Left atrial appendage occlusion: A single centre 7-year follow-up

Mark Abelson

Vergelegen Mediclinic, Somerset West, South Africa and University of Cape Town, Observatory, South Africa

Background: Left atrial appendage occlusion was first performed in South Africa in 2010 at Vergelegen Mediclinic. This is a retrospective review of the cases performed so far at this hospital by a single operator using the Amplatzer device – initially the Amplatzer Cardiac Plug (ACP) and since 2014 the Amulet device.

Methods: A retrospective review of all cases where an ACP, or Amulet, device was implanted and patients were followed up to date. All patients or their families were contacted telephonically if they were not followed up at Vergelegen Mediclinic.

Results: Eighty six patients went to theatre. Six procedures abandoned:

- 2 trans-oesophageal probes could not be passed (1x pharyngeal pouch)
- 1 left atrial appendage (laa) obliterates with contraction (PAF) and thought not safe to proceed
- 1 very large laa orifice too big for largest device
- 1 very shallow laa appendage (<10mm landing zone depth) and device could not be placed securely
- 1 could not seat device securely due to unusual anatomy

Attempted implants = 82. Total implants = 80 (successful implant 97.5%). Follow-up on 78 patients (97.5%). Two lost to follow-up. Mean follow-up 4.8 years. Median follow-up 2.6 years. Mean age = 75 years. Median age 75 years. Age range 52 - 87 years old.

Indications for laa occlusion: Contra-indication for oral anti-coagulant therapy (OACT) 56 patients (65%), high bleeding risk (Hasbled >3 or perceived high bleeding risk due to frailty and falls) 25 patients (29%), Life style choice 5 patients (6%). Chads-Vasc = 3.8 (expected stroke rate 4%/year). Hasbled 3.1. Average hospital stay 1.1 days.

Complications at 7 days – 3 minutes or bleeds.

- No strokes/TIA
- No pericardial effusions or tamponade
- No device embolisation

Long term follow-up: Actual strokes = 6 (7.5%) over mean 4.8 years follow-up. Observed stroke rate/year = 1.6% (7.5/4.8). Stroke risk reduced by 60% Strokes occurred – 2 patients in first year follow-up, 1 – 2 years, 2 – 3 years, 1 in 4 years. Major bleeds requiring discontinuation of anti-platelet therapy in 8 patients – 1 x epistaxis, 1 x subdural after fall, 5 x gastro-intestinal bleeding mainly due to underlying angio-dysplasia of the colon. Mortality at 7 years (mean follow-up of 4.8 years) = 19 (24%). (Life expectancy of 75 year olds, without AF = 11 years). (Tavi patients 5-year mortality – 30% if low risk and 50% if high risk). 1-year = 9 (11%), 2-year = 5, 3-year = 4, 4-year = 1, 5 - 7-year = 0.

Causes of death: Post stroke - 2, CCF - 4, Renal failure - 4, SCD/MI - 2, Falls - 3, Post surgery - 1, Parkinsons - 1, Amyloidosis - 1, Respiratory failure - 1 Mean age at time of death 78.1 years (67 - 85 years). Median 81 years.

Conclusion: This single centre long term follow-up of laa occlusion using the ACP/Amulet shows findings similar to other published registries of this device. It shows a high implant success rate with a very low (zero) 7-day complication rate. The long-term outcomes show an acceptably high mortality for patients of this age with underlying AF and other multiple medical problems. The stroke risk is calculated to be approximately 60% below that expected for the Chads-Vasc score – a figure similar to the risk reduction of warfarin, with a very low long-term bleeding risk.

Characteristics of young adults with heart blocks requiring pacing at Groote Schuur Hospital, University of Cape Town

Constantine Akwanalo

Department of Medicine, Division Cardiology, Moi University, Eldoret, Kenya

Background: There is paucity of literature on heart blocks requiring pacing in young adults, yet changing epidemiology of cardiovascular disease increasingly affects them, especially in Africa. Heart blocks requiring pacing in young adults below 60 years in sub-Saharan Africa (SSA) have not been adequately described in the recent past. We assessed clinical characteristics of paced patients aged 18 - 60 years at Groote Schuur Hospital in Cape Town South Africa over a 40 month period (August 2012 - December 2015).

Methods: We reviewed patients' medical records retrospectively to determine indications for pacing and underlying disease processes that are known to cause heart blocks.

Results: Information was available for 717 patients who had undergone pacing from August 2012 - December 2015 (40 months). Of these, 84 (11.7%) patients aged 18 - 60 years (mean age of 45 years and 51% being males) were paced due to heart blocks; 74 (84%) had complete heart block and 10

(12%) had Mobitz type 2; 55 (~65.5%) received a single chamber device. The etiology of heart block was unknown in 34 (40.5%), ischaemic heart disease in 20 (23.8%), post-cardiac surgery in 12 (14.3%), congenital heart block in 9 (~10.7%), genetic diseases – Keane Sayeris and Emery Dreiffus in 5 (~6%), Sarcoidosis in 3 (3.5%) and tumour in 1 (1.2%).

Conclusion: Ischaemic heart disease was the most common known etiology causing heart blocks among paced young adults at Groote Schuur Hospital, Cape Town, South Africa.

A 5-year retrospective audit of mitral valve repair surgery at Tygerberg Hospital

Mahmoud Al-naili, Alfonso Pecoraro, Anton Frans Doubell, Philippus George Herbst and Jacques Teran Janson

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

Background: Mitral valve repair (MVRep) is well established as the preferred treatment modality for patients with degenerative mitral valve disease (MVP) requiring intervention. Valve repair offers a distinct event-free survival advantage compared with replacement. There is little data on the management/outcome of MVP requiring surgery in South Africa. The aim is to describe/compare the indications, pathology and outcomes for MVRep.

Methods: All patients referred for MVRep at Tygerberg Hospital, Cape Town between 1 December 2010 and 30 June 2015 were retrospectively included. Demographics, cardiovascular risk factors, pre-operative (NYHA) functional class, pre/post-operative transthoracic/transoesophageal echocardiographs, immediate and 6-months post-surgical mortality were analysed.

Results: A total of 147 patients were considered for MVRep by the local heart team, 114 patients were accepted for MVRep: 106 underwent surgery, 6 defaulted, 2 refused surgery. Of those accepted: 57.9% males, 42.1% females, mean age 47.7 years. Further 56.1% had a pre-operative functional class III, 29.8% class II, 7% class IV and 7% class I. In addition, 60.2% had a 6-month post-operative functional class I, 32.3% class II, 5.4% class III, 2.2% class IV. MVP with flail segment due to chord rupture was the predominant etiology (29%). P2 was the most common segment involved in 36% of patients. For MVP, including patients with infective endocarditis, the mortality rate was 4.8% at 30 days and 6 months. Mortality rates for all patients accepted for MVRep were 4.7% and 6.6% at 30 days and 6 months, respectively. Freedom from reoperation was 98% at 6 months. Significant association between bileaflet involvement and MVRep-failure (p=0.006). Chordal insertion with annuloplasty was the most common intervention used (45.5%).

Conclusion: MVP was the predominant etiology for patients referred for MVRep. Chordal insertion with annuloplasty was the most common intervention. Bileaflet involvement was an independent risk factor for repair failure. Mortality rate for all MVRep was 6.6% at 6 months with 4.8% at 6 months in the prolapse group. MVRep for ischaemic MR had a significant mortality at 6 months (23%).

Differential effects of fingolimod and other transient receptor potential melastatin 7 (TRPM7) channel modulators on calcium paradox-induced myocardial injury in rat hearts

Matthew Amoni*,#, Fatma Alatrag*, Roisin Kelly-Laubscher* and Asfree Gwanyanya*

*Department of Human Biology, Faculty of Health Sciences, University of Cape Town, Observatory, South Africa. #Katholieke Universiteit Leuven, Leuven, Belgium

Background: Calcium (Ca^{2+}) paradox (CP)-induced myocardial injury occurs peri-operatively in hearts temporarily perfused with low-Ca^{2+} solutions and experimentally in the widely used isolation of cardiomyocytes for various cellular studies. CP is proposed to be mediated by Ca^{2+} overload through ion channels. However, the role of the recently-identified Ca^{2+} permeable, magnesium (Mg^{2+}) inhibited, transient receptor potential melastatin 7 (TRPM7) channels in CP is unknown. We therefore investigated the effects of TRPM7 channel inhibitors fingolimod (FTY720) and nordihydroguaiaretic acid (NDGA), as well as Mg^{2+} pre-treatment on CP.

Method: Langendorff-perfused Wistar rat hearts were treated with FTY720 (1 µmol/L), NDGA (10µmol/L), or vehicle prior to a CP protocol consisting of 3 minutes Ca^{2+} depletion, followed by 30 minutes Ca^{2+} repletion. Hearts of rats pre-treated with $MgSO_4$ (270mg/kg, intraperitoneally) or saline daily for 7 days were also subjected to CP. Haemodynamic parameters were measured using an intraventricular balloon and infarcts were quantified using triphenyltetrazolium chloride stain. The presence of cardiac TRPM7 proteins was evaluated by immunoblotting.

Results: FTY720, but not NDGA, decreased CP-induced infarct size from 64.6 ± 5.3% to 39.0 ± 6.8% (p=0.001; n=6). Although both FTY720 and NDGA minimised the CP-induced elevation of left ventricular end-diastolic pressure, only FTY720 improved LV developed pressure (p=0.029). Pre-treatment with Mg^{2+} affected neither CP-induced infarct size, nor TRPM7 expression levels in ventricular tissue.

Conclusions: The cardioprotective effects of FTY720, but not NDGA or Mg^{2+}, suggest that the action of FTY720 seems to be unrelated to the capacity of the drugs to inhibit TRPM7 channels. FTY720 may therefore have a novel therapeutic role in attenuating CP during peri-operative cardiac perfusion and experimental preparation of cardiomyocytes.

Beta-blocker target dosing and tolerability in a dedicated heart failure clinic: Charlotte Maxeke Academic Hospital 2000 - 2014

Jonathan Bolon, Keir McCutcheon, Eric Klug, Daryll Smith and Pravin Manga

Division of Cardiology, Department of Internal Medicine, Charlotte Maxeke Johannesburg Academic Hospital, University of the Witwatersrand, Johannesburg, South Africa

Background: The benefit of beta-blockers in chronic heart failure with left ventricular dysfunction is well established. However, actual use in "real world" heart failure patients has been relatively poor. Beta-blockers have generally been underused and under-dosed, largely due to perceptions about intolerability. Ivabradine, a pure heart rate lowering agent, has recently been advocated for heart failure patients with elevated heart rates who could not tolerate target doses of beta-blockers. The aim of this study was to document beta-blocker target dosing and tolerability in a dedicated heart failure clinic at Charlotte Maxeke Johannesburg Academic Hospital and assess the proportion of patients who may require ivabradine therapy.

Methods: The records of all patients attending the heart failure clinic between 2000 and 2014 were reviewed. Demographic, clinical and outcome data was recorded for 500 patients.

Results: At their last clinic visit, 489 out of 500 (97.80%) patients were taking a beta-blocker. Patients were stratified into categories according to guideline target doses, with 59.8% (n=299) achieving "target dose", 28.0% (n=140) a "moderate dose", 5.4% (n=50) receiving "low dose" of beta-blocker and 11 patients (2.2%) no dose. Beta-blocker "intolerant" patients numbered 61 (7.6%). Conventional reasons for beta-blocker caution (broncho-spasm/breathlessness, syncope, cardiac decompensation, hypotension) were found to be rare. Bradycardia was the most common cause of inadequate uptitration. Ultimately only 53 patients (10.6%) were deemed to be "ivabradine suitable".

Conclusion: Beta-blockers are well tolerated with perceptions around intolerability and concerns about safety largely unsupported in our experience. As a consequence, the role for ivabradine therapy in patients with chronic heart failure is limited.

An assessment of potential drug-drug interactions in elderly cardiac patients attending a private outpatient facility in Gauteng Province

Amanda Bornman[*], Natalie Shellack[*], Eric Klug[#], Nishern Govender[†] and Ama Sakoa Annor[*]

[*]Makgatho Health Sciences University, Sandton, South Africa. [#]Charlotte Maxeke Johannesburg Academic Hospital, Parktown, South Africa
[†]Netcare Sunninghill Hospital, Sunninghill, South Africa

Background: Polypharmacy has increased significantly, due to increasing patient age, and the presence of simultaneous illnesses. This is associated with inappropriate drug use and more potential drug-drug interactions (DDIs). Cardiovascular patients are particularly prone to develop a drug-related problem. Potential drug-drug and drug-patient interactions are poorly monitored in South Africa. The study aimed to identify, classify and determine the prevalence of potential DDIs in elderly cardiac patients.

Methods: This was a retrospective study, examining 400 patient records attending a private cardiac outpatient facility. The subjects were >55 years old, with 5 or more current medications. A validated computerised drug interaction checker was used.

Results: A total number of 3 100 potential DDIs were identified with an average of 7.75 interactions per patient (range 0 - 44). Of the 3 100 potential DDIs, only 82 (2.65%) were classified as category A, with no potential DDIs and 43 (1.39%) DDIs were classified as category X, all major in severity. In category D, 386 (12.45%) DDIs were identified of which 323 (83.68%) were classified as major in severity. Drug interactions identified with a risk rating C, constituted the majority of interactions 2 312 (74.58%), of which 2 108 (91.18%) were moderate in severity.

Conclusion: Monitoring of drug therapy, especially in the elderly population taking multiple medications, is of vital importance. Drug interactions can be detrimental to the patient's health, especially impacting on patients' quality of life. Electronic databases and drug interaction screening software may be a fundamental tool to assist pharmacists and clinicians to recognise, monitor and prevent potential DDIs.

Intermittent T wave oversensing in a patient with an implantable cardioverter defibrillator and the congenital long QT syndrome

Ashley Chin

Groote Schuur Hospital, University of Cape Town, Observatory, South Africa

Background: Inappropriate implantable cardioverter defibrillator (ICD) therapy due to lead failure is a common device related complication. The sensitivity integrity counter (SIC) in Medtronic ICDs is able to record non-physiological short V-V intervals which may detect early lead failure.

Methods: N/A

Results: An 18-year-old man was diagnosed with the congenital type 1 long QT syndrome (LQTS). He had a Medtronic MAXIMO VR ICD implanted with a 6947 Sprint Quattro lead for unexplained syncope. At 6 monthly follow-up visits, the SIC recorded non-physiological short V-V intervals (<130ms). On average, 50 - 300 short V-V intervals were recorded per month. No evidence of a lead defect was found. After 6 years, he underwent an ICD generator replacement with a Medtronic EVERA XT VR device for battery depletion. He then presented following an auditory alarm during

an episode of physical exertion. The RV lead integrity alarm had been activated because of 3 non-sustained high rate episodes. One of the non-sustained high rate episodes revealed sinus tachycardia at a rate of 140bpm with intermittent T wave oversensing. The intervals between the oversensed T wave and the following QRS complexes/ventricular EGMs were 120 - 130ms which the device recorded as short V-V intervals. No evidence for a lead defect was found. In this case, T wave oversensing was intermittent and occurred only during periods of exertion because of paradoxical lengthening of the QT interval which resulted in the T wave being oversensed. The auto-adjusting ventricular sensitivity was re-programmed to 0.45mV. At last follow-up he had no short V-V intervals or T wave oversensing.

Conclusion: This case illustrates an important cause of intermittent T wave oversensing and short V-V intervals due to paradoxical lengthening of the QT interval during sinus tachycardia in a patient with congenital type 1 LQTS.

Arrhythmias in acute heart failure as detected by 24-hour continuous cardiac monitoring

Tsungai Chipamaunga*, Jonathan Matenga*, David Kao# and James Hakim*

*University of Zimbabwe, Harare, Zimbabwe. #University of Colorado, Denver, United States of America

Background: Acute heart failure (AHF) is a leading cause of morbidity and mortality in sub-Saharan Africa. Early mortality in AHF patients in Zimbabwe is high. The burden and impact of arrhythmia events on AHF outcomes in Zimbabwe is unknown. This study sought to characterise arrhythmias in AHF patients using continuous monitoring and to determine if arrhythmias contribute to short-term outcomes.

Methods: A prospective cohort of AHF patients admitted at Parirenyatwa Hospital had baseline electrocardiography (ECG), echocardiography and underwent 24-hour Holter monitoring while hospitalised and were followed up for one month after discharge. The primary and secondary outcomes were 30-day and in hospital mortality, respectively. Predictors of primary and secondary outcomes were identified using logistic regression.

Results: Ninety-two patients (mean age 54 years; 58.7% women) were enrolled between 20 November 2014 and 1 March 2015. Thirty-nine patients (42.3%) had arrhythmic events (atrial fibrillation/flutter, other supraventricular tachycardias, non-sustained and sustained ventricular tachycardia and ventricular fibrillation), detected by continuous monitoring, detecting an additional 21.6% (p=0.004) of arrhythmias not detected on baseline ECG. Thirty-day mortality was 34.7% (n=32) and was similar in patients with, and without, arrhythmias (42.2% vs. 30.2% p=0.239). In-hospital mortality was 25.6% (n=10) in the arrhythmia group vs. 5.7% (n=3) in the non-arrhythmia group (p=0.007). The terminal rhythm was retrospectively identified as ventricular fibrillation in 3 patients who died during monitoring. Sustained ventricular tachycardia was the only independent predictor of in-hospital mortality [OR 18.1, (95% CI 2.1 - 157.0), p=0.009].

Conclusions: Arrhythmic events in AHF were common and identified more frequently by 24-hour continuous monitoring than by 12-lead ECG. These events were associated with markedly increased in-hospital mortality. Real-time ECG in AHF should be utilised routinely for risk stratification and to support timely therapeutic interventions such as cardio-pulmonary resuscitation, prompt defibrillation and antiarrhythmic therapies which can reduce mortality.

