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Diagnostic value of the signal-averaged electrocardiogram in arrythmogenic right ventricular cardiom

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Background: Arrythmogenic right ventricular cardiomyopathy (ARVC) is the leading cause of sudden cardiac death (SCD) in people aged <35 years. Accordingly, a successful early diagnosis of ARVC can be life saving. The aim of this study was to re-examine the diagnostic and clinical value of the signal-averaged electrocardiogram (SAECG) in patients with ARVC.
Methodology: This study was conducted at Groote Schuur Hospital in Cape Town where 51 patients who had been clinically assessed and diagnosed with ARVC as either definite or possible using task force criteria. They underwent SAECG to obtain RMS, LAS and fQRS recordings, which were then compared to the normal values, thus re-evaluating the importance of a SAECG in ARVC. Additional sub-studies evaluated the definite or possible diagnosis of the condition with echocardiographic findings, cardiac catheterisation findings, VT and ICD implants, biopsy results and MRI findings.
Results: A 2:1 male predominance was found. When comparing the RMS, LAS and fQRS readings obtained in the study to the normal values, the observation was that the majority of the ARVC patients had abnormal RMS, LAS and fQRS values, and overall abnormal SAECGs. Also, when evaluating the results from catheterisation, echocardiogram, MRI and biopsy, it was seen that common signs of ARVC included RV dilation, RV trabeculations, RV dyskinesia, TR and fibrofatty infiltration.
Conclusion: The SAECG proved abnormal in a large percentage of patients with both definite and possible ARVC and can thus be a very useful test before sending a patient for other procedures in order to meet the criteria for ARVC. ARVC was difficult to diagnose, and, while the majority of patients did contain an abnormal SAECG, it cannot be used as a sole diagnostic tool. ARVC patients have common signs and symptoms that should be looked at. An easy and reliable preliminary procedure to start diagnosing with, would be a SAECG. An early abnormal SAECG would mean that the patient should be sent immediately for further tests as ARVC is a condition that should be treated early due to the risk of SCD.

Cardioembolism in patients with isolated left ventricular noncompaction and reduced ejection fraction

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Background: ILVNC with reduced ejection fraction may be associated with increased risk for cardioembolism. Atrial fibrillation, low ejection fraction and blood stasis in trabecular spaces are thought to predispose to the development of intra cardiac thrombosis and cardioembolism. The risk benefit ratio of warfarin anticoagulation for primary prevention in a sub-Saharan Africa population with ILVNC is not known. We evaluated the incidence of cardioembolism in patients diagnosed with ILVNC (based on strict echocardiographic criteria) and reduced ejection fraction from a single centre.
Methods: In this prospective study of patients with ILVNC, clinical follow-up was routine, protocol-driven and echocardiographic screening for ventricular thrombi was performed at 4 monthly intervals. Patients who were on warfarin prior to study inclusion were maintained on therapy. All other individuals received warfarin only if a intra cardiac thrombus was detected by echocardiography or atrial fibrillation developed.
Results: Fifty-five patients were followed for 16.7±5.9 months (range: 12-33 months). All individuals had an LV ejection fraction <50% (mean LV ejection fraction: 29.6±11.8%). Warfarin was initiated prior to evaluation at our institution for pulmonary embolism in 1 patient (1.8%), prior documented LV thrombus in 8 patients (14.5%) or to prevent LV thrombus in 7 subjects with an ejection fraction <30% (12.7%). The remaining 39 patients (70.9%) were not commenced on any oral anticoagulation. For patients on warfarin the calculated time in therapeutic range during the study period was 35% for the cohort using the Rosendaal method. During follow-up, 1 out of the 39 patients not on warfarin, experienced a thromboembolic event and was found to have an intra cardiac thrombus with echocardiography. No thromboembolic or major bleeding complications occurred in the 16 patients on warfarin. No statistically significant differences were noted between patients on warfarin or those who were not on warfarin with respect to clinical characteristics, baseline LV ejection fraction, LV volumes, mitral regurgitation or electrocardiographic characteristics. Patients on warfarin had significantly greater right ventricular dilatation (p=0.01) and more pronounced right ventricular dysfunction (p=0.01).
Conclusions: Development of LV thrombus and cardioembolism is uncommon in this population and routine anticoagulation may not be indicated.

Treatment of surgical tissue valve dysfunction by percutaneous valve implantation

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Introduction: Percutaneous valves have added new dimensions to the treatment of valve dysfunction. The aim of this study was to assess the feasibility and safety of percutaneous valve implantation in patients with dysfunction of previous surgically implanted tissue valves.
Patients and methods: This was a prospective analysis and only patients with a previous surgically implanted dysfunctional tissue valve where percutaneous valve implantation would be an alternative treatment modality, were included. Four (n=4) patients were included from January 2012 onwards.
Results: Two octogenarians with stenosis of aortic valves, one 54-year-old with stenosis of a 29mm PERIMOUNT valve in the tricuspid position and one 38-year-old with a stenotic 25mm PERIMOUNT valve in the pulmonic position were treated with percutaneous valves. Two 26mm CoreValves® were implanted in the aortic position, whilst a 29mm Edward Sapien XT™ and a 22mm Melody® valve were implanted in tricuspid and pulmonic positions, respectively. Gradients were reduced from a median of 52mmHg (range: 22-70) to 9.5mmHg (range: 0-26) [p=0.051]. There were no complications experienced during the procedures. One aortic valve was post dilated in a patient where the tissue valve was significantly angulated pre-procedure. All patients demonstrated marked functional improvements immediately after the procedure and were discharged within 3 days. During short term follow-up ranging from 43 - 190 days, the 2 octogenarians demised due to causes unrelated to percutaneous valve implantation: one due to renal failure 93 days later and one due to complications of COPD after 192 days. The remaining 2 patients have reported significant functional and quality of life improvements after percutaneous treatment.
Conclusions: Percutaneous treatment of surgically implanted tissue valves is feasible, effective and safe. This offers an alternative to re-operation and may become the treatment of choice for these patients.

PDA and ASD closure with CeraTM and CeraFlexTM devices

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Introduction: Percutaneous closure of patent ductus arteriosus (PDA) and atrial septal defects (ASD) is standard treatment in the paediatric population. Device design has steadily improved with the development of new technologies. The aim of this study was to assess the efficacy of a new Titanium Nitride (TiN) coated Nitinol closure device.
Patients and methods: This is a prospective study of all structural lesions that qualify for closure using a percutaneous device. Seven PDAs and one ASD were closed using CeraTM and CeraFlexTM devices.
Results: The CeraFlexTM device was used in 6 cases (5 PDAs and 1 ASD) and the CeraTM device in 2 PDA cases. The median age at implantation was 2.87 years (range: 0.36-26.99) with a median weight of 14kg (range: 4.88-70). Complete closure was obtained in all patients. There were no periprocedural complications. In a small child a PDA device migrated to the aorta after 12 hours but could be repositioned using a snare, to obtain total occlusion. Short term follow-up, ranging from 41 to 225 days demonstrated complete occlusion of all defects with no residual shunts or complications.
Conclusion: Percutaneous closure of PDAs and ASDs with the CeraTM and CeraFlexTM occluder devices is effective and safe. This device offers an economical alternative to current available devices.

The incidence and predictors of ICD therapy in ARVC: From the ARVC registry of SA

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Introduction: The incidence and predictors of implantable cardioverter defibrillator (ICD) therapy in patients with Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC) for secondary prevention are not well established.
Method: A retrospective cohort of ARVC patients who had an ICD implanted for secondary prevention [documented ventricular tachycardia (VT) or ventricular fibrillation (VF) or unexplained syncope] were identified from the ARVC registry of South Africa.
Results: A total of 24 patients with ARVC who had an ICD were identified. Fifteen patients had a definite diagnosis of ARVC; 7 had a probable and 2 had a possible diagnosis according to the 2010 ARVC Task Force Criteria. The mean age of the patient cohort was 46.6±12.4 years (range: 21 to 60 years).

Over a mean follow-up of 7.8±4.3 years, 15 (62.5%) patients received appropriate device (shock or anti-tachycardia pacing) therapy for VT or VF. Two patients received device therapy within 8 days; 6 patients received therapy within 1 year; 4 patients received therapy between 1 and 2 years and 3 patients received therapy between 2 and 15 years of device implantation. The median duration from ICD implantation to first appropriate ICD therapy was 3.0±4.3 years.

Inducibility of VT during electrophysiological study, left ventricular ejection fraction ≤50%, frequent premature ventricular complexes (PVCs) (>500 PVCs per 24 hours), minor or major structural alterations on MRI or echocardiography, abnormal ECG abnormalities, syncope and heart failure did not predict appropriate device therapy. Prior documentation of VT (10 out of 15 in the appropriate device therapy group compared to 4 out of 9 in the inappropriate or no device therapy group) was the only predictor of appropriate device therapy but was of borderline significance (p=0.06). One death occurred in 24 patients and 1 patient was referred for cardiac transplantation.

Conclusion: Similar to previous secondary prevention cohorts, we found a high incidence of appropriate device therapy. In contrast to previous studies, a history of heart failure, left ventricular involvement and syncope were not predictors of appropriate device therapy in this study. Prior documentation of VT was the only predictor but was of borderline significance.

Case report: Mycotic aneurysms complicating infective endocarditis

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Introduction: The reported frequency of mycotic aneurysms complicating infective endocarditis is 2% to 4%. An intracranial location is most frequent. We present 2 cases of mycotic aneurysms in unusual locations.

Case reports: A 3-year-1 month old male presented in cardiac failure and with features of a ventricular septal defect. Echo confirmed a 4mm peri-membranous VSD with multiple vegetations in the infundibular region, the largest measuring 14mm by 11mm. There was significant tricuspid regurgitation and free pulmonary regurgitation with no discernible pulmonary valve. He underwent surgical closure of the ventricular septal defect, resection of the vegetations and repair of the tricuspid incompetence. Histology demonstrated gram positive cocci but tissue cultures were negative. Blood cultures were negative. He received a prolonged course of intravenous Cloxacillin. On follow up 2 months post surgery, a well circumscribed shadow was noted in the right lung and echo demonstrated right pulmonary artery dilatation. CT pulmonary artery angio demonstrated a 4.1cm aneurysm involving the right interlobar artery. He underwent a right middle and lower lobectomy and was discharged in a stable condition.

A 4-month-old male presented with an incidental finding of a cardiac murmur and was diagnosed with Tetralogy of Fallot. He underwent a modified Blalock Taussig shunt at 4 years of age as initial pulmonary anatomy was unsuitable for complete repair. He presented 7 months post shunt with fever and was diagnosed with infective endocarditis. Vegetations were noted on the pulmonary valve and blood culture grew Strep Viridans. He completed a 6 week course of antibiotics and underwent surgical correction thereafter. He presented 11 months later with haemoptysis. A CT angio demonstrated a left subclavean artery aneurysm at the site of the initial Blalock Taussig shunt. The aneurysm (which had eroded into the apex of the lung) was surgically resected. Histology demonstrated fibrosis and calcification and no infective pathogens were identified. He is currently stable on follow up.

Discussion: Mycotic aneurysms result from septic arterial emboli to the intraluminal space or from spread of infection through the intimal vessels. Clinical presentation is highly variable depending on the location of the aneurysm. CT and MR angiography reliably diagnose mycotic aneurysms. Ruptured aneurysms have a poor prognosis but no predictors of this complication have been identified. Many unruptured aneurysms may resolve with antibiotic therapy. No randomised trials exist to guide management and therapy must be tailored to the individual patient.

Ethnicity-related cardiovascular and metabolic responses to stress: The SABPA study

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Introduction: Previous studies in this cohort of African and Caucasian male schoolteachers have shown a higher degree of deleterious cardiovascular and metabolic changes in the African subjects. This study aims to evaluate the relationship between acute stress responses in the laboratory and some vascular disease risk factors.

Method: Anthropometry and lifestyle were assessed and 24h ambulatory blood pressures were recorded in 81 African and 100 Caucasian men. Beat-to-beat blood pressure readings were obtained during performance of the Colour Word Conflict (STROOP) test and the Cold Pressor Test (CPT), and basal and pre-and post-test blood samples were collected.

Results: The stress test elicited an augmented glucose responses ($p<0.001$) in the African men while the responses of the Caucasian men appeared to be attenuated. Indications of an enhanced a-adrenergic response were observed in hyperglycemic African subjects with a decrease in stroke volume ($p=0.07$) and cardiac output ($p=0.05$) being evident between measurements. Urinary albumin creatinine ratio (ACR) was determined by change in systolic blood pressure, as observed during the CPT in African subjects [adjusted R^2 0.31: ß, 0.54 (0.23, 0.85), $p=0.002$] and by change in plasma glucose, as observed during the STROOP test in Caucasian subjects [adjusted R^2 0.19: ß , 0.33 (0.02, 0.64), $P=0.04$].

Conclusions: An a-adrenergic driven cardiovascular and metabolic response appears to be associated with augmented glucose responses in African men when exposed to acute laboratory stress. It is proposed that pressure overload in the presence of hyperglycemia facilitates renal endothelial impairment in Africans, while renal endothelial integrity may be compromised mainly by the metabolic responses to stress in Caucasians. The pathogensis of vascular disease relating to stress thus appear to be ethnic specific.

Congenital unilateral absence of pulmonary artery: Single institutional experience

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Introduction: Unilateral absence of pulmonary artery (UAPA) is a rare congenital cardiac malformation characterised by complete absence of the intrapericardial segment of one of the main pulmonary arteries. It can present as an isolated lesion or may be associated with other congenital heart defects (CHD) in approximately 40% and 60% respectively. Isolated UAPA is associated with increased morbidity and mortality related to pulmonary hypertension (PHT) if not operated timeously.

Methods: Retrospective review of 33 cases of UAPA, isolated and associated with CHD who were sourced from a computerised database during the period 1980 - 2013 at the Chris Hani Baragwanath Academic Hospital, a tertiary care institution. Demographic data collected included age at presentation, sex, presenting features, type of UAPA, associated CHD, diagnostic procedures, surgery and outcomes.

Results: Nineteen infants (57.6%) and 14 children were reviewed. Median age at presentation was 10 months. UAPA was isolated in 14 patients (42.4%) and associated with CHD in 19 patients (57.6%). Thirty one patients (93.9%) were symptomatic. The majority of the isolated UAPA (33%; 11/33) presented with respiratory distress while the majority of UAPA associated with CHD (36.4%;12/33) presented with cyanosis. The diagnosis of UAPA was initially made on echocardiography alone in 14 patients (100%) with isolated UAPA and six patients (31.6%) with associated UAPA. Diagnosis was confirmed on computerised tomography (CT) scan, angiography and at surgery in 29 patients (87.9%).

Unilateral absence of right PA (UARPA) was diagnosed in 15 patients (45.5%) and unilateral absence of left PA (UALPA) in 18 patients (54.5%). UARPA was identified in the majority of isolated UAPA group (78.6%;11/14). The majority of UAPA combined with CHD (78.9%;15/19) were associated with UALPA. Aortic arch was opposite in 23 patients (69.7%) and the majority were from the isolated UAPA group (60.9%;14/23). PHT was observed in fifteen patients (45.5%;15/33) with a mean pulmonary vascular resistance of 16.2 Wood Units in 11 patients (73.3%;11/15). All the patients with PHT were isolated UAPA (53.3%;8/15) and associated UAPA with increased pulmonary blood flow (PBF)(46.7%;7/15).

CHD associated with UAPA were divided into two groups: 1.) Increased or normal PBF (36.8%;7/19): Ventricular septal defect (VSD)=3(15.8%), patent ductus arteriosus (PDA)=2(10.5%), single ventricle/double inlet left ventricle (DILV)=1(5.3); 2.) Decreased PBF (63.2%): Tetralogy of Fallot (TOF)= 9(47.4%), double outlet right ventricle (DORV) with pulmonary stenosis (PS)=3(15.8%). Surgical anastomosis was performed in one patient with TOF. Surgery for other associated congenital cardiac defects was performed in fifteen patients (45.5%). Overall mortality was 36.4% (12/33).

