

Outcomes of single ventricle physiology in central South Africa

Stephen Brown[1], Marius van Jaarsveld[1], Lezelle Botes[2] and Francis Smit[1]

[1]University of the Free State, Bloemfontein, Free State, South Africa

[2]Central University of Technology, Bloemfontein, Free State, South Africa

Background: Single ventricle physiology is a critical cardiac condition requiring early diagnosis and intervention.

Objectives: To report on the management and outcomes of patients diagnosed with single ventricle physiology in central South Africa.

Method: A retrospective observational analysis of patients presenting with single ventricle physiology at the Universitas Academic Hospital (UAH) in central South Africa between November 1997 and June 2021.

Results: Patients were referred from the Free State (54%), Northern Cape (29%) and Lesotho. One hundred and fifty-four patients presented with single ventricle physiology: 114 received interventions, and 40 were not eligible for intervention. Patients presented for the first time at a median age of 34.5 days, with patients from nearby districts presenting within a few days of birth. However, patients from outlying areas presented much later. Eighty-seven patients received systemic to pulmonary artery shunting or pulmonary artery banding. Sixty-three patients proceeded to bidirectional Glenn procedures, and 30 patients (26%) had full palliation to Fontan. Twenty-one patients demised after stage 1, 6 after the Glenn procedure and 2 after the Fontan procedure. Overall, 34 (29.8%) patients were lost to follow-up.

Conclusion: Patients in our study presented late, and follow-up of these patients was a challenge. The highest mortality occurs during the first stage of palliation. Outcomes from this study are comparable to other sub-Saharan studies.

Correlation of cardiac risk factors with carotid intima-media thickness and radial intima-media thickness measurements

Stephen Brown[1] and Lezelle Botes[2]

[1]University of the Free State, Bloemfontein, Free State, South Africa

[2]Central University of Technology, Bloemfontein, Free State, South Africa

Background: Early identification of patients at risk for future cardiovascular events is essential since addressing these early stages is more effective than treating advanced atherosclerotic vascular disease. The presence of multiple risk factors increases the development of atherosclerosis significantly.

Objectives: Two hundred and fifty first-time patients presenting with 1 or more modifiable risk factors at a private physician practice underwent a vascular ultrasound measuring the carotid intima-media thickness (CIMT) and radial intima-media thickness (RIMT).

Method: A prospective, descriptive-analytical single-centre study was conducted to investigate the possible relationship between carotid intimal media thickness (IMT), radial IMT and modifiable and non-modifiable cardiac risk factors. This study was conducted at a private physician practice in Bloemfontein. The study sample included 250 first-time visiting patients.

Results: Forty-two percent (n=104) of patients presented with 3 or more modifiable risk factors, 39 percent (n=98) with two risk factors and 19 percent (n=48) with 1 modifiable risk factor. Hypertension was the most common modifiable risk factor (89%) followed by obesity (66%). Male gender was associated with a significant increase in mean CIMT ($p<0,01$). Hypertension, diabetes mellitus (DM), hypercholesterolemia and smoking contributed to a thickened CIMT mean with odds ratios of 3.99, 2.82, 2.47 and 2.09, respectively. Combinations associated with a thicker mean CIMT included hypertension and DM, hypertension and smoking - odds ratios of 6.92 and 3.67. The only risk factor that demonstrated a significant association with a thicker mean RIMT was hypercholesterolemia ($p<0.01$) and the combinations of hypertension and obesity, DM and obesity and hypertension and hypercholesterolemia ($p<0.05$).

Conclusion: Male sex, increased age, hypertension, DM, hypercholesterolemia and smoking significantly contributed to a thickened CIMT, whereas only hypercholesterolemia was associated with a thickened RIMT. Among all risk factors, hypertension had the most significant impact on the CIMT mean compared to the other modifiable risk factors. Combinations of risk factors appeared to add summative risks for thickened CIMT and RIMT.

A de novo pathogenic PUF60 variant in a South African child with syndromic congenital heart disease

Husnaa Bux[1], Thomas Aldersley[1], John Lawrenson[1], Alexia Joachim[1], Bernard Keavney[2] and Liesl Zühlke[3,4]

[1]Department of Paediatrics and Child Health, Paediatric Cardiology, University of Cape Town, and Red Cross War Memorial Children's Hospital, Observatory, South Africa

[2]University of Manchester, Manchester, United Kingdom

[3]Division of Paediatric Cardiology, Department of Paediatrics and Child Health, University of Cape Town, Observatory, South Africa

[4]South African Medical Research Council, Tygerberg, South Africa

Background: Congenital heart disease (CHD) is the most common birth defect worldwide. Although aetiology is incompletely understood, a role for genetics has been demonstrated in populations of European descent. Genetic factors are especially important in patients with extracardiac anomalies (ECAs) such as intellectual disability and bodily dysmorphisms, where identification of pathogenic variation can impact diagnosis and management.

Objectives: To investigate genetic causes of disease in a patient with unexplained CHD and ECAs, who tested negative on routine CHD gene panel analysis.

Method: Exome sequencing was conducted on the patient and his unaffected parents. Data were filtered for pathogenic variants in an extended panel of known syndrome-causing genes.

Results: The patient was recruited at the age of 10 years, presenting with double outlet right ventricle, tricuspid atresia, and ECAs including learning disability, school failure, micrognathia and hypertelorism. Genetic analysis revealed a de novo frameshift pathogenic variant, PUF60 c.1569_1570del (p.Glu524AspfsTer3), in the index patient. PUF60 pathogenic microdeletions and point mutations are known to cause Verheij syndrome, a rare disease with features including coloboma, microcephaly, developmental delay, short stature and other craniofacial, cardiac and renal defects.

Conclusion: We were able to provide a genetic diagnosis of Verheij syndrome for this patient. The de novo PUF60 pathogenic variant explains his phenotype, while also expanding on our knowledge of Verheij syndrome. Only 52 patients have been described to date, with the most common features including intellectual disability (95%) and craniofacial dysmorphisms (88%); however, the hypertelorism observed in our patient is rare for this syndrome. Moreover, cardiac involvement is usually limited to septal defects, whereas the complex conotruncal phenotype is a novel finding for this syndrome. The highly variable clinical features of Verheij syndrome mean PUF60 may need to be considered in other genomic studies of patients with CHD and ECAs.

Stressed females at greater risk following myocardial ischaemia?

Megan Cairns, Caitlin Odendaal, Erna Marais, Danzil Joseph and M. Faadiel Essop

Division of Medical Physiology, Department of Biomedical Sciences, Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

Background: Cardiometabolic diseases are currently a leading cause of global mortality. Stress and associated mental illnesses are gaining increased attention in terms of their role in cardiometabolic disease onset and / or progression. Here, stress hormones such as cortisol and norepinephrine, as well as oxidative stress, have emerged as key role players in the onset of stress-cardiac pathology. However, the underlying mechanisms driving stress-related cardiac damage remain largely unclear with limited studies tackling sex-specific changes.

Objectives: To determine whether chronic stress triggers cardiac dysfunction (in a sex-specific manner) in isolated rat hearts exposed to regional ischaemia.

Method: Ten-week-old male and female Wistar rats were subjected to a chronic restraint stress (CRS) model with restricted movement (1hour daily for 4 weeks). Thereafter, the hearts were perfused using an ex vivo model of regional ischaemia, and functional parameters assessed. Plasma and serum samples were collected pre- and at point-of-death, respectively, for molecular analyses. In addition, elevated plus maze (EPM) behavioural tests were conducted.

Results: Stressed males exhibited lower plasma brain-derived neurotrophin factor ($p<0.05$) vs. controls whereas CRS females displayed increased plasma adrenocorticotrophin hormone and attenuated corticosterone levels vs. controls ($p<0.001$). Behaviourally, only female CRS animals displayed increased number of rears (EPM) vs. controls ($p<0.05$). Male CRS hearts displayed reduced work performance, coronary flow, and functional recovery vs. controls ($p<0.05$) following the ischaemic insult. However female CRS hearts only displayed reduced post-ischaemic functional recovery vs. both matched controls (29.19 ± 15.73% vs. 53.11 ± 15.38%; $p<0.05$) and vs. CRS male hearts (29.19 ± 15.73% vs. 46.95 ± 9.07%; $p<0.05$).

Conclusion: These data reveal intriguing sex-specific differences in terms of cardiac function in response to ex vivo regional ischaemia. We propose that dysregulation of stress-response hormones in females may be responsible for such a poor recovery, while lowered BDNF levels may help explain the decreased function of male hearts in response to regional ischaemia.

Interventional cardiac surveys in South Africa: ORSIRO Mission Drug Eluting Stent survey (2021 - 2022)

Graham Cassel[1], Glenda Hardy[2] and Jandre Killian[3]

[1]Netcare Milpark Hospital, Parktown, Johannesburg, South Africa

[2]Freelance Researcher

[3]Corpsolve Business Solutions, Pretoria, South Africa

Background: Cardiovascular registries and surveys provide valuable data to interpret real-world practices and standards. The South African Heart Association (SA Heart®) has taken the lead in developing registries under the SHARE umbrella which includes the SHARE-TAVI registry and the SHARE CDM registry. A new SA survey has been undertaken to provide insights of patient selection, lesion characteristics and procedural parameters of the ORSIRO Mission DES system.

Objectives: To understand the real-world experience and outcomes of interventionists using the ORSIRO Mission DES system in South Africa.

Method: A questionnaire-based survey was conducted among South African interventionists to define the nature of target lesions being treated and overall effectiveness of the DES system. Completed questionnaires were captured on an electronic datasheet and assigned a unique identifier. The Qlik Sense data platform was used to explore and analyse the complex data sets, create interactive visualisations, and share insights with specialists in an interactive and user-friendly manner.

Results: Twelve interventionists entered 273 patients into the dataset. Eighty-nine percent of patients were de novo cases, 4.46% ISR and other indications such as ACS, AMI-Inf and post-CABG were included in the survey. Lesion types were predominantly A, B1 and B2. Eighty-seven percent of patients had little or moderate calcification, while the majority showed little tortuosity in vessels. The ORSIRO Mission DES System was favourably rated regarding its trackability, pushability, crossability and overall performance.

Conclusion: The considerable investment in data on the interactive Qlik system offers many future opportunities to interrogate the full dataset in more detail. The ORSIRO Mission DES System was favourably rated on performance.

Prognostic value of dobutamine stress echocardiography: A South African experience

Andries Dippenaar[1] and Amanda Espach[2]

[1]SA Endovascular, Kuils River Netcare Hospital, Kuils River, South Africa
[2]Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

Background: Dobutamine stress echocardiography (DSE) is a well-established modality for the diagnosis and risk-stratification of coronary artery disease (CAD). Even though DSE is highly cost-effective in a resource-constrained environment, its prognostic value has not been investigated in South Africa.
Objectives: To compare the prognostic utility of a South African DSE programme to larger, internationals series.
Method: All patients undergoing routine DSE from 2019 - 2023 at a single centre (SA Endovascular, Kuils River Netcare Hospital, South Africa) were included from an ongoing registry. Patients with non-diagnostic tests, implantable cardiac devices and DSE for any indication other than CAD diagnosis (e.g., viability testing) were excluded. Inducible ischaemia was identified by a new wall motion abnormality in ≥2 myocardial segments.
Results: One hundred and sixty-nine patients (mean age 64.8 ± 10.7 years, 67% male) were analysed. Fifty-two patients (31%) had diabetes mellitus, 155 (92%) had dyslipidaemia, and 35 (21%) were smokers. Forty-eight (28%) patients had received previous percutaneous revascularisation and 10 (6%) coronary artery bypass surgery. During a mean follow-up of 36 ± 7 months, 19 (11%) patients died or underwent coronary artery revascularisation. Individuals with demonstrable, inducible ischaemia, experienced a higher rate of all-cause mortality or revascularisation during follow-up.
Conclusion: The prognostic value of a South African DSE programme for all-cause mortality and revascularisation was demonstrated for the first time. Outcome data are aligned with larger, international series with comparable follow-up times.

A cross-sectional study of clinical and echocardiographic characteristics of adult aortic valve disease at Chris Hani Baragwanath Academic Hospital

Jingisile Dlamini and Ruchika Meel

Chris Hani Baragwanath Academic Hospital, University of the Witwatersrand, Johannesburg, South Africa

Background: Aortic valve disease is an important cause of morbidity and mortality globally. Data regarding aortic valve disease remains understudied in Africa. Herein, we sought to describe the current characteristics of patients with aortic valve disease in a peri-urban hospital setting.
Objectives: To describe the demographics, clinical characteristic, and echocardiographic features of contemporary patients with aortic valve disease at a peri-urban referral hospital.
Method: In this descriptive cross-sectional study (July 2021 - October 2022), we systematically documented the demographic, clinical and echocardiographic features of patients with aortic valve disease at Chris Hani Baragwanath Academic Hospital.
Results: This study included 130 consecutive patients with organic aortic valve disease with a median age 55 (45 - 66) years, 57.7% were females. Majority were of African descent (95.4%). Aortic valve regurgitation (57.5%) was the dominant pathology followed by mixed aortic valve disease (31.1%). Aortic valve stenosis was present in 9.4% of patients. Concomitant mitral regurgitation was noted in 33% of patients. The main aetiologies were rheumatic heart disease (67%), degenerative aortic valve disease (27%), infective endocarditis (4%), bicuspid valve disease (2%). Hypertension (65.9%), dyslipidaemia (30.7%), overweight / obese (59.2%) and HIV (20.8%) were the main comorbidities. Heart failure was present in 54.6% with a mean left ventricular ejection fraction of 50.7 ± 15.8%. Rheumatic fever prophylaxis was noted in minority (6.2%). The main complications were atrial fibrillation (8.3%), pulmonary hypertension (35.8%) and renal dysfunction (25.3%). Thirty-five (26.9%) of patients were awaiting surgery.
Conclusion: Majority of patients with aortic valve disease were African females with predominant rheumatic aortic valve regurgitation and multiple comorbidities.

Myocardial fibrosis and sudden cardiac death (SCD) risk factors in mitral valve prolapse patients deemed to be at low SCD risk

Jacques Doubell, Jan Steyn, Philip Herbst and Anton Doubell

Division of Cardiology, Department of Medicine, Faculty of Medicine and Health Sciences, Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

Background: Mitral valve prolapse (MVP) is associated with an increased risk of arrhythmogenic sudden cardiac death (SCD) but there is no consensus regarding risk stratification for SCD. Myocardial fibrosis is the underlying substrate for arrhythmogenic SCD in these patients. Clinical risk markers described for SCD in MVP are electrocardiographic (ECG): T wave inversion in the inferior leads and complex ventricular ectopy (ventricular couplets, non-sustained ventricular tachycardia (NSVT) and polymorphic ventricular ectopy), echocardiographic: Mitral annular disjunction (MAD) and spiked configuration of the lateral annular velocities (Pickelhaube sign).

Objectives: We aimed to investigate the prevalence of myocardial fibrosis and clinical SCD risk markers in a healthy cohort of MVP patients considered to be at low SCD risk, describe the myocardial fibrosis pattern and correlate myocardial fibrosis with the presence of clinical risk markers.

Method: Our institutional echocardiography database was reviewed from 1 September 2020 - 31 December 2021 for patients with MVP. Patients with severe mitral regurgitation or coronary artery disease were excluded. MVP patients were contacted for enrolment into the study which included a clinical evaluation, assessment for myocardial fibrosis with cardiac magnetic resonance (CMR) imaging, assessment for SCD risk clinical markers with ECG, 48 hour Holter ECG and transthoracic echocardiogram.