Development and validation of a diagnostic approach for foetal Long-QT syndrome in children

Sally-Ann Clur*, A. Suzanne Vink*,#, Irene M. Kuipers*, Rianne H.A.C.M. De Bruin-Bon#, Arthur A.M. Wilde# and Nico A. Blom*

*Department of Paediatric Cardiology, Emma Children's Hospital Academic Medical Centre, Amsterdam, Netherlands. #Heart Centre, Department of Cardiology, Academic Medical Centre, Amsterdam, Netherlands. †Department of Paediatric Cardiology, Willem-Alexander Children's Hospital, University Medical Centre, Leiden, Netherlands

Background: Diagnosing foetal Long-QT syndrome (LQTS) is hampered by the unavailability of an ECG and invasiveness of DNA analysis. We aimed to develop and validate a novel diagnostic approach in children using colour Tissue Doppler Imaging (cTDI) in order to provide a potential marker for foetal LQTS.

Methods: This cross-sectional study included 41 LQTS children and age- and gender-matched controls. Both the myocardial contraction duration (CD) on cTDI and an ECG were obtained. CD was validated using a previously defined cTDI parameter. Inter-method and reproducibility were presented as intraclass-correlation coefficients (ICC). Receiver-operating characteristic (ROC) analysis was done and the optimal cut-off value for CD was determined. Feasibility was tested in a pilot study among foetuses.

Results: LQTS children had a longer CD compared to controls (p=0.004), while there was no statistical difference in heart rate. CD reliably associated with the QT-interval (ICC=0.80) and the previously defined cTDI parameter (ICC=0.87). The inter- and intra-observer validity was also high (ICC=0.91 and ICC=0.94). The area under the curve for CD was 0.71, and an optimal cut-off value of 415ms showed a 56% sensitivity and a 78% specificity in diagnosing LQTS. The measurement of the CD was feasible in foetuses and had a high intra-and inter observer validity (ICC=0.71 and ICC=0.88).

Conclusions: Myocardial CD assessed by cTDI was prolonged in LQTS children, and correlated reliably with the QT-interval. Measuring the CD in foetuses seems feasible, and a prolonged CD may therefore be a marker for prenatal LQTS.

Left ventricular isovolumetric relaxation time is prolonged in foetal long QT syndrome

Sally-Ann Clur*, Arja S. Vink*, Pascal Robles de Medina*, Annika Rydberg#, Susan Etheridge†, Arthur A. Wilde*, Nico A. Blom*, D. Woodrow Benson‡, Ulrike Herberg◊, Mary T. Donofrio§ and Bettina Cuneo△

*Academic Medical Centre, Amsterdam, Netherlands. #Department of Clinical Sciences, Paediatrics, Umeå University, Umeå, Sweden †Primary Children's Hospital, Salt Lake City, United States of America. ‡Herma Heart Centre, Children's Hospital of Wisconsin, Milwaukee, United States of America. ◊University of Bonn, Bonn, Germany. §Children's National Medical Centre, Washington, United States of America. △The Heart Institute, Department of Paediatrics, Children's Hospital, Denver, United States of America

Objective: Long QT syndrome (LQTS), an inherited cardiac repolarisation disorder, is an important cause of foetal and neonatal mortality. Detecting LQTS prenatally is challenging. A foetal heart rate (FHR) <3rd percentile for gestational age (GA) is specific for LQTS but the sensitivity is only approximately 50%. Left ventricular isovolumetric relaxation time (LVIRT) was evaluated as a potential diagnostic marker for prenatal LQTS.

Methods: Left ventricular isovolumetric contraction time (LVICT), ejection time (LVET), LVIRT, cycle length (CL) and FHR were measured using pulsed Doppler waveforms in foetuses. Time intervals were expressed as percentages of CL (normalised), and the left ventricular myocardial performance index (LVMPI) was calculated. Single measurements were stratified by GA and compared between LQTS foetuses and controls. Receiver-operator curves were performed for FHR and normalised LVIRT (N-LVIRT). A linear mixed effect model, including multiple measurements, was used to analyse trends in FHR, N-LVIRT and LVMPI.

Results: There were 33 LQTS foetuses and 469 controls included. In LQTS foetuses the LVIRT was prolonged after 16 weeks GA ($p<0.001$), as was the N-LVIRT in all age groups. The best cut-off to diagnose LQTS was N-LVIRT ≥11.3% at 16 - 20 weeks GA (92% sensitivity, 67% specificity). Simultaneous analysis of N-LVIRT and FHR improved the sensitivity and specificity for LQTS [AUC=0.96 (95% CI 0.82 - 1.00) at 21 - 30 weeks GA]. N-LVIRT, LVMPI and FHR trends differed significantly between LQTS foetuses and controls through gestation.

Conclusion: The LVIRT is prolonged in LQTS foetuses. Findings of a prolonged N-LVIRT and sinus bradycardia can improve the prenatal detection of foetal LQTS.

Semilunar valve growth in foetal transposition of the great arteries: Is valve size predictive of post-operative aortic root dilatation?

Sally-Ann Clur*, C.W. van der Zee*, A.S. Vink#, E. Pajkrt†, N.A. Blom* and R.L.F. van der Palen*

*Department of Paediatric Cardiology, Emma Children's Hospital Academic Medical Centre, Amsterdam, Netherlands. #Department of Cardiology, Academic Medical Centre, Amsterdam, Netherlands. †Department of Obstetrics and Gynecology, Academic Medical Centre, Amsterdam, Netherlands

Background: Transposition of the great arteries (TGA) is treated with the arterial switch operation (ASO). Despite excellent long-term survival, important residual lesions which may require re-interventions, such as neo-aortic root (NAR) dilatation, which can be identified from early childhood, are increasingly being recognised. The aim was to determine if NAR dilatation can be predicted prenatally and to document semilunar valve growth in foetal TGA.

Methods: All foetuses diagnosed with TGA suitable for ASO in our institution were included (2000 - 2016). Measurements included semilunar valve annuli, prenatally and postnatally and NAR at 1-year and last checkup. Annulus growth was analysed using a linear mixed-effect model and compared to normal values (Schneider et al., 2005). Semilunar valve Z-scores and NAR were correlated.

Results: Forty-one foetuses were included, 2 were lost to follow-up, 7 died (1 post ASO) and 33 underwent an ASO. In addition, 7/33 (21%) had a significant VSD. The median postnatal follow-up was 7.3 years (4 months - 10.5yrs). TGA-aortic valve (AoV) annuli were significantly larger than controls, but correlated with the control pulmonary valves (PV). TGA-PV diameters were comparable with control PV annuli but were significantly larger than control AoV annuli, especially in the sub-group with a VSD. Semilunar valve Z-scores correlated significantly with NAR dilatation, ($p=0.002$ PV 26 - 36 weeks'; $p=0.0002$ AoV 26 - 30 weeks'). The best cut-off value to predict a postnatal NAR ≥Z+2 was a PV Z-score 31.12 at 32 - 36 weeks' (sensitivity 87.5%; specificity 80.0%).

Conclusion: Foetal TGA semilunar valve annuli show accelerated growth, especially when there is a significant VSD. Significant correlations between foetal TGA semilunar Z-scores and post ASO NAR dilatation were found. Factors, besides post-operative haemodynamics, such as prenatal flow, quality and quantity of connective tissue and genetic factors may influence NAR dilatation.

Surgical repair of mixed total anomalous pulmonary venous connection (TAPVC): Case report

Natercia Da Silva*, Liesl Zülkhe# and Andre Brooks*

*Cardiothoracic Surgery, Chris Barnard Division of Cardiothoracic Surgery, University of Cape Town, Observatory, South Africa
#Paediatric Cardiology, Red Cross War Memorial Children's Hospital, University of Cape Town, Observatory, South Africa

Background: Description of a rare case report of mixed total anomalous pulmonary venous connection (TAPVC) as a late diagnosis of cyanotic heart disease in a patient incorrectly diagnosed with pulmonary tuberculosis (TB).
Methods: The diagnosis was confirmed as a mixed supracardiac and infracardiac TAPVC in a 14-month-old patient in one of the main South African tertiary congenital heart units at Red Cross War Memorial Children's Hospital. Diagnosis was confirmed with computerised tomographic (CT) reconstruction and echocardiographic evaluation. Surgical correction of the congenital lesion is described.
Results and Conclusion: The management strategy and results of surgery of the mixed variety of TAPVC are limited and conflicting. This case illustrates the complementary diagnostic value of various cardiac imaging modalities in understanding pulmonary venous drainage. This case reports a good outcome in a unique late diagnosis of mixed TAPVC which was surgically corrected. The surgical approach and repair is depicted and clinical outcome is described.

Long term stability of isolated human serum derived exosomes

Candice de Boer and Neil Davies

Chris Barnard Building, University of Cape Town, Cape Town, Observatory, South Africa

Background: Exosomes are secreted membrane vesicles which are found in various body fluids. Due to exosomes being nano-sized vesicles (20 - 100nm) that naturally transport RNA, mRNA and miRNA around the body they are a suitable delivery vehicle for gene or drug therapy. The long-term stability of human serum exosomes needs to be investigated for further translation into therapeutic applications.
Method: Human serum exosomes were isolated using either size exclusion chromatography (SEC) or ultracentrifugation (UC). Stability of exosomes isolated in PBS and stored at 37°C for 3 weeks with gentle agitation and -80°C was assessed by their morphological appearance and functionality.
Results and conclusion: Both the SEC and UC exosomes retained their physical properties at -80°C and 37°C, as viewed under an electron microscope. Both the -80°C and 37°C stored SEC exosomes were biologically active as they were able to be taken up by HT1080 cells, as detected by fluorescence, as well as significantly assisting human dermal fibroblasts to proliferate detected using an XTT assay and there was no statistical difference between the storage temperatures. Both the -80°C and 37°C stored UC exosomes were able to be taken up by HT1080 cells as detected by fluorescence. Human serum exosomes isolated using SEC retain physical properties and functional activity when stored for 3 weeks at 37°C. Long term stability of exosomes is an advantage for further therapeutic applications using exosomes.

Clinical results of the C-Pulse system in patients suffering from moderate or severe heart failure

Pascal Dohmen*, Holger Hotz#, Kia Pautsch#, Sofia Bienia#, Alper Oener†, Francis Smit‡, Roland Hetzer# and Hueseyin Ince†

*Heart Centre Rostock, Department of Cardiac Surgery, University of Rostock, Rostock, Germany. #Cardio Centrum Berlin, Academic Teaching Institution of Charité, Medical University Berlin, Berlin, Germany. †Department of Cardiology, Heart Centre Rostock, University of Rostock, Rostock, Germany
‡Department of Cardiothoracic Surgery, Faculty of Health Science, University of the Free State, Bloemfontein, South Africa

Background: The C-Pulse system is an extra-aortic balloon counter pulsation device to treat patients suffering from heart failure.
Methods: Seven patients, mean age of 59.6 ± 5.3 years, were treated between May 2013 and March 2014 with the C-Pulse system. Five patients suffered from ischaemic and 4 from non-ischaemic cardiomyopathy. Six patients were in NYHA functional class III and 1 in class IV. Clinical data up to 1-year site-reported as part of the prospective observational post-market OPTIONS HF study were evaluated.
Results: There was no mortality observed. During follow-up no stroke, myocardial infarction, major bleeding, or major infection due to the device were reported. Within 6 months of observation, functional NYHA class improved significantly at 6 months (p=0.034) and 1 year (p=0.025) post-operative. The mean left ventricular ejection fraction increased from 19.5 ± 6.3% to 38.0 ± 11.2% (p=0.004) and 40.0 ± 9.3% (p=0.003), respectively at 6 and 12 months. Six minute walk test was performed in 6 out of 7 patients at follow-up. The mean distance improved from 264.83 ± 89.18m to 313.74 ± 62.47m at 6 months and 423.00 ± 230.71m at 12 months, however not significant respectively p=0.143 and p=0.356. One patient was weaned off the device after 6 months of support.
Conclusion: The C-Pulse system provides a therapeutic option for patients with moderate to severe heart failure and seems to improve quality of life and cardiac function over time.

Implantation of sutureless aortic valve in a high-risk patient with active infective endocarditis TAVI

Pascal Dohmen*, Johanna Konertz#, Alper Oener†, Hueseyin Ince† and Francis Smit‡

*Heart Centre Rostock, Department of Cardiac Surgery, University of Rostock, Rostock, Germany. #Department of Cardiovascular Surgery, Charité Hospital, Medical University Berlin, Berlin, Germany. †Heart Centre Rostock, Department of Cardiology, University of Rostock, Rostock, Germany ‡Department of Cardiothoracic Surgery, Faculty of Health Science, University of the Free State, Bloemfontein, South Africa

Background: Active infective endocarditis (AIE) is a major problem, especially for patients with prior valve intervention or device implantation.
Method and results: We present a 77-year-old patient suffering from AIE 14 months after transcatheter-implanted aortic valve (TAVI). The heart team considered TAVI by increased operative risk, EuroSCORE of 10.42%, including severe pulmonary hypertension, chronic obstructive pulmonary disease, insulin dependent diabetes mellitus, chronic renal failure and polyneuropathy. Post-interventional, the patient suffered from an aneurysm spurium. During follow-up, the patient underwent dental treatment and afterwards developed a 39°C fever and blood culture repeatedly showed Escherichia Coli. Echocardiographic examination showed a new paravalvular leakage with limited vegetation at the TAVI. The heart team decided, although a EuroSCORE of 63.57%, appropriate antimicrobial therapy in combination with surgery. A sutureless aortic valve was embedded after annulus patch reconstruction. The post-operative course was uneventful.
Conclusion: This case demonstrated that sutureless valves may be a valuable option for AIE-TAVI treatment.

Development of a 3D cell RNA interference assay

Emma Doubell, Deon Bezuidenhout and Neil Davies

Cardiovascular Research Unit, Chris Barnard Building, University of Cape Town, Cape Town, Observatory, South Africa

Background: RNA interference (RNAi) is considered an attractive alternative therapeutic for a range of disease conditions including hypercholesterolemia and myocardial infarction related targets as well as to prevent restenosis after coronary stent implantation. However, their translation to the clinic is limited through lack of suitable delivery mechanisms that can achieve targeted sustained release and adequate protection from RNase degradation. Scaffold based delivery may be a suitable tool to achieve this. Currently there is a lack of suitable in vitro assay with which to test such delivery, therefore the aim is to develop a novel in vitro 3D cell culture assay for the assessment of delivery potential in vivo.
Methods: Dermal equivalents were formed with HT1080 cells and placed into PEG hydrogels containing siRNA nanoparticles. Transfection of the cells in 3D was assayed using confocal, fluorescent and phase microscopy. siRNA nanoparticles trapped within PEG hydrogels were placed into 50% foetal bovine serum (FBS) or in buffer. After incubation in 50% FBS, siRNA was released and assayed for degradation by agarose gel electrophoresis. siRNA entrapment was also assessed in a similar manner however the suspension buffer, as well as siRNA released from the hydrogels, was assessed.
Results: Cells were able to migrate through the hydrogel within 1 hour of setting, and continued until stopped. Transfection was seen within cells after 3 days, and after 6 days there were proportionally higher levels of gene knockdown compared to controls. We were also able to demonstrate that the hydrogels were able to retain nanoparticles for a number of days and that they did not negatively affect RNase protection.
Conclusion: The successful migration of cells through a PEG hydrogel with siRNA transfection in 3D, and the entrapment of nanoparticles in PEG, demonstrates in vitro the in vivo potential for our delivery of siRNA.

Impact of prolonged occlusion flow mediated dilatation on radial artery cannulation in patients undergoing transradial coronary angiography: Preliminary data

Jacques Doubell, Charles Kyriakakis, Amaan Panday, Hellmuth Weich, Philip Herbst, Alfonso Pecoraro, Jane Moses, Bradley Griffiths, H.W. Snyman, Lorrita Kabwe, Henry Cyster and Anton Doubell

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

Background: The transradial approach to coronary angiography has become the technique of choice but it is not without complications. Transradial cannulation has higher failure rates and can be complicated by radial artery spasm (RAS), radial artery pulsation loss (RAPL) and radial artery occlusion (RAO). Dilation of the radial artery prior to cannulation may decrease these complications. We aim to explore the use of prolonged occlusion flow mediated dilatation (PO-FMD) to dilate the vessel prior to cannulation to increase cannulation success. We report on the first 144 patients enrolled.
Methods: Patients undergoing transradial coronary angiography are enrolled and randomised into PO-FMD and sham-PO-FMD groups. PO-FMD is achieved by a 10 minute inflation of a blood pressure cuff on the upper arm prior to cannulation. In the sham-PO-FMD group the blood pressure cuff on the upper arm is not inflated. Number of attempts, success of cannulation and occurrence of complications are recorded. The radial artery is assessed by ultrasonography before, and after, the procedure.
Results: One hundred and twelve patients have been randomised to the sham-PO-FMD group and 102 to the PO-FMD group. The radial artery diameter prior to cannulation was 2.24mm ± 0.46mm in the sham-PO-FMD group and 2.29mm ± 0.45mm in the PO-FMD group. The number of

puncture attempts was significantly less in the PO-FMD group with 3.18 ± 3.57 in the sham-PO-FMD group and 2.54 ± 2.72 in the PO-FMD group ($p<0.05$). There were 6 failed cannulations in the sham-PO-FMD group and 2 in the PO-FMD group. Time to cannulation was 111s ± 116s in the sham-PO-FMD group and 97s ± 101s in the PO-FMD group. There were 6 RAS, 5 RAPL and 4 RAO in the SHAM-PO-FMD group and 7 RAS, 2 RAPL and 3 RAO in the PO-FMD group.

Conclusion: PO-FMD decreases puncture attempts during transradial coronary angiography.

Iliac vein access: Alternative pacing method

Vernon Freeman [*] ***and Paul Martin*** [#]

[*]Melomed Hospital Group, Cape Town, South Africa. [#]Royal Brisbane and Women's Hospital, Queensland, Australia

Introduction: Pacing, automated defibrillation and cardiac resynchronisation involves a venous transluminal pathway to the target organ (the heart) from the position chosen for generator placement. We present as case here where the option of using the right and left sided veins if the upper limbs were not available. The right lower veins were used as access through the IVC.

The patient: First pacemaker inserted in China at age 30 in 1996 for sinus rhythm with complete AV block. The patient required a new generator and leads. The current pacemaker on the right side had occluded veins with collateral circulation. Attempt to add new device via left infraclavicular veins were foiled by tortuosity

Venous access: The leads would enter the venous system above the inguinal ligament.