Conclusion: Common presenting feature was respiratory distress in isolated UAPA and cyanosis in UAPA combined with CHD. The majority of isolated UAPA were associated with UARPA. UALPA was present in the majority of UAPA combined with CHD. Isolated UAPA and UAPA combined with CHD and left to right shunts were associated with PHT. There is high mortality associated with UAPA.

Isolated unilateral absence of pulmonary artery: Review of cases seen in a Southern African tertiary care institution

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Introduction: Isolated unilateral absence of pulmonary artery (UAPA) is a very rare congenital cardiovascular malformation, characterised by normal pulmonary trunk and unilateral absence of a pulmonary artery (PA) branch. The estimated prevalence ranges from 1/200 000 to 1/300 000. Presentation in infants includes respiratory distress, congestive cardiac failure (CCF) and pulmonary hypertension (PHT). It may be asymptomatic in older children, adolescents and adults, incidentally detected during routine chest X-ray (CXR) or present with exercise intolerance, PHT, high altitude pulmonary edema and haemoptysis. Committed search for the missing pulmonary arterial supply and rehabilitation to restore flow and promote growth to allow for later surgical re-anastomosis should be aggressively attempted. Delayed diagnosis and surgical interventions is associated with increased morbidity and mortality related to PHT and recurrent haemoptysis.

Methods: To review the characteristics of 14 children with UAPA who were sourced from a computerised database during the period 1985 - 2013 at the Chris Hani Baragwanath Academic Hospital, a tertiary care institution. Demographic data collected included age at presentation, sex, presenting features, diagnosis, chest X-ray, diagnostic procedures, therapeutic strategies and outcomes.

Results: Eleven infants (78.6%) and 3 children were admitted. The presenting features were respiratory distress (78.6%; all infants – median age of 12 days), recurrent lower respiratory infections, congestive cardiac failure, cyanosis, haemoptysis, exercise intolerance, palpitation and chest pain. Median age at presentation was 2.5 weeks (1 day - 11 years). Chest X-rays (CXRs) were suggestive of UAPA in all the patients (100%;14/14). The diagnosis was initially suspected on CXR or echocardiography alone, confirmed on computerised tomography (CT) scan and angiography in 12 patients (85.7%). Pulmonary vein wedge angiography was done successfully in 2 patients (12.5%) and distal PA was visualised in both patients. Collaterals were identified in 7 patients (50%) from the bronchial, subdiaphragmatic and brachiocephalic arteries.

Diagnosis was as follows: Unilateral absence of right pulmonary artery (UARPA) in 11 patients (78.6%) and unilateral absence of left pulmonary artery (UALPA) in 3 patients (27.3%). Aortic arch was opposite in all the patients (100%). PHT in 8 patients (57.2%) and 5 of those patients were infants (63%). Mean pulmonary vascular resistance was 21.8 Wood Units (WU) in 6 patients (42.9%). Three patients were deemed inoperable and no surgical re-anastomosis of the distal PA was done in any of the patients. Mortality was 35.7% (5/14, all infants).

Conclusion: Common presenting feature was respiratory distress amongst the infants. UARPA was the most common. Aortic arch was opposite in all patients including those with UALPA. The majority of patients with PHT were infants. Isolated UAPA is associated with high mortality.

A prospective study evaluating super-responders in South Africa

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Purpose: Improvement of left ventricular ejection fraction (LVEF) following cardiac resynchronisation therapy (CRT) implantation is known to rise between 3-5%. Some patients present with dramatic increases in LVEF of up to 20% or more, or a final post CRT implantation EF of >45% and are known as "super-responders." Patients whose LVEF normalise with CRT are labelled "hyper-responders." The object of our study was to assess the number of super-, hyper-, normal- and non-responders in a cohort of patients from a single operating centre in South Africa.

Method: We looked at 61 patients who received a CRTP or CRTD device in our practice between June 2004 and September 2012, and looked at their data retrospectively. Patients' pre- and post clinical characteristics were compared using a paired t-test.

Summary of results: Our main baseline ejection fraction was 28±5.9%, Left Ventricular Internal Diameter in diastole (LVIDd) 6.6±0.8, Left Ventricular Internal Diameter in systole (LVIDs) 5.6±0.8, and QRS duration 137±30.

Post implantation mean QRS improved 17ms $p<0.001$. Mean improvement in EF was 15% $p<0.001$. LVIDd mean decreased by 0.3 $p=0.019$. LVIDs mean decreased 1 $p<0.001$.

There were 11 non-responders (18%), 5 patients did not have adequate follow up data, 18 normal responders (30%), 15 hyper-responders (25%), and 12 super-responders (20%).

Conclusion: The results demonstrated a significant improvement in ejection fraction with decrease in QRS width in appropriately selected patients. The percentage of super- and hyper-responders was higher than previously described and this may be due to the implants having been performed in a high volume experienced centre, the majority of the patients had LBBB with appropriate broad QRS complexes pre-implant.

Molecular analysis of PP1 anchoring to NCX1 macromolecular complex

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Introduction: The cardiac $Na+/Ca^{2}+$ exchanger 1 (NCX1) modulates excitation-contraction coupling and contributes to $Ca^{2}+$ removal in cardiomyocytes. Altered expression and activity of NCX1 is linked to dysfunctional $Ca^{2}+$ handling in chronic heart disease. Consequently, modulation of NCX1 activity has been proposed as a therapeutic target, but detailed understanding of NCX1 regulation is warranted. It has been shown that NCX1 exists in a macromolecular complex which would allow for regulation of its activity. NCX1 is also regulated by its accessory protein phospholemman (PLM) which inhibits NCX1 activity when phosphorylated at serine 68 (pSer68-PLM). Protein phosphatase 1 (PP1) dephosphorylates pSer68-PLM and thus indirectly regulates NCX1 activity. Although no anchoring site is known, PP1 co-precipitates NCX1. We hypothesised that PP1 regulates NCX1 activity and that a direct and functional NCX1-PP1 interaction is a prerequisite for pSer68-PLM dephosphorylation. We set out to identify PP1 binding sites to the pPLM-NCX1 complex and assess the biological function of the interaction.

Methods and results: NCX1 co-precipitated PP1 and PLM in wild-type rat left ventricular lysates and PLM-NCX1 co transfected HEK 293 cells. NCX1 protein levels were upregulated, PP1/NCX1 protein levels were downregulated while pSer68-PLM/total PLM protein levels were upregulated in our pressure overload model. The proximity ligation assay showed that cardiac NCX1 and PP1 colocalize within <40nm in isolated cardiomyocytes. Bioinformatic analysis revealed 3 putative PP1 binding sites on NCX1. Overlay assays of NCX1 and PP1α showed that PP1α bound directly to the consensus sequence R/KVxF in CBD1 (calcium binding domain 1) in NCX1, which is preserved across isoforms. The reciprocal NCX1 binding site was identified within residues 235-260 in PP1α, a region which harbours the aspartic acid, leucine and arginine docking motif. Binding data were confirmed by immunoprecipitations, mutation analysis of NCX1-GFP and FLAG-HIS-PP1α deletion mutants expressed in HEK 293 cells and in pulldown assays using NCX1 biotinylated peptides. We have generated a peptide docking model of the R/KVxF motif bound close to the PP1α active site. Single and double mutations of residues in the docking motif confirmed the interaction. Biacore analysis indicated that the NCX1-PP1α binding is strong. In competition assay using NCX1, PP1 and PLM co transfected HEK cells a NCX1 peptide disruptor was able to displace the interaction, $p<0.05$, indicating that PP1 dephosphorylates pSer68-PLM when anchored to NCX1.

Conclusion: The R/KVxF motif in CBD1 of NCX1 facilitates PP1 anchoring to NCX1 and is directly and functionally required for pSer68-PLM dephosphorylation.

E/é ratio as a predictor of left ventricular remodeling in STEMI patients

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Background: Left ventricular remodeling (LVR) after ST elevation myocardial infarction (STEMI) is known to be a predictor of heart failure and death.
Aim: To determine if the measurement of mitral E/é ratio at the time of admission can predict the occurrence of LVR at 6 months follow-up.
Methods: 92 patients undergoing primary PCI for STEMI were enrolled. Trans-mitral E-wave velocity was measured using pulsed-wave Doppler in the apical four-chamber view. E/é was measured using pulsed-wave tissue Doppler imaging at the lateral mitral annulus in the same view.
LVEF was measured using biplane Simpson's method of discs in the apical four- and two-chamber views. LV end-systolic volume (ESV) and end-diastolic volume (EDV) was also measured. These measurements were obtained during the 48 hours following the admission at 6 months follow-up. Left ventricular remodeling (LVR) was defined as an absolute increase of EDV >20%.
Results: Only 88 patients completed their follow-up with a mean age of 56.39±15.02 years. At 6 months, 28 patients (31.82%) showed LVR. E/é ratio was higher in patients experiencing LVR (11.52±2.03 vs. 6.92±1.37; p<0.001).
Patients with an E/é <8 (54 patients) had significant improvement of their LVEF at 6 months follow-up from 38.97±9.98% to 42.94±7.79%; p=0.016. Those with an admission E/é >8 (34 patients) showed non-significant improvement of their LVEF 48.33±9.17% to 45.83±7.31%; p=0.075. Admission E/é ratio showed a good correlation with LVR at 6 months follow-up (r=0.65, p<0.001).
Conclusions: E/é ratio is a good predictor of LVR at 6 months after a STEMI. Patients with an elevated E/é ratio have improved LVEF at 6 months follow-up.

The prevalence of rheumatic heart disease amongst Grade 10 - 12 learners of the Free State and Northern Cape: Preliminary results

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Introduction: The burden of Rheumatic heart disease (RHD) in industrialised countries declined to 0.3/1 000 by the end of the 20th century, mainly as a result of improvements in living standards. By contrast, acute rheumatic fever and RHD remain common in many developing countries. RHD can be prevented by introducing primary and secondary preventative programmes in a population, reducing the number of patients requiring surgery. No current information is available on the prevalence of RHD in Central South Africa.
Methods: A prospective cross-sectional study was performed in 16 - 18 year old learners attending school in low socio-economic areas in Central South Africa. Based on previous burden of disease figures, we plan to perform echocardiographic screening on 1 700 learners. So far 1 015 learners in the Free State and Northern Cape were screened between January 2011 and June 2014 as part of the Wheels of Hope Project.
Results: A total of 1 015 learners were screened by echocardiography. Normal echocardiography findings were obtained in 922 cases. There were 93 abnormal echocardiograms reviewed by a paediatric cardiologist, in which 22 abnormalities were identified. These included 7 patients with RHD, 7 with pulmonary regurgitation and tricuspid regurgitation, 2 with pericardial effusions, 2 with left ventricular hypertrophy, 2 with mitral valve prolapse, 1 with ventricular dysrhythmia and 1 sub-aorta stenosis.
Conclusion: The bench mark study by McClaren, et al. (1972) in Soweto (n=12050, age 2 - 18 years) showed a prevalence of 6.9 per 1 000 and peaked at 19.2 per 1 000 in the 15 - 18 year old bracket. Although this is a preliminary report, the fact that our results show a decline to 7 cases per 1 000 in the 16 - 18 year old group might support our impression that there is an actual decline in the prevalence of RHD in Central South Africa.

A possible role for the ATM protein in the myocardial pathology associated with obesity and insulin resistance

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Introduction: Ataxia-telangiectasie (A-T) is an autosomal recessive disorder that is caused by mutations in the ATM gene. ATM is a 350kDa serine/threonine protein kinase of the PI-3 kinase like kinases (PIKK) and has a large number of substrates in various signalling pathways. ATM can be localised to the nuclear, cytosolic or mitochondrial compartments of a cell. A-T patients have either no or low expression of ATM and display a high incidence of insulin resistance or type 2 diabetes mellitus and are more susceptible to ischaemic heart disease. ATM is activated by insulin, hypoxia, DNA-strand breaks or oxidative stress and has been implicated in the development of cancer, metabolic disorders, low anti-oxidant defence and atherosclerosis. Because of scant information on (1) the role of ATM in signalling cascades in the heart, (2) possible cardiovascular effects of ATM and (3) evidence that obesity may alter the expression of ATM, we aimed to investigate the expression and impact of ATM in the heart in the context of obesity-induced insulin resistance.
Methods: Wistar rats were rendered insulin resistant (DIO) by feeding a diet supplemented with sugar and fat for a period of 16 weeks. Ventricular cardiomyocytes were prepared by perfusion-digestion and insulin responses measured using accumulation of (^{3}H)2-deoxyglucose. The specific ATM

inhibitor KU60019 was used to manipulate activity of the protein. Expression of ATM was determined by Western blotting and commercially available antibodies. Cardiac mitochondria were prepared by differential centrifugation and their oxidative capacity determined using a Clark-type electrode. Cardiac micro-vascular endothelial cells were purchased commercially.

Results: We have demonstrated for the first time that: (1) the expression of ATM is downregulated in the heart in obesity/insulin resistance; (2) Inhibition of ATM in cardiomyocytes attenuates insulin-stimulated glucose uptake; (3) ATM is expressed in cardiac microvascular endothelial cells; (4) ATM is also localised to myocardial mitochondria and (5) its expression is downregulated in mitochondria from hearts of obese animals that also display mitochondrial dysfunction.

Conclusion: We conclude that ATM is a potential role player in the development of a diabetic cardiomyopathy.

Left main stem coronary (LMS) thrombosis in a teenager with nephrotic syndrome (NS)

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Introduction: The association between NS and an increased risk for venous thromboembolism (VTE), in particular renal vein thrombosis, is well established. Arterial thromboembolic events (ATE) have however been confined to case reports. More recently the absolute risk rates for both VTE and ATE have been described, defining a high absolute risk of both VTE (9.85%) and ATE (5.52%) in NS, particularly within the first 6 months of diagnosis.

Case: A 16-year-old male patient presented with a high-risk non ST-segment elevation acute coronary syndrome (NSTE-ACS) in late December 2013. Cardiovascular risk factors included: male gender, an increased waist ratio and raised LDL cholesterol (6.0mmol/L). Serum creatinine was normal. His admission 12-lead electrocardiogram and transthoracic echocardiogram findings indicated the right coronary artery (RCA) as the potential culprit vessel. He received standard treatment for a NSTE-ACS and underwent coronary angiography within 24 hours of admission. This revealed an unobstructed dominant RCA and a mobile filling defect within the LMS. Ventriculography demonstrated hypokinesia of the mid-inferior wall. Intravascular ultrasound (IVUS) of the LMS was undertaken revealing a highly mobile homogenous mass with no evidence of either a ruptured atherosclerotic plaque using virtual histology, or intimal dissection by means of chromoflow. The mass was aspirated and histology revealed it to be a fibrin, and not platelet rich thrombus, suggesting it was present before the time of coronary angiography and therefore not a complication of the procedure. He had an uneventful course and repeat angiography after triple antiplatelet therapy demonstrated an unobstructed LMS. He was discharged on dual antiplatelet therapy, a B-blocker, high dose statin and an ACE-inhibitor. An extensive thrombophilia screen was undertaken and except for a low-normal antithrombin level of 77iu/dL (76-125) this screen was normal. In June 2014 he was diagnosed with NS secondary to obesity related focal segmental glomerular sclerosis (FSGS). After a 10kg weight loss his urinary protein level has improved from 6.84g/day to 3.55g/day and he has had no further thrombotic events.

Conclusion: Given the fact that this young patient had evidence of coronary involvement within two coronary territories (RCA and LMS) it is highly probable that he had subclinical NS at the time of his NSTE-ACS diagnosis. In patients with unexplained coronary thrombotic events it is imperative that NS is considered as a potential acquired thrombophilia.