Results: Forty-five patients were enrolled. No patients had previously documented ventricular fibrillation, ventricular tachycardia, cardiogenic syncope or survived SCD. Sixty-six percent of patients had areas of replacement fibrosis as detected by late gadolinium enhancement (LGE). Segments commonly involved were the basal posterior (39%), basal inferior (39%) and basal lateral (25%) segments. Areas involved were focal with an average of 1.3 segments involved (SD 1.3). No patient had diffuse fibrosis as assessed by extracellular volume (ECV) expansion. Ten percent had inferior T wave inversion. Eighteen percent had polymorphic ventricular ectopy and 16% had NSVT. Forty-nine percent of patients had MAD. Fifteen percent of patients had Pickelhaube sign. No correlation was found between the presence of replacement fibrosis and any clinical SCD risk marker.

Conclusion: Replacement fibrosis and clinical SCD risk markers were common in this cohort of patients considered to be at low SCD risk. No correlation between fibrosis and risk markers was found making the predicative power of these markers for fibrosis poor. Risk markers for SCD have largely been described in preselected high risk MVP populations but to what increment their SCD risk is increased in an otherwise clinically low risk patient is unclear but essential given how common replacement fibrosis and risk markers were in our cohort. In the absence of this data liberal use of these markers in clinically low risk patients has the potential for over assessing SCD risk, resulting in inappropriate therapy.

Understanding the genetic basis of hypertension in a Xhosa South African population

Hannah Fokkens, Rabia Johnson and Jyoti Sharma

South African Medical Research Council, Tygerberg, South Africa

Background: Hypertension (HTN) drives the global burden of cardiovascular disease and is a leading cause of cardiovascular-related mortality. In particular, South Africa has been shown to have the heaviest burden of hypertension (27% - 58%). Current evidence indicates that HTN is a multifactorial condition influenced by various risk factors, including genetics and environmental determinants, drastically impacting hypertension control.

Objectives: The primary objective of this study is to investigate genetic variations linked to the management of hypertension and examine how the guidelines provided by American Heart Association (AHA) and the South African Hypertension Society (SAHS) affect the occurrence and risk factors related to hypertension in Mthatha, South Africa.

Method: In a cross-sectional study, individuals over 18 years of age were screened using the WHO Stepwise questionnaire and anthropometric measurements were taken. Univariate and multivariate analyses were performed to identify risk factors contributing to HTN. A candidate gene approach was adopted to explore the involvement of genetic variants in the regulation of HTN, by Whole Exome Sequencing of 5 individuals without HTN, 5 individuals with HTN and 5 treatment-resistant HTN.

Results: In a total cohort of 1 034 individuals, the prevalence of HTN drastically increased from 53.6% (SAHS) - 74.6% (AHA). Risk factors associated with both guidelines, including age, blood glucose, diabetic status, total cholesterol, triglycerides, waist-hip ratio, conicity index, systolic and diastolic BP, are positively associated with the development of HTN ($p<0.05$). Of interest, two polymorphisms were identified that could possibly influence drug pharmacodynamics.

Conclusion: According to the AHA guidelines >70% of individuals in the Mthatha area did not have target BP. The prevalence of HTN was higher than previously reported (30% - 32%) with age, cholesterol, diabetes, and waist-hip ratio being significant predictors of HTN. Of interest were the identified variants linked to HTN drug response, however, a larger sample size is needed to validate the pharmacogenomic findings.

Role of adenosine in prevention of no reflow guided by MVO in CMR

Ahmed Hatata

Ain Shams University, Cairo, Egypt

Background: Microvascular obstruction (MO) or no-reflow phenomenon is an established complication of coronary reperfusion therapy for acute myocardial infarction. It is increasingly recognised as a poor prognostic indicator and marker of subsequent adverse LV remodelling.

Objectives: To study the effect of adenosine on prevention of no reflow, MVO, degree of fibrosis and micro vascular haemorrhage in STEMI patients managed with primary PCI.

Method: This is an interventional prospective pilot study which was conducted on patients presenting to cardiology department in Ain Shams University hospitals with STEMI (St segment elevation myocardial infarction in the first 12 hours of presentation.) Defined as elevation of cardiac troponins at least one value above 99th percentile in a clinical setting consistent with myocardial ischaemia.

Sample size: 50 patients.

Inclusion criteria: (1) Patients presented with STEMI for primary PCI. (2) Patients with TIMI I flow after establishing flow by PTCA wire or PTCA balloon or by thrombus aspiration. (3) Coronary angiography shows total occluded vessel with TIMI zero flow. (4) Thrombus burden grade five. (5) Informed consent about adenosine is taken before procedure and hazards of adenosine are discussed with the patient and operator according to protocol.

Exclusion criteria: (1) Lack of informed consent. (2) Patients presented with cardiogenic shock. (3) Patients with complete heart block or second degree heart block. (4) Patient with CKD on dialysis. (5) Previous myocardial infarction, CABG. (6) ICM with low ejection fraction less than 35%. (7) Evidence of previous ischaemia (previous CA with significant CAD lesion more than 70% by coronary angiography or by IVUS or FFR).

Methodology: All patients who were qualified for the study on the basis of the inclusion and exclusion criteria undergone the following: (1) Clinical evaluation including: Thorough history taking Personal history: Age, smoking, alcohol. Present history: Assessment of chest pain and functional capacity. Past history: Ischemia: Previous ischaemic events, whether chest pain had started before infarction (pre-infarction angina) or not.

Medical: Diabetes mellitus, hypertension, dyslipidemia, chronic kidney disease, peripheral vascular disease, cerebrovascular disease and obesity. (2) Family history: Family history of premature coronary artery disease CAD. (3) Clinical examination: General examination: With special emphasis on ABP, heart rate. Local cardiac examination.

Procedures: Patients had been randomised into 2 groups: The Group A were given adenosine routinely after establishing TIMI I flow either spontaneously or by passing the wire or non-inflated balloon which is defined as: Faint antegrade coronary flow beyond the occlusion, with incomplete filling of the distal coronary bed.

Adenosine had been given through catheter to the distal coronary bed by loading bolus 1mg and dose can be repeated after 15 mins - 20 mins up to 2mg to LAD and 1mg in RCA and the remainder of PCI protocol will be done according to operator decision.

While the Group B had not been given adenosine, MRI was done within 48 hours of primary PCI and repeated for follow up after 3 months.

In the MRI protocol, with the assessment of: (1) MVO and degree of haemorrhage within MVO. (2) Tissue edema. (3) Ejection fraction, degree of mitral regurgitation. (4) Segmental wall motion abnormalities. (5) Extent infarction whether transmural or sub endocardial and degree of fibrosis.

Results: There was no significant difference between the two groups regarding TIMI and MBG score. There was a significant difference in myocardial salvage index and myocardium at risk with p value less than 0.001 .Yet no increase in myocardial haemorrhage among the 2 groups .There was significant improvement in EF, LV mass and LV volumes in those who were given adenosine.

Conclusion: Adenosine improves no reflow on giving as a prophylactic drug . It improves the microcirculation thus increasing the salvaged myocardium improving micro vascular obstruction and does not increase the percentage of microvascular haemorrhage.

Investigating high-density lipoprotein (HDL) subfractions, composition and functionality in people living with HIV

Peter Hudson[1], Nicholas Woudberg[2], Carmelita Abrahams[2], Festus Kamau[3], Hans Strijdom[3], Miguel Frias[4] and Sandrine Lecour[2]

[1]University of Cape Town, Observatory, South Africa

[2]Cape Heart Institute, Department of Medicine, Faculty of Health Sciences, University of Cape Town, Observatory, South Africa

[3]Centre For Cardio-metabolic Research In Africa, Division of Medical Physiology, Faculty of Medicine and Health Sciences, Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

[4]Division of Laboratory Medicine, Department of Diagnostics, Geneva University Hospitals, Geneva, Switzerland

Background: Although antiretroviral therapy (ART) increases survival in individuals living with HIV, this population faces an increased risk for cardio-vascular disease (CVD). There is mounting evidence that the distribution, composition, and functionality of high-density lipoprotein (HDL) particles subfractions are altered in the presence of cardiovascular risk factors.

Objectives: We aimed to explore whether HIV and / or ART modulate HDL subfractions / composition / functionality in individuals living with HIV.

Method: Fifty healthy HIV-negative control patients, 44 HIV-infected ART-untreated patients (HIV ART-naïve) and 50 HIV-infected ART-treated patients were included (South African cohort). HDL particles functionality was assessed by measuring reverse cholesterol efflux capacity, anti-oxidative activity (paraoxonase-1 [PON-1] activity) and anti-thrombotic activity (platelet-activating factor acetylhydrolase [PAF-AH] activity). HDL subfractions were measured using the Lipoprint® system.

Results: HIV ART-naïve patients had lower HDL-cholesterol than HIV-negative or ART-treated patients (1.05 ± 0.46 vs. 1.33 ± 0.39 vs. 1.31 ± 0.74mmol/L, respectively, $p<0.05$). The percentage of the largest subfraction of HDL (HDL-1) was higher in HIV ART-naïve patients compared to HIV-negative patients (12.46 ± 6.33 vs. 9.43±4.41%, $p<0.05$). The HIV ART-naïve patients also displayed a change in HDL composition, with decreased levels of apolipoprotein A-I compared to HIV ART-treated patients and HIV-negative patients (38.5 ± 7.5 vs. 43.8 ± 13.4 vs. 45.5 ± 8.1µmol/L, respectively, $p<0.05$). Large HDL particles inversely correlated with CD4+ count ($r=-0.279$, $p<0.01$) and small HDL particles positively correlated with CD4+ count ($r=0.333$, $p<0.01$). Although HDL particles functionality was not different between groups, PON-1 activity positively correlated with small HDL particles ($r=0.19$, $p<0.05$).

Conclusion: Our study suggests that HIV infection is associated with a change in HDL particles composition and a shift in HDL subfraction distribution, favouring large HDL subfractions, which may contribute to the increased risk of CVD in HIV patients. More in-depth studies should be conducted to better understand whether these changes of HDL particles associated with HIV and / or ART may contribute to CVD.

Myocardial effects of an Aspalathus Linearis extract

Barbara Huisamen, Mignon van Vuuren, Sybrand Smit, Zimvo Obasa, Ilze Willemse, Shantal Windvogel and Erna Marais

Faculty of Medicine and Health Sciences, Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

Background: Cardiovascular diseases (CVDs) are the number 1 cause of global mortality, with 4 of 5 of these occurring in middle to low-income countries. In South Africa, CVDs account for the second highest number of deaths annually. Obesity increases the risk for developing CVDs and type 2 diabetes, the latter associated with insulin resistance (IR) and hypertension. A positive relationship therefore exists between obesity, hypertension and risk for CVD development.(1) Rooibos (Aspalathus Linearis) is a plant from Western Cape with proven health benefits.(2) Afriplex GRT(TM) (GRT) is a laboratory standardised GMP produced unfermented (green) rooibos extract.(3,4)

Objectives: The aim of the study was to investigate anti-diabetic and myocardial effects of GRT.

Method: Rats on an obesogenic diet (HFD) were IR after 10 weeks (OGTT) whereafter they were given GRT (60mg / kg / day) for 6 weeks in conjunction with the HFD. Blood pressure was monitored throughout (CODA® tail-cuff blood pressure system, Kent Scientific). After sacrifice, hearts were perfused ex vivo and subjected to ischaemia / reperfusion to determine function and infarct size. Aortic contractility was measured (isometric force transducer), fat depots and livers weighed and livers analysed histochemically.

Ethics: SU-ACUM16-00080

Results: HFD animals with GRT: Less IP fat ($p=0.05$), lower systolic ($p=0.0277$) and diastolic ($p=0.0434$) blood pressures and increased aortic relaxation ($p<0.0001$); increased insulin sensitivity (OGTT $p<0.05$) seen also in isolated ventricular cardiomyocytes ($p=0.0007$); smaller infarct development $p<0.001$) and improved function ($p<0.001$) after ischaemia / reperfusion. Liver weight decreased ($p<0.05$) with less steatosis ($p<0.05$). For all parameters, the HFD was significantly elevated vs. control.

Conclusion: Ingesting GRT resulted in: Less weight gain; improved IR, blood pressure, vascular tone, cardiac function with smaller infarcts and less NFLD. GRT ingestion alleviated obesity associated CVD's in our model.

1. Heart and Stroke Foundation 2019; WHF 2023. 2. Layman, et al. 2018. 3. Smit, et al. 2020. 4. Obasa, et al. 2021.

Bartonella endocarditis: Case profile and outcome at Tygerberg Hospital, Western Cape

Luke Hunter

Western Cape Department of Health, Cape Town, South Africa

Background: Bartonella endocarditis(BE) has recently been recognised as the most common cause of blood culture negative endocarditis (BCNE) in patients managed at Tygerberg Hospital (TBH). There is a paucity of epidemiological data describing BE with only a few case series reported worldwide.
Objectives: Describe the patient profile, echocardiographic features, and mortality rate of BE patients enrolled in the Tygerberg endocarditis cohort (TEC) study.
Method: The TEC study is an ongoing prospective study evaluating the impact of a standardised protocol for organism detection in patients with infective endocarditis. The chosen study period for this case series was between October 2019 and September 2021.
Results: Forty-seven patients were identified with BCNE during the study period. Of these, 20 patients (42.5%) were identified with BE. PCR of valvular tissue confirmed a Bartonella species in all 12 patients who underwent surgery. Of these, Bartonella quintana was identified in 10 cases (83%), Bartonella henselae in 1 case and no organism identified in 1 case. Blood serology for prior Bartonella exposure was positive (1≥256) in all 8 unoperated participants and the operated case with a negative PCR. Seven patients (35%) lived in informal housing. Ten patients (50%) admitted heavy ethanol use. Four patients (20%) were HIV positive, and no participants had evidence of current lice infestation or recent cat scratches. The most common valve lesion on echocardiography was severe aortic regurgitation (n=14;70%). The mean EuroSCORE 2 was 5.75 (range 1.51-16.8). Surgery was offered in 16 cases and performed in 14 (60%). The 30-day, 6-month, and 18-month mortality rate was 20%, 20% and 25% respectively.
Conclusion: This case series is the largest reported in Africa and highlights an important cause of BCNE that deserves further research. The risk profile in most patients was not typical for bartonellosis. This underscores the role of timely serological testing for Bartonella in BCNE patients and where applicable, PCR-testing on valvular tissue to confirm the underlying aetiology.

A retrospective audit of cardiac implantable electronic device (CIED) complications requiring reintervention at Tygerberg Hospital

Mari-San Jacobs, Anton Doubell, Jane Moses, Jan Steyn and Kumeshin Moodley

Division of Cardiology, Department of Medicine, Faculty of Medicine and Health Sciences, Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

Background: The rate of cardiac implantable electronic device (CIED) implantations is rising worldwide due to the aging population and increased need for prevention and treatment of various cardiac rhythm disturbances. The use of CIEDs, often providing life-saving benefit, is also associated with serious complications, of which infection and lead reinterventions are most frequent. The resultant patient morbidity and financial burden to the healthcare system, especially in developing countries like South Africa, necessitates an improved understanding of the associated risk factors.
Objectives: To gain insight into the risk factors associated with device infections and reinterventions at Tygerberg Hospital.
Method: A retrospective analytical cohort study, conducted in the Division of Cardiology at Tygerberg Hospital. We included 134 patients (and 60 controls) who experienced complications requiring reintervention after CIED implantation or generator change from January 2013 - December 2022.
Results: Lead reintervention occurred in 97 patients. The mean age was 62 years. The most common indications for lead reintervention were lead dislodgement (n=41; 42%), micro-dislodgement (n=25; 26%); lead electrical malfunction (n=13; 13%), lead fracture (n=8, 8%) and twiddler syndrome (n=4; 4%). Patients had an increased procedural time of 2.6 hours vs. 1.6 hours. Device sepsis occurred in 37 patients with a mean age of 58 years. Potential risk factors for device sepsis were an increased procedural time (mean=2.27 vs. 1.6 hours), a prolonged pre-procedural hospital stay (14 vs. 6 days), being overweight (51% vs. 36%) and post-procedural haematoma (8% vs. 2%).
Conclusion: In this retrospective cohort, a risk factor for lead reintervention was increased procedural time. Device sepsis was associated with increased procedural time, prolonged pre-procedural hospital stay, increased weight and post-operative haematoma.