The leads: This procedure requires long leads and therefore a 65cm lead (Medtronic, Minnesota, USA Model 5076-65) was prepared for RV pacing. The atrial lead (Medtronic, Minnesota, USA Model 5076-65) was placed into the RA appendage via similar method.

Discussion: As device management evolves device specialist will all eventfully be challenged by bilateral occlusions of the upper limb veins. Recanalisation is not without its dangers and can at times be achieved, but more than one lead and maneuvers are difficult to perform. Epicardial pacing is an option, but this involves a thoracotomy that may not be suitable for all patients. Femoral placement of leads and then tunneling to a suprainguinal packet is achievable. The turn that the pacing lead has to make may (logically) prove to cause more lead fractures (no case reports to support this). Iliac vein access is an alternative for device implantation when conventional upper limb venous options are not available.

Characteristics of children presenting with cardiomyopathy in an African setting: Initial findings of the Imhotep registry

Barend Fourie [#] ***, George Comitis*** [*] ***, Sarah Kraus*** [†] ***, Alexia Joachim*** [*] ***, Rik De Decker*** [*] ***, Liesl Zühlke*** [*,†] ***and John Lawrenson*** [*,#]

[*]Red Cross War Memorial Children's Hospital, University of Cape Town, Observatory, South Africa. [#]Division of Cardiology, Department of Medicine, Faculty of Medicine and Health Sciences, University of Stellenbosch and Tygerberg Hospital, Bellville, South Africa. [†]Department of Medicine, Groote Schuur Hospital, University of Cape Town, Observatory, South Africa

Background: Cardiomyopathy remains a leading cause of morbidity and mortality in children worldwide. Although we see 40 - 50 incident cases annually in Cape Town, the characteristics of childhood cardiomyopathies in African children have not been systematically described. IMHOTEP is the first prospective, open-ended registry of prevalent and incident cases of heart muscle disease in children and adults in Africa. It will expand from pilot sites in Cape Town to other centres in South Africa and subsequently have representation from all 56 countries in Africa to accurately characterise cardiomyopathies on the African continent.

Methods: Commencing August 2016, all incident cases of cardiomyopathy or myocarditis presenting to 2 referral paediatric cardiac centres were enrolled into a dedicated OpenClinica registry (IMHOTEP African Cardiomyopathy Registry). Details captured include demographics, history, physical examination findings, blood investigation results, genetic screening, chest X-ray, ECG, echocardiogram features and outcome measures (adverse events, hospitalisations, death). Human Research Ethics Committee approvals were obtained prior to implementation of the registry.

Results: Up to date, 25 patients have been enrolled in the registry. The majority of patients are infants (11/25, 44%). Four of the 16 patients (25%) are perinatally HIV exposed, but all 4 tested negative by PCR. The predominant cardiomyopathy phenotype is dilated cardiomyopathy (12/25, 48%) followed by myocarditis (biopsy-proven, clinically suspected or on CMR, 7/25, 28%). Morbidity and mortality to date has been substantial – 7 deaths (mortality 28%), average hospitalisations 2.7/patient, average ICU admissions 1.3/patient, and mean number of days in hospital 28.6 (SD 17).

Conclusion: Already in these early stages, we see the full range of phenotypes represented in African children with cardiomyopathy and a significant mortality and morbidity. The paediatric limb of the IMHOTEP African Cardiomyopathy Registry promises to be a powerful tool to characterise childhood cardiomyopathy in Africa.

Echocardiographic assessment of left ventricular function in pre-eclampsia complicated by pulmonary oedema: Findings from the LV IMPACT study

Bradley Griffiths*, Anton Doubell*, Philip Herbst* and Eduard Langenegger#

*Division of Cardiology, Department of Medicine, Faculty of Medicine and Health Sciences, University of Stellenbosch and Tygerberg Hospital, Bellville, South Africa. #Division of Foetal-Maternal Medicine, University of Stellenbosch and Tygerberg Hospital, Bellville, South Africa

Background: Acute pulmonary oedema as a complication of pre-eclampsia poses significant risk to mother and foetus. Currently the cause is unknown. Published data on echocardiographic (echo) findings in this setting suggest left ventricular (LV) systolic and diastolic dysfunction may play a role. We hypothesise that pulmonary oedema complicating pre-eclampsia is associated with the presence of LV dysfunction.

Methods: Patients presenting to Tygerberg Hospital with pre-eclampsia and pulmonary oedema between February 2016 and February 2017 were prospectively enrolled. Identified pre-existing cardiac disease or an alternative cause for pulmonary oedema were exclusion criteria. An echo was performed as soon as possible after diagnosis, with a follow-up echo 2 months later. Two control groups are currently being enrolled: pre-eclampsia without pulmonary oedema, and no pre-eclampsia.

Results: Twenty-one patients met eligibility criteria during the enrolment period, with a mean age of 28. The mean time from pulmonary oedema diagnosis to echo was 28 hours. LV ejection fraction (LVEF) estimation by Teicholz method was possible in all patients, with an LVEF <50% found in 8/21 (38%). LVEF estimation by Biplane method was possible in 14/21 (67%), with an LVEF <50% found in 3/14 (21%). Evidence of diastolic dysfunction was found in 10/21 (48%). At follow-up, 4/11 (36%) showed improvement in LV systolic function and 4/11 (36%) showed deterioration. Improvement in diastolic function was seen in 7/11 (64%). Provisional data from the control cohorts suggest a lower incidence of LV systolic function and less diastolic dysfunction, but enrolment is ongoing.

Conclusions: LV function in patients with pre-eclampsia and pulmonary oedema varies widely, from normal to significantly and persistently abnormal. This likely represents the heterogeneous nature of the condition. Data from the control cohorts will help to further define this group.

The prevalence of psychosocial risk factors in acute myocardial infarction

Denishan Govender, Ahmed Vachiat and Pravin Manga

Division of Cardiology, Department of Internal Medicine, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa

Background: Psychosocial factors are known to be important risk factors in the development of acute myocardial infarction (MI). However, the biosocial model of disease has been a vastly neglected area of study in South Africa.

Methods: We studied the psychosocial factors in 100 consecutive patients with acute myocardial infarction who presented to a large urban public hospital in Johannesburg. These patients were age, sex and race matched with controls with no cardiac disease. A validated Likert score of frequency of the participants' experiences in the week, prior to the clinical event, was used to assess prevalence of psychosocial factors such as depression, anxiety and stress.

Results: The majority of the study patients fell into the age group 51 - 60 years (38.7% for cases and 31.1% for controls). Caucasians formed the majority of patients with AMI (47.2%) followed by Indian patients (24.5%). Self-reported stress levels were found in 96% of MI patients with almost 40% reporting severe stress levels. The odds of MI was found to be 3.3 fold higher for those with mild to extremely severe depression compared to those with no depression (95% CI 1.02 - 10.4). With regards to work related stress, the odds of MI was found to be 5.6 times higher for those with moderate/severe work stress compared to those with minimal or no stress (95% CI 2.97 - 10.8). Significant financial stress contributed to a 13-fold higher odds of having MI (95% CI 6.79 - 25.1). The odds of MI was not affected by differences in leisure and work time activities.

Conclusion: Psychosocial factors are prevalent in many patients presenting with acute myocardial infarction. A multidisciplinary approach targeting emotional and chronic stressors may be of major benefit in reducing incidence of coronary artery disease.

Assessing the effect of growth factor combination on enhancing cellular vascularisation within a three-dimensional poly(ethylene glycol) scaffold

Carla Astrid Gustafsson, Cindy Chokoza, Kyle Peter Goetsch, Neil Hamer Davies, Deon Bezuidenhout and Peter Zilla

Cardiovascular Research Unit (CVRU), Groote Schuur Hospital, University of Cape Town, Observatory, South Africa

Background: The prevalence of myocardial infarction-induced heart failure has risen drastically over recent years, creating a need for new and effective therapeutic strategies to treat the pathologies seen post-infarction. In 2016, it was estimated that more than 37.7 million people had been diagnosed with HF globally, making this an issue, not only in the first world, but also in developing countries like ours. The controlled release of growth factors (GFs), using biomaterials, has emerged as one of the more promising treatment approaches. In this study, poly(ethylene glycol) [PEG] hydrogels (with or without heparin) were characterised as a controlled release vehicle for basic fibroblast growth factor (bFGF) and placental growth factor-2 (PlGF-2) delivery.

Method: Spheroid assays with HUVECs and HSVECs were used to assess the angiogenic potential of each growth factor alone, and a combination thereof. ELISAs were carried out to create 28-day release profiles for the heparinised and non-heparinised gels. To determine the bioactivity of the

fresh, as well as eluted GFs, chemotaxis and XTT assays were utilised. Rheological analyses were conducted on all types of PEG gels utilised, followed by a hydrolytic degradation experiment.

Results and conclusion: As expected, these factors induced endothelial cell (EC) sprouting (average cumulative sprout length after 72 hours of 920.48 for bFGF 10ng/ml, 519.99 for PlGF-2 100ng/ml, and 1162.39 for the combination of the 2; $p<0.05$) with bFGF also promoting cell proliferation (normalised OD450nm for bFGF 10ng/ml of 1.49, $p<0.05$). The gels could effectively entrap the GFs and release them in a sustained manner, with PlGF-2 maintaining its bioactivity after elution. Gel stiffness, as well as degradation, were confirmed by rheological analyses, with the storage moduli decreasing over time. The findings indicate that these hydrogels hold much promise as a delivery vehicle for therapeutics in the treatment of pathologies that often follow a myocardial infarction.

The prevalence of psychosocial effects in patients with heart failure

Jamie-leigh Hayes*,# and Nqoba I. Tsabedze*,†

*Charlotte Maxeke Johannesburg Academic Hospital, Johannesburg, South Africa. #Durban University of Technology, Durban, South Africa
†University of the Witwatersrand, Johannesburg, South Africa

Background: Chronic heart failure (CHF) is a debilitating disease with significant morbidity and mortality. Previously published data reports a high burden of psychosocial stressors in this population with the prevalence of depression and anxiety ranging from 13.9% - 77.5% and 9.3% - 63% respectively. However, there are no epidemiological data on the psychosocial stressors in a South African CHF population, yet the prevalence of CHF is increasing. We prospectively investigated the prevalence of depression, anxiety and stress in patients with CHF attending a tertiary centre out-patients' clinic.

Methods: We prospectively subjected 103 patients to the DASS-21 questionnaire to determine the prevalence of depression, anxiety and stress. These questionnaire responses were analysed to determine whether depression, anxiety and stress levels reported were mild, moderate, severe or extremely severe using the DASS-21 score sheet. Epidemiological and clinical data were prospectively collected and analysed.

Results: A total of 103 study participants were successfully enrolled. Black patients were the dominant race at 74 (71.8%), followed by White at 12 (11.7%). Females accounted for 64 (62.1%) and the mean age 51.6 (±14.1 SD). The duration of follow-up in our clinic ranged from 0.1 years - 16.9 years with a median of 2.25 years. Depression, anxiety and stress were individually present in 54 (52.4%), 55 (53.4%) and 50 (48.5%), respectively. Depression, anxiety and stress were more prevalent in females (35.9%), (37.9) and (34%), respectively, than males (16.5%), (15.5%) and (14.5%), respectively. Unemployment in patients with depression, anxiety and stress were 77.8%, 74.5% and 80% respectively. Patients that fall into functional classes III and IV who were seen to be depressed, anxious and stressed were 7.4%, 20% and 24% respectively.

Conclusion: Psychosocial stressors are prevalent in patients with CHF. More time and resources need to be invested in assessing for the prevalence of these stressors and in interventional programmes to alleviate their morbidity.

Spectrum and age of presentation of congenital heart disease in KwaZulu-Natal, South Africa

Ebrahim Goolam Mahomed Hoosen*,#, Andiswa Nzimela*,# and Himal Dama*,#

*University of Kwazulu-Natal, Durban, South Africa. #Inkosi Albert Luthuli Central Hospital, Durban, South Africa

Background: KwaZulu-Natal (KZN) is the second most populous province of South Africa but has the most children, over 3.3 million under 14 years. Public sector hospitals serve 85% of this population and refer all patients requiring congenital heart disease (CHD) intervention to Inkosi Albert Luthuli Central Hospital (IALCH).

Method: A "snapshot" of all patients presenting to IALCH paediatric cardiology with significant CHD (defined as CHD likely requiring surgery in childhood) was obtained over 1 calendar year (May 2014 - 2015). Patients were recruited on admission and relevant information recorded via a questionnaire.

Results: A total of 322 patients were identified. The most common conditions were isolated VSD (21%), Tetralogy of Fallot (14%), PDA (13%), complete AVSD (11.5%) and secundum ASD (5%). The most common associated chromosomal abnormality was Trisomy 21 in 18% of patients, 50% of whom had AVSD. Median age of presentation of all congenital heart disease was 149 days (Range: 0 - 4 479). In addition, 41% of VSDs, 57% Tetralogy patients, 48% of PDAs and 54% of VSDs presented beyond 6 months of age. Only 2 simple TGAs, 4 patients with duct dependent systemic circulation, 11 with duct dependent pulmonary circulation and 2 with TAPVC presented within the first 28 days of life. There were 177 patients (55%) which were classified as late presenters. A statistically significant relationship was found between late presentation and cost of travel to the nearest healthcare facility. Late presentation occurred despite the majority of patients having multiple contacts with healthcare professionals. The most commonly missed clinical sign was respiratory distress or cardiac failure in 60% of late presenters.

Conclusion: Significant under and late presentation of CHD occurs in the KZN public sector. Factors responsible for these need to be identified and addressed. Referral patterns and rates may serve as a surrogate marker of the state of the healthcare system in the province.

Congenital Long QT Syndrome (LQTS) associated with complete atrioventricular block: A case report

Samkelo Jiyana*, Adele Greyling*, Zongezile Makrexeni*, Andile Nxele* and Lungile Pepeta#

*Department of Paediatric Cardiology, Walter Sisulu University, Port Elizabeth, South Africa. #Nelson Mandela University, South Campus, Summerstrand, Port Elizabeth, South Africa

Background: Congenital LQTS (autosomal dominant hereditary condition, prevalence of 1/2 500), characterised by a prolonged corrected QT interval (QTc) on ECG, is associated with arrhythmias and sudden cardiac death (SCD). Complete AV block is defined as complete AV dissociation on ECG. Most commonly, AV block associated with congenital LQTS, is 2:1. Congenital LQTS with complete AV block carries a poor prognosis with a high risk for SCD in infancy. Management includes B-blockers and pacemaker implantation. In refractory cases, an implantable cardiac defibrillator and/or left cardiac sympathetic denervation may be considered.
Method: A term infant, presenting with a respiratory tract infection at age 27 days, was found to be bradycardiac. He was born by normal vaginal delivery, birth weight of 3.4kg, with no significant maternal medical, or drug, history. There was no family history of SCD or syncope. On examination he was pink, in respiratory distress with no dysmorphisms. Cardiovascular examination was normal apart from the bradycardia. ECG showed complete AV block with a narrow complex, junctional escape rhythm (50bpm) and prolonged QTc (520ms). Echocardiography revealed a structurally normal heart. U and E and thyroid function tests were normal. Both parents had a normal ECG. A dual chamber epicardial pacemaker was inserted and propranolol commenced. The result of genetic testing is awaited.
Conclusion: We present a case of congenital LQTS with complete AV block due to a de-novo genetic mutation, treated with a combination of pacing and B-blockers. Without intervention, this rare condition carries a high mortality rate.

Atrialised right ventricular myxoma in a patient with Ebstein's anomaly

Thadathilankal-Jess John*, H.W. Snyman*, J. Janson# and A.J.K. Pecoraro*

*Division of Cardiology, Department of Medicine, Faculty of Medicine and Health Sciences, University of Stellenbosch and Tygerberg Hospital, Bellville, South Africa. #Department of Cardiothoracic Surgery, Faculty of Medicine and Health Sciences, University of Stellenbosch and Tygerberg Hospital, Bellville, South Africa

Background: Ebstein's anomaly is a rare entity affecting around 1 in 200 000 live births and accounts for less than 1% of congenital heart diseases. Ebstein's anomaly with an associated myxoma is extremely rare, with only 1 other case report found in the literature.
Methods: We describe a female patient with a histopathologically confirmed right ventricular myxoma in the setting of Ebstein's anomaly.
Results: During surgery, the mass (3 x 2 x 2cm) was successfully excised. The stalk was attached to the interventricular septum and Ebstein's anomaly of the tricuspid valve was confirmed.
Conclusion: This case is important as it: • Illustrates an extremely rare finding of a ventricular myxoma in the setting of an Ebstein's anomaly. • Highlights how an accurate diagnosis can be made using basic principles of examination, ECG interpretation and echocardiography. • Demonstrates the surgical approach to a rare combination.

Acute myocarditis: The role of cardiac MRI in establishing the diagnosis

L. Kabwe*, C.G. Kyriakakis*, H. Weich*, A.J.K. Pecoraro*, D. Zaharie#, C. Sher-Lockets#, G. Van Zyl† and P.G. Herbst*

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

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

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

Introduction: Myocarditis is an inflammatory disease of the myocardium with a wide range of clinical presentations. The diagnosis is usually presumptive based on patient demographics and clinical course. The value of cardiac MRI in diagnosing myocarditis is fairly novel. We report on 2 cases both presenting acutely, in different ways, and describe the role of CMR in making the diagnosis.
Case report: **Case 1:** 32-year-old male patient, a methamphetamine user, had acute central chest pain and ECG changes in keeping with an infero-lateral STEMI. Post thrombolysis he had recurrent pain and dynamic ST elevation. Immediate coronary angiography revealed unobstructed vessels. Left ventriculography (and echocardiography) showed a non-dilated left ventricle, with mid-wall dyskinesia and sparing of the basal and apical segments. A diagnosis of mid-ventricular Takotsubo cardiomyopathy was made. Routine blood panel, toxicology screen, CRP and ESR were normal, hs-Troponin T was elevated at 1 265ng/l. CMR revealed sub-epicardial late gadolinium enhancement and tissue oedema, with endocardial sparing typical of a myopericarditis. **Case 2:** A 24-year-old male presented with recurrent episodes of non-sustained ventricular tachycardia (VT) and acute chest pain with syncope. He denied use of illicit drugs or flu like illness. ECG showed regular runs of non-sustained monomorphic VT. Transthoracic echocardiography showed basal inferior septal hypokinesia and coronary angiography unobstructed vessels, with normal left ventricular function. Blood results were normal. CMR, however, revealed sub-epicardial late gadolinium enhancement with sparing of the endocardium, establishing the diagnosis of myocarditis.