Low systolic blood pressure and high resting heart rate as predictors of outcome in patients with Peripartum Cardiomyopathy

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Background: Patients with Peripartum Cardiomyopathy (PPCM) often present with low systolic blood pressure (SBP) preventing appropriate up-titration with standard heart failure medication. The aim of this study was to identify the contribution of high resting heart rate (HR) to low SBP as a risk marker factor for patients with recent onset of PPCM receiving medical therapy.

Methods: Retrospective analysis of 206 patients with recent onset PPCM enrolled consecutively at two tertiary care centres in South Africa. Clinical assessment and echocardiography were obtained at baseline and at six months and laboratory results were performed at baseline only. Poor outcome was defined as the combined endpoint of death, LVEF <<35% or remaining in New York Heart Association (NYHA) functional class III/IV at six months. Complete LV recovery was defined as LVEF ≥55% at six months.

Results: There were 100 (49%) patients with SBP <<110mmHg. Patients with low SBP had lower BMI than those with higher BP. The mean dose of beta blocker therapy was similar to those with low BP than in the other group. Patients with a high heart rate (HR.≥>100) and low SBP (<110mmHg) tended to have worse outcomes than patients below the HR median and high SBP. PPCM patients with low SBP and high HR were less likely to be on ACE-inhibitors (n=35, 69% vs. n=129, 84%, p=0.024) and on carvedilol (n=24, 47% vs. n=98, 64%, p=0.047) compared to the rest of the study cohort.

Conclusion: This study suggests increased risk of poor outcome in patients with PPCM presenting low SBP and high HR on standard HF medication possibly having implications on HF management.

High circulating free fatty acids (FA) abolish ischaemic preconditioning (PC) in isolated perfused rat hearts

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Introduction: Although the harmful effects of FA on cardiac function during ischaemia (I) and reperfusion (R) are well established, little information is available regarding substrate effects on PC. Most ex vivo studies on isolated hearts used glucose as sole substrate. In view of the significant increase in FA metabolism during R, as well as increased plasma FA levels in obesity, presence of this substrate may affect the PC process. The aim of this study was to determine the effects of FAs on PC.

Methods: Isolated working rat hearts were preconditioned with 3x5 minutes global I/5 minutes R, followed by 35 minutes regional I and 1h R. Hearts from untreated or dichloro-acetate (DCA) treated (50mg/kg/h for 8 h) rats were perfused with buffer containing glucose (G;10mM), palmitate [1.2mM/3% albumin (HiFA) or 0.5mM/3% albumin (LoFA)] or a combination of G+FA (n=6/group). Endpoints were infarct size (IS), function and activation of ERK and PKB. Infarct size (% of area at risk) was determined using tetrazolium staining.

Results: PC caused a significant reduction in IS of hearts perfused with G as substrate (% of area at risk: Non-PC: 38.9±1.8; PC: 22.6± 3.7; $p<0.001$). FA increased IS of non-PC hearts (% of area at risk: G 38.9±1.8; HiFA 48.5±1.7*; LoFA 41.8 ±5.1; G+HiFA 53.6±4.1*; G+LoFA 57.3±4.7*; *$p<0.05$ vs. G). Hearts perfused with HiFA or HiFA+G could not be preconditioned [IS (% of area at risk): HiFA 48.6±1.0; G+HiFA 53.7±3.9], while hearts perfused with LoFA ± glucose were preconditioned [IS (% of area at risk): 33.81±5, 27.6±1.9 respectively]. Inhibition of PDHK by DCA reversed the harmful effects of HiFA on PC [IS (% of area at risk): HiFA+G+DCA 29.4±3.2; HiFA+DCA 30.0±1.7]. PC hearts perfused with G only, showed a 20% recovery of cardiac output during R, while PC hearts perfused with HiFA or G+HiFA failed.

Western blot showed no association between PKB and ERK activation during early reperfusion and IS reduction in the presence of high or low perfusate FA, with or without DCA.

Conclusion: The outcome of PC ex vivo is profoundly influenced by the presence of HiFA in the perfusate. Stimulation of glucose oxidation by DCA reverses these harmful effects. No association between IS reduction and the RISK pathway was observed in the presence of Hi or LoFA.

Melatonin as a novel therapy in pulmonary arterial hypertension

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Introduction: Pulmonary arterial hypertension (PAH) is a disorder characterised by elevated pulmonary arterial pressure which leads to cardiac hypertrophy and dysfunction. Current treatments have marginal impact and additional therapies are required. Melatonin is a natural product shown to be cardioprotective against hypertension and myocardial ischaemia. We propose that melatonin treatment may be cardioprotective in a model of monocrotaline (MCT) induced PAH.

Methods: Male Long Evans rats (150-175g) were injected with MCT (80mg/kg) which induced PAH after 28 days. Melatonin (6mg/kg) was added to drinking water after 14 days of PAH development, until day 28 (n>5). Cardiac hypertrophy was confirmed with a ratio of the right ventricle weight over left ventricle plus septal weight (RVW/LV+S). Cardiac functional parameters were assessed at day 28, using isolated heart perfusion and echocardiography including right ventricular systolic (RVSP), developed pressure (RVDP) and left ventricular end diastolic volume (LVEDV). We also assessed plasma levels of an indicator of oxidative stress (TBARS).

Results: Melatonin reduced RVW/LV+S (0.56±0.03 vs. 0.34±0.03, $p<0.0006$), RVSP (92.74±5.13mmHg vs. 79.82±0.51mmHg, $p<0.0001$) and RVDP (81.22±2.75mmHg vs. 71.39±0.57mmHg, $p<0.025$). Melatonin also improved LVEDV (0.173±0.01mL vs. 0.65±0.08mL, $p<0.0002$) and plasma TBARS (2.07±0.28µM/mg protein vs. 1.25±0.06µM/mg protein, $p<0.019$).

Conclusions: Our data suggest that melatonin improves cardiac function in far progressed experimental PAH by decreasing oxidative stress. Melatonin may represent a novel therapeutic approach in the treatment of PAH.

Myocardial deformation in African hypertensive patients: An analysis using speckle tracking echocardiography

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Introduction: Speckle tracking echocardiography is an important contributing factor to the systolic function of the left ventricle in health and disease. Evaluation of left ventricular (LV) strain using speckle tracking is a sensitive technique used to assess cardiac performance and can be a better index of systolic function than ejection fraction (EF) in hypertensive patients. We postulate that changes in the myocardial strain, as reflected by longitudinal, radial and circumferential strain, may contribute to LV systolic function in hypertensive patients.

Methods: This study evaluated LV myocardial strain in 123 hypertensive patients – 41 with EF<50% (HTLEF group) and 41 with EF≥50% (HTNEF group) with heart failure and 41 with EF>50% and no heart failure (HHD). Subjects were consecutively recruited from the Chris Hani Baragwanath Hospital Cardiac Clinic from January 2011 - December 2012. Inclusion criteria were: documented prior diagnosis of hypertension (measurements on

3 separate occasions where systolic BP was ≥140mmHg or diastolic BP was ≥90mmHg taken over a period of 2 months at the Hypertension Clinic), documented HF using Framingham Study criteria, sinus rhythm and normal coronary angiography. Myocardial strain imaging was acquired using 2D transthoracic imaging and analysed off line using QLab software (Phillips).

Results: Longitudinal (LS), circumferential (CS) and radial (RS) strain were progressively lower in HTNEF and HTLEF as compared to HHD patients [-11.4+0.2 vs. -8.7+1.2 vs. -13.5+1.33, p<0.0001(LS); -11.5+0.3 vs. -9.0+1.4 vs. -15.2+1.69, p<0.0001(CS); 42.2±2.4 vs. 29.0±1.3 vs. 57.8±4.5, p<0.0001 (RS)], respectively. Furthermore, in HHD patients, radial and circumferential strain was preserved as compared to HTNEF group. Longitudinal, radial and circumferential strain correlated with ejection fraction [r=0.56(LS);r=0.64(CS); r=-0.66(RS), p<0.0001]; left ventricular mass index [r= 0.62(LS); r=0.53(CS); r=-0.55(RS), p<0.0001] and left ventricular sphericity index at end diastole [r=-0.75(LS); r=-0.70(CS); r=0.78(RS), p<0.0001] in hypertensive patients.

Conclusion: LV longitudinal strain, which is predominantly governed by the subendocardial region, is the most vulnerable component of LV myocardial deformation in hypertension and therefore most sensitive to the presence of myocardial disease. In hypertensive patients, abnormalities in baseline myocardial deformation are identified in patients with altered left ventricular geometry. Myocardial strain varies depending on the left ventricle's degree of remodelling and systolic function. Myocardial deformation indices may play a role in reflecting the mechanisms linking altered left ventricular geometry with progression to decompensated left ventricular systolic function.

The use of biological tissue covered stents for the treatment of complex coronary artery aneurysms

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Background: Coronary artery aneurysms have a prevalence of 5% in a coronary angiography population. CAAs predispose to turbulent flow and thrombus formation even in the absence of significant obstruction with increased risk of acute coronary syndrome, dysrhythmias and sudden cardiac death. The treatment options are poorly defined with data restricted to case reports and expert opinion.

We describe 2 cases using a pericardium covered stent for vessel reconstruction following coronary aneurysms.

Case discussion: Two patients underwent percutaneous intervention for significant aneurysm formation associated with angiographic significant stenosis. The first patient presented with recurrent unstable angina. Coronary angiography revealed a significant aneurysm in the mid segment of the right coronary artery followed by a >70% stenosis and a larger aneurysm in the proximal segment preceded by a >70% stenosis. The intervention aimed to construct normal to normal segments, excluding the aneurysms. Pre-dilatation of the proximal and mid segment stenosis was initially done, followed by deployment of two overlapping AneugraftDx stents. The second patient presented as a high risk inferior ST elevation myocardial infarction and had early signs of cardiogenic shock. Angiography showed a giant aneurysm in the proximal segment of the left anterior descending artery with TIMI 2 flow and a markedly aneurysmal right coronary artery. The distal right coronary artery was predilated and distal aneurysmal segment excluded with two AneugraftDx stents. Despite these interventions, the patient's haemodynamic status did not improve mandating intervention to the aneurysmal left anterior descending artery. The distal stenotic lesion in the left anterior descending artery was stented with a conventional drug eluting stent followed by sequential deployment of two AneugraftDx stents proximally, excluding the aneurysm and "reconstructing" the left anterior descending artery from its normal proximal portion overlapping with the distal drug eluting stent. Full blood vessel reconstruction was achieved and the aneurysms were immediately and completely excluded with no short term complications, TIMI 3 flow was restored and six month follow up angiography showed patent vessels with complete aneurysm exclusion and no evidence of in-stent restenosis.

Conclusion: Covered coronary stents may provide an effective tool for the safe and immediate exclusion of coronary artery aneurysms with excellent short term results and safety. Further clinical data is required in this field.

New data for rheumatic mitral regurgitation by 3D echocardiography in sub-Saharan Africa: Insights for surgical repair?

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Introduction: As compared to degenerative mitral regurgitation, the surgical results for rheumatic mitral regurgitation have been previously documented to be suboptimal. We performed three dimensional transoesophageal echocardiography (3DTEE) to analyse the morphology of rheumatic mitral regurgitation in more detail to determine the reasons for the suboptimal surgical outcomes.

Methods: Twenty eight patients with pure severe rheumatic MR underwent 2D/3D transthoracic and transoesophageal echocardiograms. Two experienced operators described MV morphology. Although the Wilkins score has been developed for mitral stenosis, we used the same criteria and applied the grading as a semi quantitative assessment of mobility, thickening, calcification and subvalvular involvement in a segmental fashion to the rheumatic regurgitant mitral valve.

Results: Mean age was 47.7±13.1 years and 24 (85%) were female. Mean left ventricle (LV) diastolic volume was 84.3±32.2ml/m^2, ejection fraction was 55.2%±13.1%. Mean mitral annulus area was 1605.9±653.7mm^2. Mean anterior leaflet area was 1184.9±559.0mm^2 and mean posterior leaflet area was 945.7±352.7mm^2. The tenting was mostly symmetric (67.8%) and the mean tenting volume was 3.5±2.4ml. The Wilkins score was 9.0±2.3 (thickening 1.96±0.7; calcification 1.4±0.7; mobility 2.3±0.7; subvalvular thickening 3.3±0.8) thus suggesting mostly being contributed to by reduced

mobility and subvalvular disease. Involvement of the posterior leaflet was more common as judged by the Wilkins score (posterior leaflet was 6.9±4.8, anterior leaflet was 3.9±1.7). Commissural fusion was present in 67.9% of patients, with the posteroinferior commissure fused in 67.8% and the anterolateral in 45.7%.

Conclusion: The results of this study suggest that the suboptimal results of surgery for rheumatic mitral regurgitation are due to the presence of subvalvular disease, limited mobility and commissural fusion. Improvement of the results of mitral valve surgery should address these aspects of rheumatic mitral regurgitation in a significant way.

Anaemia and chronic heart failure

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Introduction and aims: Anaemia has been associated with adverse outcomes in patients with chronic congestive cardiac failure in numerous international studies but local data are lacking. Thus this study aimed to define the prevalence of co-morbid anaemia in patients attending the Heart Failure Clinic at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH).

Methods: A total of 220 files were reviewed over a 6 month period from the Heart Failure Clinic at CMJAH. Anaemia was defined by the World Health Organisation criteria as a haemoglobin (Hb) level <13g/dl in men and <12g/dl in women.

Results: Mean age of the study group was 59.8 years (SD±12.2). The mean Hb concentration was 13.79g/dl (SD±1.96). The mean Hb in men was 13.83g/dl (SD±1.97) and in females the mean Hb was 13.79g/dl (SD±1.96). The overall prevalence of anaemia in the sample population was 21.4% (47 patients). The prevalence of anaemia in males and females was 15.8% and 26.1% respectively. Although there was a trend towards a higher Minnosota Heart Failure Questionnaire Score and lower Hb, this was statistically not significant (p=0.452). Unexpectedly there was a weak positive correlation between Hb concentration and furosemide dosage but this was statistically not significant (p=0.123). Correlation of Hb concentration and the 6 minute walk test yielded a positive correlation, which was statistically significant (p=0.001). There was a significant association between the Hb level and New York Heart Association (NYHA) Functional Class (p=0.030). Patients classified as NYHA III had a mean haemoglobin of 11.9g/dl, whereas NYHA I patients had a mean haemoglobin of 13.98g/dl. The highest prevalence of anaemia in the different NYHA functional classes (51.7%) was found in NYHA class III patients.

Conclusion: The findings of this study confirm that anaemia is common in heart failure patients (1 in 5) and furthermore that it is associated with greater severity of heart failure, making anaemia a potential prognostic marker in the management of heart failure patients in South Africa.

Clinical characteristics of cardio-renal syndrome in chronic heart failure

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Introduction and aims: It is well established that renal dysfunction in chronic heart failure is an important adverse prognostic factor. There is scant local data defining the clinical characteristics that are risk factors for renal dysfunction in patients with heart failure. Thus the aim of this study was to evaluate the relationship between severity of heart failure and severity of renal dysfunction.

Methods: The study was conducted at the heart failure clinic of Charlotte Maxeke Johannesburg Adademic Hospital. A total of 240 patients files were reviewed retrospectively from the heart failure clinic over a 6 month period. Forty two patients were excluded from the study due to lack of adequate study data.

Results: The mean age of the study group was 53.3 years (SD±15.05) with the youngest subject being 21 years old and the oldest subject aged 85 years. The mean systolic blood pressure was 119mmHg and the mean diastolic blood pressure (DBP) was 75mmHg. The mean eGFR was 72.01ml/min/1.73m^2. The overall prevalence of low eGFR (<60ml/min/1.73m^2) in the sample population was 34.5%.

Not unexpectedly we found that there was a significant negative correlation between the eGFR values across the different NYHA functional classes (p=0.012). Thus it was found that a higher NYHA class (clinically worse) was associated with worse renal function. The prevalence of low eGFR (<60ml/min/1.73m^2) within each NYHA class was 27% for NYHA I, 38% for NYHA II, 40% for Class III and 80% in Class IV.