Lupus myocarditis: Redefining diagnostic strategies

Sumanth Karamchand, Megan Rajah, Riette du Toit, Philip Herbst and Anton Doubell

Division of Cardiology, Department of Medicine, Faculty of Medicine and Health Sciences, Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

Background: Lupus myocarditis (LM) is a rare but potentially fatal complication occurring in 5% - 10% of patients with systemic lupus erythematosus (SLE). There is no single clinical or imaging modality diagnostic of LM, with most diagnostic tools geared toward ruling out alternative diagnoses. Endomyocardial biopsy (EMB) is the gold-standard for the diagnosis of myocarditis but is invasive and validated in the context of non-rheumatological myocarditis. Non-invasive imaging, including 2D-echocardiography (2D-echo) and cardiac magnetic resonance (CMR), have emerged as useful non-invasive diagnostic tools for rheumatological connective tissue disease. The development of T1- and T2-mapping, have significantly improved the diagnostic utility of CMR.

Objectives: This ongoing study aims to determine the optimal diagnostic strategy in patients with LM.

Method: This is a cross-sectional diagnostic accuracy study involving 2 cohorts of patients enrolled in Tygerberg Hospital. Eleven asymptomatic SLE patients and 13 symptomatic LM patients (pre-specified according to the SLICC-criteria) were included between May 2022 and July 2023. Asymptomatic patients were investigated with 2D-echo with speckle tracking, and CMR. LM patients were investigated with 2D-echo, CMR and EMB.

Results: Of 12 patients with clinical LM, a lymphocytic-infiltrate was demonstrated on EMB in 25% of cases. None, however, met the Dallas Criteria. 85% of these patients, on the other hand, met the 2018 Lake Louise criteria for myocarditis on CMR. However, abnormal regional function, global longitudinal strain and T1-relaxation was demonstrated in 8 of 11 asymptomatic control patients using both CMR and 2D-echo.

Conclusion: Endomyocardial biopsy, even though safe, is invasive and demonstrated limited histologic diagnostic utility in this preliminary study. CMR demonstrates promising diagnostic utility in active LM according to the Lake Louise Criteria validated for viral myocarditis but also detects abnormal tissue properties in asymptomatic SLE patients, possibly representing sub-clinical disease. Further work is required to develop an optimised CMR criteria in differentiating LM from asymptomatic lupus.

Ventricular tachycardia revealing systemic sarcoidosis: A rare case report

Yusuf Khatib, Haroon Mia, Sajidah Khan, Darrin Naidoo and Sandhiran Nadar

Inkosi Albert Luthuli Central Hospital, Durban, South Africa

Background: Sarcoidosis is a multi-system disease that may affect many organ systems. Cardiac involvement in patients with sarcoidosis is reported to be in the region of up to 25%. Symptomatic cardiac involvement is much more uncommon, and is seen in less than 5% of all cases of sarcoidosis. Although clinically apparent cardiac sarcoidosis is an uncommon entity, ventricular tachycardia as the initial presentation is rare.

Method: We discuss the case of a 44-year-old Indian male who presented to our hospital with palpitations and syncope secondary to ventricular arrhythmia. Investigation revealed a diagnosis of systemic sarcoidosis with cardiac involvement. He was commenced on amiodarone and corticosteroids, and had an implantable cardiac defibrillator inserted.

Conclusion: Our case report indicates that sarcoidosis may, although rare, present initially with cardiac manifestations without any detectable systemic findings. This makes sarcoidosis an important diagnostic consideration in patients with ventricular tachycardia of unknown origin given the high mortality associated with ventricular tachyarrhythmias.

Hypertrophic obstructive cardiomyopathy and alcohol septal ablation: A case series at Netcare Sunninghill Hospital

Eric Klug[1], Farrel Hellig[2] and Jason Bassett[3]

[1]Tickerdoc Research, Netcare Sunninghill Hospital, Sandton, South Africa

[2]Netcare Sunninghill Hospital, Sandton, South Africa

[3]Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa

Background: Hypertrophic cardiomyopathy (HOCM) is predominantly an autosomal dominant inherited disorder. Approximately 40% - 60% of HOCM cases are caused by genetic mutations of sarcomere proteins. Another 5% - 10% are caused by mutations in other genes, while the cause remains unknown in 25% - 30% of HOCM cases.

Around 70% of HOCM patients exhibit impedance to the left outflow tract, with pressure gradients exceeding 30mmHg. Outflow tract obstruction is caused by mitral valve systolic anterior motion and septal contact due to flow drag and, additionally, causing mitral regurgitation. The main concerns associated with HOCM are sudden cardiac death (due to tachyarrhythmias) and progression to heart failure. Medical treatment plays a role but has inconsistent effects on resting gradient and symptoms. Patients who experience symptoms such as chest pain, dyspnoea, and syncope, with resting and post-ectopic gradients above 50mmHg, and septal thickness above 15mm, could be considered for interventional procedures.

Traditionally, surgical myomectomy has been considered the gold standard. However, recent meta-analyses have shown that alcohol septal ablation is equally effective in terms of efficacy and mortality compared to myomectomy.

Objectives: The objective of this case report is to retrospectively review seven cases of patients with HOCM who underwent alcohol septal ablation (ASA) at a single centre by a single operator. We planned to review their clinical presentation, symptoms, and associated clinical findings, analyse the procedural details, and assess the success rate of the intervention, identify complications and determine the need for repeat intervention.

Method: A retrospective review of records at the Netcare Sunninghill Hospital of consecutive cases of HOCM who underwent ASA between June 2022 and February 2023. Data captured included baseline characteristics, symptomatology and ECG features, number of septal branches ablated, total alcohol volume used, pre- and post-procedural gradient, post-procedural CK and troponin-T, conduction abnormalities and follow-up gradients and symptoms.

Results: We followed 7 cases of HOCM, all of whom underwent successful ASA. Following the procedure, 1 patient required a repeat ASA (14.2%), 1 patient developed new left bundle branch block (14.2%), and no cases required a permanent pacemaker. In all cases, the resting gradient post procedure was <30mmHg. All cases had significant symptomatic improvement at follow-up.

Conclusion: ASA performed at Netcare Sunninghill Hospital has been successful in improving resting LVOT gradients and reducing symptoms, without significant complications. Although the success rate is based on a small case series, results are equivalent to that of published surgical myomectomy.

Creating decellularised bovine pericardium tissue scaffolds with tissue guided regeneration potential

Angélique Lewies[1], Lezelle Botes[2], Johannes Jacobus van den Heever[1], Pascal Maria Dohmen[3] and Francis Edwin Smit[1]

[1]Department Cardiothoracic Surgery, Faculty of Health Sciences, University of the Free State, Bloemfontein, Free State, South Africa

[2]Department of Health Sciences, Central University of Technology, Bloemfontein, Free State, South Africa

[3]Department of Cardiac Surgery, Heart Centre Rostock, University of Rostock, Rostock, Germany

Background: Glutaraldehyde (GA)-fixed bovine pericardial patches are an industry standard for cardiovascular bio-prostheses. However, pannus formation, cytotoxicity, inflammation, calcification, and lack of tissue remodelling are well described.

Objectives: The additional processing of decellularised scaffolds with low-concentration monomeric GA fixation and detoxification in an amino acid solution has been developed as an alternative process. These scaffolds (DF) were compared to decellularised scaffolds (DE) and standard GA-fixed pericardial patches (Glycar®) in a subcutaneous rat model.

Method: In vitro, the impact of processing on cross-linking, enzymatic degeneration, cytotoxicity, porosity, and alpha galactosyl (alpha-gal) content were compared. Subcutaneous implants were performed in 18 juvenile Sprague-Dawley rats (6 per group) and explanted after 8 weeks. Host cell infiltration, calcification, structure, and strength were then compared. Analyses included haematoxylin and eosin staining, von Kossa, quantitative calcium analysis (ICP-MS), scanning electron microscopy, tensile strength and Young's modules.

Results: Excellent collagen fixation, resistance to collagenase, reduced alpha-gal content, and low cytotoxicity towards human epithelium cells were demonstrated in the DF group in vitro. The porosity was well retained in the DF and DE groups. Similar host cell infiltration with no calcification occurred after 8 weeks of implantation in the subcutaneous rat model in DF and DE groups. Limited host cell infiltration was observed for the Glycar® group.

Conclusion: Decellularised scaffolds (DE and DF) showed potential for regeneration through a higher level of porosity, no cytotoxicity, extensive host cell infiltration, and no calcification in the rat model. Monomeric GA-based fixation and amino acid detoxification had the added benefit of resisting enzymatic degradation and maintaining mechanical properties compared to decellularised scaffolds.

Exploring the mechanisms responsible for reduced systolic function in severe aortic stenosis with high transvalvular gradients

Jacques Liebenberg, Anton Doubell, Jan Steyn and Philip Herbst

Division of Cardiology, Department of Medicine, Faculty of Medicine and Health Sciences, Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

Background: The mechanisms responsible for a reduced ejection fraction (rEF) in severe AS with high transvalvular gradients are unclear.

Objectives: To characterise the mechanics responsible for a rEF in patients with severe AS and high transvalvular gradients.

Method: Twenty-one patients with severe AS with high transvalvular gradients (AVA <1.0cm^2 and MG >40mmHg) were analysed. The cohort consisted of 9 patients with rEF (EF50%). Participants were evaluated using echocardiography, magnetic resonance imaging and an invasive pressure-volume study.

Results: A female preponderance (80% females) were present with a mean age of 64. The groups were matched for age, sex, and body surface area. Load-independent contractile muscle function was similar between the groups: preload recruitable stroke work slope (101 vs. 112mmHg; p=0.62), end systolic pressure volume relationship slope (1.91 vs. 1.28mmHg/ml; p=0.07) and Starling contractile index slope (3.47 vs. 7.96mmHg/ml/s; p=0.31). Afterload indices as assessed by end systolic wall stress and valvuloarterial impedance were higher in cases with rEF (150 vs. 83.5 N/cm^2; p<0.01 and 4.8 vs. 3.4mmHg/ml; p=0.05). This was driven by disproportionally higher degrees of valvular stenosis (valve area 0.46 vs. 0.78cm^2; p<0.01). The rEF group were more symptomatic (NYHA 3.3 vs. 2.3; p=0.02), had more pulmonary hypertension (50 vs. 30mmHg; p=0.04), and more myocardial fibrosis (24% vs. 13% of left ventricular mass; p=0.03).

Conclusion: The pathophysiological problem in patients with rEF in severe AS with high transvalvular gradients relates to an excessively increased afterload driven by more severe valvular stenosis, with a preserved intrinsic ventricular contractile function. Myocardial fibrosis seen in the rEF group did not translate into worse intrinsic muscle function. The time dependence of progressive valvular stenosis and myocardial fibrosis suggest that LVEF impairment is a subsequent stage following a preserved LVEF in the natural progression of severe AS.

Causes of heart failure in patients seen in the academic hospital complex in Bloemfontein, Free State: A pilot study

Thabiso Litelu[1], Karabo Mbele[2], George Nel[2], Dineo Mpanya[3] and Nqoba Tsabedze[3]

[1]University of the Free State, Bloemfontein, Free State, South Africa

[2]Heart Failure Society of South Africa (HeFSSA), Pretoria, South Africa

[3]University of the Witwatersrand, Johannesburg, South Africa

Background: Heart failure is associated with increased morbidity, mortality and utilisation of the health care budget. In Africa, heart failure patients have a high 1-year all-cause mortality rate of 34%.

Objectives: To describe the causes of heart failure, demographics and clinical characteristics of heart failure patients.

Method: A cross-sectional retrospective study was conducted between 1 October and 13 December 2021 on adult patients with heart failure hospitalised at the Universitas Hospital in Bloemfontein.

Results: The study population comprised 83 patients with a mean age of 52.0 ± 15.4 years. The majority (53.0%) were females. The mean left ventricular ejection fraction was 37.2 ± 14.5%, and 42 (50.6%) had heart failure with reduced ejection fraction. Twenty-three (32.9%) patients had dyspnoea, 23 (32.9%) had peripheral oedema, 15 (21.4%) had ascites and 10 (14.3%) had orthopnoea (n 70). On clinical examination, 20 (24.1%) had a displaced apex beat and 17 (20.5%) had raised jugular venous pressure (n 83). The baseline electrocardiogram (n 80) revealed atrial fibrillation / flutter in 20 (25%) patients.

Fifty-eight (87.9%) patients were prescribed oral beta-blocker therapy, followed by diuretics in 53 (80.3%), angiotensin-converting enzyme inhibitors in 47 (71.2%), and mineralocorticoid receptor antagonists in 45 (68.2%) patients (n 66).

The most common causes of heart failure were rheumatic heart disease in 28 (33.7%) patients, idiopathic dilated cardiomyopathy in 20 (24.1%), ischaemic cardiomyopathy in 12 (15.7%) and hypertensive heart diseases in 9 (10.8%) patients. There was no identifiable precipitant of heart failure in 48 of 71 (67.6%) patients.

Conclusion: Rheumatic heart diseases were the most common cause of heart failure, reported in 33.7% of the study population. The next phase is establishing a registry of heart failure patients treated in multiple centres in South Africa. The registry will enable better characterisation of heart failure patients and potentially reduce the morbidity and mortality associated with heart failure.

Intracardiac masses referred to the Paediatric Cardiology Unit at the Chris Hani Baragwanath Academic Hospital (South Africa) over a decade

Wendy Maimela[1], Antoinette Cilliers[2] and Phophi Raphulu[2]

[1]Chris Hani Baragwanath Hospital / Discovery Health Foundation, Johannesburg, South Africa

[2]Chris Hani Baragwanath Academic Hospital, University of the Witwatersrand, Johannesburg, South Africa

Background: Intracardiac masses (ICM) vary between vegetations related to infective endocarditis, thrombi and intracardiac tumours. Little is known about ICM in children on the African continent. Therefore, we identified and described the characteristics of ICM in children at a southern African tertiary centre.

Objectives: To identify and described the characteristics of ICM in children at a southern African tertiary centre.

Method: A retrospective descriptive study of 141 patients over 10 years at CHBAH.

Results: Majority of patients with ICM (38%) presented below the age of 1. Fifty-nine percent presented as neonates. The remaining 62% were distributed as follows: 1 - 5 years (22%), 5 - 10 years (20%), 10 - 15 years (15%), older than 15 years (5%). There was a male predominance of 53% (76/141). Of 48 positive cultures, 15 had more than one organism (these were mostly immunocompromised patients). Most were gram positive organisms, 10 had Methicillin sensitive staphylococcus aureus (MSSA) and 8 had Methicillin resistant staphylococcus aureus (MRSA). Other organisms included klebsiella pneumoniae in 8 patients and fungal species in 12 patients. Congenital cardiac lesions were present in 43% of cases, while indwelling catheters were identified in 12%.

Intracardiac thrombi (ICT) constituted 26% (36/141) of ICM. Left ventricular thrombi associated with dilated cardiomyopathy (DCMO) was the leading cause in 56% cases. Shortening fractions ranged between 4% and 24%.

Cardiac tumours represented 20% (29/141). Fifty-two percent were primary tumours, 67% of whom presented under 1 year. Fifty-three percent had rhabdomyomas associated with tuberous sclerosis. Secondary tumours presented mostly after infancy, were all malignant, with nephroblastoma being the most common cause (60%).

Conclusion: The most common ICM are vegetations associated with IE, then intracardiac thrombi in the presence of DCMO. Primary cardiac tumours are rare, are common in Infancy and are mostly benign. Secondary tumours are due to infiltrative or metastatic malignant tumours and present later in childhood.