Conclusion: Our cases illustrate 2 different acute presentations of myocarditis, one as an acute coronary syndrome and the other with ventricular arrhythmia, both with an unclear initial diagnosis despite thorough workup. CMR afforded us the ability to confidently make the diagnosis of myocarditis. CMR adds value in cases involving the myocardium, where diagnosis is unclear, and removes the need for invasive tests such as myocardial biopsy.

Gallium DOTATATE PET/CT scanning for the detection of inflammation in the pathogenesis of restenosis in patients with mitral stenosis following balloon mitral valvuloplasty

Dominic Kakooza*, Willy Mboyo Vangu# and Pravin Manga

*Division of Cardiology, Department of Internal Medicine, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa
#Department of Nuclear Medicine, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa

Background: Restenosis following percutaneous balloon mitral valvuloplasty (PBMV) for mitral valve stenosis is thought to be an inevitable long-term consequence of PBMV necessitating repeat PBMV or surgery. It has been postulated that the restenosis is driven by inflammation. Gallium DOTATE is an isotope which has been shown to be taken up by inflammatory macrophages in patients with atherosclerosis. We thus postulated that Gallium Dotatate scanning may identify inflammation in mitral valves.
Methods: We identified 19 patients who had undergone PBMV at least 6 months prior to our study and who had echocardiographic evidence of restenosis with valve area 0.5cm^2 lower than immediately post PBMV. Thirteen patients were included in final analysis (6 patients refused participation or were lost to follow-up). Enrolled patients underwent 68 Gallium DOTATATE PET/CT scanning. Both quantitative and qualitative assessment of uptake was performed.
Results: The mean age of the study population was 38 years with 40% male and 60% female. The mean number of years post balloon mitral valvuloplasty was 12 years. A total of 46% (6 patients) demonstrated Gallium Dotatate uptake in the mitral valve, whilst 54% (7 patients) exhibited no uptake in the mitral valve.
Conclusion: Our findings suggest that close to half of patients, more than 10 years post PBMV, have ongoing inflammation in the mitral valve leaflets. This is in concert with recent findings of chronic inflammation and extracellular matrix remodeling in mitral valve restenosis following PBMV.

Aorto-pulmonary shunt survival: A 10-year African single centre review

Michelle Koch and Firoza Motara

Charlotte Maxeke Johannesburg Academic Hospital, Johannesburg, South Africa

Background: The first Blalock-Taussig shunt was performed in 1944. Subsequent to this, various modifications have been used to manage children with cyanotic heart disease associated with decreased pulmonary blood flow. Although the BT-shunt improves pulmonary blood flow, it is only used as a temporary measure and patients would require definitive surgery later in life. The aim of this review was to evaluate patients undergoing aorto-pulmonary shunts at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) and survival to definitive surgery.
Method: Hospital records of patients requiring aorto-pulmonary shunts between 1 July 2007 and 30 June 2017 were reviewed. Relevant information with respect to demographics, pathology, surgery and outcomes were entered onto standardised collection sheets for analysis.
Results: A total of 30 patients underwent an aorto-pulmonary shunt in the given timeframe. Of the 30 patients, 36.7% presented within the first week of life and 20% presented at 1 - 4 weeks of life while 30% were 1 month - 1 year of age and 13.3% were older than 1 year at presentation. The majority of patients had a diagnosis of Pulmonary Atresia (26.7%) and Tricuspid Atresia (23.3%). Following up on the shunt operation up to date, 40% of patients had died and 33.3% were lost to follow-up. Eight patients (26.7%) continue follow-up at cardiology clinic. Four patients (13.3%) have proceeded to definitive surgery while 4 (13.3%) still await corrective surgery.
Conclusion: In this series, aorto-pulmonary shunts provided palliation in patients requiring early surgical intervention. At final follow-up, only 13.3% had proceeded to second stage definitive treatment. The high percentage of mortality and loss to follow-up suggest that this method of palliation in our centre has a guarded outcome.

Percutaneous pericardioscopy in a population with a high prevalence of tuberculous pericarditis (TBP): The potential value of mycobacterial DNA amplification in establishing an early definite diagnosis

Charles Kyriakakis*, Andrew Whitelaw#, Mae Newton-Foot# and Anton Doubell*

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

Background: Establishing a rapid definite diagnosis of tuberculous pericarditis remains challenging. Microscopy of pericardial fluid for acid-fast bacilli (AFBs) is insensitive. Laboratory confirmation remains dependent on Mycobacterium tuberculosis (MTB) culture, which is slow, expensive and insensitive. While the GeneXpert MTB/RIF assay has been well evaluated for pulmonary TB, its use in extrapulmonary TB, and especially pericardial TB, is less well documented.

Objective: To describe the performance of the GeneXpert MTB/RIF assay for detection of MTB in pericardial samples, and to compare the yield of the assay on pericardial fluid and tissue specimens.
Methods: Patients with a moderate-to-large pericardial effusion were offered inclusion. After standard pericardiocentesis they underwent percutaneous pericardioscopy and pericardial biopsy. The evaluation of pericardial fluid specimens included: biochemistry, GeneXpert MTB/RIF, microscopy and TB culture. Tissue specimens were evaluated by microscopy, TB culture, GeneXpert MTB/RIF and histology.
Results: Of 16 participants, 9 were HIV-positive. Pericardioscopy was possible in 13 and biopsy was achieved in 11. Fourteen were diagnosed with definite TBP, 13 of these were MTB culture positive. Mean time to culture positivity was 18 days (14 - 40 days). An alternative diagnosis was established in 2; 1 scleroderma serositis, 1 malignant effusion. Of the 14 with definite TBP, 8 were GeneXpert positive on pericardial fluid and 4 on tissue, with 1 resistant to rifampicin. A single fluid specimen and 3 tissue samples were AFB positive on microscopy. Nine fluid and 10 tissue specimens cultured positive for MTB.
Conclusions: GeneXpert MTB/RIF evaluation of pericardial fluid and tissue allowed for a more rapid diagnosis of definite TBP, compared to culture. Its additional advantage is the ability to rapidly confirm rifampicin resistance. Although microscopy also allows for an immediate diagnosis, its yield is low. Current results suggest that the performance of GeneXpert MTB/RIF may be better on pericardial fluid than tissue.

Acute viral myocarditis presenting with complete atrioventricular heart block and Stoke Adams attacks: Case report and literature review

***Mamaila Lebea*[*,#] *and Antoinette Cilliers*[*]**

[*]Chris Hani Baragwanath Academic Hospital, University of the Witwatersrand, Johannesburg, South Africa. [#]Nelson Mandela Children's Hospital, Johannesburg, South Africa

Background: Myocarditis is an inflammation of the myocardium, usually following a viral infection. It has a wide range of clinical presentations, varying from a tachycardia without pyrexia to heart failure and sudden death. The electrocardiogram is often nonspecific and commonly shows a sinus tachycardia, nonspecific ST or T wave changes. Both tachyarrhythmias and bradyarrhythmias have been described. Complete atrioventricular (AV) block is a rare complication. Furthermore, Stokes-Adams (S-A) attacks, which are defined as an abrupt, transient loss of consciousness due to a sudden decrease in cardiac output that is caused by a sudden change in the heart rate or rhythm, are also very rare in children with myocarditis.
Case report: A 4-year-old male presented with episodes of loss of consciousness associated with seizure activity thought to be Stokes Adams attacks. He was found to have a high-grade complete atrioventricular (AV) block secondary to viral myocarditis evidenced by raised cardiac enzymes. His clinical examination was normal, with the exception of a slow and irregular heartbeat. No cardiomegaly was present on chest X-ray and his myocardial function was normal on echocardiography. He was treated with Dobutamine infusion and transvenous temporary ventricular pacing catheter. The AV block resolved over the following 5 days and remains asymptomatic 6 months later.
Conclusion: We report a paediatric case of presumed viral myocarditis presenting with complete AV block and Stokes-Adams attacks. Viral myocarditis associated with complete AV block is rare in children. A few cases have been described in the literature. Although temporary transvenous pacing may be required, in most of the cases the rhythm disturbance is transient and does not require permanent pacemaker placement.

A descriptive study on the prevalence of newly diagnosed glucose dysregulation in patients presenting with acute myocardial infarction at Charlotte Maxeke Johannesburg Academic Hospital

***Menachem Levin*[*,#] *and Pravin Manga*[*]**

[*]Department of Internal Medicine, Division of Cardiology, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa
[#]Netcare Foundation, Johannesburg, South Africa

Background: Cardiovascular disease is a major worldwide health problem and is expected to become the leading cause of death in developing countries by 2020. Prediabetes and diabetes are modifiable risk factors, often previously undiagnosed in patients presenting with acute myocardial infarction. To our knowledge, there are currently no South African data on the prevalence of prediabetes and diabetes in patients with acute myocardial infarction. This study looked at the prevalence in one cardiology referral unit in Johannesburg, South Africa.
Methods: This single centre observational prospective study included 125 patients fulfilling the study criteria for acute myocardial infarction. At presentation, baseline investigations including electrocardiogram, full blood count, troponin and glycosylated haemoglobin levels were obtained from patients. Confounders to HBA1c were taken into consideration. Patients were placed into 1 of 4 groups, depending on HbA1c level and the presence or absence of established diabetes prior to the hospital admission.
Results: The mean age of the study group was 58 years (range 24 years - 83 years) with 103 Males (82%). The group had variable ethnicity and included 5 Coloured (4%), 20 Black (16%), 35 Indian (28%) and 65 White (52%) patients. Overall smoking was the most prevalent risk factor identified with 81 (65%) patients either previously, or currently, smoking. Just over half of patients had a history of hypertension, and one third had an LDL above 1.8mmol/l. Only 26% of patients gave a family history of ischaemic heart disease. Newly diagnosed prediabetes and diabetes were found in 35% and 18% of patients, respectively.

Conclusions: In patients presenting to our unit with acute myocardial infarction, 35% were found to have newly diagnosed prediabetes and 18% newly diagnosed diabetes. These results are in keeping with international trends. They highlight the significant growth of lifestyle associated disease and subsequent increased burden of cardiovascular disease in our population.

Cardioprotection is not associated with upregulation of mitophagy

Amanda Lochner, Karthik Dhanabalan, Sibo Mzezewa and Barbara Huisamen

University of Stellenbosch and Tygerberg Hospital, Bellville, South Africa

Background: The mitochondrion has emerged as an important role player in cardiomyocyte survival/death via the permeability transition pore and its capacity to generate free radicals. In addition, removal of damaged mitochondria by mitophagy may play an important role in maintaining cardiac function, both at baseline and in response to stress such as ischaemia/reperfusion (I/R). Since hearts from hyperphagia-induced obese rats exhibited normal function and increased resistance to I/R injury, the aim of this study was to determine the effects of (1) I/R on mitochondrial oxidative phosphorylation and mitophagy in these hearts and (2) reactive oxygen species generation during reperfusion by pretreatment with melatonin, a ROS scavenger.

Methods: Four groups of rats were studied: control rats ± melatonin (10mg/kg/day) and high fat diet rats ± melatonin. After 16 weeks hearts were perfused in the working mode and subjected to 25 minutes global ischaemia/10 minutes reperfusion. Mitochondria were prepared in KCl-EDTA and oxidative function measured polarographically with glutamate/malate or palmitoyl-carnitine as substrates. Mitophagy was assessed using Western blot and PINK, Parkin, p62/SQSTM1 and TOM70 as markers.

Results: Long-term melatonin administration caused a significant reduction in infarct size of both control, and HFD rat hearts. With palmitoyl carnitine the QO2 (states 3 and 4) was higher in mitochondria from obese rat hearts, while melatonin was without effect in both groups. Ischaemia, as well as reperfusion, caused downregulation of PINK in control heart mitochondria, with a further lowering by melatonin treatment. PINK and p62SQSTM1 expression was lower in hearts from obese rats under control conditions as well as after 25 minutes ischaemia, with melatonin having no effect on mitophagy.

Conclusion: Cardioprotection induced by melatonin had no effect on mitochondrial function but was associated with a lowering in mitophagy in control, but not obese hearts.

Characteristics and outcomes of severe and complicated hypertension in an urban area of Mozambique

Naisa Manafe*, Rosália Nhabete†, Elsa Machava†, Josefa Daniel†, Karen Sliwa‡ and Ana Olga Mocumbi*,#,†

*National Institute of Health, Maputo, Mozambique. #University of Eduardo Mondlane, Maputo, Mozambique. †Hospital Geral Mavalane, Maputo, Mozambique. ‡Hatter Institute for Cardiovascular Research in Africa, Department of Medicine, Faculty of Health Sciences, University of Cape Town, Observatory, South Africa

Background: Hypertension is a major challenge to public health and a major reason for hospitalisation and death. In Mozambique, low levels of detection, treatment and control are described. However, data on target-organ damage (TOD) and associated clinical conditions are lacking. We therefore aimed at characterising the clinical profile of subjects with severe hypertension and determining the outcomes at 6-month follow-up.

Methods: We designed a prospective descriptive cohort study to assess adults with severe hypertension, as defined according to the JNC VII guidelines. The study was conducted from April 2016 - May 2017 at Mavalane Hospital in Maputo, Mozambique. Patients were characterised through physical examination, laboratory profile, electrocardiography, echocardiography, and then followed for 6 months to assess occurrence of complications such as heart failure, stroke, renal failure, hospital admission and death. Data were analysed using SPSS software version 20.0. The study was approved by the National Bioethics Committee for Health of Mozambique.

Results: We studied 116 subjects (111 [95.7%] Black; women 81 [70%]). Women were slightly younger than men (mean 57 years vs. 59 years); with 18 (15.5%) patients younger than 44 years. Risk profile included diabetes (10; 8.6%); smoking (8; 6.9%) and obesity (46; 42.5%). Mean values for systolic and diastolic blood pressure (BP) were 192.3 ± 23.6 and 104.2 ± 15.2, respectively. The most frequent TOD were left atrial enlargement in 91 (88.3%); left ventricular hypertrophy in 57 (50.4%); hypertensive retinopathy in 30 (26.3%) and renal damage in 19 (16.3%) subjects. Most subjects (80.2%) were receiving antihypertensive treatment at entry, but only 37.4% had BP controlled at the end of follow-up. Major events during 6-month follow-up were renal damage (4.2%), stroke (3.4%) and heart failure (1.7%) as well as hospitalisations (10.3%) and death (8.6%).

Conclusion: Severe and complicated hypertension is associated with poor outcomes and high case-fatality rate on short-term follow-up.

Auditing the prevalence, characteristics and medical management of atrial flutter in a tertiary setting in South Africa: Preliminary data

Joshua Marx, Anton Doubell, Inaayat Mahomed and Jane Moses

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

Background: Atrial flutter (AFL) is a common supra-ventricular arrhythmia in the first world and it is thought to be so in South Africa too, although little data exist. AFL is a macro-reentry circuit, typically occuring in the right atrium and involving the cavo-tricuspid ishtmus. AFL can only be definitively diagnosed by a 12-lead electrocardiogram (ECG). It usually has an atrial rate of 300 beats per minute and mostly conducts to the ventricles in a 2:1 fashion, leading to a rapid heart rate. AFL is often seen in patients with structural heart disease and can result in a tachycardia induced cardiomyopathy and predisposes to stroke. There is a perception that atrial flutter is sub-optimally managed in our patient population.

Methods: A retrospective descriptive study on AFL in a tertiary centre in South Africa was conducted. Cases were identified from all electronic ECGs taken at Tygerberg Hospital (TBH) from 1 January to 31 December 2016. Echocardiographic data within 6 months of each ECG was evaluated.

Results: From 14 141 ECGs analysed, 80 displayed atrial flutter (5.7/1 000). Males predominated (67.5%). The average age was 61 years. Typical AFL accounted for 90%. The average atrial rate was 266bpm. While most conducted with a fixed ratio, commonly 2:1, 46.25% conducted with a variable block. The average ventricular rate was 96bpm. Transthoracic echocardiography was performed in 63.75% and 25% received transoesophageal echocardiograms. Impaired left ventricular (LV) systolic function was common (63.3%) as was diastolic dysfunction (86.4%). The LV size was normal in 66%.

Conclusion: In those undergoing an ECG in a South African tertiary hospital setting, 5.7/1 000 have atrial flutter, mostly typical. The majority had impaired LV function. One third of patients were managed without echocardiograpy. The reason for this is the subject of this ongoing study.

Anti-retroviral treatment is associated with increased cardiovascular risk in HIV-infected individuals from the Western Cape region

Nyiko Mashele*, Ingrid Webster*, Corli Westcott*, Mashudu Mthethwa*, Frans Everson*, Nandu Goswami#, Patrick De Boever†, Tim Nawrot‡ and Hans Strijdom*

*University of Stellenbosch and Tygerberg Hospital, Bellville, South Africa. #Medical University of Graz, Graz, Austria. †VITO, Antwerp, Belgium ‡Hasselt University, Hasselt, Belgium

Background: The use of anti-retroviral treatment (ART) has substantially increased the life expectancy of people living with human immunodeficiency virus (HIV). However, prolonged use of ART contains its own risks, as different combinations of the treatment have been associated with increased cardiovascular risk. Endothelial dysfunction (ED), a well-established response to cardiovascular risk factors, is common in HIV-infected patients. Sparse data is available on ED, as measured by flow mediated dilatation (FMD) of the brachial artery, in HIV infected individuals on ART. The aim of this cross-sectional study is to access the cardiovascular risk profile of HIV infected individuals on ART in comparison to their treatment naïve counterparts. Additionally, we investigated the potential predictors for FMD in the treatment group.

Methods: We assessed anthropometric, glucose tolerance, serum lipids, FMD, inflammatory and renal markers in HIV positive individuals on ART (n=218) and treatment naïve (n=41).