Furthermore we found a statistically significant positive correlation (p<0.05) with eGFR and the Minnesota Living with Heart Failure questionnaire and the 6 minutes walk test. No association was found between haemoglobin levels and eGFR (p=0.79).

Conclusion: The findings of this study confirm that renal dysfunction is more prevalent in patients with more advanced heart failure. These findings highlight the need to treat heart failure patients early after presentation and to treat them more appropriately if we are to decrease complications such as renal dysfunction, thereby improving morbidity and mortality.

Effect of systolic blood pressure on outcomes after admission for acute coronary syndrome

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Introduction and aims: The clinical characteristics determining outcome after acute coronary syndrome is poorly described in South Africa. Thus the aims of this study was to evaluate the role of the admission systolic blood pressure (SBP) on outcomes following an acute coronary syndrome (ACS) event at a large urban public hospital in Gauteng, South Africa.

Methods: Patient admission data over a 2.5 year period were reviewed retrospectively following admission to Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) with a diagnosis of acute coronary syndrome. Patients were divided into 4 quartiles based an admission SBP; <100mmHg; 110-119mmHg; 120-139mmHg and >140mmHg.

Results: Six hundred and thirteen out of 658 patients had complete data for analysis. Patients admitted with SBP greater than 140mmHg were more likely to be hyper-tensives, smokers and more dyslipidaemic. Those with SBP <100mmHg were significantly more likely to be in Killip class 3 or 4 and had significantly higher mean heart rates when compared to the other 3 quartiles of admission SBP. Admitting SBP was not significantly different amongst the 4 racial groups nor with regards to gender and age. Presence of atrial fibrillation was also no different in the 4 quartiles of SBP. The 4 SBP quartiles showed no significant differences with regards to percentage of patients receiving fibrinolysis or undergoing PCI. Patients in the lowest quartile of SBP <100mmHg had almost a three-fold risk of death compared to the other quartiles of SBP. A SBP of greater than 120mmHg on admission on univariate analysis conferred no additional risk of death. Heart rate >96 per minute, Killip class 3-4 and AF also conferred significant hazards for mortality.

Conclusion: This study confirms previous studies that the admission SBP is an important prognostic marker for mortality following admission for acute coronary syndromes and early aggressive management of such patients is warranted.

Iron defecincey as cause of anaemia in chronic heart failure

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Introduction: Anaemia has been associated with adverse outcomes in patients with chronic congestive cardiac failure in many international studies. There are many causes attributed to anaemia in heart failure. One of the major factors implicated in the pathogenesis of anaemia in chronic heart failure is iron deficiency.

Aims: Thus this study aimed to define the prevalence of iron deficiency as the cause of anaemia in patients attending the Heart Failure clinic at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH).

Methods: Data from 200 patient files from the heart failure clinic at CMJAH were reviewed retrospectively over a 6 month period. Anaemia was defined by the World Health Organisation criteria of a haemoglobin (Hb) level <13g/dl in men and <12g/dl in women. Serum ferritin levels were measured to assess for iron deficiency.

Results: The mean Hb concentration of the study group was 13.79g/dl (SD±1.96). The mean Hb in men was 13.83g/dl (SD±1.97) and in females the mean Hb was 13.79g/dl (SD±1.96). The overall prevalence of anaemia in the sample population was 21.4% (47 patients). The prevalence of anaemia in males and females was 15.8% and 26.1% respectively. Mean age of the study group was 59.8 years (SD±12.2).

Seventy two patients (32.7%) had ferritin levels recorded. Only 1 female patient (0.01%) was found to be iron deficient based on serum iron studies (ferritin <15µg/L). None of the male subjects were iron deficient.

Conclusion: Iron deficiency as a cause of anaemia in chronic heart failure patients in the population studied is uncommon. The reason for this is unclear but it is possible that serum ferritin is not an ideal marker of iron deficiency anaemia.

Prevalence and epidemiology of acute coronary syndromes in a large urban hospital in South Africa

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Introduction and aims: The prevalence of non-communicable diseases is reported to be rising rapidly, especially in developing nations. However, there are very few studies assessing the epidemiology of acute coronary syndrome in South Africa. Thus the aim of this study was to evaluate the prevalence and epidemiology of acute coronary syndrome (ACS) at a large urban public hospital in Gauteng, South Africa.

Methods: A retrospective audit of all admissions to Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) was performed over 2.5 years from January 2010 - June 2012.

Results: During the study period a total of 3 016 patients were admitted to the cardiology division of CMJAH. Of these 658 patients were admitted with a diagnosis of ACS giving an overall prevalence of 20.7%. Six hundred and thirteen patients had complete data for analysis. There were 451 males (73.6%) and 162 females (26.4%). The mean age of the study group was 58.9±12.5 years. Females with ACS were significantly older than men.

In this study group of ACS patients, Whites constituted the largest cohort of 334 (55%) patients. This was followed by Black 133 (22%) patients. Indian

patients constituted 19% followed by Coloured patients at 4%. The mean ages of the racial groups were 56.7±12.2, 59.3±12.9, 59.4±12.4, 61.2±13.9 for Black, Indian, White and Coloured racial groups respectively. Differences in the mean age between the race groups was not statistically significant (p=0.123).
The majority (49%) of admissions for ACS was for ST elevation myocardial infarction. Non ST elevation myocardial infarction constituted for 41% of admissions. The remaining 10% were admitted with unstable angina. There were no gender differences with regards to type of ACS presentation.
Conclusion: As compared to previous published literature in South Africa, the prevalence of acute coronary syndromes has increased substantially in an urban environment. Of note is the dramatic rise in prevalence of ACS in black patients in whom the condition was said to be rare a few decades ago.

Prevalence of cardio-renal syndrome in patients with heart failure

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Introduction and aims: Many studies have demonstrated that renal dysfunction has a significant prognostic impact on morbidity and mortality in patients with heart failure. There are scant data locally with regard to the prevalence of renal dysfunction in patients with chronic heart failure. Thus the aim of this study was to define the prevalence of renal dysfunction in patients attending the heart failure clinic at Charlotte Maxeke Johannesburg Academic hospital (CMJAH).
Methods: A total of 242 patients were reviewed retrospectively from the Heart Failure clinic at CMJAH. Forty two patients were excluded from the study due to lack of adequate study data. Only patients with reduced ejection fraction <50% were enrolled in the study. The eGFR was calculated using the Modification of Diet in Renal Disease formula: (186.3 X serum creatinine) -1.154 x (age) -0.203 x (0.742 if female) x (1.212 if African).
Results: The presence of probable renal dysfunction was defined as a calculated creatinine clearance of <60ml/min/1.73m^2. This is the threshold eGFR below which complications of renal impairment appear.
The mean age of the study group was 53.3 years (age range 21-85). The mean age of the group with lower eGFR was somewhat older at 60.8 years. The mean systolic blood pressure was 119mmHg and the mean diastolic blood pressure was 75mmHg. Statistically there was no significant difference with regards to systolic or diastolic blood pressures between the group with low eGFR and those with eGFR more than 60ml/min/1.73m^2.
The mean eGFR in the total sample group was 72.01ml/min/1.73m^2. The mean eGFR in men was 72.30ml/min/1.73m^2 and in women 71.70ml/min/1.73m^2. The overall prevalence of low eGFR (<60ml/min/1.73m^2) in the sample population was 34.5%. The prevalence of low eGFR was almost identical in male (33.6%) and female patients (35%).
Conclusion: The findings of this study confirm that the cardio-renal syndrome is common in heart failure patients managed in a dedicated heart failure clinic of a large urban public hospital in South Africa.

Selective Epac modulation mediates cardioprotection during ischaemia/reperfusion

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Introduction: Exchange protein directly activated by cyclic AMP (Epac) – a cyclic AMP-activated guanine nucleotide exchange factor for Ras-like GTPases, Rap – has emerged as a new regulator of processes in a protein kinase A independent manner. Although recent data on Epac indicated its positive effects on the cardiovascular system, little is known about its possible involvement in a clinical setting, such as the pre- and post-treatment of ischaemic hearts. We aimed to elucidate, firstly, the specificity, and secondly, the degree of involvement of Epac activation in mediating cardioprotection by pre- or post-treatment of ischaemic hearts with Epac agonist and antagonists.
Methods: Isolated perfused working rat hearts were used to evaluate mechanical function. Regional ischaemia was induced by ligating the left descending coronary artery for a period of 35 minutes followed by 60 minutes reperfusion and infarct size was determined by using triphenyl tetrazolium chloride staining. Hearts were perfused, immediately before (pre-treatment) or after (post-treatment) sustained ischaemia, with (1) a selective Epac1 agonist (8-CPT-2'-O-Me-cAMP, CPT) alone or (2) CPT in combination with a non-selective Epac antagonist brefeldin A, BFA, or (3) CPT with a recently discovered selective Epac1 antagonist, ESI-09. Epac-Rap1 activation assays were also conducted to determine specificity of the drugs on Epac activation.
Results: Ischaemic hearts either pre-treated or post-treated with CPT alone showed a significant reduction in infarct size (% of area at risk: 21.6±3.1 or 23.0±2.7, respectively) compared to the untreated group (37.8±2.2, p<0.05). Furthermore, hearts pre- or post-treated with a combination of CPT and BFA had significantly larger infarct sizes (40.3±2.4 or 35.8±1.4, respectively) compared to hearts pre- or post-treated with CPT alone. CPT at 2µM effectively induced Epac-Rap1 activation, which was dose-dependently inhibited by both BFA and ESI-09.
Conclusion: Agonist-induced Epac activation before or after exposure to ischaemia has powerful cardioprotective effects suggesting that stimulation of this signalling pathway has therapeutic potential.

Risk of contrast-induced nephropathy in patients with acute coronary syndrome

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Introduction: Contrast-induced nephropathy (CIN) is a phenomenon that occurs in a considerable number of patients who undergo catheterisation. Risk factors for the development of CIN are numerous and have been widely studied. Patients with acute coronary syndrome (ACS) and in need of urgent catheterisation have a high risk of CIN. In this study we will evaluate the level of CIN risk in ACS patients who undergo catheterisation in our Interventional Cardiology Unit.
Methods: We evaluated all patients with ACS who underwent catheterisation for in a period of two months. Demographic, clinical and laboratory data were collected. We used a Risk Score of CIN developed by Mehran, et al. to measure the risk of each patient. The variables are hypotension, intraaortic-balloon-pump, heart failure, age >75, diabetes mellitus, anemia, contrast volume used and renal function. Finally, patients were grouped into different risk groups.
Results: Seventy seven patients with ACS who underwent catheterisation were evaluated. Sixty patients had NSTEMI (78%) and 17 patients STEMI (22%). The mean age of the patients was 63.9±10.6 years old, 84% were men (n:65) and diabetics 36% (n:28). The mean MDRD4 was 88.1±32ml/min/1,73m^2 and mean hemoglobin was 13.62±1.9g/dl. We classified the patients into different groups after calculating the score for each patient. Three patients would have had CIN in the first and in the second group; 4 patients would have had CIN in the third group and 2 patients in the fourth group. Overall, a total of 12 patients would have had CIN (16% of the entire sample) according to the risk score. Only 43% of Risk Group 3 (medium-high) and 50% of Risk Group 4 (high) had established the protocol for renal protection.
Conclusions: Sixteen percent of patients in our sample would have had CIN according to this Risk Score. Most of the patients in our sample with medium-high and high risk were not adequately prepared from the renal point of view. Therefore, there is an underuse of the renal protection protocol.

Carvedilol use in patients with severe rheumatic mitral regurgitation awaiting mitral valve surgery

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Aims: To determine whether the anti-remodeling agent, carvedilol, improves clinical and echocardiographic parameters in patients with severe rheumatic mitral regurgitation.
Methods: Patients with severe rheumatic mitral regurgitation, who qualified for mitral valve surgery, were prospectively recruited and randomised to carvedilol (25mg bd) or no anti-remodeling therapy. The patients underwent baseline and pre-operative clinical examination, 6 minute walk test, Minnesota Heart Failure questionnaire, echocardiogram and blood tests. Patients also underwent a baseline cardiac catheterisation and coronary angiogram to rule out other causes for mitral regurgitation.
Results: Eight black female patients, who provided informed consent, had complete data and were included in this analysis. Four were randomised to receive carvedilol while 4 were randomised to receive no anti-remodeling therapy. Average follow up was 12 months in the carvedilol group and 8.5 months in the control group. One patient in the control group had mild hypertension controlled on long-acting nefedipine and 2 patients in the control group were HIV positive but did not qualify for ARV therapy. At baseline, patients recruited to the carvedilol arm were, on average, younger (35.75-years-old vs. 45.25-years-old), more ill requiring higher doses of furosemide at baseline (120mg daily vs. 80mg daily), had higher mean heart rates (87.25bpm vs. 82bpm), shorter 6MWT (387.5m vs. 400m), more dilated ventricles (LVIDD 65.28mm vs. 63.35mm) and lower left ventricular ejection fractions (46.63% vs. 58.05%). Both groups were similar in terms of baseline blood pressure, BNP and pulmonary pressures.
At follow up, on average, patients in the carvedilol group had reduced heart rate (-6.5bpm vs. +6.75bpm), reduced average systolic blood pressure (-6.75mmHg vs. +15mmHg), improved 6MWT (23.75m vs. 6.35m) and improved PASP (+3.05mmHg vs. +10.53mmHg), but had worse changes in heart failure questionnaire scores (-17 vs. -31points) and NT-ProBNP (+408ng/L vs. -473.75ng/L). Patients in the carvedilol group also did not have improved 2D echocardiography measures including LVIDD (-0.075mm vs. -5.175mm), LVIDS (-0.2mm vs. -6.525) or EF (-0.15% vs. +7.3%) at follow up.
Conclusions: This small prospective, randomised, controlled trial shows that: the clinical and 2D echocardiographic response in patients with severe rheumatic mitral regurgitation awaiting mitral valve surgery treated with carvedilol is variable and does not provide support for the use of carvedilol in these patients.

The DEBB (Drug-Eluting Balloon in Bifurcations) study

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Background: Bifurcation lesions are regarded as complex lesions because of the risk of side branch (SB) occlusion at the time of percutaneous intervention (PCI) and the risk of main branch (MB) complications related to stent distortion. The optimal approach to coronary bifurcation lesions by PCI is a subject of debate. Here we describe preliminary data on a strategy of drug-eluting balloon (DEB) pre-dilation of the SB followed only by provisional stenting of the MB using a drug-eluting stent (DES).

Methods: Following pre-dilatation and DEB-treatment of a significant SB, the MB was treated with DES using a provisional stenting strategy. The SB was left with no further intervention. Patients were discharged on routine medical therapy including clopidogrel for a minimum of 6 months. Six month control coronary angiograms were performed and baseline lesion characteristics were then compared with final lesion characteristics using quantitative coronary angiography.
Results: Six patients had complete data and were included in this analysis. One patient demised suddenly 60 days after intervention and a cardiac death is suspected. Five patients underwent their 6-month control angiogram without adverse events. All side branches were more than 2mm in luminal diameter at baseline and all had ostial "pinching" with mean residual diameter after PCI at the ostia of 1.27mm. At the 6-month angiogram all SBs were patent and the mean ostial diameters had not changed significantly (mean diameters were 1.32mm) and there were no other complications.
Conclusions: A strategy of SB treatment with a DEB followed by MB stenting appears to be a feasible option for treating bifurcation coronary lesions. However, sudden death in one patient may be a flag for increased risk of stent thrombosis.