Isolated aortic regurgitation mechanisms and causes in a SA cohort

Malcolm Masikati[1], Mpiko Ntsekhe[2] and Tim Pennel[2]

[1]Groote Schuur Hospital, Observatory, South Africa

[2]Department of Cardiology, Groote Schuur Hospital and University of Cape Town, Observatory, South Africa

Background: Aortic regurgitation (AR) is due to primary abnormalities of the aortic valve or peri-valvular apparatus and or structures such as the aortic root and the ascending aorta. Whereas the etiology and mechanisms of AR is relatively well described in Europe and North America, little information exists about their spectrum and frequency in sub-Saharan and South Africa. Understanding the precise mechanisms of AR informs surgical planning of valve and aorta repair. Reports from local studies suggest that rheumatic heart disease in the commonest cause of valvular heart disease in RSA particularly in population under 40 but whether it's the most common cause of isolated AR is not known. The aims of this study were to determine the spectrum of disorders that cause isolated aortic regurgitation and their proportion, the predominant mechanisms of isolated aortic regurgitation. The accuracy of pre-op determination of etiology by clinical and imaging evaluation was also evaluated.

Objectives: The objectives were: (1) To determine the causes of isolated AR in patients who had undergone aortic valve surgery at Groote Schuur Hospital, Cape Town, between January 2003 and June 2018. (2) To determine the demographic and clinical profile of patients undergoing isolated AVR. (3) To describe the clinical presentation with regard to acute vs. chronic, pulmonary edema, blood pressure, duration of symptoms, proportion with dilated ventricles and proportion with LVEF <45%.

Method: This is a retrospective review of hospital records of patients who had aortic valve replacement (AVR) for isolated AR from January 2003 - June 2018 at Groote Schuur Hospital (GSH). Most patients had a presumptive etiological diagnosis determined by pre-operative echocardiography. For this study the etiology and pathological mechanism was confirmed by macroscopic examination at surgery and pathological examination of explanted valves.

Results: There were 141 patient records available over the period. The mean age for the cohort was 43 years (29 - 57) with a male predominance of 63.1%. Baseline co-morbid conditions of the participants included hypertension 43.3% (61/141), human immunodeficiency virus (HIV) 16.9% (21/141), chronic kidney disease 4.3%. The mechanistic and etiological diagnosis was available for all 141 study participants. The 5 predominant categories of mechanisms were: (1) Thickening / fibrosis / retraction with commissary fusion in 32.6%. (2) Cusp perforation / leaflet destruction 24.8%. (3) Prolapse of the aortic leaflet cusps 7.1%. (4) Aortic root or annular dilatation in 27%. (5) Mixed mechanisms were noted 8.5%.

The most common disease which caused aortic regurgitation by affecting the valve leaflets were rheumatic heart disease, infective endocarditis, degenerative valve disease and bicuspid aortic valve. Diseases that affect the root and aorta included hypertension, Marfan's syndrome, syphilitic aortitis, Takayasu's arteritis, and pyogenic aortitis.

Of the 141 patients in the study complete information on the pre-op echo, surgical macroscopic inspection and histological evaluation was available in 92. Of the 92 patients there was consistency in the diagnosis in 93.5% (86/92). The most common discrepant diagnosis was rheumatic heart disease at histology or on surgical inspection but having been referred with a pre-operative echo diagnosis of infective endocarditis.

Conclusion: We show that AR in a South African cohort, setting is a disease of young patients, the majority of which is caused by RHD. In our cohort clinical and echocardiographic assessment was able to accurately identify the mechanisms of the AR in 95.7% (135/141) the patients. This information differs from that obtained from the global north where isolated AR is usually a disease of older patients (55 - 70) that is caused by predominantly by degenerative valve disease and bicuspid valves. Further larger studies in an African setting are warranted to validate the findings of this study as our sample size was small.

Characteristics and outcomes of dextro-transposition of great vessels at Chris Hani Baragwanath Academic Hospital in South Africa over a 10-year period

Zoleka Mbhele and Antoinette Cilliers

Chris Hani Baragwanath Academic Hospital, University of the Witwatersrand, Johannesburg, South Africa

Background: Transposition of great vessels accounts for 5 - 7% of total congenital heart disease and 20% of all cyanotic congenital heart disease. Early presentation and surgical intervention improve survival outcomes.

Objectives: Describing characteristics and outcomes of dextro-transposition of great vessels over 10-year period.

Method: A retrospective and descriptive study done at Chris Hani Baragwanath Academic Hospital from January 2012 - December 2022. It evaluated demographics, age at presentation, surgery undertaken and outcomes including mortality.

Results: A total of 49 patients were identified and the majority were males (71.4%). Most patients originated from the Gauteng Province (69.4%) followed by the North-West Province (24.5%). The median age at presentation was 12 days (IQR: 0 - 87 days). Most patients had an associated ventricular septal defect (59%). Patent foramen ovale or atrial septal defects were present in 41% of cases and 45% had patent ductus arteriosus. An emergency septostomy was done in 17 cases (35%). A total of 24 (49%) patients had either staged or corrective surgery. Arterial switch surgery was done in 18 cases (75% of all surgeries) with a median age of 19 days (IQR: 1.5 - 38 days). The Mustard procedure was performed in 2 patients (aged 5 months and 12.5 months) and a Rastelli operation was done in 1 patient at 14 months. Staged surgery was undertaken in 3 patients in the form of a BT shunt or pulmonary artery banding. Mortality was recorded in 22 cases (44.9%).

Conclusion: Most patients presented during neonatal period and two-thirds had associated intracardiac shunts. Less than half of patients underwent corrective surgery, and the mortality rate was high compared to more resource replete countries.

An adult presentation of Cor Triatriatum diagnosed as post-partum cardiomyopathy: A case study

Ruchika Meel, Keitumetsi Sothoane and Ebrahim Variava

Department of Internal Medicine, University of the Witwatersrand, Johannesburg, South Africa

Background: The incidence of Cor Triatriatum ranges from 0.1% - 0.4% globally. It is a rare diagnosis that has never been reported or described in a South African context.

Objectives: To highlight the presence of Congenital Heart Disease (CHD) in adulthood as a cause of heart failure and the importance of detailed imaging to assess the defect and co-existing lesions.

Method: A 39-year-old female with background assessment of Human Immunodeficiency Virus (HIV) and post-partum cardiomyopathy presented in decompensated heart failure. She had no clinical stigmata of a syndromic disease. The chest X-ray film showed an enlarged cardiac silhouette with features of pulmonary oedema. The electrocardiogram showed sinus tachycardia, right axis deviation, right ventricle enlargement and strain pattern. Transthoracic echocardiogram showed severely dilated right sided chambers with a severe tricuspid regurgitation, pulmonary arterial systolic pressure of 100mmHg and a depressed left ventricular ejection fraction of 19%. An atrial septal defect with left to right shunting of blood, a membrane dividing the left atrium into an upper and lower chamber and causing left ventricular inflow obstruction, as well as a severe mitral regurgitation were noted. An assessment of Cor Triatriatum sinister was confirmed on transoesophageal 2- and 3-dimensional imaging. Due to the complex congenital heart disease and poor left ventricular function, surgery was deferred and the patient was managed medically with diuretics and anti-remodelling therapy.

Conclusion: We have presented a rare case of Cor Triatriatum in an adult with co-morbidities, diagnosed with detailed imaging. In a resource limited setting, these patients may not be diagnosed in childhood and therefore, the clinician must remain vigilant for the presence of CHD as an aetiology of heart failure in an adult.

Spectrum of thoracic ascending aortic aneurysms at a peri-urban tertiary hospital: An echocardiography-based study

Ruchika Meel[1], Michael Hasenkam[2], Ricardo Goncalves[3], Kelly Blair[1] and Shungu Mogaladi[1]

[1]Chris Hani Baragwanath Academic Hospital, University of the Witwatersrand, Johannesburg, South Africa

[2]Aarhus University Hospital, Aarhus, Denmark

[3]Glynnwood Hospital, Benoni, South Africa

Background: Thoracic ascending aortic (TAA) aneurysms are an important cause of disability and death and require early detection for effective management. Currently, there is a paucity of data from Africa pertaining to TAA aneurysms.

Objectives: To describe the spectrum of TAA aneurysms at a peri-urban tertiary hospital.

Method: This was a descriptive retrospective study based on clinical and echocardiographic imaging data of patients with TAA aneurysms from October 2017 - October 2022. Advanced strain imaging was performed to measure left ventricular (LV) strain and circumferential strain (CS) of the ascending aorta as a proxy measurement of aortic compliance.

Results: The study comprised 139 cases of TAA aneurysms (52.5% females) with a mean age of 50 ± 14.8 years with 45 age and gender matched controls. Most patients (95%) were of African ethnicity. The main etiologies were hypertension (41.7%), HIV (36.6%), connective tissue disease (10.7%), congenital (2.2%) and mixed pathologies (8.6%). Two-thirds of patients (69.7%) presented in heart failure, 10% presented with aortic dissection. Majority (59.7%) were in New York Heart Association class II. Echocardiography revealed enlarged aortic dimensions compared to controls (P<0.001). TAA aneurysms were complicated by severe aortic regurgitation (AR) in half (50.3%) of patients. The mean LV ejection fraction (46.9 ± 12.7%) was reduced compared to controls (P<0.001). Aortic CS was reduced compared to controls (4.4 [3.2 - 6.2] % vs. 9.0 [7.1 - 13.4] %, P<0.001). Aortic stiffness was higher in the aortic aneurysm group compared to controls (15.39 ± 20.65 vs. 5.04 ± 2.09, p=0.001). LV longitudinal strain (-13.9 ± 3.9% vs. 18.1 ± 6.7%), was reduced compared to controls (P<0.001). Most patients were on heart failure therapy. Surgery was performed in 29.4% and overall mortality was 7.9 %. Mortality for acute aortic dissection was 40%.

Conclusion: TAA aneurysms associated with hypertension and HIV are common in this predominantly African female population and are associated with considerable morbidity and mortality. Echocardiography with strain imaging are potential tools for screening and risk stratifying TAA aneurysms.

Anticoagulation control for nonvalvular atrial fibrillation in Johannesburg, South Africa

Vanessa Mogashoa, Dineo Mpanya and Nqoba Tsabedze

University of the Witwatersrand, Johannesburg, South Africa

Background: In an ageing society, atrial fibrillation (AF) is a growing epidemic in Africa. Anticoagulation, considered the backbone of AF management, is limited to warfarin as the mainstay of available anticoagulation therapy for non-valvular atrial fibrillation (NVAF) in most low- and middle-income countries (LMICs). Thus, necessitating an optimal time in therapeutic range (TTR) to avoid bleeding and thromboembolic complications. This study aimed to assess warfarin anticoagulation control among patients with NVAF in Johannesburg, South Africa.

Objectives: This study aimed to assess warfarin anticoagulation control among patients with NVAF in Johannesburg, South Africa.

Method: We conducted a retrospective review of patients with atrial fibrillation who were on a vitamin k antagonist (warfarin) in a tertiary academic centre in Johannesburg, South Africa. Anticoagulation control was assessed by calculating the time in therapeutic range (TTR) using the Rosendaal method for patients with NVAF.

Results: Our study population comprised of 223 patients with AF and a mean age of 62.3 ± 14.3 years. Non-valvular atrial fibrillation was diagnosed in 177 (79.3%) patients. Among the 223 patients with atrial fibrillation, a pre-existing history of cerebrovascular accidents and transient ischaemic attacks was documented in 20 (9.0%) patients. The median TTR among patients with NVAF was 46% [interquartile range (IQR): 8.7 - 86], and the TTR was greater than 70% in 114 (35.6%) patients with NVAF. The mean CHA2DS2-VASc Score was 4 ± 1.5, and it did not differ between patients with poor and optimal anticoagulation control. A history of heart failure symptoms was reported in 186 (83.4%) patients of which 146 (78.5%) had NVAF. Warfarin toxicity was documented in 18 (8.1%) of the 223 patients, and among the 18 patients with warfarin toxicity, 13 (83.3%) had NVAF.

Conclusion: In our study, a TTR greater than 70% was found in 35.6% of NVAF patients on warfarin. This is despite a mean CHADS-VASc Score of 4, indicating a high annual stroke risk. Multiple bio-psycho-ecological factors contribute to poor TTR in LMICs. Larger multi-centre trials comparing the occurrence of bleeding, thromboembolic events, as well as the total cost to the healthcare system in patients treated with warfarin compared to direct oral anticoagulation therapy are required to guide oral anticoagulation strategies in Africa.

Interesting case of rehabilitation of an anomalous origin of the pulmonary artery from the aorta

Mohamed Monareng

Chris Hani Baragwanath Academic Hospital, University of the Witwatersrand, Johannesburg, South Africa

Background: Anomalous origin of the pulmonary artery (AOPA) from the ascending aorta is a relatively rare and yet a very important cardiac malformation. The incidence is 0.1% - 0.33% of all congenital heart diseases. It is characterised by the origin of one pulmonary artery from the ascending aorta with the normal origin of the other pulmonary artery from the right ventricular outflow tract in the presence of two arterial valves. Frequently, it involves the right pulmonary artery and less commonly the left pulmonary artery. It is associated with other cardiac malformations and rarely is present as an isolated anomaly.

Objectives: Case presentation of rehabilitation of an anomalous origin of the right pulmonary artery arising from the ascending aorta.

Method: Retrospective case presentation of a child with rehabilitated anomalous right pulmonary artery from the ascending aorta.

Results: One-year-old male infant with a 2-week history of cough and increased work of breathing. He previously had multiple admissions for lower respiratory tract infections. On arrival he was in severe respiratory distress with saturation of 50% on RA. He had subtle dysmorphism, cyanosis and digital clubbing. Electrocardiogram showed a right axis deviation, P pulmonale and biventricular hypertrophy. Chest X-ray showed cardiomegaly and a right upper lobe consolidation. Echocardiogram showed anomalous origin of the right pulmonary artery (RPA) arising from the innominate artery, pulmonary hypertension and a left-sided aortic arch. He was started on antifailure treatment. CT angiogram showed an absent RPA with major aortopulmonary collateral arteries supplying the right lung. Cardiac catheterisation showed the anomalous RPA with origin stenosis and severe pulmonary hypertension. We managed to cannulate and balloon dilate the RPA origin stenosis to establish continuity of the RPA from the base of the innominate artery. We will re-cath the patient in 6 months and possibly present for surgery depending on the findings.

Conclusion: In patients with AOPA and poor visualisation of the RPA, a cardiac catheterisation should be done to look for the anomalous pulmonary artery and possibly try to rehabilitate it.

Coenzyme Q10, as an antioxidant prophylactic, attenuates doxorubicin-induced cardiotoxicity in an in vitro H9C2 cell model

Sharnay Naidoo[1,2], Nonhlakanipho Sangweni[1], Jyoti Sharma[1], Gerald Maarman[2], Luca Tiano[3] and Rabia Johnson[1,2]

[1]Biomedical Research and Innovation Platform, South African Medical Research Council, Tygerberg, South Africa

[2]Centre for Cardio-metabolic Research in Africa (CARMA), Division of Medical Physiology, Faculty of Medicine and Health Sciences, Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

[3]Institute of Biochemistry, Polytechnic University of the Marche, Via Ranieri, Ancona, Italy

Background: Coenzyme Q10 (CoQ10), an essential component within the mitochondria has been previously shown to alleviate cardiotoxic side-effects induced by doxorubicin (Dox). The premise is that Dox causes mitochondrial abnormalities, which leads to cardiac dysfunction, making CoQ10 an ideal prophylactic to mitigate Dox-induced cardiotoxicity (DIC). However, the mechanism by which CoQ10 attenuates Dox-induced mitochondrial dysfunction is poorly understood.

Objectives: To determine whether CoQ10 supplementation can ameliorate DIC using an H9c2 cardiomyoblast model.

Method: H9c2 and MCF-7 cells were pre-treated with CoQ10 (2 or 3μM), or 10μM dexrazoxane (Dex, a cardioprotective drug) for 2 days, before being co-treated with 0.5μM Dox for an additional 4 days. The Dox-treated group received media for 2 days before being treated with 0.5μM Dox, to induce cardiotoxicity. Untreated cells served as the control. On day 7, oxidative stress (DCF and GSH), mitochondrial activity (Seahorse, JC-10 and MitoTracker), and apoptosis (Caspase 3/7 and Annexin V) were assessed. Results obtained were validated by gene expression (NRF2, NOX4 and caspase 9).