Results: The ART group was older and showed significantly lower heart rate (HR) and viral load (VL). Additionally, they also displayed elevated cholesterol (total, triglycerides) and gamma glutamyl transferase (cGGT) levels. Multiple regression analysis revealed that ART treatment (ß=-2.96; p=0.01) and C-reactive protein (CRP) levels (ß=-1.77; p=0.04) were associated with a Δ FMD % in the sample population. Further analysis into the treatment group revealed that CRP (ß=-2.11; p=0.03) and waist hip ratio (ß=13.77; p=0.05) were predictors for Δ FMD %.

Conclusion: Increased CVD risk was observed in HIV-infected individuals on ART compared to their ART naïve counterparts. In addition, we found a relationship between FMD and inflammation in the treatment group, potentially increasing their risk for atherosclerotic CVD.

Prevalence of systolic heart failure: Epidemiological study in a single centre

Mamotabo Matshela*,#,† and Nonhle Lushozi‡

*University Of KwaZulu-Natal, Durban, South Africa. #London School of Economics and Political Science, London, United Kingdom †Mediclinic Heart Hospital, Arcardia, South Africa. ‡Durban University of Technology, Durban, South Africa

Background: Heart failure (HF) is a major global health challenge and affects about 26 million people worldwide. In sub-Saharan Africa the syndrome is associated with recurrent hospitalisation causing high hospital expenditures. The prevalence of HF in some population studies accounts for 1 - 2%. The aim of this study was to evaluate the prevalence of HF with reduced ejection fraction (HFrEF) in a single centre setting to improve HF registry and management of HFrEF in the minorities. We also evaluated the association between patients' demographic characteristics with HFrEF and the primary contributing factors.

Methods: A total of 155 patients (45% males, mean age 57 years) with HFrEF, LVEF <50% were studied and included in the registry. Echocardiographic images were evaluated prospectively, between 1 January and 30 June 2016. Patients were divided based on ethnicity, then subdivided into tertiles based on the severity of LV dysfunction and HF symptoms. This was an age and gender matched study.
Results: The mean LVEF was 34 (10%) and prevalence of HFrEF was 12.9%. The study population consisted predominantly from impoverished communities: 73% Africans, 13% Indians, 12% Whites and 2% were of Colour. Strong relationship between the severity of LVEF impairment, black ethnicity, poor socio-economic status and symptoms were demonstrated. Severely impaired LV systolic function was associated with severe symptoms, low socio-economic class and black ethnicity, p<0.001. The major risk factors for the development of LV dysfunction were: hypertension, diabetes mellitus, mitral valve disease, and older age (p<0.0001).
Conclusion: The prevalence of HFrEF was higher than previously reported, with an estimate of 12.9% in the minorities. Low socio-economic class and black ethnicity were associated with severely impaired LV function and a cluster of risk factors for HFrEF, encouraging the need for a larger registry to address health disparities regarding the management of HFrEF in South Africa.

The prevalence of pulmonary hypertension in patients with systolic heart failure: Echocardiography based study

***Mamotabo Matshela*[*,#,†] *and Nonhle Lushozi*[‡]**

[*]University Of KwaZulu-Natal, Durban, South Africa. [#]London School of Economics and Political Science, London, United Kingdom
[†]Mediclinic Heart Hospital, Arcardia, South Africa. [‡]Durban University of Technology, Durban, South Africa

Background: Pulmonary hypertension (PH) is a mean pulmonary arterial systolic pressure (mPASP) greater than 25mmHg at rest and 30mmHg during exercise. The prevalence of PH in heart failure with reduced ejection fraction (HFrEF) has previously been reported to vary, with a 10% prevalence of PH in heart failure reported in smaller studies. The aim of this study was to evaluate the prevalence of PH in HFrEF. We also evaluated the association between left ventricular ejection fraction (LVEF) with mPASP, and left atrial (LA) size and contributing factors of PH in our patients.
Methods: A total of 124 patients (45% males, mean age 57 years) with HFrEF, LVEF <50% were studied. Two-dimensional transthoracic echocardiographic images were evaluated, prospectively and introspectively, between 1 January and 31 December 2016. Patients were divided into 2 groups, based on echocardiographic evidence of PH or not, further subdivided into tertiles based on the severity of LV systolic dysfunction, and later based on the severity of PH. This was an age and gender matched study.
Results: The prevalence of PH and duration of heart failure symptoms were 78% and 8 ± 4 months, respectively. There was a strong inverse relationship between the severity of LVEF impairment and PH, as patients with severely impaired LV systolic function demonstrated more severe PH; χ^2 -0.84, p<0.001. There was a strong relationship between the LVEF and LA size χ^2 -0.83, p=0.002 and also between LA size and severity of PH; χ^2 0.75, p<0.007. The following factors were associated with the development of PH: mitral incompetence, severity of LV dysfunction, older age, hypertension and diabetic (p<0.0001).
Conclusion: The prevalence of PH in HFrEF was higher than previously reported, with an estimate of 78%. PH was highly variable in patients with LV dysfunction and correlated with the severity of LV dysfunction, and LA size.

An unusual case of pulmonary atresia with a tiny ventricular septal defect, a left coronary cameral fistula to the right ventricular outflow tract

Godfrey Mbawala, Antoinette Cilliers and Hopewell Ntsinjana

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

Background: Pulmonary atresia with intact interventricular septum (PAIVS) includes a spectrum of lesions with variable degrees of hypoplasia of the tricuspid valve and right ventricle (RV) and the possibility of coronary fistulae.
Method and results: We present a male neonate born by normal vaginal delivery with good apgars and a birth weight of 2 864g that manifested at 11 days post-delivery with respiratory distress and cyanosis. There were no dysmorphic features. He was apyrexial and haemodynamically stable with a pulse rate of 160/minute and a blood pressure of 63/31mmHg. A 3/6 continuous murmur was audible at the left upper sternal border and a hepatomegaly was palpable 4cm below the right subcostal margin. The electrocardiogram showed evidence of an enlarged right atrium with poor right ventricular complexes. There were no ischaemic changes. The chest X-ray showed reduced pulmonary vascular markings with mild cardiomegaly. The echocardiogram demonstrated pulmonary atresia with a hypoplastic RV and tricuspid valve. There was trivial tricuspid regurgitation with a peak instantaneous gradient of 60mmHg, a small ventricular septal defect measuring 2mm with a right to left shunt, and a 3mm atrial septal defect with bidirectional shunting. A large left sided coronary fistula communicating with the RV outflow tract and a small vertical patent ductus arteriosus was also present. Cardiac catheterisation confirmed the echocardiographic diagnosis. Additional information provided was the presence of suprasystemic pressures within a hypoplastic unipartite RV, multiple coronary fistulas and no identifiable right coronary artery (RCA). In view of the RV coronary dependent circulation and absent right coronary artery the patient was not offered any surgical intervention.
Conclusion: Our patient demonstrates an unusual variety of pulmonary atresia and tiny VSD, behaving like a PAIVS with a large left coronary cameral fistula to the RVOT, absent RCA, and a RV dependent coronary circulation.

Carvedilol causes down-regulation of cardio-protective STAT3, PDGFa and PDE4D in patients with severe chronic primary mitral regurgitation

Keir McCutcheon*, Caroline Dickens#, Therese Dix-Peek#, Sacha Grinter*, Lindsay McCutcheon*, Atulkumar Patel†, Ahmed Vachiat*, Nqoba Tsabedze*, Raquel Duarte# and Pravin Manga*

*Division of Cardiology, #Molecular Biology Laboratory, Department of Internal Medicine, †Department of Cardiothoracic Surgery, University of the Witwatersrand, Johannesburg, South Africa

Background: There is no medical therapy that effectively improves outcomes in patients with chronic primary mitral regurgitation (CPMR). Several studies have demonstrated that beta-adrenergic receptor blockers attenuate left ventricular (LV) adverse remodeling, but no prior study has prospectively examined the LV response to carvedilol treatment in patients with CPMR.

Methods and results: Following baseline investigations, including echocardiography, serum analysis and LV endomyocardial biopsy (EMB), 13 patients with severe CPMR awaiting mitral valve surgery were randomised to carvedilol therapy or no anti-remodeling therapy. At the time of surgery (at a medium of 10 and 7 months after baseline investigations in the study and control groups, respectively), non-invasive investigations and EMB were repeated. Following RNA extraction, 109 candidate genes were selected for study based on previous gene expression studies in animals and humans with heart failure, volume overload and CPMR. Gene expression analysis from endomyocardial RNA determined that in patients treated with carvedilol, there was a significant down-regulation of cardio-protective b-arrestin-2 (p=0.04), grk3 (p=0.03), pde4d (p=0.04), stat3 (p=0.02) and pdgf-a (p=0.03). No significant change in expression of a number of extracellular matrix proteins (Collagen, FBN, VCAN, MMPs, PAI-1) was detected. There was a trend towards significant activation of TNF in the hearts of patients treated with carvedilol (p=0.08).

Conclusion: This is the first prospective study to measure changes in molecular remodeling pathways in response to drug therapy in humans with CPMR. Significant down-regulation of several cardio-protective genes was found in hearts of patients treated with carvedilol supporting previous animal studies demonstrating adverse outcomes with carvedilol.

Carvedilol fails to attenuate adverse remodeling in patients with severe chronic primary mitral regurgitation

Keir McCutcheon*, Sacha Grinter*, Lindsay McCutcheon*, Atulkumar Patel#, Ahmed Vachiat*, Nqoba Tsabedze* and Pravin Manga*

*Division of Cardiology, Department of Internal Medicine, University of the Witwatersrand, Johannesburg, South Africa. #Department of Cardiothoracic Surgery, University of the Witwatersrand, Johannesburg, South Africa

Background: Medical therapy thus far has failed to show effective improvement in outcomes in patients with chronic primary mitral regurgitation (CPMR). Beta-adrenergic receptor blockers have shown attenuation of left ventricular (LV) adverse remodeling and improvement in ejection fraction (EF) in several studies. No prior study has prospectively examined the LV response to carvedilol treatment in patients with CPMR.

Methods: Following baseline echocardiography, 13 patients with severe CPMR awaiting mitral valve surgery were randomised to carvedilol therapy (CRV group) or no anti-remodeling therapy. At the time of surgery (10 and 7 months after baseline investigations in the study and control groups, respectively), echocardiography was repeated.

Results: There was a median reduction in LVEDDI in the CRV group by 1.08mm/m^2 and 0.31mm/^{2} in the control group (p=0.62). The median reduction in LVEDVI in the CRV group was 7.1ml/m^2 and 3.6ml/m^2 in the control group (p=0.76). The median reduction in LVESDI in CRV group was 0.6mm/m^2 and 0.6mm/m^2 in the control group with no significant statistical difference (p=0.72). There was a non-significant reduction in global longitudinal strain in the CRV group by 1% and by 4% in the control group (p=0.11). The median reduction in EF in the CRV and control groups was 4% and 2.5%, respectively, with no significant difference in the change between the 2 groups (p=0.72).

Conclusion: This small, randomised, controlled pilot study is the first to examine the effects of carvedilol on left ventricular remodeling in patients with severe chronic primary mitral regurgitation. After a median follow-up of 10 months, patients treated with carvedilol did not show improvements in echocardiographic measures of LV function such as the LV EF or global longitudinal strain.

A case of an aberrant right subclavian artery associated with a patent foramen ovale complicated by bilateral subclavian artery embolisation

Ruchika Meel*, Ricardo Gonçalves#, Jaroslaw Kowalczyk#, Liam Brannigan# and Jeffrey Harrisberg†

*Division of Cardiology, Department of Internal Medicine, Chris Hani Baragwanath Academic Hospital and the University of the Witwatersrand, Johannesburg, South Africa. #Glynnwood Hospital, Johannesburg, South Africa. †Sunninghill Hospital, Johannesburg, South Africa

Background: Aortic arch anomalies are an uncommon congenital abnormality. Aberrant right subclavian artery, the most common aortic arch anomaly, occurs in 0.5% of the general population. The association of a patent foramen ovale (PFO) presenting with simultaneous bilateral subclavian artery paradoxical embolisation is extremely rare.

Method: Mrs JJ, a 76-year-old female with background history of recent surgery for small bowel obstruction presented with severe pain in both upper limbs with signs of acute ischaemia. An assessment of bilateral threatened upper limbs was made and the patient underwent emergency bilateral

embolectomy. Thrombi were extracted from both brachial arteries. A subsequent work-up revealed a tunneled PFO with a positive bubble test on both the transthoracic, and transoesophageal, echocardiograms. An intermittent small left to right shunt was noted. The PFO was the suspected cause of the paradoxical embolisation to the subclavian arteries. An aortogram revealed an anomalous origin of the right subclavian artery from the aortic arch, just distal to the left subclavian artery. Additionally, she was subsequently found to have a deep vein thrombosis complicated by multiple pulmonary emboli. She underwent successful percutaneous closure of the PFO with an Amplatzer occluder device. She was continued on anticoagulation with warfarin.
Conclusion: We have reported the first case of a PFO and anomalous origin of the right subclavian artery complicated by simultaneous, paradoxical, bilateral subclavian artery embolisation.

Clinical and echocardiographic characteristics of patients with infective endocarditis secondary to nyaope use at Chris Hani Baragwanath Hospital

Ruchika Meel, Claudia dos Santos and Mohammed Essop

Division of Cardiology, Department of Internal Medicine, Chris Hani Baragwanath Academic Hospital and the University of the Witwatersrand, Johannesburg, South Africa

Background: Recently there has been an increase in the number of infective endocarditis (IE) cases related to intravenous (IV) nyaope use at Chris Hani Baragwanath Hospital. We aimed to systematically document their clinical and echocardiographic characteristics.
Methods: Clinical and echocardiographic characteristics of all patients (68) with IE due to IV nyaope use were retrospectively extracted from hospital records (2014 - 2017).
Results: Mean age was 25.8 ± 4.5 years (96% males). Withdrawal symptoms were noted in 17, fever in 40, dyspnea in 52 and right ventricular failure in 30 cases. CD4 count of <200cells/ul was present in 6 patients. The majority were HIV reactive (76%), 8% were positive for Hepatitis B and 58% had Hepatitis C infection. Two patients required dialysis for renal failure. Systemic emboli were noted in 12%. Septic pulmonary emboli were noted in 62%. Prior antibiotic use was encountered in 60% of cases. Blood cultures revealed Methicillin sensitive Staphylococcus Aureus in 61%, Enterococcus faecalis (9%) and Pseudomonas Aeruginosa in 1 patient. Sterile cultures were noted in 29% of patients. Polymicrobial infection was present in 6 patients. Severe RV systolic dysfunction was noted in 13 patients (RVS' <10cm/s). Pulmonary hypertension (PHT) was present in 62%. Mean vegetation size was 14.6 ± 7.7mm. Pericardial effusion was noted in 25 cases. The tricuspid valve was most commonly involved (50%), followed by the mitral (17%), aortic in 3% and pulmonary valve (1 patient). Combined valve lesions were noted in 20%. Eight patients died. On multivariate logistic regression analysis, the main predictor of in-hospital mortality was PHT (OR 0.93, p=0.05).
Conclusion: IE secondary to IV nyaope use is responsible for considerable morbidity and mortality in a predominantly young male population.

Morphological characteristics of the mitral valve in patients with rheumatic mitral regurgitation: A descriptive study

Ruchika Meel, Claudia dos Santos, Hiral Matioda and Ferande Peters

Division of Cardiology, Department of Internal Medicine, Chris Hani Baragwanath Academic Hospital and the University of the Witwatersrand, Johannesburg, South Africa

Background: Surgical repair has proven challenging for rheumatic mitral regurgitation (MR) due to the complex anatomy of the mitral valve (MV). Little data exists pertaining to detailed morphological characteristics of the regurgitant rheumatic mitral valve. Thus, we aimed to objectively describe the MV morphology and its correlation to age and MR severity.
Methods: This was a cross-sectional study comprising 59 patients with moderate or severe rheumatic MR. On 2-dimensional echocardiography mitral annulus (MA), posterior leaflet angle (PL), anterior leaflet angle (AL), coaptation distance (CD), tenting area (TA), anterior leaflet length (ALL), anterior leaflet bending distance (ALBD), bending distance (BD), and posterior leaflet length (PLL) were measured using Philips Qlab9 software.
Results: Median age was 49 (IQR 31 - 55) years (80% females). Severe MR was noted in 17 (29%) patients. Left ventricle ejection fraction was 58.9 ± 11.5%. MA, CD, TA, ALBD, BD, PLL were 41 ± 7.1mm, 9.7 ± 3.7mm, 2.7 ± 1.0cm^2, 14.6 ± 4.3mm, 6.5 ± 2.9mm and 12 ± 4.5mm. AL and PL angles were 23 (IQR 14.5 - 32.8) and 36.6 (IQR 24 - 42) degrees, respectively. There was a positive correlation between age and MA diameter (r=0.35, p<0.05), and, age and CD (r=0.36, p<0.05). MR severity, as measured using effective regurgitant orifice (ERO) and vena contracta (VC), increased as MA diameter increased (ERO and MA: r= 0.29, p<0.05; VC and MA: r=0.29, p<0.05). A positive correlation was noted between ERO and CD (r=0.29, p<0.05), ERO and TA (r=0.29, p<0.05), as well as between ERO and PLL (r=0.53, p<0.05). Further, as the VC increased, there was an increase in PLL (r=0.34, p<0.05).
Conclusion: We have detailed the morphological characteristics of the MV in rheumatic MR. Increasing age likely impacts the morphology of the MV. The extent and form of structural alteration of the valve possibly determines MR severity. These findings may have implications in terms of surgical outcomes following MV repair. Further studies are needed to confirm this hypothesis.

Building surveillance system to access the relative burden hypertension in Mozambique: Insights from a simplified hospital-based registry

***Ana Mocumbi*[*,◊,§], *Norberto Lumbandali*[*], *Austin Schumacher*[#], *Denise Langa*[*], *Carlos Funzamo*[*], *Carlos Macuacua*[†], *Rosalia Nhabete*[†], *Sérgio Chicumbe*[*] and *Wael Al-Delaimy*[‡]**

[*]Instituto Nacional De Saúde and Universidade Eduardo Mondlane, Maputo, Mozambique. [#]University of Washington, Washington, United States of America. [†]Hospital Geral de Mavalane, Mozambique. [‡]University of California, San Diego, United States of America. [◊]University of California, San Francisco, United States of America. [§]Universidade Eduardo Mondlane, Mozambique

Background: Health systems in sub-Saharan Africa have largely concentrated on communicable diseases (CDs). However, there has been a growing burden of non-communicable diseases (NCDs), particularly of risk factors such as hypertension (HTN) and diabetes. Driven by the recognition of limited resources and the lack of an effective surveillance system for NCDs in Mozambique, we developed a tool to collect data on risk factors and diseases targeted by the global prevention and control strategy. The objective of this study was to determine the relative burden of HTN using a simple surveillance tool.