Assessment of left atrial and left ventricular function in chronic rheumatic mitral regurgitation by strain imaging

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Introduction: There is a paucity of data on left atrial (LA) and left ventricular (LV) deformation characteristics in patients with chronic, isolated, rheumatic mitral regurgitation (MR).
Methods: This observational study was conducted at Chris Hani Baragwanath Academic Hospital between January and June 2014. Sixteen patients with chronic isolated moderate or severe rheumatic MR (all in sinus rhythm) were compared to 19 healthy age and gender matched controls. All patients underwent imaging using a Philips iE33 2D system with an S5-1 transducer. The assessment of MR severity was based on standard guidelines. Speckle tracking analyses were performed using the Philips QLAB 9 quantification software. Patients with poor images and conflicting co-morbidities were excluded.
Results: The mean age of patients with chronic MR was 31±11 years with 12 females (75%). Left ventricular ejection fraction was >60% in 12 patients and subnormal (50-60%) in 4 patients. There was no difference in peak LA global longitudinal strain (PALS) between the chronic MR and the control group (26±10% vs. 31±6%, p=0.12). There was a difference in peak LV global longitudinal strain (PVLS) between chronic rheumatic MR and control group (-19±3 vs. -17±2%, p=0.03). In the chronic MR group 5 (31%) of the patients had decreased PALS and normal PVLS, 6 (37%) had decreased PALS and PVLS, 5 (31%) had normal PALS and PVLS. None of the patients had a normal PALS with impaired PVLS. There was a negative correlation between the mean PALS and PVLS (r=-0.7).
Conclusion: There is a strong correlation between impairment of LA and LV longitudinal mechanics in chronic rheumatic MR. However, impairment of LA longitudinal function can precede impairment in LV longitudinal mechanics. These data suggest that reduction in PALS may be a more sensitive marker of severe MR than reduction in PVLS .The clinical significance of this finding needs to be validated in a larger cohort.

The changing clinical profile of chronic moderate to severe rheumatic mitral regurgitation in a tertiary hospital

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Introduction: South Africa is a population in transition with increasing urbanisation and adoption of western life styles. We hypothesise that these changes may have a significant impact on the profile of patients presenting with significant rheumatic mitral regurgitation (MR).
Methods: All patients that presented with chronic moderate to severe, rheumatic MR from January to December 2013, to Chris Hani Baragwanath Academic Hospital, valvular heart disease clinic, were retrospectively studied. Patients with concomitant significant valvular lesions, including more than mild mitral stenosis, were excluded. All underwent echocardiographic exam using a Philips iE33 system. The assessment of moderate to severe rheumatic MR was made in accordance to standard guidelines.
Results: A total of 110 patients with moderate to severe rheumatic MR were seen. The sample comprised of 94 females (85%). All patients were indigenous black South Africans. The mean age was 43 years. The mean BMI was 21kg/m^2. Severe MR was present in 54%. Hypertension was the most common comorbidity (49%) followed by HIV which was present in 19%. Anaemia was present in 6% of patients. The remainder which included diabetes mellitus, chronic kidney disease and pulmonary tuberculosis comprised 7%. Acute rheumatic fever (ARF) diagnosed with the Jones criteria was seen in only 2 patients.
NYHA functional class I comprised 24% of patients, class II 61%, followed by class III and IV at 16%. Ninety percent of patients were in sinus rhythm. The remainder were in atrial fibrillation. Thirty three percent of the patients were hospitalised for heart failure. The medical therapy comprised of diuretics (80%), ACEI/ARB (39%), calcium channel blocker (25%), beta blockers (30%), digoxin (8%), warfarin (12%), HAART (10%) and penicillin prophylaxis (6.4%).
Conclusion: Moderate to severe MR occurred predominantly in females. The mean age of the patient with rheumatic MR has increased in contrast to the older literature where MR was predominantly a lesion of the first two decades. This could be attributed to a marked decline in incidence of ARF. Furthermore, in the current rheumatic MR population, concomitant diseases such as hypertension and HIV are frequent and may have a significant impact on the assessment and management of patients.

Three cases of left ventricular non-compaction cardiomyopathy associated with rheumatic mitral valve disease

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Introduction: Left ventricular non-compaction (LVNC) cardiomyopathy is a rare heterogeneous genetic disorder that occurs in isolation or in association with congenital heart disease. The association with rheumatic mitral valve disease is extremely rare. Herein we present this rare association.
Case presentations: Three case reports are described of a 42-year-old female, a 41-year-old male and a 64-year-old female patient, respectively. The first case presented with signs and symptoms of left ventricular (LV) failure. These included a displaced apex beat and 4/6 mitral regurgitation (MR) murmour. The ECG showed sinus rhythm with left atrial and ventricular enlargement. The transthoracic echocardiogram (TTE) identified eccentric LV hypertrophy (LVH), severe rheumatic MR, LV ejection fraction (EF) of 50%, pulmonary hypertension (PHT), and a LV non-compaction (LVNC) phenotype. The second case had a mitral valve repair in 1989, and presented in biventricular heart failure. Clinical signs were a left parasternal heave and a 4/6 tricuspid regurgitation (TR) murmour. The ECG showed sinus rhythm with left atrial and right ventricular enlargement. TTE revealed severe rheumatic mitral stenosis, LVEF of 40%, eccentric LVH, PHT, and a LVNC phenotype. Heart failure treatment was prescribed and the patient was referred for a balloon mitral valvuloplasty. The third case had a history of repeated hospitalisations for left heart failure. Clinical signs included a displaced apex beat and 4/6 MR murmour. The ECG appeared similar to the first case. The TTE identified severe rheumatic MR, an LVEF of 39%, eccentric LVH, and a LVNC phenotype. Treatment for heart failure was instituted and the patient was referred for a mitral valve replacement.
Discussion and conclusion: The significance of this finding is uncertain. It is unknown whether left ventricular dysfunction seen in these patients is related to volume overload and left ventricular remodelling or whether it is due to LVNC. Future studies should determine whether LVNC phenotype regresses following successful mitral valve surgery.

Tricuspid valve endocarditis associated with intravenous nyoape use: A report of 3 cases

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Introduction: In developed countries, right sided endocarditis (RSIE) frequently coexists with intravenous drug abuse (IDA) and human immunodeficiency virus (HIV). RSIE has been rare in sub-Saharan Africa, both in the pre and post HIV era, most likely due to the low frequency of IDA. We report on 3 cases of RSIE seen at a single hospital, all of whom were HIV positive and were IDA using nyoape (variable drug combination of an antiretroviral, heroin, methamphetamines and cannabis).
Case presentations: We report on 3 male patients (aged 29, 30 and 20 respectively) who presented with a history of nyoape use and concurrent HIV infection. They presented with subacute dyspnoea and fever. The physical examination revealed tricuspid regurgitation (TR) and right heart failure. Case 1 had E. Coli and Salmonella on blood cultures. A bilateral alveolar infiltrate was noted on the chest X-Ray. The electrocardiogram showed sinus tachycardia and right ventricular strain. Imaging with transthoracic echocardiography revealed vegetations on the tricuspid valve, severe TR and pulmonary hypertension. CT pulmonary angiography showed bilateral consolidation and infarction (septic pulmonary emboli). The patient was treated with intravenous (IV) antibiotics and subsequent bioprosthetic tricuspid valve replacement. The second case had staphylococcus aureus on blood cultures. All imaging was similar to the first case. The patient defaulted antibiotic treatment. The third case had sterile blood cultures. Similar imaging findings were again noted and the patient was treated with IV antibiotics.
Discussion and conclusion: The above cases, to the best of our knowledge, are the first reported cases of RSIE secondary to nyoape use. Nyoape use is on the rise among young South Africans of poor background. Nyoape was initially smoked, but is now injected. This indicates a new pattern of drug use and may lead to an increase in cases of RSIE with concurrent HIV. A high level of vigilance should be maintained for atypical presentation of RSIE in IDA and a diagnosis made early before complications arise.

Cardiovascular predictors of in-hospital mortality following noncardiac surgery

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Introduction: Predictors of in-hospital mortality (IHM) in South African noncardiac surgery patients are not well described. This study sought to determine the association between patient comorbidity and IHM in a cohort of South African noncardiac surgery patients.
Methods: Data related to comorbidity and IHM for 5 944 patients was obtained from a large administrative database at a tertiary South African hospital. Logistic regression was used to determine independent predictors of IHM. In addition, average attributable risk fractions (AFFs) were calculated for all independent predictors of IHM.
Results: Renal failure, congestive heart failure and cerebrovascular disease were independently associated with IHM (Odds ratios [Confidence Intervals]: 6.645 [5.207-8.480]; 2.702 [1.653-4.416]; and 2.846 [1.835-4.413], respectively). Hypertension and ischaemic heart disease were associated with improved survival (Odds ratios [95% Confidence Intervals]: 0.790 [0.649-0.961] and 0.730 [0.581-0.917], respectively). Renal failure had the largest contribution to IHM in this study (AAF=0.25), followed by high-risk surgery (AAF=0.14), cerebrovascular disease (AAF=0.03) and congestive heart failure (AAF=0.02).
Conclusion: Renal failure, congestive heart failure and cerebrovascular disease are major contributors of IHM in South African noncardiac surgery patients. It is possible that timely, pre-operative identification and treatment of hypertension and ischaemic heart disease may improve survival in South African noncardiac surgery patients.

Clinical and haemodynamic predictors of vasoreactivity in category one pulmonary arterial hypertension

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Introduction: Despite advances in diagnosis and therapy, pulmonary arterial hypertension (PAH) is a disease with high mortality. The purpose of performing acute vasoreactivity testing in PAH is to identify the small subset of patients who may exhibit a favourable long-term response to calcium channel blocker therapy and to provide prognostic information.
Aim: To document baseline clinical and haemodynamic variables comparing acute vasoreactive responders with nonresponders in 27 patients with category 1 PAH.
Methods: Patients with confirmed category 1 PAH were included in the study. Clinical characteristics, including effort tolerance, and patient demographics were recorded. A right and left heart catheterisation was performed together with measurement of cardiac output using the Fick method. Vascular resistances were calculated and response to Nitric Oxide evaluated. A positive vasoreactive response was defined as a 10% reduction in mean Pa pressure to an absolute value of 40mmHg and no decrease in cardiac output. Logistic regression was used to identify determinants of vasoreactivity. All values are listed as mean ±SD.
Results: The etiology of PAH was idiopathic in 17 (63%), associated with autoimmune disease in 5 (19%), HIV related in 2 (7%) and secondary to a congenital shunt in 2 (7%) of the patients. The mean RA, PAP, CO and PVR for the entire group was 13.0±7.2, 63.6±16.3, 4.3±1.3 and 14.2±7.9. A positive vasoreactive response was seen in only 4 (15%) of the patients. No clinical or haemodynamic variable was able to accurately predict a vasodilator response.
Conclusion: A minority (15%) in this study of patients with severe PAH showed vasoreactivity with NO. PAH patients who are vasoreactive, appear to have lower baseline right atrial pressures. This predictive variable is not intended to serve as a substitute for short-term vasoreactivity testing. However, it may be useful before short-term testing to anticipate the likelihood of an acute response versus nonresponse and therefore the likelihood of the need to start more advanced long-term therapy.

Criss-cross heart with double-outlet right ventricle: untwisting a previously incorrect diagnosis by transthoracic echocardiography

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Introduction: Criss-cross heart (CCH) is a rare, complex congenital abnormality seen in <0.1% of congenital heart defects, with only 300 cases being reported in the literature.[1-3] It occurs due to twisting of the ventricular muscle along its long axis during embryonic development and is characterised by a superior-inferior orientation of the ventricles (SIV) with the right ventricle (RV) lying superiorly and the left ventricle (LV) inferiorly. There is atrioventricular (AV) concordance with crossed ventricular inflow streams (CIS).[1-3] Due to both the rarity of the condition and its associated defects, diagnosis by transthoracic echocardiogram (TTE) remains challenging. We report a case of CCH with double outlet RV (DORV) in a 15-year-old boy.
Case: Our patient is a 15-year-old boy referred to adult cardiology services after being lost to medical follow-up for some years. He was referred with a diagnosis of DORV with tricuspid atresia, obtained from previous notes. He had a history of two previous cardiac surgeries, a pulmonary artery (PA) banding at three months of age and a Glenn shunt at age five. He reported being asymptomatic (able to keep up with his peers at his remedial school) despite being clinically cyanotic with peripheral arterial saturation of 77%. He was not in cardiac failure. At TTE a diagnosis of CCH with an atrioventricular septal defect (AVSD), DORV, a tight PA band and a functioning Glenn shunt was made. He subsequently underwent left and right heart catheterisation to evaluate his suitability for completion of a Fontan procedure, which was found to be favourable.
Discussion: TTE remains the diagnostic investigation of choice in most patients presenting to adult cardiologists with a history of congenital heart disease. The diagnosis of CCH depends on identifying the SIV arrangement with CIS.[1-3] The presence of SIV is defined as the horizontal alignment of the interventricular septum on either the parasternal or subcostal short axis views with the RV lying above the LV.[1] CIS is defined as failure of visualisation of both AV valves and four cardiac chambers in one imaging plane in either the apical or subcostal four chamber views, with the presence of crossed AV inflow confirmed by colour Doppler flow with each atrium seen to be draining into the contralateral ventricle.[1] The associated abnormalities are important for prognosis and palliative procedures. Most patients have ventricular septal defects, abnormal ventriculo-arterial connections, RV outflow tract obstruction, atrial septal defects and hypoplastic RVs.[1,2]

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Groote Schuur Hospital septic pacemaker and defibrillator lead extraction: Case series

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Introduction: The occurrence of sepsis in patients who have implanted pacing and defibrillator devices is not uncommon in this era of ever-increasing use of device-based therapy. Septic or redundant leads can be removed surgically or percutaneously by manual extraction.
Methods: We reviewed 6 cases that presented to the Cardiology Unit at GSH with device-related sepsis between November 2013 and June 2014. The patients were males and females aged between 36 and 90 years. Two patients had dual chamber pacing systems, 2 had single chamber pacing systems, 1 patient had a CRT-P device and 1 patient had a CRT-D device. Four patients had undergone a generator replacement an average of 15.5 weeks prior to diagnosis of sepsis and lead extraction. In 2 cases the generator or pacing leads had eroded the skin. In another case sepsis was thought to be on the basis of wound dehiscence. One patient presented with unexplained sepsis and a vegetation on the RV lead found on TOE. All lead extractions were performed under general anaesthesia with a mechanical sheath using a traction/counter traction method.
Results: A total of 13 out of 14 leads were extracted successfully. The average procedure time was 155 minutes. In one case where a dual chamber device was implanted, the leads fragmented during extraction. A residual 1-2cm fragment of the distal tip remained in the RV, as well as 3-4cm of insulation material remained in the RA. In 3 patients Methicillin Sensitive Staphylococcus Aureus was isolated as the causative organism. All patients were well at 4 week follow-up.
Conclusion: Extraction of pacemaker leads using manual extraction is safe and effective.

The outcome of tricuspid valve surgery in patients with left-sided valvular pathology

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Background: In the context of endemic left-sided rheumatic heart disease, tricuspid valve disease requiring surgical intervention merits closer scrutiny in order to analyse surgical outcomes with presently employed techniques.
Aims: To evaluate the results of simultaneous tricuspid valve surgery for severe functional tricuspid regurgitation at the time of left-sided valve surgery in a rheumatic population.
Materials and methods: A retrospective analysis of the perioperative and follow-up data of 30 patients who underwent tricuspid valve surgery with concomitant rheumatic mitral and/or aortic valve replacement between July 2003 and December 2011 was undertaken.
Patients referred for left-sided valve replacement surgery with clinically and echocardiographically documented severe functional tricuspid regurgitation in the presence of tricuspid annular dilatation, were submitted for combined valvular procedures.
Outcomes were analysed by evaluation of the perioperative and 2-year follow-up clinical and echocardiographic data.
Results: There was a statistically significant improvement in the following parameters at 6 weeks postoperatively: New York Heart Association functional class, tricuspid annular diameter, pulmonary artery systolic pressure, severity of tricuspid regurgitation and tricuspid transvalvular gradient. Preoperative and postoperative pulmonary hypertension were demonstrated to be associated with the development of major adverse cardiovascular events. There were no identifiable predictors for the development of severe residual postoperative tricuspid regurgitation. The development of severe residual postoperative tricuspid regurgitation was not associated with the occurrence of major adverse cardiovascular events. The technique of tricuspid valve repair did not impact on the occurrence of major adverse cardiovascular events or on the development of severe residual postoperative tricuspid regurgitation. A satisfactory outcome was observed in 40% of the study population.
Conclusion: The immediate results of tricuspid valve surgery for severe functional tricuspid regurgitation in rheumatic heart disease favour surgical intervention. However, the persistence of severe tricuspid regurgitation adversely influenced long-term outcomes. Therefore, the management of patients with functional tricuspid regurgitation should encompass surgical strategies which result in a lower incidence of severe residual postoperative tricuspid regurgitation.