Results: Pre-treatment with 2μM and 3μM CoQ10 attenuated DIC by decreasing ROS production ($p<0.01$) and improved mitochondrial activity ($p<0.05$). This was driven by an increase in total glutathione content ($p<0.05$), mitochondrial bioenergetics ($p<0.001$) and membrane potential ($p<0.05$). Subsequently, an improvement in mitochondrial mass ($p<0.05$) with a concomitant reduction in caspase 3/7 activity ($p<0.0001$), caspase 9 expression and cardiomyoblast death were observed in the CoQ10 treated cells versus those treated with Dox alone ($p<0.05$). Interestingly, pre-treating MCF-7 cells with CoQ10 significantly decreased Dox-induced caspase 3/7 activity.

Conclusion: This study demonstrated that CoQ10 enhanced antioxidant levels and mitochondrial activity, whilst decreasing Dox-induced cardiac apoptosis. However, our findings also suggest that co-administering CoQ10 with Dox may reduce the efficacy of this chemotherapeutic drug.

CABG and the role of viability assessment in ischaemic cardiomyopathy

Surendra Naidoo

University of KwaZulu-Natal, Inkosi Albert Luthuli Central Hospital, Durban, South Africa

Background: Available evidence, recently reinforced by the results of the REVIVED-BCIS 2 trial, supports surgical revascularisation rather than PCI in patients with CAD and severely depressed LV systolic function. The STICH viability substudy showed no correlation between viability, CABG-related benefit and mortality whilst the PARR-2 substudy reported significantly lower cardiac events with PET guided myocardial revascularisation than standard care.

Objectives: To analyse the early outcomes of CABG in ischaemic cardiomyopathy in the Department of Cardiothoracic Surgery at Inkosi Albert Luthuli Central Hospital between May 2022 and May 2023.

Method: We analysed the early outcomes of CABG in ischaemic cardiomyopathy in the Department of Cardiothoracic Surgery at Inkosi Albert Luthuli Central Hospital between May 2022 and May 2023. Primary endpoints were major adverse cardiac events in the postoperative period and at one month follow-up.

Results: Fourteen patients underwent CABG with an ejection fraction of less than 35%. Five patients had myocardial viability studies before surgery. Postoperative mortality was 15% due to septic complications in patients that underwent urgent CABG following myocardial infarction.

Conclusion: Available evidence demonstrates no significant value of viability-guided management. Real world treatment decisions are likely to be influenced by underlying clinical confounders. Documentation of viability may be necessary when perioperative risk influences decision making.

Quality of life in children after cardiac surgery for congenital heart disease at Jakaya Kikwete Cardiac Institute

Adam Ndamayape

Jakaya Kikwete Cardiac Institute, Dar es Salaam, Tanzania

Background: Congenital heart diseases (CHDs) are the most common birth defects accounting for 30% of all congenital abnormalities affecting 8 - 12 newborns per thousand live births and is the second leading cause of death in neonates. There is major improving in treatment of children with CHD especially with surgical correction. Improvement of quality of life (QoL) is now a major concern after cardiac surgery.

Objectives: To assess the quality of life (QoL) in children after cardiac surgery for congenital heart disease (CHD).

Method: A cross-sectional study was performed in children aged 2 - 18 years. The case group had 60 children with a history of corrective heart surgery in the 3 months prior to the study. The control group had 60 healthy children, age-matched to the case group. The QoL of both groups was assessed by Paediatric Quality of Life Inventory (PedsQL) Generic Core Scales. The same post-operative children were also assessed with the PedsQL Cardiac Module. Data were analysed using T-test with $P<0.05$ as the level of significance.

Results: This study recruited 120 children aged 2 - 18 years. Sixty were children operated and 60 children were healthier individuals with no health problem. PedsQL Generic Core Scales assessment showed significant differences between groups in the physical function parameter and emotional functioning of QoL ($P<0.05$) in children aged 13 - 18 years, but there were no significant differences in the social, and school function parameters. However, there was significant difference in physical function in children aged 2 - 4 years and found no significant different in their social functions.

Conclusion: Health-related quality of life however was significantly lower in children who had undergone surgery for congenital heart disease. Post-operative children are at risk for physical appearance, anxiety, cognitive, and communication problems.

Safety and efficacy of inclisiran in South African patients at high cardiovascular risk: A sub-analysis of the ORION-9, -10 and -11 studies

Frederick Raal[1], Mark Abelson[2], Suzanne Blignaut[3], Lesley Burgess[4], Soritha Coetzer[5], Iftikhar Ebrahim[6] and Andrea Gibbon[7]

[1]University of the Witwatersrand, Johannesburg, South Africa
[2]Busamed Paardevlei Private Hospital, Somerset West, South Africa
[3]Paarl Research Centre, Paarl, South Africa
[4]Tread Research, Division of Cardiology, Department of Medicine, Faculty of Medicine and Health Sciences, Stellenbosch University and Tygerberg Hospital, Bellville, South Africa
[5]Helderberg Clinical Research Centre, Somerset West, South Africa
[6]Raslouw Private Hospital, Raslouw, Pretoria, South Africa
[7]Medical Affairs, Novartis, Waterfall City, Midrand, South Africa

Background: In the phase III ORION trials, inclisiran administered on days 1, 90 and 6-monthly thereafter significantly reduced low density lipoprotein cholesterol (LDL-C) in patients with heterozygous familial hypercholesterolaemia (HeFH, ORION-9), established atherosclerotic cardiovascular disease (ASCVD, ORION-10 and -11) or ASCVD risk equivalents (diabetes mellitus, FH or a 10-year Risk Score for CVD ≥20%, ORION-11).
Objectives: To retrospectively analyse the ORION phase III trial data to assess the efficacy and safety of inclisiran in the South African cohort.
Method: The ORION-9, -10 and -11 randomised, double-blind, placebo-controlled trials included patients treated with maximally tolerated statins with / without other lipid-lowering therapy (excluding PCSK9 inhibitors) and ASCVD (LDL-C ≥1.8mmol/L), ASCVD risk equivalents or HeFH (LDL-C level ≥2.6mmol/L). Patients were randomised 1:1 to inclisiran sodium 300mg or placebo administered at days 1, 90, 270 and 450. Coprimary endpoints were LDL-C percentage change from baseline to day 510 and time-adjusted percentage change in LDL-C from baseline after day 90 to day 540.
Results: Two hundred and ninety-eight patients (mean age 58 years, 56% male) were included. Despite lipid-lowering therapy, mean LDL-C at baseline was 3.65mmol/L. At day 510, inclisiran reduced LDL-C levels by 46.5% (95% confidence interval [CI], -51.7 to -41.3), with a between-group difference of -54.2% (95% CI, -61.3 to -47.2; p<0.0001). Time-averaged percent change in LDL-C between days 90 and 540 was -45.2% (95% CI, -48.8 to -41.6) for the inclisiran group and 7.6% (95% CI, 4.0 to 11.2) for the placebo group; between-group difference of -52.8% (95% CI, -57.9 to -47.8; p<0.0001). The safety profile of inclisiran was comparable to placebo. Injection site reactions were more common with inclisiran (10.1% vs. 0.7%), but none were severe or persistent.
Conclusion: Inclisiran effectively lowers LDL-C in South African patients at high cardiovascular risk with limited adverse effects.

Afterload mismatch: More than a high afterload problem?

Megan Rajah, Anton Doubell and Philip Herbst

Division of Cardiology, Department of Medicine, Faculty of Medicine and Health Sciences, Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

Background: Severe aortic stenosis (AS) with a low left ventricular ejection fraction (LVEF) but high gradients, maintained in the severe AS range, is termed afterload mismatch (AM). Insufficient left ventricular hypertrophy (LVH) related wall thickening, with failure to overcome a high afterload, is speculated to underlie AM. We used cardiac magnetic resonance (CMR) to interrogate this hypothesis.
Objectives: To compare the degree of LVH and diffuse myocardial fibrosis in severe AS with and without AM using CMR.
Method: Patients with high gradient severe AS, with and without AM, underwent CMR at Tygerberg Hospital. Patients with myocardial infarction or other structural pathologies were excluded. Cine CMR images were acquired with standard protocols. Extracellular volume (ECV), as a fibrosis marker, was calculated using native and post-contrast T1 mapping. T2 mapping was performed to exclude oedema.
Results: Of 34 participants, 15 (44%) had AM and 19 (56%), had preserved LVEF (31% vs. 60% respectively). Indexed LV mass and end-diastolic volumes were significantly higher in the AM group (114g/m^2 vs. 71g/m^2, p=0.0002; 120ml/m^2 vs. 74ml/m^2, p=0.0001, respectively). A significantly higher native T1 time was demonstrated in the AM group (1043ms vs. 1017ms, p=0.02). Similarly, significant extracellular expansion was demonstrated in the AM group (ECV of 27% vs. 24%, p=0.02). T2 relaxation was identical (48ms vs. 48ms) confirming that the increased T1 and ECV were attributable to fibrosis and not oedema.
Conclusion: Severe AS patients with AM demonstrate a sufficient LVH response and a significantly higher fibrotic burden compared to those with preserved LVEF. Whether reduced LVEF relates to excessive afterload, inadequate use of preload reserve possibly due to fibrosis, or a degree of reversible myopathy, requires further study.

Two unusual cases of neonatal rhabdomyomas

Phophi Raphulu and Antoinette Cilliers

Chris Hani Baragwanath Academic Hospital, University of the Witwatersrand, Johannesburg, South Africa

Background: The majority of primary paediatric cardiac tumours are benign. Cardiac rhabdomyomas are the most common cardiovascular feature of the tuberous sclerosis complex.

Method: **Case 1:** A female neonate seen at 5 days of age with bradycardia. The mother had a foetal ultrasound that showed a large right ventricular mass. An electrocardiogram (ECG) showed second-degree heart block, with a ventricular rate of 75b/min. Transthoracic echocardiography showed a large mass within the interventricular septum (IVS) measuring 32mm x 14mm, with multiple smaller masses 5mm x 4mm situated around the larger mass. In view of the heart block and bradycardia, it was decided to attempt rapid shrinkage of the large mass within the IVS using Everolimus. There was a rapid reduction in the size of the mass and complete resolution of the heart block within 1 month.

Case 2: This female neonate was referred with a wall-to-wall heart from a peripheral hospital. The patient had respiratory distress and required ventilation. CT scan of the chest showed a large anterior left sided mediastinal mass with shift to the right associated with a collapsed right lung. Skin examination revealed multiple hypomelanotic macules. Transthoracic echocardiography confirmed a large homogenous mass in the pericardium, and multiple smaller masses in the right ventricle, left ventricle and on the interventricular septum. In view of the larger mass compressing the right lung and the patient being ventilator-dependant, it was decided to attempt rapid tumour shrinkage using Sirolimus. The intraventricular masses resolved within 2 weeks while the larger extracardiac mass reduced in size. The patient was successfully weaned off the ventilator and oxygen during this time.

Conclusion: While the natural history of rhabdomyomas is to regress with time, intervention to reduce the size of large tumours causing complications may be required.

Antiretroviral therapy and HIV-associated cardiovascular disease: A prospective correlation study of cardiac biomarkers and cardiovascular magnetic resonance imaging

Pieter-Paul Robbertse, Anton Doubell, Tonya Esterhuizen and Philip Herbst

Division of Cardiology, Department of Medicine, Faculty of Medicine and Health Sciences, Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

Background: Biochemical markers are fundamental in cardiac evaluation, and various novel assays have recently been discovered. Their ability to detect and track subclinical cardiovascular disease (CVD) in HIV-infection is not known.

Objectives: We set out to determine if cardiac biomarkers could detect subclinical CVD in newly diagnosed people living with HIV (PLWH) and how this correlates with advanced cardiac imaging.

Method: ART naïve PLWH were recruited with HIV uninfected, age- and sex-matched controls. All participants underwent measurement of high-sensitivity cardiac troponin T (hs-cTnT), N-terminal pro B-type natriuretic peptide (NT-proBNP), soluble ST2 (sST2), Galectin-3, and a CMR study with multiparametric mapping. The HIV group started ART and was re-evaluated 9 months later. The cardiac biomarkers and their correlation with CMR parameters were evaluated in, and between groups.

Results: Compared with controls (n=22), hs-cTnT (4.0ng/l vs. 5.1 ng/l; p=0.004) , NT-proBNP (23.2ng/l vs. 40.8ng/l; p=0.02), and Galectin-3 (6.8ng/ml vs. 9.0ng/ml; p=0.002) were all significantly higher in the ART naïve group (n=73). After 9 months of ART, hs-cTnT (5.1ng/l vs. 4.3ng/l; p=0.02) and NT-proBNP (40.8ng/l vs. 28.5ng/l; p=0.03) both decreased significantly and a trend of decrease was seen in sST2 (16.5ng/ml vs. 14.8 ng/l; p=0.08). Galectin-3 did not demonstrate decrease over time (9.0ng/ml vs. 8.8ng/ml; p=0.6). The cardiac biomarkers that showed the best correlation with CMR measurements native T1, T2, and ECV, were NT-proBNP ($rs \geq 0.4$, $p<0.001$) and Galectin-3 ($rs \geq 0.3$, $p<0.01$).

Conclusion: The cardiac biomarkers support the presence of subclinical myocardial injury, remodelling, and fibrosis at HIV diagnosis and ART had a positive influence on these markers. The ability of cardiac biomarkers to detect and track tissue abnormalities diagnosed with CMR, showed promise. With additional research, this could lead to improvements in screening and monitoring myocardial abnormalities, even in CMR-limited settings.

Identical twins, non-identical hearts: Is HIV to blame?

Pieter-Paul Robbertse[1], Jan Steyn[1], Megan Rajah[1], Anton Doubell[1], Jean Nachega[2] and Philip Herbst[1]

[1]Division of Cardiology, Department of Medicine, Faculty of Medicine and Health Sciences, Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

[2]University of Pittsburgh, Pittsburgh, Pennsylvania, United States of America

Background: Cardiovascular abnormalities have been demonstrated in people living with HIV at the time of HIV diagnosis. Pathology may be subtle and requires statistically powered studies to demonstrate subclinical abnormalities in the individual, as measurements often lie within the normal range and the recruitment of genetically matched controls are challenging.

Objectives: We describe subtle cardiovascular remodelling and dysfunction in two identical twins, one HIV negative and the other with a new diagnosis of HIV (serodiscordant).

Method: A 25-year-old female, incidentally, diagnosed with HIV (CD4 count 513 cells / ml; estimated time of HIV-infection 7-months), underwent cardiovascular magnetic resonance imaging, cardiac biomarker, and echocardiographic strain evaluation. Her healthy, HIV-uninfected identical twin, living together since birth, underwent an identical assessment for comparison. Blinded measurements for comparison were performed on both twins.

Results: The HIV-infected twin (twin 1) had a globular left ventricle (LV), whereas her sister (twin 2) had a triangular shaped LV, with larger LV volumes and cavity dimensions seen in twin 1. Global longitudinal strain of the LV, peak longitudinal atrial strain, as well as native T1 of the LV were all higher in twin 1. The cardiac biomarkers high sensitivity cardiac troponin T, N-terminal proBNP, as well as the novel markers Galectin-3 and soluble-ST2 were similar, although numerically higher, in twin 1.

Conclusion: Across multiple modalities, morphological, functional, and biochemical parameters demonstrated a trend toward abnormality in the HIV-infected twin. As monozygotic twins demonstrate a high degree of cardiac heritability and as our twins have lived in the same environment since birth, these differences are in keeping with early remodelling and subtle cardiac dysfunction due to HIV-infection, particularly as it mirrors the magnitude of changes observed in larger studies.