Methods: Between February 2014 and January 2015 we implemented a simplified registry for selected NCD at entry points of a secondary level facility in Maputo, Mozambique. We added age, gender and immediate outcome to the data collected routinely for CD. Health professionals involved in data collection and reporting were trained on the new diseases to report, namely: diabetes, HTN, stroke, asthma, mental illnesses, alcohol intoxication and cancer. Data analysis was performed using R version 3.2.4. Univariate analysis was carried out on all variables using frequencies and percentages. We calculated age- and sex-specific distributions for each disease, as well as the distributions of diseases by patient outcome.

Results: We captured 91 967 new patients at entry points; in 2 637 (2.9%) the diagnosis was missing, or unreadable. Of the 6 423 patients assisted at hospital entry points with the targeted conditions, 2 397 (37%) had HTN. Average age was 54 years and most were female (1 638, 68.3%). Females were more represented (2/3 of all HTN) than males, likely due to a difference in health seeking behaviour and access. In total, 6 HTN patients died representing a quarter of all deaths at entry points.

Conclusions: There is high burden of HTN and NCDs that can be unveiled through their inclusion in the current surveillance tools for CD.

Group A Streptococcus susceptibility to penicillin in a high endemic area for rheumatic heart disease

***Ana Mocumbi*[*,‡], *Lúcio Ribeiro*[*,#], *José Langa*[*], *Eduardo Guno*[†], *Marta Njive*[†] and *Pedro Cabello*[#]**

[*]Instituto Nacional De Saúde and Universidade Eduardo Mondlane, Maputo, Mozambique. [#]Fundação Osvaldo Cruz, Rio de Janeiro, Brazil [†]Centro de Saúde de Mavalane, Maputo, Mozambique. [‡]Universidade Eduardo Mondlane, Maputo, Mozambique

Background: Rheumatic Heart Disease (RHD) is highly prevalent in Mozambique, where a prevalence of 3% was found in school-aged children. However, the incidence of Rheumatic Fever (RF), a post Group A Streptococci (GAS) complication in genetically susceptible individuals, is unknown. GAS circulation has been confirmed in a recent study that showed its occurrence in 6.1% of children aged 5 - 14 years screened at a hospital for fever. Penicillin is the recommended drug for prevention of RF/RHD. In preparation for launching a prevention and control programme in Mozambique, we designed a study to assess the susceptibility of GAS to penicillin.

Methods: Between January 2016 and June 2016 we consecutively assessed children aged 5 - 14 years with odinophagy attending a primary referral hospital in Maputo city. Clinical evaluation, oropharynx swabs and anti Streptolysin O blood tests were obtained from all children. Antibiotic therapy in the last 6 weeks was an exclusion criterion. GAS was detected by culture on blood agar. Antibiotic susceptibility test was performed using the Kirby-Bauer disc diffusion method. The National Bioethics Committee for Health approved the study.

Results: We recruited 72 children with mean age 8 years, of which 27 (37.5%) were boys. GAS was found in culture of the oropharyngeal secretions in 6 children (8.3%). Evidence of recent GAS infection was found in 27 (37.5%). No GAS resistance was observed to oral V penicillin and amoxicillin, 2 antimicrobials recommended for the management of pharyngitis by the local guidelines. Our results confirm the adequacy of penicillin for the management of these infections in this highly endemic area for RHD.

Conclusion: Penicillin remains the drug of choice for the management of GAS pharyngitis in this highly endemic setting for RHD and should thus be used for primary and secondary prevention.

High burden of hypertension among all-cause emergency admissions in Mozambique snapshot of emerging trends (MOZART) disease surveillance study

Ana Mocumbi*[*,‡], Kimberley Keates[#], Igor Dobe[*], Naisa Manafe[*], Norberto Lumbandali[*], Geoffrey Madeira[*] and Simon Stewart[#,†]

[*]Instituto Nacional De Saúde and Universidade Eduardo Mondlane, Maputo, Mozambique. [#]Mary Mackillop Institute of Health Research, Australian Catholic University, Melbourne, Australia. [†]Centre of Research Excellence to Reduce Inequality in Heart Disease, Melbourne, Australia. [‡]Universidade Eduardo Mondlane, Maputo, Mozambique

Background: The limited information on the burden of non-communicable diseases in many low-income countries in sub-Saharan Africa hampers prioritisation of health resources allocation, and deployment of adequate prevention and control measures. We aimed to determine the burden of hypertension relative to other conditions at emergency departments.

Methods: A prospective 30-day (24-hour surveillance) snapshot study was performed with random profiling of one-in-five presentations to the emergency department of major hospitals servicing the urban area in Maputo, Mozambique. For each patient, electronic surveys captured socio-demographic and clinical profile, including past history, vital signs, treatments, discharge status and diagnoses (ICD 10 coded).

Results: From >6 000 patients screened, 1 338 patients of mostly African ancestry (aged 1 month - 85 years, 51% female, 38% paediatric cases) were studied. Although established forms of cardiovascular disease accounted for only 1.1% of cases, 40% of adults reported a past history of hypertension and a further 29% presented elevated BP (>140/90mmHg). Overall, the age (35 ± 15 vs. 36 ± 15 years) and BP profile (132 ± 25/81 ± 14 vs. 131 ± 25/83 ± 15mmHg) of men and women were similar. However, BMI levels were markedly greater in women than men (15% vs. 4% were obese; p<0.001) and increasing BMI was associated with higher BP levels (121 ± 22/76 ± 12 vs. 145 ± 33/89 ± 17mmHg for those with a BMI <20 vs. >30kg/m^2; p<0.001). On an adjusted basis, adults presenting with an elevated BP were older (OR 1.04, 95% CI 1.03, 1.06 per year; p<0.001), male (OR 1.63, 95% CI 1.13, 2.35; p=0.018), have a history of hypertension (OR 1.96, 95% CI 1.33, 2.89; p=0.01) and increasingly overweight (OR 1.08, 95% CI 1.04, 1.12 per kg/m^2; p<0.001).

Conclusions: The high latent risk for cardiovascular disease posed by uncontrolled hypertension calls for immediate action. This type of survey may help to close the gap in routine health information on cardiovascular diseases in Africa.

Impact of an unknown HIV serostatus on the risk of post-operative cardiovascular morbidity and mortality

Yoshan Moodley

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

Background: An unknown HIV serostatus is associated with undesirable patient outcomes in medically treated patients. The impact of an unknown HIV serostatus on post-operative outcomes, such as major adverse cardiovascular events (MACE), in surgical settings with a high prevalence of HIV infection has not yet been established. This was the impetus for the current study.

Methods: This was an unmatched case-control study of 460 (patients with MACE/cases=92 and patients without MACE/controls=368) adult patients who underwent vascular/general surgery at a tertiary South African hospital. Data related to age, gender and the presence of established cardiovascular risk factors in surgical settings were extracted from patient medical records. HIV serostatus for each patient was recorded as positive or negative (where pre-operative documentation of such test results existed) or unknown (where no pre-operative documentation of an HIV test result existed). Data were analysed in accordance with recommendations for unmatched case-control study designs.

Results: Adjusted analysis revealed that there was no statistically significant difference in risk of post-operative MACE between HIV-negative (reference group; 41.3% of cases and 36.4% of controls), HIV-positive (odds ratio: 1.16, 95% confidence interval: 0.42 - 3.21; 7.6% of cases and 13.3% of controls) and HIV-unknown serostatus (odds ratio: 0.85, 95% confidence interval: 0.47 - 1.54; 51.1% of cases and 50.3% of controls) groups.

Conclusion: Our study findings suggest that an unknown HIV serostatus is not a risk factor for post-operative MACE. HIV serostatus should not be included in cardiovascular risk stratification methods in surgical settings with a high prevalence of HIV.

The prevalence of myocardial viability as detected by Flourine-18 Fluorodeoxyglucose Positron Emission Tomography in patients referred for evaluation of appropriateness of coronary revascularisation in Johannesburg

Dineo Mpanya

University of the Witwatersrand, Johanneburg, South Africa

Background: In the management of acute coronary syndromes in sub-Saharan Africa there is a significant delay between the time of onset of chest pain and performance of coronary angiography. Therefore, in our clinical setting, there is a frequent need to assess for the presence of myocardial viability to determine the benefit of myocardial revascularisation. The aim of our study was to determine the prevalence of myocardial viability as

detected by 18F-Fluorodeoxyglucose Positron Emission Tomography (18F-FDG PET) and to compare our prevalence of myocardial viability to data published elsewhere.

Methods: We retrospectively reviewed 99mTc-sestamibi myocardial perfusion Gated Single Photon Emission Tomography (SPECT) and corresponding 18F-FDG PET reports of 240 consecutive patients referred for evaluation of myocardial viability between January 2009 and June 2015. The patients were grouped into those with functionally significant viability with ≥10% viable total myocardium (Group 1), and no significant viability with 0 - 9% of total viable myocardium (Group 2).

Results: A total of 236 patients met the inclusion criteria. There were 193 (82.8%) males. The mean age was 59.1 (SD 11.0) years. The prevalence of myocardial viability in Group 1 and Group 2 was 131 (55.5%) and 14 (5.9%), respectively. The mean survival for 102 patients with functionally significant viability was 2.25 (SD 2.1) years [CI 1.83 - 2.66] and 2.76 (SD 2.3) years [CI 2.21 - 3.32] for 68 patients with no significant viability. There was no statistical significant difference between the 2 groups (p=0.1423).

Conclusion: The prevalence of functionally significant myocardial viability, as detected by 18F FDG PET in our cohort, was 55.5%. Despite delayed access to the cardiac catheterisation laboratory, our viability rates are similar to those reported in the developed world.

Endothelial biomarkers and endothelial function in a South African HIV population of mixed ancestry

Mashudu Mthethwa*, Corli Westcott*, Nyiko Mashele*, Ingrid Webster*, Frans Everson*, Nandu Goswami#, Patric De Boever†, Tim Nawrot†,‡ and Hans Strijdom*

*Faculty of Medicine and Health Sciences, University of Stellenbosch and Tygerberg Hospital, Bellville, South Africa. #Medical University of Graz, Graz, Austria. †VITO, Antwerp, Belgium. ‡Hasselt University, Hasselt, Belgium

Background: Premature cardiovascular disease (CVD) and endothelial dysfunction are prevalent in HIV-infected individuals. HIV has been shown to be associated with increased biomarkers of endothelial injury; however little information is available in the South African context. We aimed to investigate the relationship between endothelial biomarkers and endothelial function in HIV-negative and HIV-positive participants of mixed ancestry in South Africa.

Methods: Fifty-three HIV-negative and 70 HIV-positive participants were recruited from clinics in the Western Cape. About 64% of HIV positive participants were on ART. Serum endothelial biomarkers (p-selectin, e-selectin, ICAM, VCAM, PAI-1) were measured with Mulitplex analysis. Flow mediated dilation (FMD) (clinical measure of endothelial function) was determined in the brachial artery.

Results: Data unevenly distributed was log-transformed. There were no significant differences in BMI and waist circumference between groups. HIV-positive participants showed significantly lower levels of p-selectin [(median and IQR) HIV-negative: 86.4ng/ml (76.9 - 104.3); HIV-positive: 59.87ng/ml (48.13 - 81.9), p<0.0001] and PAI-1 [HIV-negative: 216.6 ± 348.5ng/ml; HIV-positive: 105.7 ± 680.6ng/ml, p<0.0001]. P-selectin (r=-0.4269) and PAI-1 (r=-0.9171) correlated negatively with HIV-infection (adjusting for cardiovascular medication, age, BMI and ART), whereas VCAM (r=-0.3091) and PAI (r=-0.8965) correlated negatively with ART (additionally adjusting for HIV). No differences were observed in %FMD between groups, and regression analysis showed that none of the biomarkers independently predicted %FMD. Forward stepwise regression analysis (adjusting for mentioned variables and baseline diameter) showed that CD4 is an independent predictor of %FMD (b*=0.285881; p=0.01). ICAM (b*=-0.163186; p=0.047) and PAI-1 (b*=-0.552558; p<0.0001) negatively associated with maximum shear rate.

Conclusion: Results indicated a higher CD4 count to be associated with improved endothelial function (stressing the importance of ART). Endothelial biomarkers showed an overall significant negative association with HIV status which is a novel finding. Our population distinctly differs from that of other studies since participants were exclusively from mixed ancestry and this could possibly explain differences in results.

Anaemia, renal dysfunction and in-hospital outcomes in patients with heart failure in Botswana

Julius Chacha Mwita*,#, Mgaywa Gilbert Mjungu Damas Magafu†, Bernard Omech*,#, Matthew J. Dewhurst‡ and Yohana Mashalla◊

*Department of Internal Medicine, University of Botswana, Gaborone, Botswana. #Department of Internal Medicine, Princess Marina Hospital, Botswana. †Department of Family Medicine and Public Health, University of Botswana, Gaborone, Botswana. ‡Department of Cardiology, North Tees and Hartlepool NHS Foundation Trust, Stockton-on-Tees, United Kingdom. ◊Department of Biomedical Sciences, University of Botswana, Gaborone, Botswana

Background: Anaemia and renal dysfunction are associated with excess morbidity and mortality in heart failure (HF) patients. To estimate the frequency and impact of anaemia and renal dysfunction on in-hospital outcomes among HF patients.

Methods: We studied 193 consecutive HF patients at Princess Marina Hospital in Gaborone from February 2014 - February 2015. HF was defined according to the European Society of Cardiology criteria. Anaemia was defined as haemoglobin <13g/dL for men and <12g/dL for women. Renal dysfunction was defined as an estimated glomerular filtration rate (eGFR) <60ml/min/1.73m^2, calculated by the simplified Modification of Diet in Renal Disease formula. Length of hospital stay and mortality were the in-hospital outcomes.

Results: The mean (sd) age was 54 (17.1) years (53.9% females). The overall median estimated eGFR was 75.9mL/min/1.73m^2 and renal dysfunction was detected in 60 (31.1%) patients. Renal dysfunction was associated with hypertension (p=0.01), diabetes mellitus (p=0.01) and lower haemoglobin

(p=0.008). The mean (sd) haemoglobin was 12 (3.0) and 54.9% of the patients were anaemic. Microcytic, normocytic and macrocytic anaemia were found in 32.1%, 57.5% and 10.4% of the patients, respectively. The mean (sd) haemoglobin was significantly higher for males than for females (12.4 ± 3.3g/dL vs. 11.5 ± 2.5g/dL, p=0.04). Anaemia was more common in patients with diabetes (p=0.03) and with increasing left ventricular ejection fraction (p=0.005). Neither renal dysfunction, nor anaemia, was significantly associated with the length of hospital stay or in-hospital mortality.

Conclusions: Anaemia and renal dysfunction are prevalent in HF patients, partly explained by the predominant contribution of hypertension in the causation of HF in SSA. Neither anaemia, nor renal dysfunction, was an independent predictor of length of stay nor in-hospital mortality in this population. These findings indicate that HF data in developed countries may not apply to sub-Saharan Africa (SSA) countries.

Cardioprotection in hearts from obese rats is mediated via an exchange protein directly activated by cyclic AMP (Epac) - ERK pathway

Zibele Ndlovu, Hans Strijdom, Amanda Lochner and Erna Marais

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

Background: Obesity is the major risk factor for cardiovascular disease. Emerging evidence suggests that Epac could be a new therapeutic target for obesity and cardiovascular disease. We aimed to elucidate the degree of involvement of Epac activation in mediating cardio protection by post-treatment of ischaemic hearts from obese rats with an Epac selective agonist.

Methods: Wistar rats receiving a high fat diet (HFD) for 16 weeks were compared to age-matched controls receiving normal rat chow. Mechanical function was evaluated in isolated perfused working hearts. Regional ischaemia was induced by 35 minutes ligation of the left descending coronary artery followed by 60 minutes reperfusion and infarct size determination. Hearts were perfused with a selective Epac agonist (8-CPT-2'-O-Me-cAMP, CPT), MEK-ERK inhibitor (PD 98059) and selective Akt/PKB inhibitor (A6730) for 10 minutes immediately after sustained ischaemia.

Results: Intra-peritoneal (IP) fat was significantly increased in HFD animals compared to control (IP/body weight ratio: HFD: 5.45 ± 0.2 vs. Control: 4.09 ± 0.2, $p<0.05$). Epac activation with CPT after regional ischaemia significantly reduced infarct size in the HFD group (HFD: 25.49 ± 4.39% vs. HFD + CPT: 11.10 ± 2.10%, $p<0.05$). Post treatment with PKB inhibitor did not affect CPT protection (HFD + CPT: 11.10 ± 2.10% vs. HFD + CPT + A6730: 17.60 ± 3.63%). However, CPT protection was abolished by post treatment with MER-ERK inhibitor in HFD (HFD + CPT: 11.10 ± 2.10% vs. HFD + CPT + PD98059: 20.35 ± 3.32%, $p<0.05$).

Conclusion: The results suggest that the MAPK/ERK pathway plays a significant role in cardio protection mediated by selective Epac activation after ischaemic exposure of hearts from obese rats.

Extensive aortic replacement and supra-aortic extra-thoracic debranching to treat aortic dissection

Catharina Nesselmann[*], Sebastian Patrick Sommer[#], Alper Öner[†], Hüseyin Ince[†], Pascal Dohmen[*] and András Hoffman[*]

[*]Department of Cardiac Surgery, Rostock Heart Centre, Rostock, Germany. [#]Heart and Diabetes Centre NRW, Ruhr University of Bochum, Bad Oyenhausen, Germany. [†]Department of Cardiology, Rostock Heart Centre, Rostock, Germany

Background: Despite immediate surgery, acute aortic dissection comes with an increased risk of death or permanent disability. In this context, criteria of an optimised extension of surgery underlie permanent debate. Early, extensive surgical correction of the ascending and thoracic aorta, in conjunction with extra-thoracic revascularisation of supra-aortic branches, might improve results.