Dyslipidemia and its correlates among HIV infected children on HAART attending Mbarara Regional Referral Hospital

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Background: HAART and chronic HIV associated inflammation has been attributed to abnormal lipids in HIV infected people. Very little is known about dyslipidemia among children in Uganda in the era of increasing HAART use.
Aim: To determine the prevalence of lipid abnormalities, study the correlation of the lipid abnormalities to CD4 percent, HIV clinical stage and duration on HAART and study the correlation of lipid abnormalities with the blood pressure of HIV infected children.
Methods: A cross-sectional, descriptive and analytical study of HIV infected children age 1-17 years receiving HAART for more than 6 months in Mbarara Regional Referral Hospital. Sociodemographic, clinical and immunological data were collected and recorded in a questionnaire. Blood was

drawn for lipid profiling, 3 series of blood pressure measurements taken and the mean of the last 2 used in the analysis. Dyslipidemia was defined as any low HDL (≤40mg/dl), high LDL (>130mg/dl), high TG (>130mg/dl) and a high total cholesterol (>200mg/dl) or a combination of these in the study population.

Results: The mean age was 118 months (SD 49 months) with 49.5% of the children male and 62.1% having had severe HIV disease at initiation of HAART. Mean duration of HAART was 55.6 months (SD 31.2 months). The prevalence of dyslipidemia was 74%. Among the children with dyslipidemia, 56.6% exhibited low HDL, 22% had hypertriglyceridemia, 15.6% had high LDL and 11% had hypercholesterolemia. 9.2% of the children had hypertension. We found significant association between dyslipidemia and WHO clinical stage at initiation of HAART (AOR 2.9 1.05 - 8.45 p=0.040). No significant association was observed between hypertension and dyslipidemia.

Conclusion: There is a high prevalence of dyslipidemia associated with severe HIV disease at initiation of HAART and a high prevalence of hypertension among HIV-infected children on HAART.

An echocardiograhic comparison of isolated left ventricular noncompaction versus idiopathic dilated cardiomyopathy

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Background: Diagnosing isolated left ventricular noncompaction (ILVNC) is often challenging, as it is easily mistaken for idiopathic dilated cardiomyopathy (IDCM). The aim of this study was to characterise the functional and structural echocardiographic features, other than the established ILVNC criteria, that could be used to differentiate these two conditions.

Methods: This prospective study evaluated 98 patients, 49 with ILVNC and 49 with IDCM. We utilised our previous published comprehensive echocardiographic criteria to identify ILVNC. IDCM was diagnosed where an ejection fraction was ≤45% and an end diastolic dimension of >55mm was found on echo. The exclusion criteria for both ILNVC and IDCM were documented hypertension, known coronary artery disease, organic valvular disease, any systemic illness, or any primary organ failure.

Results: No significant differences were seen in the clinical characteristics and echocardiographic features of patients with ILVNC compared to their IDCM counterparts, with the exception of greater E-wave velocities in patients with ILVNC (p=0.05).

Conclusion: Apart from myocardial wall structure there were no differences in the functional parameters that allow for differentiation between ILVNC and IDCMO. It therefore remains important to carefully apply the echocardiographic criteria for ILVNC in order to accurately make the diagnosis.

Myocardial and vascular dysfunction in patients with rheumatoid arthritis: Insights from cardiovascular magnetic resonance

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Introduction: Rheumatoid arthritis (RA) is a multi-system, autoimmune disorder and is one of the strongest known risk factors for cardiovascular disease (CVD) morbidity and mortality. Endothelial dysfunction, accelerated atherosclerosis, vascular inflammation and myocarditis are thought to contribute to this excess CVD. Cardiovascular magnetic resonance (CMR) has the capacity of simultaneously assessing non-invasively cardiac function, altered vascular distensibility, myocardial strain and fibrosis. The purpose of this study was to assess cardiac and vascular function and to determine their relation to the presence of cardiovascular risk factors (CVRFs) and RA disease duration.

Methods: 22 RA patients with no CVRFs (16 female, mean age 51±13), 44 RA patients with CVRFs (31 female, mean age 53±12), 35 normal controls (31 female, mean age 49±10), and 18 controls with CVRFs (10 female, mean age 51±11), underwent CMR at 1.5 Tesla. All patients with previously known CVD were excluded. CVRFs and duration of disease were recorded for each subject. Biventricular volumes and function, LGE, myocardial strain and vascular function were assessed by CMR. Aortic distensibility and pulse wave velocity were measured in the ascending aorta, proximal descending aorta and distal descending aorta.

Results and conclusions: There were no differences in left ventricular (LV) volumes and LV ejection fraction between the 4 groups. RA patients with CVRFs showed the greatest reduction in mid short axis circumferential systolic strain, peak diastolic strain rate, and vascular indices. RA patients without CVRFs showed a similar degree of vascular dysfunction and deformational abnormality as controls with CVRFs. Aortic distensibility (Rs=-0.25, p=0.048) and total pulse wave velocity (Rs=0.41, p<0.001) correlated with RA disease duration. CMR demonstrates impaired myocardial deformational characteristics and impaired vascular function in RA and in patients with CVRFs. The cardiac abnormalities due to RA appear to be independent and incremental to those due to traditional CVRFs.

Myocardial and vascular inflammation in systemic lupus erythematosus drives the increased cardiovascular risk in young patients independently of cardiovascular risk factors: Insights from cardiovascular magnetic resonance

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Introduction: Systemic lupus erythematosus (SLE) is a systemic autoimmune disorder that commonly affects the heart. The impact of SLE on the heart is a 7 to 9 times greater incidence of CVD in SLE patients compared to healthy controls. Moreover, female patients with SLE between 35 and 44 years old have an incidence of myocardial infarction over 50 times greater than that observed in the Framingham cohort. The exact cause of this excess CVD burden in SLE is poorly understood, but is thought to be multi-factorial. Cardiovascular magnetic resonance (CMR) has the capacity of simultaneously assessing non-invasively cardiac function, altered vascular distensibility, myocardial strain and fibrosis. The purpose of this study was to assess cardiac and vascular function and myocardial strain in patients with SLE and to determine their relation to the presence of cardiovascular risk factors (CVRFs) and SLE disease duration.

Methods: Eleven SLE patients with no CVRFs (11 female, mean age 37±7), 19 SLE patients with CVRFs (18 female, mean age 47±11), 39 normal controls (39 female, mean age 45±12), and 11 controls with CVRFs (11 female, mean age 52±9), underwent CMR at 1.5 Tesla. All patients with previously known CVD were excluded. CVRFs, disease activity index and duration of disease were recorded for each subject. Biventricular volumes and function, LGE, myocardial strain and vascular function were assessed by CMR. Aortic distensibility and pulse wave velocity (PWV) were measured in the ascending aorta, proximal descending aorta and distal descending aorta.

Results and conclusions: There were no differences in left ventricular (LV) volumes and LV ejection fraction between the 4 groups. SLE patients with CVRFs showed the greatest reduction in mid short axis circumferential systolic strain, peak diastolic strain rate, and vascular indices. SLE patients without CVRFs showed a similar degree of vascular dysfunction and deformational abnormality as controls with CVRFs. Impaired aortic distensibility (Rs=0.59, $p<0.001$) and total pulse wave velocity (Rs=0.29, $p=0.01$) correlated with SLE disease duration. Evidence of impaired circumferential systolic strain and vascular function in SLE is demonstrated on CMR assessment, which is independent and incremental to that due to traditional CVRFs.

Myocardial perfusion is associated with impaired strain in systemic lupus erythematosus: A cardiovascular magnetic resonance study

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Introduction: Systemic lupus erythematosus (SLE) is a systemic autoimmune disorder that commonly affects the heart, resulting in a 7 to 9 times greater incidence of cardiovascular disease (CVD) in SLE patients compared to healthy controls. Female patients with SLE between 35 and 44 years old have an incidence of myocardial infarction over 50 times greater than that observed in the Framingham cohort. The clinical utility of cardiovascular magnetic resonance (CMR) first-pass perfusion for assessment of myocardial ischaemia is well-established. We hypothesised that CMR including stress first-pass perfusion would be able to detect coronary microvascular disease and subtle functional abnormalities in SLE. We aimed to detect myocardial ischaemia and regional dysfunction in SLE using adenosine stress perfusion CMR.

Methods: Twenty nine SLE patients (28 female, mean age 42±9 years) and 29 matched controls (28 female, mean age 42±9 years) without previously known cardiovascular disease underwent CMR at 1.5T including cine, tagging, perfusion, and late gadolinium enhancement (LGE) imaging. Comorbid status, disease activity index and duration of disease were recorded for each subject.

Results and concusions: Myocardial perfusion reserve index (MPRI) was lower in SLE compared to controls (1.4±0.2 vs. 1.9±0.4, $p<0.001$). A third of lupus patients had visual evidence of non-segmental subendocardial perfusion defects, in keeping with microvascular dysfunction. No segmental perfusion defects were observed to suggest presence of coronary artery disease. There was no significant difference in LV size, mass and ejection fraction between SLE patients and controls. Peak systolic circumferential strain (-17.2±1.7 vs. -19.4±1.2, $p<0.001$) and peak diastolic strain rate (78±24 vs. 118±15 s-1, $p<0.001$) were impaired in SLE patients. Left atrial size was larger in SLE (32±5 vs. 26±4mm, $p<0.001$), in keeping with diastolic dysfunction. Focal fibrosis on LGE was found in 10 (43%) SLE patients compared to none of controls, and represented overall a small fraction of

fibrosis (2.7±0.3%). In SLE, MPRI had a significant correlation with peak systolic strain (R=-0.76, p<0.001) and peak diastolic strain rate (R=0.65, p<0.001). Myocardial perfusion is impaired in patients with SLE with no known heart disease. In these patients, impaired MPRI was associated with abnormal myocardial deformation characteristics. It is likely that chronic disease activity and myocardial inflammation results in abnormalities in microvascular function which predate the development of myocardial functional derangements. CMR is an important tool for assessment of subclinical myocardial disease in SLE.
Continuous data are mean ± SD unless otherwise indicated.

Myocardial perfusion reserve is associated with impaired strain and higher disease activity on rheumatoid arthritis: Cardiovascular magnetic resonance study

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Introduction: Rheumatoid arthritis (RA) is a chronic autoimmune disease of the joints, with frequent extra-articular complications including cardiovascular disease (CVD). RA Patients are known to develop premature vascular dysfunction and atherosclerosis, with excess mortality mainly attributed to coronary artery disease (CAD). We hypothesised that cardiovascular magnetic resonance (CMR) including stress first-pass perfusion would be able to detect coronary microvascular disease and subtle functional abnormalities in RA. We aimed to detect myocardial ischaemia and regional dysfunction in RA using CMR imaging.
Methods: Fifty five RA patients (39 female, mean age 54±11 years) and 55 matched controls (39 female, mean age 53±10 years) without previously known cardiovascular disease underwent CMR at 1.5T including cine, tagging, perfusion and late gadolinium enhancement (LGE) imaging. Comorbid status, disease activity index (DAS28-CRP score) and duration of disease were recorded for each subject.
Results and conclusions: Myocardial perfusion reserve index (MPRI) was lower in RA compared to controls (1.5±0.3 vs. 1.9±0.4, p<0.001). Half of RA patients had evidence of non-segmental subendocardial perfusion defects on visual assessment, in keeping with microvascular dysfunction. There was no significant difference in LV size, mass and ejection fraction between RA patients and controls. Peak systolic circumferential strain (-17.0±1.1 vs. -18.7±1.2, p<0.001) and peak diastolic strain rate (82±19 vs. 115±21 s^{-1}, p<0.001) were impaired in RA. Focal fibrosis on LGE was found in 27 (49%) RA patients compared to none of controls, and represented overall a small fraction of fibrosis (3.8±0.3%). In RA, MPRI had a significant correlation with peak systolic strain (R-0.71, p<0.001), peak diastolic strain rate (R0.63, p<0.001) and DAS28-CRP score (R-0.38, p=0.005). Myocardial perfusion reserve is impaired in patients with RA with no known heart disease. In these patients, impaired MPRI is associated with abnormal myocardial deformation characteristics. It is likely that chronic disease activity and myocardial inflammation results in abnormalities in microvascular function which predate the development of myocardial functional derangements. CMR is an important tool for assessment of subclinical myocardial disease in RA.
Continuous data are mean ±SD unless otherwise indicated.

Myocardial tissue characterisation with late gadolinium enhancement in rheumatoid arthritis, systemic lupus erythematosus and systemic sclerosis

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Introduction: Rheumatoid arthritis (RA), systemic lupus erythematosus (SLE) and systemic sclerosis (SSc) commonly involve the cardiovascular system, and are associated with high morbidity and mortality. Mechanisms of cardiovascular disease (CVD) involvement in these clinical entities are not fully understood. Furthermore, little is known about myocardial structure and function in these inflammatory arthropathies. Late gadolinium enhancement (LGE) cardiovascular magnetic resonance (CMR) imaging is a tool for noninvasive evaluation of myocardial fibrosis that has the advantage over other imaging techniques of being able to directly visualise both ischaemic and non-ischaemic patterns of injury, and has prognostic significance. The objective of this study was to assess the frequency and pattern of LGE in RA, SLE and SSc patients without any known CVD using CMR and to determine its relation to disease duration, vascular function (aortic distensibility; pulse wave velocity) and left ventricular (LV) systolic function (LV ejection fraction; mid short axis circumferential systolic strain).

Methods: Fifty nine RA patients (42 female, mean age 53±12), 29 SLE patients (28 female, mean age 42±10), 18 SSc patients (17 female, mean age 55±10), 45 normal controls (38 female, mean age 44±12), and 14 controls with cardiovascular risk factors [CVRFs] (11 female, mean age 52±8) underwent CMR at 1.5 Tesla. All patients with previously known CVD were excluded. Biventricular volumes and function, presence and pattern of LGE, myocardial strain and vascular function were assessed by CMR.
Results and conclusions: LGE was found to occur in 46% of RA, 31% of SLE and 50% of SSc patients compared to 9% of normal controls and 21% of controls with CVRFs ($p<0.001$). Presence of LGE correlated with disease duration ($Rs=0.33$; $p<0.001$), myocardial strain ($Rs=0.29$; $p<0.001$), and total aortic pulse wave velocity ($Rs=0.72$; $p<0.001$). CMR demonstrates an increased burden of both ischaemic and non-ischaemic fibrosis in patients with inflammatory systemic diseases with no known CVD. Increased myocardial fibrosis may contribute to the poor cardiovascular outcomes in this group of patients. LGE in RA, SLE and SSc correlates with increasing disease duration, impaired myocardial strain, and increased pulse wave velocity.