Antiretroviral therapy reduces aortic stiffness in newly-diagnosed persons with HIV-infection after 9 months

Pieter-Paul Robbertse, Anton Doubell and Philip Herbst

Division of Cardiology, Department of Medicine, Faculty of Medicine and Health Sciences, Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

Background: People living with HIV (PLWH) are at increased risk of cardiovascular disease (CVD), which is underestimated by contemporary risk stratification systems. Subclinical cardiovascular abnormalities may be present at the time of HIV diagnosis and serve as potential substrate for future CVD. Aortic stiffness, as measured with pulse wave velocity (PWV), is a validated predictor of CVD and has been shown to be elevated in PLWH at HIV diagnosis.

Objectives: We prospectively evaluated the influence of contemporary antiretroviral therapy (ART) on aortic stiffness in a group of newly diagnosed PLWH.

Method: A group of ART naïve PLWH with modest cardiovascular risk and free from known CVD, were recruited at HIV diagnosis. Aortic stiffness was measured using carotid-femoral PWV on a ViCorder module (Skidmore Medical, UK). ART was initiated and PWV was re-evaluated 9 months later.

Results: Seventy-three participants completed follow-up and were included. The cohort was relatively young (mean age 32 ± 7 years) with good female representation (n=33, 45%). Most received tenofovir / lamivudine / dolutegravir (n=71, 97%) Half of the group smokes cigarettes. Two participants were controlled hypertensives, and 2 participants had metabolic syndrome. A significant decrease in PWV (scaling factor of 0.8) was observed at 9 months of ART (5.93 ± 1.0 vs. 5.69 ± 1.0m/s; p=0.01). Aortic distensibility increased significantly as well (0.20 [IQR: 0.16 - 0.26] vs. 0.21 [IQR: 0.19 - 0.27] mmHg-1; p=0.02).

Conclusion: Improvement in aortic stiffness was observed in a group of newly diagnosed PLWH after ART-initiation at 9 months of ART. This provides evidence of a modifiable component of vascular dysfunction and, in turn, cardiovascular risk with the use of contemporary ART at 9 months. It is unknown if this effect will be sustained long term. The use of aortic stiffness (alone or in combination with other parameters) as a predictor of cardiovascular outcomes in the ART era requires further study.

Pinocembrin improves cardiac function in an in vivo neoplastic model of chemotherapy-induced cardiotoxicity

Nonhlakanipho Sangweni[1], Carmelita Abrahams[2], Kwazi Gabuza[1], John Chipangura[2], Lawrence Mabasa[1], Sandrine Lecour[2] and Rabia Johnson[1]

[1]Biomedical Research and Innovation Platform, South African Medical Research Council, Tygerberg, South Africa

[2]Division of Cardiology, Faculty of Health Sciences, University of Cape Town, Observatory, South Africa

Background: A major concern in cardio-oncology research is the risk of using novel cardioprotective agents that potentiate cancer by reducing the efficacy of chemotherapeutic drugs. This is mainly due to the use of inadequate cardiotoxicity models that lack a cancer aspect.

Objectives: To investigate the prophylactic benefits of a potent flavonoid, pinocembrin (Pin), against chemotherapy-induced cardiotoxicity (CICT) using an in vivo neoplastic mice model.

Method: Tumour-bearing female C57BL/6 mice were treated once a week for 5 weeks with either (1) Doxorubicin (Dox), the chemotherapeutic drug, (2) Pin, to assess the toxicity / effect of the flavonoid in vivo, or (3) Co-treated with Dox plus Pin to determine Pin's cardioprotective effect. The control groups received saline solution. Cardiac function was measured at baseline and at endpoint via echocardiography analysis.

Results: At endpoint, neoplasia (25.94%) and Dox (20.96%; $p \leq 0.05$) impaired myocardial strain and induced fibrotic tissue damage, when compared to the control groups (28.02%). Co-treatment with Pin attenuated CICT by ameliorating strain measurements (36.57%; $p \leq 0.05$), left ventricular ejection fraction (LVEF, 63.89% vs. 43.82%; $p \leq 0.001$) and fractional shortening (FS, 35.03% vs. 22.57; $p \leq 0.01$), whilst mitigating fibrosis and troponin T ($p \leq 0.01$) expression. The expression of mitochondrial bioenergetic proteins (UCP2; $p \leq 0.05$ and PGC1-α; $p \leq 0.01$) and autophagy-related markers (pmTOR; $p \leq 0.01$, LC3B; $p \leq 0.001$ and ATG7; $p \leq 0.01$) were significantly increased after co-treatment with Pin when compared to the Dox group. Pin alone demonstrated no adverse effects as shown by LVEF (60.97% vs. 65.16%; $p \geq 0.10$) and FS (32.49% vs. 35.85%; $p \geq 0.10$) measurements at endpoint versus baseline. As a co-treatment, Pin (720.6 ± 270.4; $p \leq 0.01$) had an additive effect on Dox's (1007 ± 411.5; $p \leq 0.05$) tumour regression properties, indicating that Pin does not potentiate neoplasia or reduce the efficacy of Dox.

Conclusion: Therefore, the data obtained in this study supports the co-administrative use of Pin with Dox to reduce the risk of developing CICT.

Risk-stratified mortality outcomes comparison in the SHARE TAVI registry

Elizabeth Schaafsma[1], Jacques Scherman[2], Hellmuth Weich[3], Nqoba Tsabedze[4] and Mpiko Ntsekhe[5]

[1]South African Heart Association NPC, Matieland, Stellenbosch, South Africa

[2]Division of Cardiothoracic Surgery, Groote Schuur Hospital and University of Cape Town, Observatory, South Africa

[3]Division of Cardiology, Department of Medicine, Faculty of Medicine and Health Sciences, Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

[4]Department of Cardiology, University of the Witwatersrand, Johannesburg, South Africa

[5]Department of Cardiology, University of Cape Town, Observatory, South Africa

Background: TAVI implants have been available for >10 years in SA but still not widely available, due to funder opposition.

Objectives: Data captured in the SHARE TAVI registry provides benchmark data for the local TAVI programme, evaluating outcomes against best practise, to promote access to appropriate treatment.

Method: Clinical and demographic data of 2 217 patients (pts) captured into a web-based prospective registry, outcomes reviewed at 30 days and annually (to 8 years) post-implant (VARC2 definitions). Patients risk-stratified using STS score and definitions (High Risk >8%, Intermediate 4-7.9%, Low <4%). Follow-up to 1-year includes 50 additional non-TAVI pts who declined / were unsuitable for TAVI, and 470 who exited due to mortality, declined funding / unaffordable co-payments, or patient choice during / after funding applied for.

Results: Patient populations and outcomes are similar to other registries and studies (GARY, Corevalve, PARTNER 1) in early TAVI programmes (Schaafsma, et al. 2022). Twenty-four point nine percent of the 470 pts exited due to mortality during authorisation process, 40 / 470 (8.5%) before approved TAVI dates. Exited pts average days to mortality from consultation date, ranged from 228.0 days in High, 205.7 days Intermediate, and 205.3 days in Low risk pts, with 1-year mortality in corresponding risk categories of 64.95%, 49.6.% and 38.6%. Non-TAVI patients all-cause 1-year mortality, and days to mortality post-consultation, were High risk 33.3%, average mortality = 292.3 days; Intermediate risk 50.0%, 226.5 days; Low risk 31.6%, mortality at average 271.8 days. TAVI pts outcomes considerably better than exited or non-TAVI pts for the same risk categories: High risk 1-year mortality = 18.0%, average 649.5 days from implant; Intermediate 13.9% and 645.9 days; Low 8.8% and 655.8 days. One-year mortality in the 2021 cohort = 13.9%, in 2022 cohort procedural success s = 99.1%, 30-day mortality = 2.44%.

Conclusion: 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.

Mortality in cardiothoracic surgery patients during COVID-19 at a central hospital in Johannesburg

Lamisah Seedat, Matthew Lumsden, Rachel Finlay, Kayowa Lukoji, Bathembu Mgudlwa, Thifhelimbilu Luvhengo and Itumeleng Taunyane

Department of Cardiology, University of the Witwatersrand, Johannesburg, South Africa

Background: The COVID-19 pandemic affected service provision across hospitals globally. Resource diversion, legislation and accessibility of services impacted healthcare multidimensionally.

Objectives: To compare the mortality rate between the first year of the COVID-19 pandemic to the year preceding it, and to determine the factors influencing this.

Method: A retrospective review collecting quantitative data was conducted. The pre-COVID year (27 March 2019 - 27 March 2020) was compared to the first year of the pandemic (27 March 2020 - 27 March 2021). Patients under 18 years old were excluded. Data was analysed using Statistica with univariate and bivariate analysis applied.

Results: Eight point forty-five percent of 343 patients demised in the pre-COVID year. This decreased to 6.47% of 232 patients during the COVID year (p=0.39). Both annual periods showed greater mortality from non-elective than elective procedures, with 81.82% of pre-COVID and 75.00% of COVID mortalities occurring after non-elective procedures (p=0.06). The most deaths occurred after coronary artery bypass graft surgery in both years (npre-COVID=8 (27.59%); nCOVID=7 (46.67%). Fourteen of 56 patients undergoing a secondary procedure demised (25%). Nine of the 14 were pre-COVID and 5 during COVID. The most common pathologies in demised patients pre-COVID were coronary artery disease (n=7; 24.14%), rheumatic heart disease (n=4; 13.10%) and functional valve disease (n=4; 13.10%). This was opposed to during COVID where coronary artery disease (n=4; 26.67%), degenerative valve disease (n=3; 20.00%) and infective endocarditis (n=2; 13.33%) were most common. There was increased presence of a recent myocardial infarction from pre-COVID (10.71%) to COVID (21.43%) (p=0.57). Eleven percent of demised patients were NYHA class 3 or 4 prior to the pandemic. This increased to 21.42% during the pandemic (p=0.90).

Conclusion: The COVID-19 pandemic did not result in significant changes to the patterns of mortality noted in cardiothoracic surgery patients prior to the pandemic.

A retrospective review of patients with total anomalous pulmonary venous return at a tertiary care hospital in Johannesburg, South Africa

Pretty Setlhake and Antoinette Cilliers

Chris Hani Baragwanath Academic Hospital, University of the Witwatersrand, Johannesburg, South Africa

Background: Total anomalous pulmonary venous return (TAPVR) is rare and represents almost 3% of all congenital heart diseases.

Objective: Describing characteristics and outcomes of children diagnosed with TAPVR from January 1978 - July 2023 at Chris Hani Baragwanath Academic Hospital.

Methods: Retrospective review of characteristics and outcomes of children diagnosed with TAPVR from January 1978 - July 2023, at Chris Hani Baragwanath Academic Hospital using paediatric cardiology electronic database for identification purposes.

Results: Sixty-one patients were diagnosed, 36 (59%) males and 24 (39%) females with one undocumented sex (2%). The age of diagnosis varied from few hours of life, to children aged more 12 months old, with 32 (52%) of the children being less than 3-months-old and 13 (21%) of this group being neonates. There were 20 (33%) deaths, with 12 (60%) males and 8 (40%) females. The age of death varied from few hours of life to children aged more 12 months old, with the highest intragroup mortality amongst neonates (70%). The highest proportion of mortality was seen amongst the mixed type (2/2) followed by infracardiac (3/4), supracardiac (10/30) then cardiac (5/25). 14/20 of the deaths were sepsis related with 10 (71%) less than three months old. 3/20 had dysmorphic features / syndromic, 1/20 bleeding post op, 1/20 died at home and 1 undocumented cause of death. Thirty-six (59%) of the children underwent surgery. Eighteen (50%) were supracardiac, 16 (44%) cardiac, 1 (2.8%) infracardiac and 1 (2.8%) mixed type. Six (17%) died post operatively, 1 from bleeding and 5 from sepsis.

Conclusion: The most common type of TAPVR is supracardiac. Approximately half of the children with TAPVR presented before 3 months of age. A third of the children died, majority of them preoperatively. Timely diagnosis and surgical intervention is necessary to improve patient outcome.

Associations of single nucleotide polymorphisms with QTc and left ventricular function in peripartum cardiomyopathy

Gasnat Shaboodien[1], Charle Viljoen[2], Polycarp Ndibangwi[3], Julian Hoevelmann[2], Lameez Pearce[2], Margherita Torchio[4] and Karen Sliwa[3]

[1]University of Cape Town, Groote Schuur Hospital, Observatory, South Africa
[2]Cape Heart Institute, Faculty of Health Sciences, University of Cape Town, Observatory, South Africa
[3]Division of Cardiology, Department of Medicine, Faculty of Health Sciences, University of Cape Town, Observatory, South Africa
[4]Centre for Cardiac Arrhythmias of Genetic Origin and Laboratory of Cardiovascular Genetics, Istituto Auxologico Italiano, IRCCS, Milan, Italy

Background: Peripartum cardiomyopathy (PPCM) is a form of pregnancy-associated heart failure that affects previously healthy women toward the end of pregnancy or in the months following delivery. PPCM is associated with left ventricular (LV) non-recovery in about half of patients and death in more than 10% of patients within the first year after diagnosis. Recent clinical investigations have also shown that about 50% of patients with PPCM have a prolonged QTc at presentation, which is a predictor of poor outcome (death, readmission, persistent poor LV function) by 6 months. The mechanism of QT prolongation in PPCM, however, remains poorly understood.
Objectives: The aim and objective of the study was to use single nucleotide polymorphism (SNPs), known to be associated with long QT syndrome (LQTS), to distinguish between short and long QTc in patients with PPCM.
Method: We recruited 43 patients with PPCM and genotyped them for 12 single nucleotide polymorphisms (SNPs) known to have an association with the QT interval: AGT (rs699); NOS1AP (rs16847548); CYP11B2 (rs1799998); NOS1AP (rs4657139); AKAP9 (rs7808587); AKAP9 (rs2961024); AKAP9 (rs11772585); AGTR1 (rs5186); AKAP9 (rs2282972); KCNQ1 (rs2074238); KCNH2 (rs1805123) and ACE (rs4646994). These variants were correlated with clinical and echocardiographic parameters, as well as the QT interval, as corrected by the Bazett's formula (QTc).
Results: LVEDD at presentation was 58mm (IQR 53 - 63), LVEF 31% (IQR 24 - 36), and QTcB (in lead V3) 450ms (IQR 429 - 476). SNP analysis showed that 40% of the PPCM cohort that had the NOS1AP (rs16847548) variant were associated with significantly longer QTc (441ms [426 - 458] vs. 471ms [443 - 480], p=0.028). Those with the NOS1AP (rs16847548) variant were more likely to have both prolonged QTc and LVEF<35% (15.4 vs. 47.1%, p=0.024). Our results also showed that PPCM patients with the AKAP9 (rs2282972) variant, however, had a shorter QTc (431ms [415.0 - 459.5] vs. 468ms [425 - 490], p=0.012), less LV dilatation (LVEDD 57.0 [53.0 - 59.5] vs. 63.0 [57.0 - 67.5] vs. p=0.022) and were likely to have both a shorter QTc and LVEF<35% (24.1 vs. 57.1, p=0.033). None of the other SNPs showed any significant clinical, electrocardiographic, or echocardiographic differences.
Conclusion: Our study found that, in a cohort of PPCM patients, the NOS1AP (rs16847548) variant is associated with a prolonged QTc, and the AKAP9 (rs2282972) variant is associated with a shorter QTc. As prolonged QTc and severely impaired LV function are well-known predictors of poor outcome, we postulate that NOS1AP could be used as a marker of outcome in PPCM patients. We also postulate that the AKAP9 variant, known to be associated with a decreased risk for cardiac events (such as syncope, cardiac arrest, and sudden death), might also be used to indicate a decreased risk of cardiac events in a certain subset of our PPCM patients. However, a larger study is needed to determine if these SNPs may have a prognostic value in PPCM.