Methods: With current reorganisation of the Rostock aortic service, treatment strategies of aortic dissection focus on complete ascendant aortic (AAR) and arch replacement (AR), combined with frozen elephant trunk procurement (FET) of the thoracic aorta and extra-thoracic debranching of supra-aortic vessels (SAD) in deep hypothermic circulatory arrest. Between October 2015 and September 2016, 21 patients underwent extensive surgery for aortic dissection or intra-mural haematoma of the ascending or thoracic aorta.

Results: Complete AR with frozen FET and SAD was performed in 11 of 21 patients. Mean age was 65 years, 72% of patients were male. We observed no intra-operative death. There were 2 permanent strokes, no paraplegia and 1 post-operative death. Remaining patients were discharged home via our collaborative rehabilitation centre and are under surveillance in good clinical condition.

Conclusion: Despite increased surgical trauma, extensive aortic replacement and SAD results in favourable short-term results. Surveillance data will analyse for impact of our strategy on long-term results.

The value of the frozen elephant trunk for correction of acute type A aortic dissection

Catharina Nesselmann*, Sebastian Patrick Sommer#, Alper Öner†, Hüseyin Ince†, Pascal Dohmen* and András Hoffman*

*Department of Cardiac Surgery, Rostock Heart Centre, Rostock, Germany. #Heart and Diabetes Centre NRW, Ruhr University of Bochum, Bad Oyenhausen, Germany. †Department of Cardiology, Rostock Heart Centre, Rostock, Germany

Background: Immediate surgery of the ascending aorta in case of acute aortic dissection limits death or permanent disability. In this context, the fate of the thoracic aorta's false lumen determines for long-term mortality. Hence, criteria for optimised surgery is on permanent debate. We propagate immediate extensive surgical correction of the ascending and the thoracic aorta in conjunction to improve long-term results.

Methods: Review of the existing literature and presentation of the aortic service treatment strategies of aortic dissection, comprising of complete ascendant aortic (AAR) and arch-replacement (AR), combined with frozen elephant trunk procurement (FET) of the thoracic aorta in deep hypothermic circulatory arrest. Between October 2008 and July 2017, 105 patients underwent extensive surgery for aortic dissection or intra-mural haematoma of the ascending or thoracic aorta.

Results: Complete AR with frozen FET (Evita) has demonstrated favorable mid- and long-term results in the literature and in our patients. Mean age was 62 years, 61% of patients were male. Operation time was 316 minutes and circulatory arrest 38 minutes. We observed no intra-operative death. The 30 days mortality was 11%. Post-operative complications consisted of prolonged respiratory support and tracheotomy, acute renal failure and dialysis and critical illness polyneuropathy. There were 5 permanent strokes, no paraplegia. Remaining patients were discharged home via our collaborative rehabilitation centre and are under surveillance in good clinical condition.

Conclusion: Despite increased surgical trauma, extensive aortic replacement results in favorable results. Surveillance data will proof impact of our strategy on long-term results.

Evaluation of the frequency and predictors of pacing induced cardiomyopathy at Groote Schuur Hospital in Cape Town: A retrospective study

James Russell and Ashley Chin

Divison of Cardiology, Department of Internal Medicine, Groote Schuur Hospital, University of Cape Town, Observatory, South Africa

Background: Right ventricular (RV) pacing produces both electrical and mechanical dyssynchrony resulting in interventricular and intraventricular dyssynchrony. Limited data is available in Africa regarding the frequency and predictors of right ventricular pacing in pacemaker recipients with originally preserved LV ejection fraction. The aim of the study is to evaluate the LV function after long-term pacing by echocardiography at Groote Schuur Hospital in Cape Town.

Methods: A retrospective study, enrolling patients attending the Pacemaker clinic. An analysis of consecutive patients receiving pacemakers from 1988 - 2015 according to the initial antibradycardia pacing indication, and degree of ventricular pacing percentage, was performed. Pacemaker induced cardiomyopathy was defined as a LV ejection fraction ≤40% and no other cause of LV dysfunction was identified.

Results: Of the 102 study patients, 5 (4.9%) developed PICM over a mean follow-up of 9.34 ± 8.4 years with post permanent pacemaker LVEF being 28.6% ± 6.47% in patients with Pacemaker Induced Cardiomyopathy (PICM) compared to 60.25% ± 8.65% in patients without PICM. According to pacing indication, patients were divided into atrioventricular block group A (n=78) and sinus node disease group B (n=14). All the documented PICM in this study were noted in patients receiving RV pacing (group A cohort). Mean percentage of right ventricular pacing was not predictive of outcome whilst lower LVEF prior to permanent pacemaker was a predictor of PICM. All patients in this study had pacing from the RV apical region.

Conclusion: The vast majority of patients who receive RV apical pacing will not experience pacing-induced LV dysfunction at long-term follow-up.

NT-Pro BNP and galectin-3 are prognostic biomarkers of acute heart failure in sub-Saharan Africa: Lessons from the BAHEF trial

Mahmound Sani*, Albertino Damasceno#, Beth Davison†, Gad Cotter†, Bongani Mayosi‡, Christopher Edwards†, Feriel Azibani◊, Tasneem Adam◊, Gulnaze Arif#, Neusa Jessen# and Karen Sliwa◊,§

*Bayero University Kano and Aminu Kano Teaching Hospital, Kano, Nigeria. #Eduardo Mondlane University, Maputo, Mozambique †Momentum Research Inc, Durham, United States of America. ‡Department of Medicine, Groote Schuur Hospital and University of Cape Town, Observatory, South Africa. ◊Hatter Institute for Cardiovascular Research in Africa, Department of Medicine, Faculty of Health Sciences, University of Cape Town, Observatory, South Africa. §IDM, Inter Cape Heart Group South African Medical Research Council, Cape Town, South Africa

Background: Acute heart failure (AHF) accounts for a large proportion of hospital admissions and is associated with high risk for future cardiovascular events and death. African patients with AHF are younger than those in the West, present more acutely, have a more severe disease and higher mortality and have predominantly hypertension and cardiomyopathy, rather than ischaemic heart disease. The relationship between NT-Pro BNP and galectin-3 and outcomes has not been studied in African patients with AHF. We sought to describe the association between plasma levels of NT-Pro BNP and galectin-3 and CV death or HF hospitalisation, as well as their associations with echocardiography markers of left and right ventricular remodeling among AHF patients in sub-Saharan Africa.

Methods: In a subset of 80 patients, with complete data in the BAHEF trial (NCT01822808), NT-Pro BNP and galectin-3 analysis was carried out and the association with various outcome measures checked.
Results: The mean age of the sub group was 52.6 years, with 52.5% females. The total number of CV death or HF hospitalisation through 24 weeks was 9/80 (11.6%). Both biomarkers at baseline predicted combined CV death or HF hospitalisation through week 24 (p=0.0328 and 0.0001, respectively). Galectin-3 at baseline predicted changes (week 24 to baseline) in left ventricular ejection fraction (LVEF), left ventricular end systolic diameter (LVESD), LVEDD and tricuspid annular plane systolic excursion (TAPSE).
Conclusions: Both NT-Pro BNP and galectin-3 at baseline predicted combined CV death or HF hospitalisation through week 24, but only galectin-3 at baseline predicted CV death through week 24. Galectin-3 at baseline also predicted changes in all tested markers of both LV and RV remodeling. These tests have the potential of being used for risk stratification of AHF patients in sub-Saharan Africa.

The SHARE-TAVI registry 1-year results: How do we compare?

Elizabeth Schaafsma*[*,#], Jacques Scherman[#], Hellmuth Weich[†] and Mpiko Ntsekhe[#] (on behalf of the SHARE Investigators)

[*]SA Heart Association, Cape Town, South Africa. [#]Division of Cardiology, Groote Schuur Hospital and University of Cape Town, Observatory, South Africa. [†]Division of Cardiology, Department of Medicine, Faculty of Medicine and Health Sciences, University of Stellenbosch and Tygerberg Hospital, Bellville, South Africa

Background: SHARE-TAVI registry was set up by SA Heart to prospectively study all South African TAVI patients, delineating the unique challenges faced and comparing outcomes to international data.
Methods: All 11 TAVI centres capture data into the web-based registry. Seven centres perform <20 implants/year. Seventeen percent of procedures were in 3 state teaching facilities. From September 2014 - July 2017, 453 patients were entered and 318 received implants. Fifty-four patients did not receive an implant, mostly due to declined funding or mortality. Eighty-one entered patients await funding decisions, median wait is 103 days (range 1 - 1 095 days) and days to procedure is 83 days (range 1 - 1 124 days) from first TAVI evaluation consultation. Outcomes reported as defined by the VARC-2 criteria.
Results: The mean age was 80.04 ± 7.7 years, 50.3% were male, and mean risk prediction values were 6.73% ± 6.16 (STS PROM); 19.76 ± 11.55 (logEuroSCORE) and 7.39% ± 8.19 (EuroSCORE 2), making the population comparable to US Corevalve Pivotal trial population, SOURCE XT and German Aortic Valve registry (GARY). Overall procedural success was 90.9%, peri-operative mortality was 7.3%, complications included stroke (3.0%), bleeding (8.5%), vascular complication (8.5%). Thirty-day all-cause mortality was 8.5% (compared to 3.4% in US Corevalve and 5.6% for GARY) and 1-year mortality was 18.2% (compared to 14.2% in US Corevalve, 19.4% in SOURCE XT and 20.7% for GARY). One-year cardiac mortality was 11.5% and accounted for 63% of 1-year mortality. Non-cardiac mortality of 6.7% mostly resulted from malignancy. Mean ICU stay was 2.42 ± 2.05 days, hospital stay 5.23 ± 4.56 days. One-year pacemaker implantation (6.7%) was lower than comparable registries, strokes (4.9%) comparable to GARY (4.8%) and SAPIEN XT (6.3%). A total of 66.4% of patients in NYHA class III/IV at baseline, 90.4% patients at NYHA class I/II at 1 year.
Conclusions: Local outcomes compare favourably to international figures at 1 year, but appropriate use of TAVI in South Africa is limited unduly by resource constraints.

The relationship between oxidative stress-related markers and retinal microvascular structure and function in a bi-ethnic population: The SABPA study

Wayne Smith*[*,#], Felicia Maugana[*], Carina Mels[*,#] and Nico Malan[*]

[*]Hypertension in Africa Research Team (HART), Faculty of Health Sciences, North-West University, Potchefstroom, South Africa. [#]MRC Unit on Hypertension and Cardiovascular Disease, North-West University, Potchefstroom, South Africa

Background: Oxidative stress is implicated in the development of macrovascular diseases, while less is known about its role in the retinal microvasculature. Retinal microvascular abnormalities may indicate early cardiovascular disease risk. We compared oxidative stress-related markers between a cohort of Black and White teachers and investigated whether oxidative stress-related markers are associated with retinal vessel calibers and vessel responses to flicker light-induced provocation (FLIP) in these groups.
Method: We performed a cross-sectional analysis on 82 Black and 77 White male teachers participating in the follow-up leg of the Sympathetic activity and Ambulatory Blood Pressure in Africans study. The teachers were originally recruited from the Kenneth Kaunda Education district in the North-West Province of South Africa. We excluded women from the study as oxidative stress-related markers vary during the menstrual cycle, while oestrogens have a protective effect against oxidative damage. Retinal maximum artery (Art_maxdil) and vein dilation in response to FLIP was assessed. Central retinal artery equivalent (CRAE), central retinal vein equivalent and arterio-venous ratio (AVR) were determined from retinal images and 24-hour ambulatory blood pressure was measured. Oxidative stress-related markers included: thiobarbituric acid reactive substances (TBARS), reactive oxygen species (ROS) (serum peroxides), total glutathione (tGSH), ferric reducing ability of plasma (FRAP), superoxide dismutase (SOD), glutathione peroxidase (GPx) and glutathione reductase (GR).

Result: Although Black men had higher TBARS (p=0.011), they also had higher GPx (p=0.001) and SOD activities (tendency; p=0.062) with lower FRAP and tGSH levels (both p<0.001) compared to White men. Multiple regression analyses revealed an independent association between SOD activity and Art_maxdil (Adjusted R^2=0.19; ß=-0.36; p=0.002) whereas AVR (Adjusted R^2=0.12; ß=-0.32; p=0.007) and CRAE (Adjusted R^2=0.27; ß=-0.23; p=0.040) were independently associated with ROS.
Conclusion: The up-regulated SOD activity in Black men may contribute in maintaining retinal vascular function while retinal arterial narrowing may be mediated by ROS.

The management of coronary artery aneurisms in the setting of acute coronary syndromes

H.W. Snyman, Hellmuth Weich and Anton Doubell

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

Background: The approach to complex coronary intervention for coronary artery disease (CAD) and acute coronary syndromes (ACS) has been transformed by invasive coronary imaging e.g. by optical coherence tomography (OCT). In the setting of CAD and ACS it allows for high resolution evaluation of the coronary wall, atherosclerotic plaque characteristics and especially the mechanism underlying ACS, as illustrated by this case.
Method: A 49-year-old male patient was referred to our unit 2 weeks after successful thrombolysis for an antero-lateral STEMI. The patient had no risk factors other than hypertension. Angiography revealed a moderate lesion in the mid LAD followed by a short aneurysmal segment and the mechanism of infarction was thought to be mural thrombus from the aneurysm that embolised. OCT, however, revealed a narrow true lumen with 3 connections to a larger space with a differential of mural haematoma, pseudo-aneurysm or plaque rupture with dissection into the plaque. The disease proximal to the aneurysm was assessed as flow limiting (area=0.29mm^2) and a decision was reached to treat. The significant size mismatch between the 3.7mm vessel and the 5.2mm aneurysmal segment posed a therapeutic challenge. A covered stent was considered a poor option given the poor long-term outcome with these devices and the literature did not provide guidance to direct treatment.
Results: The case was discussed with experienced colleagues in a high-volume centre abroad. They reported good outcomes in similar cases utilising simple DES to treat the lesion and bridge the aneurysm, indicating that the aneurysmal segment tends to undergo negative remodeling down to the size of the stent. A 4.0 x 18mm DES was deployed at 18 atmospheres and the central portion post dilated to 4.5mm with some residual flow outside the stent. The procedure was uncomplicated.
Conclusion: This case illustrates the limitations of coronary angiography in the assessment of some complex lesions and how OCT may guide therapy and change our understanding of the mechanism of ACS.

HIV-infection, but not high sensitivity CRP, is associated with markers of vascular function: Results from the Western Cape cohort of the EndoAfrica study

Hans Strijdom[*], Ingrid Webster[*], Corli Westcott[*], Nyiko Mashele[*], Mashudu Mthethwa[*], Frans Everson[*], Nandu Goswami[#], Patrick De Boever[†,‡], Tim Nawrot[‡] and Faadiel Essop[◊]

[*]Division of Medical Physiology, Faculty of Medicine and Health Sciences, University of Stellenbosch and Tygerberg Hospital, Bellville, South Africa [#]Medical University of Graz, Graz, Austria. [†]VITO, Mol, Belgium. [‡]Hasselt University, Diepenbeek, Belgium. [◊]Department of Physiological Sciences, Faculty of Medicine and Health Sciences, University of Stellenbosch and Tygerberg Hospital, Bellville, South Africa.

Background: C-reactive protein (CRP) is an acute phase protein and biomarker of atherosclerosis. HIV-infection ± antiretroviral therapy (ART) is associated with increased cardiovascular risk and CRP levels are raised in people with HIV-infection. The relationship between CRP, HIV-infection and markers of vascular function are not well described in South African populations. We aimed to investigate whether CRP and HIV are associated with vascular function.
Methods: HIV-free and infected participants were from the Cape Town region. Cardiovascular risk factors were determined, serum high sensitivity-CRP (hs-CRP) levels measured and vascular function assessed with flow-mediated dilatation (FMD) and retinal micro vessel imaging. The study population (n=346) was divided into a high hs-CRP group (>3mg/dL; n=212) and low hs-CRP group (<3mg/dL; n=134), and additionally into HIV-free (n=97), untreated HIV (n=50) and HIV+ART (n=199).
Results: There was a high prevalence of traditional cardiovascular risk factors. Hs-CRP levels were not elevated in the HIV-group. In the high hs-CRP group, BMI and triglycerides were increased and the central retinal venular equivalent (CRVE; marker of cardiovascular risk) trended to be higher. The high hs-CRP/HIV-free group had the highest mean BMI value of all groups, and a greater prevalence of endothelial injury (FMD <6.52%) compared to high hs-CRP/HIV+ART (62% vs. 45%). The CRVE was increased in the high hs-CRP/untreated HIV group compared to HIV+ART. Multiple regression showed that hs-CRP was not associated with FMD or CRVE; however, HIV treatment was associated with FMD (ß: 0.14; p<0.01) and CRVE (ß:-0.15; p<0.01). Logistic regression showed that hs-CRP did not predict endothelial injury, whereas HIV-infection was associated with 47% less risk of endothelial injury (OR: 0.53; p=0.03). HIV-infected participants on ART were 52% less likely to have endothelial injury (OR: 0.48; p=0.04).
Conclusion: HIV-infection was not associated with increased hs-CRP. HIV-infection and ART were independently associated with improved vascular function, whereas hs-CRP was not associated with markers of vascular injury.

Managing Takayasu arteritis in the cardiac catheterisation lab: The Cape Town experience

Lenise Swanson*[*,#], Barend Fourie[†], Peter Nourse[‡], Mignon McCulloch[‡] and Rik De Decker[#]

[*]University of Cape Town, Cape Town, South Africa. [#]Department of Paediatric Cardiology, Red Cross War Memorial Hospital, University of Cape Town, Observatory, South Africa. [†]Department of Paediatrics and Child Health, University of Stellenbosch and Tygerberg Hospital, Bellville, South Africa. [‡]Department of Paediatric Nephrology, Red Cross War Memorial Hospital, University of Cape Town, Observatory, South Africa.