Apical LV aneurysms in children

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Introdcution: Congenital apical left ventricular aneurysms are rare in children and should be differentiated from congenital left ventricular diverticuli. We present 3 cases of apical LV aneurysms in children.
Cases: Case 1 is a 5-day-old male infant, HIV exposed on nevirapine, who was referred for a soft systolic murmur. No cardiac failure was present and mild cardiomegaly was noted on Chest X-ray. ECG demonstrated right axis with RVH. Echocardiogram showed a large apical left ventricular aneurysm measuring 16mm by 19mm with good ventricular function. This was confirmed on CT angiogram and the child underwent successful resection of the aneurysm. Histology demonstrated mural fibrosis and granulation tissue with no vasculitis.
Case 2 is a 2-year-old male who presented with a 1 week history of coughing, shortness of breath and tachycardia. Clinical cardiac failure was present with cardiomegaly on CXR. Echocardiography demonstrated pericardial effusion with a LV apical aneurysm measuring 40mm x 43mm with good ventricular function. A CT angiogram further defined the aneurysm. HIV was positive with a high viral load and low CD4 count. TB work up was negative. He was started on antifailure medication and his clinical condition optimised. He was operated successfully 2 months after commencing antiretroviral therapy. Histology demonstrated transmural fibrosis.
Case 3 was a 9-year-old male who presented with palpitations, cough and dyspnoea. Cardiac failure and cardiomegaly was present. A large apical aneurysm with a pericardial effusion was again noted echocardiographically and further defined by CT angiography. Coronary angiogram was normal. He also tested HIV positive with a high viral load and low CD4 count. His TB work up was negative. The child was started on antifailure medication and commenced on antiretroviral treatment. However, he demised before he could be operated on.
Discussion: Patients with apical LV aneurysm may be asymptomatic or present with arrhythmias, heart failure, peripheral embolism, endocarditis, cardiac rupture or sudden death. We postulate a possible association with HIV infection or exposure. Surgical resection is the treatment of choice to prevent complications.

Patent ductus arteriosus closure using occlutech duct occluder, experience in Port Elizabeth, South Africa

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Background: Percutaneous closure of patent ductus arteriosus (PDA) has become standard therapy. Various devices have been developed for percutaneous closure of PDAs. Experience with the Occlutech Ductal Occluder will be presented.
Methods: Data regarding ductal closure using Occlutech Ductal Occluder was reviewed and prospectively collected following ethics clearance. Demographics; haemodynamic and angiographic characteristics including ductal size; device to close the duct and closure approach; screening time; complications and outcomes were documented.
Results: From March 2013 - February 2014; 31 patients (21 females and 10 males) were assigned to percutaneous closure of the PDA using Occlutech Ductal Occluder. The median age of the patients was 19 months (range, 1 month-300 months), and the median weight was 11.8kg (range 2.5kg-78kg). The pulmonary artery systolic mean was 41.45mmHg (SD±21.47); with a mean pulmonary artery mean of 30.09mmHg (SD±16.65). The QP: Qs ratio mean was 2.39 (SD±1.45); with a pulmonary vascular resistance mean of 2.6 WU (SD±2.0). Thirteen patients had Krichenko Type A duct (42%); 4, type C (13%); 4, type D (13%) and 10, type E (32%). The ductal size mean was 3.15mm (SD±1.99mm). The screening duration mean was 16.62 minutes (SD±9.07). Nine patients were occluded using size 3.5x5; 3 with 3.5x5L; 1 with 4x6; 5 with 5x7; 1 with 5x7L; 3 with 6x8; 2 with 6x8L; 1 with 8x10; 4 with 8x10L; and 2 with 10x12L. In one patient, the device dislodged to the descending aorta immediately following deployment, but was successfully retrieved. A larger and longer device was deployed succesfully. Complete ductal occlusion was achieved in all (100%) patients (n=31) before discharge (day one).
Conclusion: The Occlutech Ductal Occluder is a safe and effective device for closure of ducts in appropriately selected patients. Due to its large aortic disk and delivery system (6F), this device is not capable of closing PDAs in small infants.

Evaluating coronary artery disease in patients without typical angina

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Background: Historically, typical angina is defined by 3 discrete criteria: effort induced pain, typical characteristics, relief with TNT or rest. Consequently, patients not fulfilling all criteria are considered less likely to have coronary artery disease (CAD).
Aim: Evaluate patients without typical angina for CAD.
Methodology: Evaluate CAD by comparing sestaMIBI results (screening) with angiography results (diagnostic) in a cohort of patients without typical angina.
Assess the clinical profile (demographics, symptoms, risk factors) of CAD in this cohort.
Results: Amongst 5 378 subjects with suspected angina, 525 did not have typical angina (9.8% prevalence). The study group comprised 173 subjects who underwent both sestaMIBI and coronary angiography. Angiography showed 99 patients (57%) had macrovascular disease; 47 required intervention (31 grafting, 16 percutaneous). This population consisted of mostly obese male smokers, over 54 years (all p>0.005). Interestingly, the presence CAD and the number of angina criteria met were not significant (p=0.419). Furthermore, hypertension, diabetes, family history and dyslipidaemia were not significant (all p>0.005).
Only 134 of 173 subjects completed sestaMIBI stress test adequately. From 134 subjects, 39 had normal angiography but abnormal sestaMIBI, suggesting possible microvascular disease. Nineteen had normal sestaMIBI but abnormal angiography, indicating possible global ischaemia. In 26 cases, both studies were normal; other diagnoses included emphysema, gastrointestinal diseases and valvular heart disease. The presence of metabolic syndrome and abnormal sestaMIBI results were strongly significant (p=0.001).
Conclusion: The profile of the CAD patient without typical angina is more likely to be the middle-aged obese, male smoker.

Is there an association between sleeping patterns and other environmental factors with obesity and blood pressure in an urban African population?

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Background: Beyond changing dietary patterns, there is a paucity of data to fully explain the high prevalence of obesity and hypertension in urban African populations. The aim of this study was to determine whether other environmental factors (including sleep duration, smoking and physical activity) are related to body anthropometry and blood pressure (BP).
Methods: Data were collected on 1 311 subjects, attending two primary health care clinics in Soweto, South Africa. Questionnaires were used to obtain data on education, employment, exercise, smoking and sleep duration. Anthropometric and BP measurements were taken.
Results: Subjects comprised 862 women (mean age 41±16 years and mean BMI 29.9±9.2kg/m^2) and 449 men (38±14 years and 24.8±8.3kg/m^2). In females, former smokers had a higher BMI (p<0.001) than current smokers, while exposure to second hand smoking was associated with a lower BMI (p<0.001) in both genders. Longer sleep duration was associated with a lower BMI (p=0.01) in females, but not males, whilst in males napping during the day for >30 minutes was related to a lower BMI and waist circumference (β=-0.03, p30 minutes/day was related to lower systolic BP (β=-0.02, p<0.05) whilst napping for ≤30 minutes and >30 minutes were both related to lower diastolic BP (β=-0.03 and -0.02 respectively).
Conclusions: These data suggest that environmental factors rarely collected in African populations are related, in gender-specific ways, to body anthropometry and blood pressure. Further research is required to fully elucidate these associations and how they might be translated into public health programmes to combat high levels of obesity and hypertension.

Investigation of Ac-SDKP levels in the pathophysiology of constrictive tuberculous pericarditis

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Introduction: Tuberculous pericarditis, a prevalent form of extra-pulmonary tuberculosis (TB) in South Africa leads to life threatening constrictive pericarditis in 30-60% of patients despite antituberculous medication. Constrictive pericarditis is characterised by fibrosis and there are no effective predictors and prophylactics for the development of constriction. N-acetyl-seryl-aspartyl-lysyl-proline (Ac-SDKP), an antifibrotic peptide, generated by prolyl oligopeptidase (POP) and degraded by angiotensin-converting enzyme (ACE), has been detected in normal pericardial fluid. We investigated the role of Ac-SDKP and ACE in the pathophysiology of TB pericarditis and the in vitro effects of Ac-SDKP and ACE inhibitors lisinopril and RXP407 on the prevention of fibrosis.

Method: Ac-SDKP levels in pericardial fluid from TB pericarditis cases were compared to control samples using a specific ELISA kit. Enzymatic activities of ACE and POP in TB pericardial fluid were measured by specific fluorogenic assays using Z-Phe-His-Leu and Z-Gly-Pro amino methyl coumarin as substrates. Further, a hydroxyproline assay was used to assess the effects of Ac-SDKP, lisinopril and RXP407 on the prevention of fibrosis in WI-38 lung fibroblasts.
Results: Levels of Ac-SDKP in participants with TB pericarditis (156pg/ml [IQR 126.18-187.43]) were significantly lower (p=0.03) than in controls without pericardial disease (412pg/ml [IQR 146.71-717.92]). Further, POP and ACE activities could be measured in tuberculous pericardial fluid (8.035pmol/ml and 2.472mU/ml respectively). In the in vitro studies, Ac-SDKP, lisinopril and RXP407 alone had no effect on the production of collagen by the cells. However, Ac-SDKP alone and in combination with the ACE inhibitors reversed the effect of AngII on collagen formation in the fibroblasts.
Conclusion: This is the first study investigating the POP and ACE activity in tuberculous pericardial fluid. A definitive implication of altered Ac-SDKP homeostasis in TB pericarditis would constitute a strong rationale for the implementation of ACE inhibitors, specifically of N-domain selective inhibitors, in the management of TB pericarditis.

Methylenetetrahydrofolate Reductase C677T polymorphism is associated with increased risk of coronary artery disease

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Background: Methylenetetrahydrofolate reductase (MTHFR) reduces 5',10'-methylenetetrahydrofolate to 5'-methylenetetrahydrofolate and remethylates homocysteine to methionine, two important reactions involved in methylation pathways and folate metabolism. The common MTHFR C677T single nucleotide polymorphism (SNP) (rs1801133) has been associated with raised levels of homocysteine, a well known risk factor for coronary artery disease (CAD). There is a high prevalence of aggressive and premature CAD in our local Indian population. The MTHFR C677T SNP has not been investigated in this population. The present study therefore investigated the MTHFR C677T SNP in young Indian patients with CAD compared to age- and sex-matched Indian and Black controls.
Methods: A total of 290 subjects were recruited into this study which included 106 CAD patients (confirmed on angiography, mean age 37.5, range 24 - 45 years), 100 age-, sex- and race-matched controls, and 84 age- and sex-matched Black controls. Polymerase chain reaction (PCR) followed by restriction fragment length polymorphism (RFLP) was used to genotype CAD patients and healthy controls. Data for clinical markers were obtained from pathology reports.
Results: The MTHFR 677 T allele was found at a higher frequency in the total Indian group (10%) compared to the total Black population (2%) (p=0.0007, odds ratio (OR) = 4.778 95% confidence interval (CI) 1.687-13.53). The frequency of the MTHFR 677 T allele was significantly higher in CAD patients (14%) than in the control group (7%) (p=0.0353, OR=0.475 95% CI 0.2431-0.9281). The MTHFR C677T SNP did not significantly influence levels of total cholesterol, LDL, HDL, triglycerides, fasting glucose, fasting insulin or hsCRP in CAD patients compared to controls.
Conclusion: The MTHFR 677 T variant allele is associated with increased risk of CAD in young patients of Indian ethnicity.

MicroRNA-499 Single Nucleotide Polymorphism in Patients with Premature Coronary Artery Disease

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Introduction: MicroRNAs (miRs) are non-coding RNA molecules that affect gene expression via negative regulation. Single nucleotide polymorphisms (SNPs) in miRs have become of interest due to their involvement in several diseases. MiR-499 is an inflammatory-associated miR implicated in chronic diseases such as coronary artery disease (CAD). This study investigated the frequency of the miR-499 A>G SNP (rs3746444) in a population with a high prevalence of premature CAD compared to controls from both a high and low prevalence population.
Methods: A total of 289 subjects were recruited into this study which included 105 Indian patients with CAD (confirmed on angiography, mean age 37.5; range 24 - 45 years), 100 age-, sex- and race-matched controls, and 84 age- and sex-matched Black controls. Polymerase chain reaction (PCR) followed by restriction fragment length polymorphism (RFLP) was used to genotype all subjects.
Results: The miR-499 variant (G) allele was found at a higher frequency in the total Indian group (34%) compared to the total Black population (22%) (p=0.0070, OR=1.796 95% CI 1.182-2.730). Indian cases presented with higher frequency of the variant allele compared to Indian controls (38% vs. 29%, p=0.059 respectively).
Conclusion: The polymorphic variant of miR-499 (rs3746444) occurs at a higher frequency in Indians compared to Blacks. This may be a contributing factor to the higher risk profile for the development of premature CAD in Indians.

Mitochondrial DNA polymorphisms 5178 C>A and 16189 T>C in young South African Indians with coronary artery disease

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Introduction: Mitochondrial dysfunction has been associated with several chronic diseases including coronary artery disease (CAD). Polymorphisms in mitochondrial DNA (mtDNA) may play an essential role in the pathogenesis of CAD. Two common single nucleotide polymorphisms (SNPs) at position 5 178 and 16 189 have been associated with CAD and related disorders. The South African (SA) Indian population has a high prevalence of early-onset CAD compared to the SA Black population group, and there is no data with regard to these SNPs in this group. We aimed to investigate the frequency of the mtDNA 5 178 C>A and 16 189 T>C SNPs in SA Indians and SA Blacks.
Methods: A total of 284 subjects were recruited into this study which included 100 CAD patients (confirmed on angiography, mean age 37.5; range 24 - 45 years), 100 age-, sex- and race-matched controls, and 84 age- and sex-matched Black controls. All patients and controls were genotyped by Polymerase Chain Reaction-Restriction Fragment Length Polymorphism (PCR-RFLP).
Results: The frequency of alleles for the mtDNA 5178 SNP was similar between patients and controls of Indian ethnicity. The frequency of the mtDNA 16 189 variant allele was equal in the total SA Black (12%) and total SA Indian population (12%), and slightly higher in the SA Indian control group (12.5%) compared to the CAD patients (11%).
Conclusion: Our results provide no conclusive evidence of association between the mtDNA 16 189 T>C SNP and CAD in young South African Indians.

Sirtuin 1 polymorphisms in young South African Indians with coronary artery disease

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Introduction: Sirtuins are a class of proteins involved in a wide range of biological processes such as aging, transcription, apoptosis and inflammation. Sirtuin 1 (SIRT 1), a histone deacetylase, has been identified as a candidate molecule affecting the epigenetic mechanisms of cardiovascular disease (CVD). Previous studies have shown that some SIRT 1 single nucleotide polymorphisms (SNPs) are associated with body mass index, diabetes, blood pressure, cholesterol metabolism and coronary artery calcification. We investigated 2 SIRT 1 SNPs, rs1467568 and rs7895833, in young Indians with coronary artery disease (CAD) and compared them to Indian and Black controls.
Method: For rs1467568, a total of 287 subjects were recruited into this study (104 CAD patients, 99 age-, sex- and race-matched controls, and 84 age- and sex-matched Black controls). For rs7895833, a total of 281 subjects were recruited into this study (100 CAD patients, 99 age-, sex- and race-matched controls, and 82 age- and sex-matched Black controls). All patients were male, of Indian ethnicity, confirmed on angiography, mean age 37.5; range 24 - 45 years. All subjects were genotyped using TaqMan SNP Genotyping Assays. Clinical markers were provided by pathology reports.
Result: The variant allele for both SNPs were found at a higher frequency in the total Indian group compared to the total Black population (rs1467568: 42% vs. 18% respectively, p<0.0001, OR=3.190 95% CI 2.058-40943 and rs7895833: 41% vs. 22% respectively, p<0.0001, OR=2.466 95% CI 1.620-3.755). Indian controls presented with a higher frequency for both SNPs compared to Black controls (rs1467568: 40% vs. 18% respectively, p<0.0001, OR=2.996 95% CI 1.850-4.853 and rs7895833: 41% vs. 22% respectively, p<0.0001, OR=2.513 95% CI 1.578-4.004). The SNPs were not associated with any of the clinical markers, including total cholesterol, LDL, HDL, triglycerides, fasting glucose, fasting insulin, HbA1c, hsCRP, IL-6 or BMI in CAD patients.
Conclusion: The SIRT 1 rs1467568 and rs7895833 variant alleles may serve as risk alleles that contribute to Indians developing early onset CAD.