Investigating DNA methylation of metabolic and inflammatory genes with therapeutic potential for obesity: A cohort study in South African women

Ayesha Shaik[1], Tarryn Willmer[2], Carmen Pheiffer[2] and Faadiel Essop[3]

[1]Stellenbosch University and Tygerberg Hospital, Bellville, South Africa
[2]Biomedical Research and Innovation Platform, South African Medical Research Council, Tygerberg, South Africa
[3]Centre for Cardio-metabolic Research in Africa (CARMA), Division of Medical Physiology, Department of Biomedical Sciences, Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

Background: Obesity and insulin resistance are modifiable risk factors that present opportunities for Type 2 diabetes prevention and intervention.
Objectives: The current study aimed to (1) Elucidate the epigenetic mechanisms underpinning obesity and insulin resistance in South African women, and (2) Explore the potential of exercise intervention to reverse these pathogenic modifications.
Method: Obese (n=27) and normal-weight (n=27) South African women were recruited for the first arm of the study. Subcutaneous gluteal (GSAT) and abdominal (ASAT) adipose biopsies from study participants were subjected to targeted next-generation sequencing (tNGS), after which results were validated using bisulfite pyrosequencing. The second arm of this study investigated the impact of exercise on DNA methylation signatures identified in Aim 1. To this end, pyrosequencing was employed to analyse DNA methylation in GSAT and ASAT biopsies from 19 South African women with obesity who underwent 12 weeks of aerobic and resistance training.
Results: tNGS identified differential methylation of Peroxisome Proliferator-Activated Receptor Gamma (PPARG), Macrophage Inhibitory Factor (MIF), Fatty Acid Synthase (FASN), Tumour Necrosis Factor Alpha (TNFA), FK506-binding protein (FKBP5), and Solute Carrier Family 6, Member 4 (SLC6A4) in obese compared to normal-weight women. Further investigation of these genes revealed hypermethylation within intron 5 of FKBP5 in GSAT, and the promoter regions of FASN and SLC6A4 in ASAT of obese compared to normal-weight women. Hypermethylated CpG sites within these genes correlated positively with markers of adiposity, insulin resistance, and inflammation. Importantly, compared to baseline, women who underwent 12 weeks of exercise training displayed a reversal of SLC6A4 methylation in ASAT compared to the control group. These changes positively correlated with high-density lipoprotein levels and negatively correlated with Haemoglobin A1C (HbA1c).
Conclusion: This study provides novel evidence of adipose tissue-specific DNA methylation signatures that are associated with obesity and insulin resistance that can be modulated by exercise.

Elevated blood pressure levels among HIV+ patients in sub-Saharan Africa: A systematic review and meta-analysis

Simon Stewart[1], Alexander Chen[2], Laura Waite[3], Ana Mocumbi[4], Yih-Kai Chan[5], Justin Beilby[2] and Dike Ojji[6]

[1]University of Notre Dame Australia, Fremantle, Australia
[2]Torrens University Australia, Adelaide, Australia
[3]Department of Health, Victoria, Australia
[4]Universidade Eduardo Mondlane, Maputo, Mozambique
[5]Australian Catholic University, Melbourne, Victoria, Australia
[6]University of Abuja & University of Abuja Teaching Hospital, Gwagwalada, Abuja, Nigeria

Background: Despite a high burden of hypertensive heart disease among HIV+ patients, there remains a paucity of data on the pattern of elevated blood pressure among HIV+ patients in sub-Saharan Africa.
Objectives: To use systematic review and meta-analyses to provide estimates of the prevalence of elevated blood pressure and blood pressure levels (when reported) among HIV+ patients living throughout the region.
Method: We searched PubMed and other databases to identify articles published from 1 January 2011 - 31 December 2021. Each study was independently reviewed for methodological quality. We used a random-effects model to estimate the prevalence of elevated blood pressure and mean systolic / diastolic blood pressure across studies. Heterogeneity (I^2) was assessed via the χ^2 test on Cochran's Q statistic. This review is registered with PROSPERO, number CRD42022297948.
Results: We included 48 studies in the systematic review and meta-analysis reporting data of a pooled sample of 193 843 HIV+ patients. Study quality was high with only 3 medium-quality. Prevalence of elevated blood pressure varied widely (range 8 - 54.7%). The pooled prevalence of elevated blood pressure for HIV+ patients was 21.9% (95% CI 19.9 - 23.9). The pooled mean systolic / diastolic blood pressure for adolescents was 120 / 77mmHg. Subgroup meta-analyses on prevalence by age and BMI showed strong positive correlations. Sex-specific, ART-specific, and CD4-specific meta-analyses on prevalence indicated the prevalence of elevated blood pressure – in males are 1.33 times more than in females; in patients on ART are 1.23 times more than in patients not on ART; in patients with a CD4 count >200 are 1.45 times more than in patients with a CD4 count <200.
Conclusion: With a paucity of representative / standardised data from many countries, there is urgent need to develop proactive screening and health care programmes for HIV+ patients in sub-Saharan Africa at high risk of prematurely developing cardiovascular disease.

Baseline predictors of vascular function in people living with HIV: 36-month follow-up data from the Endoafrica study

Hans Strijdom, Frans Everson, Ingrid Webster, Boipelo Kgokane, Amanda Genis and Sana Charania

Centre For Cardio-metabolic Research In Africa, Division of Medical Physiology, Stellenbosch University and Tygerberg Hospital, Bellville, South Africa

Background: People living with HIV (PLWH) have a 2-fold greater risk of cardiovascular disease (CVD), yet the identification of biomarkers and predictors of vascular changes (which often precede overt CVD) is lacking in the sub-Saharan African context.
Objectives: To identify baseline predictors of vascular function (blood pressure, endothelial function, retinal microvascular status and sub-clinical atherosclerosis) at 36-months follow-up in a cohort of PLWH.
Method: Longitudinal study (baseline: 36-months): Health, immunovirological and cardiometabolic data were collected from PLWH. Vascular measurements included systolic and diastolic blood pressure (SBP, DBP), flow-mediated dilatation (FMD), central retinal arteriolar and venular equivalent (CRAE and CRVE), and carotid intima-media thickness (c-IMT). Multilayer perceptron neural network analysis and mixed-model ANCOVA statistics were performed.
Results: PLWH cohort (N=102), with mean baseline age of 39.6 ± 9.4 years, ~60% female and ~51% smokers. At 36-months, body weight, fasting glucose, eGFR, urine albumin-creatinine-ratio (ACR), CD4 and viral load remained unchanged; whereas t-cholesterol and gamma-glutamyl-transferase declined by ~5% (p=0.04) and ~23% (p=0.002) respectively. The most prominent baseline predictor of 36-month mean SBP was kidney function (ACR and eGFR), with ACR exerting significant between-subject effects (p=0.014). Mean FMD decreased by ~16% (p=0.05), with baseline CD4 a prominent predictor (between-subject effects: p=0.012). Mean CRAE values remained unchanged, whereas mean CRVE increased at 36-months, with baseline antiretroviral therapy (ART) duration showing significant between-subject effects (p=0.04). Mean c-IMT was ~10% lower at 36-months, with eGFR, CD4 and age emerging as prominent predictors.
Conclusion: Changes in vascular endpoints showed mixed trends in this PLWH cohort: endothelial function (FMD) and retinal venular calibres (CRVE) worsened over 36 months, whilst subclinical atherosclerosis (c-IMT) showed modest improvement. ACR, eGFR, CD4 and ART duration were prominent baseline predictors of vascular function at 36-months. This study highlights the importance of assessing temporal vascular changes in PLWH, and identifies potential novel, early predictors of vascular outcomes.

High-dose cyclosporine preserves myocardial cytochrome oxidase metabolism after cold cardioplegic myocardial ischaemia and reperfusion

Dirk Troitzsch[1], Sebastian Vogt[2], John Michael Hasenklam[1] and Hans Nygaard[1]

[1]Aarhus University, Faculty of Health Sciences, Department of Cardiothoracic and Vascular Surgery, T-Research, Department of Clinical Medicine, Aarhus, Denmark

[2]Cardiovascular Research, Biomedical Research Center, Department of Cardiac and Thoracic Vascular Surgery, Philipps-University Marburg, Germany

Background: Mitochondrial swelling and morphologic changes may contribute to myocardial injury in response to ischaemia-reperfusion.
Objectives: We hypothesised that pre-ischaemic treatment with high-dose cyclosporine A (CsA) results in reduced mitochondrial morphology injury and improved oxidation function measured by mitochondrial redox state (CytOx).
Method: Twenty New Zealand white rabbits (male, 2.1 ± 0.3kg) were divided into 2 groups: Control (n=10) and CsA (n=10). Each group received a bolus of saline or 60mg/kg cyclosporine A. All animals were anaesthetised with sodium pentobarbital (45mg/kg IV) and heparinised (700 IU/kg IV). The heart was rapidly excised, immersed in physiologic saline, cannulated and perfused in the Langendorff model at 37°C. A research-based miniaturised optical near-infrared (NIR) probe for real-time measurement of myocardial mitochondrial redox state (CytOx) was fixed in the myocardium and baseline data were obtained. Hearts were then subjected to 10°C of cold cardioplegic ischaemia for 2 hours and then reperfused for 2 hours. Mitochondrial CytOx were measured continuously and correlated to changes in cardiac muscle mitochondria morphology evaluated by transmission electron microscopy.
Results: Mitochondrial CytOx at the end of reperfusion in the control group (-1.85 ± 0.3µmol/L) was significantly diminished compared with the CsA group (+0.13 ± 0.5µmol/L). Electron microscopic morphometric evaluation revealed better preservation of mitochondrial and ultrastructural morphology in the CsA group than in the control group. Mitochondrial swelling was also attenuated in the CsA group (25.7 ± 3.5%) compared with the control group (41.2 ± 2.8%, $p<0.001$).
Conclusion: Pre-ischaemic treatment with high-dose cyclosporine A preserves cardiac mitochondrial function as expressed by mitochondrial redox state (CytOx) and limits mitochondrial morphological changes in response to cold myocardial ischaemia-reperfusion.

Measurement of myocardial tissue oxygenation and postischaemic cardiac performance in newborns undergoing cardiac surgery

Dirk Troitzsch[1], Sebastian Vogt[2], John Michael Hasenklam[1] and Hans Nygaard[1]

[1]Aarhus University, Faculty of Health Sciences, Department of Cardiothoracic and Vascular Surgery, T-Research, Department of Clinical Medicine, Aarhus, Denmark

[2]Cardiovascular Research, Biomedical Research Center, Department of Cardiac and Thoracic Vascular Surgery, Philipps-University Marburg, Germany

Background: In neonates with congenital heart disease physiology exposed to cardiopulmonary bypass (CPB), cardioplegic ischaemia and reperfusion, myocardial blood flow and oxygen delivery may be inadequate. Imbalances in myocardial oxygenation and mitochondrial injury with impaired oxidative phosphorylation are probably related to myocardial dysfunction.
Objectives: We hypothesised that continuous tissue oxygen measurement may provide a marker for myocardial oxygenation and identify patients at risk for perioperative myocardial injury.
Method: We examined myocardial tissue oxygen data in neonates (n=14, age 5.5 ± 4.8 days) undergoing cardiac surgery for congenital heart disease. Microcatheter oxygen probes (Licox®) were placed minimally invasive in the myocardial tissue (left ventricular wall). Myocardial tissue oxygen tension (ptiO2) was monitored as indicator of regional myocardial tissue oxygenation and recorded continuously during surgery. Risk factors for critical myocardial ptiO2 were evaluated using multiple linear regressions to determine their impact on postoperative myocardial dysfunction.
Results: Severe derangements in myocardial oxygen metabolism occur frequently in patients with postoperative myocardial dysfunction. Three of the 14 patients demonstrated significantly low and critical myocardial ptiO2 during reperfusion (19.3 ± 3.1mmHg vs. 38.9 ± 5.7mmHg, $p<0.05$) leading to myocardial dysfunction (low cardiac output), postoperatively. Prolonged CPB and aortic cross-clamp time, age less than 5 days and weight less than 2.2kg ($p<0.05$) were associated with critical decreased myocardial tissue oxygenation and myocardial dysfunction in the early postoperative period.
Conclusion: Perioperative on-line tracking of myocardial tissue oxygen (ptiO2) rapidly detect patients at highest risk for impaired myocardial tissue oxygenation leading to myocardial dysfunction. The impact of this oxygenation vulnerability on myocardial dysfunction was minimised by continuous myocardial tissue ptiO2 monitoring and provides early point-of-care intervention to improve outcome in neonates undergoing congenital heart surgery.

Myocardial tissue oxygen tension and relationship to high-energy phosphates during cold cardiac ischaemia and reperfusion

Dirk Troitzsch[1], Sebastian Vogt[2], John Michael Hasenklam[1] and Hans Nygaard[1]

[1]Aarhus University, Faculty of Health Sciences, Department of Cardiothoracic and Vascular Surgery, T-Research, Department of Clinical Medicine, Aarhus, Denmark

[2]Cardiovascular Research, Biomedical Research Center, Department of Cardiac and Thoracic Vascular Surgery, Philipps-University Marburg, Germany

Background: The decline in cardiac high-energy phosphates (HEP) and intracellular pH (pHi) is directly related to the severity of the imbalance of oxygen supply and demand in the myocardium.

Objectives: We hypothesised that there is a relationship between cardiac HEP and pHi, as measured using 31phosphorus nuclear magnetic resonance spectroscopy (31P-MRS) and intramyocardial tissue oxygen pressure (ptiO2) in the isolated perfused heart.

Method: Ten New Zealand white rabbits (male, 2.3 ± 0.2kg) were anaesthetised with sodium pentobarbital (45mg/kg intravenous) and heparinised (700 IU/kg intravenous). The heart was rapidly excised, immersed in physiologic saline, cannulated and perfused in the Langendorff mode at 37°C. After placing a minimally invasive, flexible oxygen microprobe (Licox®) into the left ventricular anterior wall, baseline data were obtained after an equilibration period of 40 minutes. Hearts were then subjected to 10°C of cardioplegic ischaemia for 2 hours and reperfused. The status of phosphorylated cardiac energy metabolites (measured using a 4.7-T high-field 31P-MR spectrometer47/40 Biospec, BRUKER BioSpin GmbH) was assessed, and myocardial tissue oxygen tension, including temperature compensation, was assessed on-line. Linear correlation analysis was performed between 31P-MRS data and myocardial tissue ptiO2 readings.

Results: Intracellular pH (R2=0.97; P<0.01), phosphocreatine (PCr) (R2=0.95; P<0.01) and inorganic phosphates (Pi) (R2=0.97; P<0.01) measured after cardioplegia and onset of ischaemia correlated significantly with the decline in myocardial tissue ptiO2. During reperfusion, only intracellular pH (R2=0.94; P<0.01) and PCr (R2=0.69; P<0.05) values correlated significantly with myocardial tissue ptiO2.

Conclusion: Changes in intramyocardial tissue ptiO2 paralled changes in cardiac HEP and pHi . Therefore, monitoring of myocardial tissue oxygen pressure (ptiO2) during induced cold cardioplegic ischaemia and reperfusion may provide a real-time minimally invasive estimate of myocardial oxidative metabolism and cardiac energetics.

Oxygen level-dependent alterations in cardiovascular haemodynamics and cerebral oxygenation during physiological and cardiopulmonary bypass conditions in newborn piglets

Dirk Troitzsch[1], Sebastian Vogt[2], John Michael Hasenklam[1] and Hans Nygaard[1]

[1]Aarhus University, Faculty of Health Sciences, Department of Cardiothoracic and Vascular Surgery, T-Research, Department of Clinical Medicine, Aarhus, Denmark

[2]Cardiovascular Research, Biomedical Research Center, Department of Cardiac and Thoracic Vascular Surgery, Philipps-University Marburg, Germany

Background: Recent reports indicate that under certain restricted conditions hyperoxia may decrease tissue oxygen consumption with associated adverse haemodynamic and metabolic effects.