Background: Takayasu arteritis is a chronic inflammatory disease of the aorta and pulmonary arteries and their major branches. The disease typically affects young adult females, but may also manifest in childhood. Vascular complications are common, and range from aneurysmal dilation to severe stenosis with visceral ischaemia. Management of this large vessel vasculitis has relied on immunosuppressive therapy and adjunctive surgical revascularisation strategies to control and improve renovascular complications. Alternative approaches such as catheter-based interventions have been shown to be effective in managing its vascular complications in adult patients. Little data exist for this strategy in the paediatric population. We describe the management and outcomes of a cohort of young patients with Takayasu's arteritis using endovascular techniques commonly employed for interventional cardiac catheterisation procedures.

Methods: Eleven patients with significant stenosis on CTA/MRA underwent catherisation for revascularisation procedures. Patients either received percutaneous transluminal angioplasty of the affected vessel or had an arterial stent placed. The preferred management approach was decided upon at the discretion of the attending cardiologist. Patients with significant stenoses at follow up were considered for additional procedures.

Results: A total of 9 procedures were performed. Four patients were successfully stented using either Advanta V12 (covered) or Cook Formula stents. Of these, one patient suffered undetected retroperitoneal bleeding and demised several hours after stenting of the descending aorta. Two patients required subsequent stenting procedures to alleviate stenoses that developed after their initial procedures, with good results. Three patients underwent renal artery angioplasty, with no reported complications. Follow up revealed significant improvements in symptoms, blood pressure control, and renal function.

Conclusion: Transcutaneous arterial intervention is an effective non-surgical strategy for relieving the vascular complications of Takayasu's arteritis in children.

Atherosclerotic plaque in HIV-positive patients presenting with acute coronary syndromes

Ahmed Vachiat and Pravin Manga

Charlotte Maxeke Johannesburg Academic Hospital, University of the Witwatersrand, Johannesburg, South Africa

Background: Atherosclerosis in HIV+ patients with ACS presents with different risk factor profiles in developing when compared to developed regions. The underlying plaque burden in HIV+ patients presenting with ACS is poorly defined. The aim was to characterise the atherosclerotic plaque and plaque burden in HIV+/ACS patients using intravascular ultrasound (IVUS) and virtual histology (VH).

Method: A prospective study of 20 HIV+ patients presenting with ACS was conducted between 2012 and 2015. IVUS and VH was used to assess the culprit and non-culprit arteries in HIV+/ACS patients. The plaque burden was divided into mild disease (<40%), moderate (40 - 70%) and severe (>70%) plaque.

Results: HIV+ patients presenting with ACS had a mean age of 51.1 (±8.1) years, 65% patients were males. Only 10 (50%) patients were on anti-retroviral therapy. Risk factors included smoking 11/20 (55%), hypertension 6/20 (30%), diabetes 2/20 (10%) and dyslipidemia 2/20 (10%). Fifteen (75%) patients presented with STEMI. The LAD was the most common artery involved (60%). The total plaque burden consisted of moderate plaque in 60% of patients, followed by mild plaque in 35% and severe plaque in 5% of cases. The total plaque burden was significantly higher in the proximal than in the mid portion of the coronary arteries (p=0.010). There was more severe plaque (30%) in the culprit vessel when compared to non-culprit vessels (5%). The predominant plaque morphology consisted of fibrous (55.4%) and fibro-fatty (26.6%) plaque while necrotic core was present in 13.3% and dense calcium present in only 4.7%. The mean LDL was 2.33 ± 0.7mmol/l.

Conclusion: STEMI is the most common presentation of HIV+ patients with ACS. The greatest burden of disease involves the proximal LAD. The atherosclerotic plaque in HIV+ patients is predominantly comprised of non-calcified fibrous and fibro-fatty plaque (82%).

Is Rivaroxaban (Xarelto®) cost-saving for the treatment of deep vein thrombosis and pulmonary embolism in the South African healthcare environment?

Praneet Valodia

Praneet Valodia Consulting (Pty) Ltd, Cape Town, South Africa

Background: Rivaroxaban (Xarelto®), a non-vitamin K oral anticoagulant, is used for the treatment of deep vein thrombosis (DVT) and pulmonary embolism PE. It is a direct factor Xa inhibitor. Rivaroxaban is used as monotherapy and no routine coagulation monitoring is required. The objective of the study was to determine the pharmaco-economic impact of the use of rivaroxaban relative to a combination of enoxaparin and warfarin in South Africa for the treatment of DVT and PE.

Methods: Two costing methods were used: "n=1" study: This involved simulating the cost of 1 patient who was administered rivaroxaban or a combination of enoxaparin and warfarin in hospital. "n=100" study: This involved simulating the cost of 100 patients who were administered rivaroxaban in comparison to 100 patients who were administered a combination of enoxaparin and warfarin in-hospital and warfarin only out-of-hospital over 3 months. **Cost components include:** Medicines (SEP), dispensing fees, INR tests and length of hospital stay (LOS).
Results: A cost minimisation evaluation was applied. When taking the worst-case scenario into account, savings due to rivaroxaban for the "n=1" study ranged from R3 560 - R11 771 per patient per hospital stay. Savings due to rivaroxaban for the "n=100" study ranged from R425 - R8 636 per patient over a 3-month treatment period. Based on the medicine price only, rivaroxaban was cheaper in-hospital (R57.18 per day) vs. a combination of enoxaparin and warfarin (R221.38 per day). When warfarin was used alone it cost R1.45 per day. Savings as a result of rivaroxaban was primarily due to the shorter hospital LOS per episode of care.
Conclusions: Irrespective of the analyses, i.e. the "n=1" or "n=100" , savings were reported due to the use of rivaroxaban relative to its comparator.

Complex open heart surgery post-aprotinin: Are we doing better?

Keren Worms-Bitton, Ziv Beckerman, David Kadosh, Oved Cohen and Gil Bolotin
Department of Cardiac Surgery, Rambam Healthcare Campus, Technion – Faculty of Medicine, Haifa, Israel.

Background: Antifibrinolytics are commonly used in cardiac surgery. In 2008, the FDA prohibited the use of aprotinin due to suspicion of associated stroke, renal failure and early graft failure. Due to inability to prospectively study aprotinin, we retrospectively reevaluated the efficacy and safety of aprotinin vs. tranexamic acid in high-risk surgical procedures.
Methods: Altogether, 276 patients were enrolled. Group A (n=128), operated on between 2006 and 2007, received the half-Hammersmith aprotinin protocol; Group B (n=148), operated on between 2009 and 2010, received tranexamic acid. All patients underwent complex cardiac procedures, i.e. double or triple valve replacements, aorta surgery and/or combined procedures. Safety was measured in terms of mortality, post-operative CVAs, post-operative thrombocytopenia, renal failure and post-operative myocardial infarction. Efficacy was evaluated in terms of post-operative bleeding and infusions of blood products. Massive bleeding was defined as more than 1 300ml/day.
Results: The groups did not differ in terms of demographics, pre-operative or operative variables (including types of surgeries performed, cross-clamp and bypass-times), aside for higher prevalence of hyperlipidemia in group B: 57% vs. 43% (p=0.03). Rate of blood or blood products infusion was 84% in group A vs. 75% (p=ns). Altogether, group B patients bled more (28% in group B vs. 13% in group A, p=0.001) (RR=2.5 in group B for excessive bleeding 95% CI 1.34 - 4.67). No difference was noted in post-operative mortality, CVAs, renal failure or thrombocytopenia. Group B patients had higher post-operative increase in troponin levels (p=0.001) and longer hospital stay lengths (p=0.007).
Conclusion: Among high-risk patients, aprotinin proved to be more efficacious in terms of reducing bleeding, with no evidence of associated increased rates of post-operative complications. Accordingly, the usage of aprotinin should be reconsidered for treatment among cohorts of high-risk cardiac patients.

Innovative airway management solution

Keren Worms-Bitton*, Zvi Peled*, Avishai Ziser#, Victor Kerzman* and Gil Bolotin*
*Department of Cardiac Surgery, Rambam Healthcare Campus, Technion – Faculty of Medicine, Haifa, Israel. #Department of Anaesthesia, Rambam Healthcare Campus, Technion – Faculty of Medicine, Haifa, Israel

Background: Ventilator-associated pneumonia is a hazardous complication associated with significant morbidity and mortality. The safety and efficacy of the AnapnoGuard system, a novel respiratory guard system, as an airway management tool in mechanically ventilated patients were evaluated in this prospective, double-arm, randomised-controlled study.
Methods: The study population included 41 patients. Patients in the study group were connected to the AnapnoGuard control unit in which subglottic secretions suction and cuff pressure control were enabled. Patients in the control group were treated according to the current standard of care. In both groups, the presence of CO^2 levels above the cuff was measured by the control unit. The primary end point of the study was the overall duration and extent of endotracheal tube cuff leakage determined by CO^2 area under the curve (ROC curve). Secondary end points included the number of cuff pressure measurements within the safely accepted range (24 - 40cmH^2O) and a number of significant CO^2 leakage readings.
Results: The average CO^2 area under the curve representing CO^2 leakage calculated for the study group was significantly lower compared to control group (0.09 ± 0.04 vs. 0.22 ± 0.32 respectively, $p<0.001$). Measurements of significant leakages (CO^2 ≥2mmHg) were significantly lower in the study group (0.056 vs. 0.642 respectively, $p<0.001$). Cuff pressure measurements within the safety range in the study group were almost 3 times higher when compared to the control group (99.6% vs. 35.1%, $p<0.001$). The average volume of secretions evacuated was 1.8 times higher in the study group (105ml/day vs. 59ml/day) (p=0.1). No serious adverse events were recorded throughout the study.
Conclusion: The AnapnoGuard system was found to be safe and effective in reducing CO^2 leaks and maintaining proper cuff pressure. The greater secretion evacuation in the study group may indicate that less secretion leaked down to the bronchial tree.

Cardiac presentations of HIV positive patients in an urban hospital in South Africa

Don Zachariah

Division of Cardiology, Department of Internal Medicine, Charlotte Maxeke Johannesburg Academic Hospital, University of the Witwatersrand, Johannesburg, South Africa

Background: There is limited knowledge on the impact of the HIV epidemic on heart disease in South Africa. The aim of the study is to ascertain the spectrum of cardiac disease in HIV positive patients presenting to a busy urban tertiary hospital in South Africa.
Methods: A prospective, clinical registry captured data from all de novo cases of heart disease presenting to our cardiology unit. A total of 6 100 cardiac patients were admitted to the unit from September 2011 - September 2015. All confirmed HIV positive patients' data were analysed to delineate the profile of cardiovascular disease in these patients.
Results: There were 597 patients (9.8%) who were confirmed to be HIV positive. The mean age was 41 years (SD ± 11) and predominantly female (54.3%). The mean CD4 count was 259cells/mm^3 (SD ± 79) with the majority of them (66%) having a CD4 count <350cells/mm^3. Of the entire HIV positive cohort, only 29% were on HAART therapy at presentation. The most common presentation was HIV related cardiomyopathy (34%). There were 107 patients (18%) with valvular heart disease of which the specific etiology was not delineated. Pericardial disease was present in 89 patients (15%). Interestingly, there was a significant number of HIV patients with coronary artery disease (11%). The remainder of patients were noted to have: hypertensive heart disease (7%), pulmonary hypertension (7%), peripartum cardiomyopathy (3%), congenital heart disease (2%), conduction disease (2%) and aortic disease (1%).
Conclusion: In South Africa, HIV positive patients with cardiac disease present at a young age and HIV related cardiomyopathy is the most common presentation.

Clinical characteristics of HIV related cardiomyopathy patients in an urban hospital in South Africa

Don Zachariah

Division of Cardiology, Department of Internal Medicine, Charlotte Maxeke Johannesburg Academic Hospital, University of the Witwatersrand, Johannesburg, South Africa

Background and methods: HIV related cardiomyopathy (CMO) is one of the most common HIV related cardiac manifestations seen in sub-Saharan Africa. It has a four-fold increased mortality risk compared to HIV negative controls with idiopathic dilated CMO. We recently reported HIV related CMO to account for 3.9% of all admissions to the Cardiology ward of Charlotte Maxeke Johannesburg Academic Hospital. Thus, the aim of this study was to ascertain the clinical characteristics of this cohort of patients. The cohort comprised a total of 204 admitted patients from September 2011 - September 2015. Of these, 156 patients had adequate data and thus comprised the current study cohort.
Results: The mean age was 38 years (SD ± 9) with 95 female patients (61%) and 61 male patients. The mean CD4 count was 167cell/mm^3 (SD ± 102). HIV related CMO patients generally did not have markedly enlarged left ventricular dimensions with the mean left ventricular dimension in diastole to be only 50mm (SD ± 4.1). The mean left ventricular ejection fraction was 39% (SD ± 5.8). There was a high (38%) incidence of anaemia, as defined by WHO definition (males <14g/dl and females <12g/dl). The mean hemoglobin levels were found to be 9.2g/dl (SD ± 3.9). The mean eGFR was 104ml/min/1.73m^2 (SD ± 22). The prevalence of low eGFR (<60ml/min/1.73m^3) was 9.4% demonstrating that the rate of cardiorenal syndrome in this population is low when compared to other CMO cohorts.
Conclusion: In the South African setting, HIV related cardiomyopathy occurs predominantly in a younger population, more likely to be female. Compared to other forms of CMO, the left ventricular dimensions are smaller with a high prevalence of anaemia.

Cardiac surgery for grown-up congenital heart disease: A 12-year retrospective from a transitional country

Liesl Zühlke[*,#], Nazaakat Guzgay[†], Paschale Saneka[†], Paul Human[‡], TIM Pennel[‡], Andre Brooks[‡] and Blanche Cupido[#]

[*]Department of Paediatric Cardiology, Red Cross War Memorial Children's Hospital, University of Cape Town, Observatory, South Africa
[#]Division of Cardiology, Department of Medicine, Groote Schuur Hospital, University of Cape Town, Observatory, South Africa. [†]Medical Student, Groote Schuur Hospital, University of Cape Town, Observatory, South Africa. [‡]Chris Barnard Division of Cardiothoracic Surgery, Groote Schuur Hospital, University of Cape Town, Observatory, South Africa

Background: The remarkable advancements in both paediatric and adult cardiology and cardiac surgery over the past decades have resulted in an increased number of grown-ups with congenital heart defects (GUCH). This set of patients poses unique challenges and requires specialist care, particularly in a transitional country. Surgical records can indicate the need for a comprehensive GUCH programme.
Method: We conducted a retrospective review of GUCH patients who have undergone surgery at the Groote Schuur Hospital's Chris Barnard division of cardiothoracic surgery between 1 January 2003 and 30 June 2015. We reviewed surgeries performed, most common congenital heart lesion as well as mortality rate.

Results: There were 109 cases identified as having surgery for GUCH in the 10-year study period with 61% of surgeries performed on females and 39% on males. The largest proportion of patients, 36 (33%), were between 20 - 29 years old and the smallest proportion, 5 patients (5%), were between 50 - 59 years old. The majority of patients, 100 (92%), had corrective surgery, and 9 patients (8%), had palliative surgery. Mortality rate was 4%. The median age at death was 49. More than half, 63 (58%), of the surgeries were performed by congenital surgeons, 80 patients (73%) live in the Western Cape. The most common lesions were septal defects, seen in VSD (9%), ASD (49%), AVSD (15%) and Tetralogy of Fallot (11%). Of interest, despite the established cardiac surgery programme in the province, 92 patients (87%) had their first surgery in adulthood.

Conclusion: In conclusion, this study has shown that many people in developing countries only present for the first time in adulthood, especially with non-critical CHD lesions. The mortality rate in adulthood is low but a comprehensive GUCH service in our province, with specialist teams, is needed to focus on this patient population.

Rationale and design of the Protea study-partnerships in congenital heart disease in Africa A North-South partnership in congenital heart disease (CHD): Establishment of a CHD cohort for aetiological, intervention and outcome studies in South Africa

Liesl Zühlke[*,#], John Lawrenson[†], Rik Dedecker[*], Blanche Cupido[#,†], Bernard Kheavney[‡], Gasnat Shaboodien[◊], Raj Ramesar[§] and Bongani Mayosi[#,◊]

[*]Department of Paediatric Cardiology, Red Cross War Memorial Children's Hospital, University of Cape Town, Observatory, South Africa [#]Division of Cardiology, Department of Medicine, Groote Schuur Hospital, University of Cape Town, Observatory, South Africa. [†]Department of Paediatric Cardiology, Department of Paediatrics and Child Health, University of Stellenbosch and Tygerberg Hospital, Bellville, South Africa [‡]Division of Cardiovascular Sciences, University of Manchester, Manchester, United Kingdom. [◊]Hatter Institute for Cardiovascular Research in Africa, Department of Medicine, Faculty of Health Sciences, University of Cape Town, Observatory, South Africa. [§]Division of Human Genetics, Department of Pathology, Groote Schuur Hospital, University of Cape Town, Observatory, South Africa

Background: There is an urgent need for research to be conducted into congenital heart disease (CHD) in Africa. The resource-related challenges that African countries face in caring for patients with CHD and their families are compounded by the lack of an African specific evidence base. The motivation of the study is to develop the first comprehensive cohort of CHD patients in South Africa and give African specific evidence base and phenotypic/genetic causes of CHD. Improving knowledge about CHD epidemiology in sub-Saharan Africa, by the establishment of a densely phenotyped and prospectively followed CHD cohort in Africa, can significantly impact the efficacy of care and ultimately improve the outcome for CHD patients.

Hypothesis and aims: To describe the broad base of studies of aetiology, lifecourse and clinical management of CHD following the implementation of a CHD registry and biorepository. To examine 2 genetic hypotheses and explore de novo mutations and transmitted mutations in cases of CHD. To comprehensively and innovatively study repaired Tetralogy of Fallot and coarctation of the aorta using computational fluid dynamic modeling.

Methods and results: We will present our comprehensive bespoke comprehensive clinical, genotypic/phenotypic, demographic, and outcomes database. We will also describe our blood (and/or saliva) based biobank of samples for DNA extraction and genetic analysis.

Conclusions: Our project aims to directly improve patient care. Currently there are clear care gaps, late diagnosis and delayed management of CHD in Africa. We believe that a well-resourced and outcomes-based registry will decrease these care gaps and facilitate improved patient outcomes. We anticipate that it will identify patient-and hospital-related predictors for poor outcomes and could allow clinicians to identify patients at risk and implement appropriate interventions.