Objectives: The goal of the study was to investigate the response to variable supraphysiologic levels of oxygen tension on cardiovascular haemodynamics and cerebral oxygenation during anesthesia and cardiopulmonary bypass.

Method: Studies were carried out in n=20 stable ventilated newborn piglets (2.3 ± 0.2kg BW). Neonatal piglets underwent supraphysiologic levels of oxygen under physiological conditions or normothermic cardiopulmonary bypass (CPB) (n=10 per group). The inspiratory oxygen concentration (FIO2) was increased from 0.3 to 1.0. Brain oxygenation was continuously measured using frontal near-infrared spectroscopy. Furthermore, the animals were placed on normothermic cardiopulmonary bypass (CPB). Piglets were exposed during CPB a graded supraphysiological PO2 protocol and either physiologic PO2 (~180mmHg) or hyperoxia (~450mmHg). Blood samples and haemodynamic data were measured.

Results: After increasing the FIO2 to 1.0, arterial PO2 had increased from about 100 to 400mmHg, and oxygen uptake (VO2) was decreased (p<0.05). Hyperoxia increased systemic vascular resistance (SVR) and right atrial pressure (p<0.05). During normoxic recovery VO2, SVR and associated changes in brain oxygenation returned to baseline. During cardiopulmonary bypass, hyperoxia also affected significantly (p<0.05) oxygenation and circulation parameters, if PO2 values were higher than 200mmHg.

Conclusion: Under physiological and CPB situations supraphysiological oxygen tension decrease oxygen consumption and is associated with increased vascular resistance, which may have implications for the neonatal metabolic regulation of oxygen utilisation and cellular responses during and after interventional cardiology, cardiac surgery and intensive care medicine.

Echocardiographic screening for cardiovascular disease in CSA: Expanding the role of echocardiography in patient referral

Elmare van den Heever[1], Lezelle Botes[2], Stephen Brown[1] and Francis Smit[1]

[1]Universitas Academic Hospital, Bloemfontein, Free State, South Africa

[2]Central University of Technology, Bloemfontein, Free State, South Africa

Background: Cardiovascular disease (CVD) affects millions of people resulting in significant morbidity and mortality. Inadequate healthcare systems combined with costly treatments impose a high economic burden with growing challenges in the public healthcare arena. The demand for equitable access to specialty services is high in a country where most of the population relies on public healthcare services.

Objectives: This article elaborates on the shortcomings in diagnosing and referring patients for echocardiography at a tertiary care hospital, to seek possible solutions to expedite referral for appropriate therapy and reduce late or inappropriate referrals.

Method: The study consists of a review and sub-analysis of a descriptive longitudinal observational hospital-based study performed on 2 523 first-time echocardiography referrals to a tertiary care hospital, conducted in the echocardiography laboratory of the Division of Cardiology, Universitas Academic Hospital.

Results: Three thousand four hundred cardiac abnormalities were diagnosed in 1 868 patients (74%). Primary valvular disorders (60%) and secondary pulmonary hypertension (26%) were the most significant. Alarmingly, more than a third of these patients presented with severe valvular disease, which mirrors a definite pattern of late referral. This statement is supported by the high presence of secondary pulmonary hypertension resulting from valvular and left heart disorders, which reflects progressive heart disease, as clinical signs usually become evident only after decompensation occurs. The fact that 44% of patients with dilated cardiomyopathy (DCMO) had a left ventricular ejection fraction (LVEF) of less than 30% indicates that a substantial number of patients presented with severely impaired left ventricular systolic function at first referral, suggesting missed diagnosis and / or late referral. Misdiagnoses in this study were confirmed by the poor correlation, almost half of the cardiac diagnoses, between clinical referral requests and echocardiography diagnoses. The late referrals can be attributed to long travel distances and the number of regional hospitals.

Conclusion: Echocardiography screening can fill the void to expedite diagnosis and effective referral. Echocardiographic services are in high demand from secondary regional and district hospitals in central South Africa. Misdiagnoses and late referrals increase the burden on an already debilitated healthcare system in central South Africa. However, from the data, it seems that the implementation of a more available echocardiographic screening service can address these gaps in the current healthcare system and improve service delivery which may be much more cost-effective than rigid referral guidelines.

Echocardiographic findings of heart disease in an adult population in central South Africa

Elmare van den Heever[1], Lezelle Botes[2], Stephen Brown[1] and Francis Smit[1]

[1]Universitas Academic Hospital, Bloemfontein, Free State, South Africa

[2]Central University of Technology, Bloemfontein, Free State, South Africa

Background: Although the global impact of cardiovascular disease is well established, the spectrum and distribution of disorders vary considerably in different countries and communities. Understanding the cardiovascular health burden in central South Africa will provide insight and understanding of disease trends, which is essential for healthcare planning. The study aimed to evaluate the spectrum and frequency of cardiac abnormalities in central South Africa diagnosed using echocardiography.

Objectives: The study aimed to evaluate the spectrum and frequency of cardiac abnormalities in central South Africa diagnosed using echocardiography.

Method: The study included 2 523 adults referred for echocardiographic evaluation for the first time over 28 consecutive months in central South Africa. Demographic and echocardiographic data were recorded at the time of the first visit.

Results: The mean age of the study population was 51.8 ± 17.38 years, with slightly more females than males (55% vs. 44%, 1% unknown). Caucasians were significantly older at first referral than the other ethnic groups (Caucasians: 60.7 ± 15.3); (Black Africans: 50.1 ± 17.3); (Mixed race: 54.5 ± 1 7.5); (Asians: 50.8 ± 14.3)($p<0.0001$; $p<0.0001$; 0.0266). Three thousand four hundred echocardiographic confirmed cardiac abnormalities were diagnosed in 1 868 patients. Valvular heart disease (VHD) (44%), pulmonary hypertension (PHT) (26%), isolated left ventricular hypertrophy (LVH) (19%) and dilated cardiomyopathy (DCMP) (14%) were the most common abnormalities diagnosed. Significantly more abnormalities were observed in Black Africans than Caucasians (77% vs. 71%; $p<0.05$). Rheumatic valvular disease (RVD) was diagnosed in 6% and degenerative disease in 38% of the study population. Alarmingly, 44% of DCMP patients presented with a left ventricular ejection fraction (LVEF) of less than 30%. The leading cause of isolated LVH was hypertension (66%). The prevalence of ischaemic heart disease was low (6%).

Conclusion: There is a high burden of CVD in central South Africa, with three-quarters of the study population diagnosed with cardiac abnormalities, most of which are attributed to valvular heart disease. Echocardiographic screening programmes can reduce the burden of cardiac disease by addressing the number of late referrals to improve patient outcomes.

Application of the basic optimisation tools of occupational radiological protection during interventional procedures

Belinda van der Merwe

Central University of Technology, Bloemfontein, Free State, South Africa

Background: The international guidelines on radiological protection in cardiology, recommend that when there is a risk of occupational radiation exposure, staff should utilise personal protective shielding, training must be regularly updated and quality assurance programmes should ensure the regular use of personal dosimeters. The radiological protection implementation habits of 3 interventional theatres were investigated in terms of the application of the basic optimisation tools of occupational radiological protection namely time, distance, and shielding.

Objectives: Measure the effective radiation dose to the eyes, thyroid, hands and feet of the physician, nurse and radiographer by means of finger dosimeters. Determine the application of time, distance and shielding by means of a checklist benchmarked internationally. Recommend radiation protection actions to enhance a radiation safety culture.

Method: The distance was determined during procedures for example by measuring the distance of the Image Intensifier to the patient and the distance of the feet of the specialist and scrub nurse to the X-ray tube and foot pedal. Time evaluation included the application of the last image hold and intermittent fluoroscopy. The shielding included evaluation of the utilisation of the transparent ceiling suspended screens, leaded plastic table shields, and personal protective equipment.

Results: The highest dose measured for 20 procedures to the eye of the cardiologist was 2.47mSv, to the foot 3.4mSv and to the hand 5.01mSv. The highest doses (3.89mSv and 2.34mSv) were recorded at the feet of the nurses at all the sites.

Conclusion: The gap has been identified that there is a need for the team to repeat the audit checklist regularly to implement, apply and maintain the radiation protection culture. The comprehensive checklist is therefore currently converted to a mobile application with report features.

Retrospective study on the adoption of lipid management guidelines in post-myocardial infarction patients in a tertiary care centre

Patricia Wambua[1], Charles Kariuki[2] and Elijah Ogola[3]

[1]Ubora Heart Clinic, Nairobi, Kenya

[2]The Nairobi Hospital, Nairobi, Kenya

[3]University of Nairobi, Nairobi, Kenya

Background: Lipid management after acute myocardial infarction (AMI) is one of the important aspects of secondary prevention in this high cardiovascular (CV) risk group, and targeted reduction of low-density lipoprotein-cholesterol (LDL-C) remains the primary target for lipid therapy post-MI.

Objectives: Retrospective study to assess lipid management adequacy in post-MI patients at a tertiary care centre compared to the 2019 ESC dyslipidaemia management guidelines.

Method: Retrospective review of medical records of AMI patients admitted to the Ubora Heart Clinic, Nairobi Hospital, Kenya, from January 2020 - June 2022.

Results: The study involved 79 patients (mean age: 59.3 ± 12), mostly male (77.2%) and of African race (75.9%). The majority had ST-segment elevation myocardial infarction (STEMI) (62%). The six most prevalent cardiovascular risk factors amongst the patients were: Systemic arterial hypertension 50 (63.3%), dyslipidaemia 34 (43.0%), type II diabetes mellitus (T2DM) 25 (31.6), history of smoking 12 (15.2%), obesity / overweight 11 (15.1%) and family history of premature coronary artery disease or sudden cardiac death 4 (5.1%). Within 48 hours of admission, 88.6% of the patients had lipid profiles, with a mean LDL-C level of 3.18mmol/L (SD ± .18). All patients received high-intensity statins: 40mg / 80mg atorvastatin or 20mg / 40mg rosuvastatin. Thirty-nine (44%) patients had repeat lipid profiles on follow-up with a median lipid analysis time of 5 months (IQR 2.0-10.0). Overall, 14.7% of the patients studied achieved the guideline-recommended LDL-C goal of an LDL-C target of <1.4mmo/L and a ≥50% reduction from baseline LDL-C. After 5 months of follow-up, 75 (94.9%) patients were on statin monotherapy, with only 4 (5.1%) on high-intensity statin and ezetimibe combination therapy.

Conclusion: This retrospective study emphasises the importance of early sensitisation and adoption of secondary prevention strategies in acute coronary syndrome (ACS) following the 2019 ESC guidelines.

Higher allostatic load score is associated with early cardiovascular risk in young South Africans: The African Predict study

Annemarie Wentzel[1], Ruan Kruger[1], Wayne Smith[1], Edmond Wonkamtingang[2], Neil A. Hanchard[2] and Stephanie T. Chung[3]

[1]Hypertension In Africa Research Team (HART), Faculty of Health Sciences, North-West University (NWU), Potchefstroom, South Africa
[2]Centre For Precision Health Research, National Human Genome Research Institute (NHGRI), National Institutes of Health, Bethesda, Maryland, United States of America
[3]Section on Paediatric Diabetes, Obesity, and Metabolism, Diabetes, Endocrinology, & Obesity Branch, National Institutes of Health, Bethesda, Maryland, United States of America

Background: Allostatic load (AL) reflects the cumulative physiological burden and dysregulation due to sustained stress exposure. AL-scores (ALS) describe neuro-endocrine, metabolic, cardiovascular, and immunological domains. Whether ALS is associated with CVD risk in youth and young adults (YA), and whether the risk would differ at such an early age, is unclear.
Objectives: In youth and YA we compared the (1) Total ALS, (2) Cardiovascular profile in high and low ALS, and (3) Association of ALS with markers of CVD.
Method: Participants in the African Prospective study on the early detection and identification of cardiovascular disease and hypertension (AfricanPREDICT) were 587 youth ≤24 years (48% male, 21 ± 2 years) and 579 YA >24 years (49% male, 27 ± 2 years) were evaluated. ALS was calculated, using the upper quartile population distribution, from fasting dehydroepiandrosterone (DHEA), cortisol, interleukin-6 (IL-6), C-reactive-protein (hsCRP), BMI, systolic-BP, diastolic-BP, and lower quartile of HDL-cholesterol. The upper quartile of ALS in the whole population defined high ALS. Retinal-vessel-analyses, pulse-wave-velocity (PWV), and echocardiography were measured, and regression analyses determined associations with ALS adjusted for sex, ethnicity, cotinine, gamma-glutamyl-transferase and physical activity.
Results: ALS range was 1 - 8, and a high (ALS >3) was observed in 35% of youth, and 47% YA. In youth with high ALS, ALS associated with narrower retinal arteries (Adj R2:0.16, β-coefficient, -1.73, (95%CI), -2.95, -0.94), p=0.052), higher PWV (Adj R2:0.56, 0.75(0.48, 1.98), p=0.021), increased left-ventricular-mass-index (Adj R2:0.61, 2.21(0.43, 8.46) p=0.048), lower left-ventricular-function (global-longitudinal-strain) (Adj R2:0.37, -0.45(-1.06, -0.06) p=0.015). Similarly, in YA with high ALS, ALS associated with narrower retinal arteries (Adj R2:0.43, -4.54(-6.58, -2.50), P<0.001), higher PWV (Adj R2:0.44, 0.62(0.09, 1.17), p=0.043), increased left-ventricular-mass-index (Adj R2:0.53, 2.62(1.52, 5.76) p=0.032), lower diastolic-function (E/A ratio) (Adj R2:0.27, -0.11(-0.18, -0.04) p=0.002).
Conclusion: Youth and YA with high ALS showed signs of sub-clinical cardiovascular compromise vs. low ALS. ALS and physiological dysregulation should be evaluated in youth and YA, when assessing current and future cardiovascular risk.

An extremely hypercoagulable case of thyro-cardiac disease

Pin-Yi Wu[1] and Ruchika Meel[2]

[1]Donald Gordon Hospital, University of the Witwatersrand, Johannesburg, South Africa
[2]Chris Hani Baragwanath Academic Hospital, University of the Witwatersrand, Johannesburg, South Africa

Background: Thyro-cardiac disease is a well described medical entity. Its association with coagulation and fibrinolysis, however, is still currently underappreciated.
Objectives: To highlight the extremely hypercoagulable state associated with hyperthyroidism and cardiac disease.
Method: A 45-year-old African, male patient with no significant past medical history presented to a tertiary hospital in a thyroid storm secondary to Grave's disease. He had symptoms and signs compatible with heart failure secondary to Grave's disease, mixed mitral valve disease (MVD) and atrial fibrillation (AF). Laboratory thyroid function tests revealed thyroid stimulating hormone level of <0.01mIU/L, free T4 level 39.2pmol/L and thyroid hormone receptor antibodies of 39.33U/L. Trans-thoracic echocardiography revealed biventricular dilatation with severe rheumatic mitral regurgitation, moderate mitral stenosis and severe tricuspid regurgitation. Left ventricular ejection fraction was reduced at 39% and pulmonary artery systolic pressure was elevated at 77mmHg. Multiple intra-cardiac thrombi were found on the left atrial appendage, posterior mitral leaflet, right ventricular outflow tract and the proximal pulmonary artery, confirmed on transoesophageal echocardiography and computed tomography scan of the chest.
Results: The patient was treated acutely with potassium iodide drops, propranolol and neomercazole. Anticoagulation was initiated with warfarin. He was referred for urgent surgery due to non-resolving left atrial and mitral valve thrombus, high risk for embolisation and concomitant underlying MVD. He had a successful thrombectomy, mitral valve replacement and good post-operative outcome.
Conclusion: In the current case the combination of multiple co-morbidities contributing to an extreme state of hypercoagulability is a unique presentation and has not been previously described. It serves to draw attention of the clinician to maintain a state of vigilance for co-morbidities such as valvular heart disease, and not merely attribute the heart failure and hypercoagulable state to hyperthyroidism and AF.