Renal dysfunction in African patients with acute heart failure

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Background: In Western countries with typically elderly ischaemic acute heart failure (AHF) patients, predictors and clinical outcome of renal dysfunction and worsening renal function are well described. However, prevalence, predictors and clinical outcome of renal dysfunction in younger, mainly hypertensive AHF patients from Africa, have not been described.

Methods and results: From 1 006 patients enrolled in the sub-Saharan Africa Survey of Heart Failure (THESUS-HF), renal function was determined by the estimated glomerular filtration rate (eGFR) using the MDRD formula. Worsening renal function (WRF) was defined as an increase in creatinine ≥0.3mg/dL (26.5µmol/L) from baseline to day 7/discharge. The mean (SD) age of the patients was 52.4 (18.2) years, 481 (50.8%) were women, and the predominant race was black African (932 of 946 [98.5%]). Heart failure (HF) was most commonly due to hypertension (n=363 [39.5%]) and only 7.8% had ischaemic HF. At hospital admission, 289 patients (30.6%) had an eGFR<60 ml/min/1.73m^2. WRF during hospitalisation was detected in 53 (9.8 %) of 543 patients with a follow-up creatinine value, and was independently associated with the Western sub-Saharan region, body mass index, and the presence of rales. WRF was an independent predictor of death or readmission through 60 days (multivariable HR=1.98 (1.07, 3.68); p=0.0298) and all-cause death through 180 days (multivariable HR=1.80(1.02, 3.17); p=0.0407).
Conclusions: Renal dysfunction is also prevalent in younger non-ischaemic acute heart failure patients in Africa, but worsening renal function is less prevalent and has different predictors compared with Western cohorts. Nevertheless, WRF is strongly and independently related with clinical outcome.

Minimally Invasive Mitral Valve Surgery (MIMVS): The Groote Schuur Hospital programme

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Objective: Minimally invasive surgical procedures present a paradigm shift in treating symptomatic heart valve lesions. Innovative technology has enabled surgeons to perform complex cardiac surgical procedures through limited skin incisions with the same degree of safety and quality compared to conventional (open) heart surgery. In selected individuals this approach has led to greater patient satisfaction and fewer reported complications. We report on our institution's initial experience with minimally invasive mitral valve surgery (repair or replacement) at Groote Schuur Hospital.
Methods: A cohort of the first 40 patients who underwent MIMVS through a limited right mini-thoracotomy (68% replacements/32% repairs) was compared with a baseline cohort of 404 patients operated conventionally through a midline sternotomy (75% replacements/25% repairs). The mean age was 44.9±13.3 years in the minimally invasive group (82.5% female/17.5% male) vs. 41.0±14.8 years in the conventional group (72.8% female/27.2% male).
Results: Compared to a conventional approach, MIMVS was associated with significantly shorter post-operative ventilation times (7.3±5.9 hours (MIMVS) vs. 15.0±10.8 hours (conventional) (p<0.0001; Wilcoxon), and a 50.4% (p<0.0001; Wilcoxon) shorter duration of ICU stay and a 39.5% (p<0.0001; Wilcoxon) shorter duration of hospital stay, respectively. There was one intra-operative conversion to a median sternotomy due to bleeding, in the MIMVS group. MIMVS was also associated with a 45.3% lower volume of post-operative blood loss (p<0.0001; Wilcoxon) and a 42.9% fewer need for post-operative blood units transfused (p=0.0002; Wilcoxon). The 30 day mortality was 0% in the MIMVS group and 2.0% in the conventional group.
Conclusion: MIMVS has become the procedure of choice in several units for the surgical management of mitral valve pathology. Not only is this procedure associated with faster recovery times and a superior cosmetic result, we confirmed that it leads to comparable outcomes to conventional (open) heart surgery.

Infective endocarditis in South Africa: What is the impact of the HIV pandemic?

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Introduction: Infective endocarditis (IE) is an uncommon disease that carries significant morbidity and mortality despite advances in antimicrobial therapy. The association of cardiac disease in patients infected with HIV has been addressed recently. The aim of this study was to compare HIV positive and negative patients with infective endocarditis, and to assess the role and impact of HIV on the outcomes of IE.
Methods: This is a retrospective study of patients undergoing surgery for IE at a tertiary-level hospital in South Africa between 2006 and 2014. Demographics, diagnosis, intra- and post-operative records were analysed and compared for HIV status.
Results: There were 63 patients operated for IE during this period. Demographics showed 55% male predominance, at an average age of 40 years. These included repair or replacement of 31 aortic, 27 mitral and ten tricuspid valves. Of these patients 30 (48%) were tested for HIV and four patients tested positive (13%).
Discussion: The HIV status of patients, and the general population, does not have a clear impact on presentation of IE or on the outcomes of surgery. Despite our small sample size, we can speculate that in the midst of an HIV epidemic we should be seeing more HIV+ patients presenting with IE, but this was not the case.
Conclusion: The incidence of HIV infection in the present study is the same as that of the general population and HIV infection does not seem to have a causal link to IE.

Ex vivo measurements of rat vascular reactivity: The role of obesity and perivascular adipose tissue (PVAT)

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Introduction: Vascular endothelium is a common target of most cardiovascular risk factors. Obesity, an increasingly important cardiovascular risk factor, is associated with the development of endothelial dysfunction. Endothelial dysfunction is an early, reversible precursor of atherosclerosis and coronary artery disease. How obesity affects vascular function is not fully elucidated, particularly regarding the potentially modulating effects of perivascular adipose tissue (PVAT). In this study, we aimed to measure isometric tension function of obese rat aortas (fed with a high fat diet for 16 weeks) and age-matched lean controls, in the presence or absence of PVAT. Critical signaling proteins were measured by western blot analyses.

Results: Phenylephrine and serotonin induced hypercontractile responses in PVAT-free obese aortic rings, which normalised in the presence of PVAT. Aortic contraction was unaffected by PVAT in lean groups. Acetylcholine (ACh) induced greater relaxation in PVAT-containing lean rings (72% relaxation) vs. obese rings (56%). Removal of PVAT reduced relaxation in lean rings from 72% - 58%, but not in obese groups. Maximum ACh concentrations failed to induce relaxation greater than 72% in any of the groups; however additional administration of a NO-donor (SNAP) achieved 100% relaxation, which is suggestive of endothelium-dependent relaxation impairment in the rings. This could be ascribed to age-related dysfunction as aortic rings from younger lean rats showed greater relaxation (95.4% vs. 57.8%). PVAT-free aortic tissue showed significantly reduced phospho/total eNOS ratios in obese groups (Lean:100% vs. Obese:31.6±2%); however phospho/total PKB/Akt and AMPK ratios were unaffected.

Conclusion: PVAT exerted anti-contractile effects in obese aortic rings, but not in lean aortic rings. Obese groups (with or without PVAT) showed impaired relaxation and decreased eNOS activation versus lean groups, which is suggestive of endothelial dysfunction. Obesity-associated PVAT therefore seemed to protect against a pro-contractile response, but failed to improve relaxation, whereas PVAT in lean groups exerted a pro-relaxation response to ACh.

Introducing the EndoAfrica study: Are HIV and ART associated with endothelial dysfunction?

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Endothelial dysfunction is a reversible precursor of atherosclerosis and coronary artery disease. Early detection can provide an opportunity for clinical interventions to prevent the development of endothelial dysfunction, and hence its clinical sequelae. Although several studies from the developed world have provided evidence for the development of endothelial dysfunction in HIV-infected individuals, very little data is available on the association between HIV-infection, 1st line antiretroviral treatment (ART) and endothelial dysfunction in Sub-Saharan African (SSA) populations. In view of the emergence of new cardiovascular risk factors in these populations (e.g. HIV-infection) and epidemiological transition, research on the interplay between communicable and non-communicable diseases (cardiovascular disease) has become imperative.

The EndoAfrica study (funded by the ERAfrica™ project as part of the European Commission's 7th Framework Programme for Research) comprises researchers from South Africa (project coordinator), Kenya, Côte d'Ivoire, Belgium and Austria, and will commence in the second half of 2014 for a period of 3 years. The aims of EndoAfrica will be to investigate whether the vascular endothelium is a primary target of HIV-infection and/or first line NRTI/NNRTI ART on populations from three geographically distinct African countries (South Africa, Kenya and Côte d'Ivoire). The study will be conducted in participants recruited from HIV-clinics, and the following cohorts are envisaged:

Group 1: Participants with HIV-1 infection, not yet on 1st line ART (CD4 count as close as possible to treatment threshold of 350/mm^3);

Group 2: Patients with HIV-1 infection on ART (many of whom will be recruited from Group 1); and

Group 3: Participants without HIV infection. At recruitment, participants will be screened for traditional cardiovascular risk factors (hypertension, diabetes, obesity, smoking, dyslipidaemia).

Endothelial function will be clinically assessed as follows: (1) Doppler/flow-mediated dilation measurements of the brachial artery and (2) Retinal vascular reactivity measurements by retinal camera imaging. Serum biomarkers of endothelial dysfunction will be measured: vascular cellular adhesion molecule-1 (VCAM-1), intercellular adhesion molecule-1 (ICAM-1), TNF-α, e-selectin, and CRP. Investigations will be repeated after 18 months. Clinical studies will be underpinned by animal, ex vivo and in vitro investigations in which the in vivo, vascular (aortic ring isometric studies) and direct cellular effects (cultured endothelial cells) of 1st line ART drugs will be explored. We believe this study will provide novel data regarding the prevalence of endothelial dysfunction in SSA populations. Furthermore, data will be generated that will provide novel insights into the effects of HIV infection and ART on vascular endothelial function in these populations.

Ascertainment of congenital heart disease in the Limpopo Province of South Africa

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Introduction: The Limpopo Province of South Africa is home to 5.4 million people (2011 census). Each year 130 000 babies are born. About 6 000 will die before their 5th birthday. Pneumonia, diarrhoea, malnutrition and neonatal deaths are prominent. Congenital heart disease (CHD) is one of the top 10 causes of under 5 mortality.

The paediatric cardiology clinic at the Polokwane/Mankweng Hospital Complex is the only public sector site for echocardiographic diagnosis of CHD in children in the province. It is estimated that over 90% of children in the province receive care in the public sector. Consequently the clinic data should provide a good estimate of the ascertained cases of CHD in the Limpopo province.

Method: A record review of all paediatric echocardiography reports for the period 1 January 2001 - 31 December 2010 was conducted. All records with a diagnosis of CHD in a child aged less than 13 years at the time of diagnosis were included in the study.

The following anonymised data was extracted from each record: date of birth, sex, date of diagnosis, referring hospital and diagnosis. Where multiple congenital cardiac abnormalities were present in a single child the lesion considered to be haemodynamically most important was listed as the primary diagnosis. Preterm birth or congenital abnormalities were recorded as associated diagnoses.

For the period of the study the annual birth data for the Limpopo Province was obtained from Statistics South Africa and used to generate incidence rates for ascertained cases of CHD.

Result: One thousand two hundred and sixty seven cases of CHD were diagnosed during the 10 year study period with similar numbers ascertained each calendar year. Eight hundred and ninety five children in the cohort were born during the first 8 years of the study. During this period there were 999 533 registered live births. Based on global epidemiology, this represents about 10% of all expected CHD. PDA, AVSD, tetralogy of Fallot, tricuspid atresia and pulmonary atresia had better ascertainment relative to global rates than HLH, TGA, TAPVD and coarctation of the aorta.

Conclusion: CHD is underdiagnosed in the Limpopo Province. There was no observable improvement in ascertainment during the study period.

Ascertainment of rheumatic heart disease in children in the Limpopo Province of South Africa

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Introduction: Rheumatic heart disease (RHD) is mainly acquired during childhood or early adulthood and is a major cause of acquired childhood heart disease in Southern Africa. The incidence of acute rheumatic fever in populations has has been shown to vary over time and primary prevention can be achieved by an improvement in living conditions and access to health care.

The paediatric cardiology clinic at the Polokwane/Mankweng Hospital Complex was established in 1999. Since then it has been the single echocardiographic diagnostic facility for children (up to 13 years of age) in the public sector in the Limpopo province. All children identified with possible heart disease in the public sector in Limpopo are referred to the clinic for further evaluation.

Method: A record review of all paediatric echocardiography reports for the period 1 January 2001 - 31 December 2012 was conducted. All records with a first diagnosis of RHD were included in the study provided that the subject was diagnosed before their 13th birthday.

The following anonymised data was collected: diagnosis, date of diagnosis, date of birth, sex, referring hospital.

Result: Two hundred and twenty six cases of RHD were diagnosed during the study period. The number of cases decreased from an average of 36 cases per year for the first 4 years of the study to an average of 14 and 6 cases per year in the middle and final 4 years of the study respectively.

Conclusion: A marked reduction in the number of diagnosed cases of RHD in children was observed. During the same time period the number of cases of congenital heart disease diagnosed each year remained relatively constant. This suggests that there has been a drop in the prevalence of childhood RHD in the Limpopo province.

HIV – associated pulmonary hypertension in a densely populated, peri-urban township in South Africa

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Background: Pulmonary Hypertension (PH) is a devastating, progressive disease, with increasingly debilitating symptoms and, usually, shortened overall life expectancy due to narrowing of the pulmonary vasculature and consecutive right heart failure. Estimated one and three year survival rates in HIV-associated PH (HIV-PH) in developed countries have been reported at 70% and 50% in the pre-antiretroviral therapy (ART) era and 90% and 70% since the advent of ART. We aim to describe the clinical presentation and survival of patients with HIV-PH in a township in South Africa.

Methods: Presented data are from an infectious diseases referral clinic in Cape Town, South Africa; a participating centre in the Pan African Pulmonary hypertension Cohort (PAPUCO) study. PH was diagnosed by Echocardiography and defined as right-ventricular systolic pressure (RVSP) >35mmHg. Further investigations included pulmonary function test, radio nucleotide perfusion scan, chest X-ray and computed tomography and right heart catheterisation and were performed at the discretion of the treating physician.
Results: Twenty eight patients were diagnosed with HIV-PH between July 2011 and November 2013. Median age was 37 years (range 25 to 62), 71% were female, and 71% had a prior history of tuberculosis (TB). Median CD4 count was 323 cells/μL (IQR 159-574) and 82% were on ART at the time of diagnosis. Median baseline RVSP was 61mmHg (IQR 53 to 73), TAPSE 14mm (IQR 11-16), and 75% were WHO functional class III-IV. Survival rates at six months (n=27) and one year (n=23) were 67% and 61%, respectively. Median time from presentation to death was 103 days (IQR 50 to 132). Predictors of survival were baseline RVSP (p=0.001) and distance walked at six minutes (p=0.013).
Conclusion: One-year survival of our patients seems to be much lower compared to data from high-income countries. Most patients were on ART at presentation. Late presentation, prior history of TB, lacking awareness of PH in HIV at primary care, limited access to tertiary care and absence of PH-specific treatment options in the public sector are the most plausible reasons for the lower survival rate in our setting. Practitioners at primary care level should be aware of the increased risk of PH in HIV-positive patients, since early detection and referral may improve survival. The contribution of TB to the development of PH needs to be further elucidated.

BNP predicts systolic dysfunction in pregnant women with cardiac disease

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Background: In pregnancy, the importance of BNP levels has mostly been evaluated in pre-eclampsia. Changes in BNP levels amongst women with cardiovascular disease, complicating pregnancy, have not been characterised.
Methods: As part of an on-going registry at a specialised tertiary clinic in Cape Town, we examined the serum BNP levels in 152 consecutive patients manifesting cardiovascular disease in pregnancy, or within 6 months postpartum. Each patient underwent clinical assessment, ECG, echocardiography and laboratory tests; including serum BNP levels, which were performed at baseline and 6-months follow-up. Twenty controls with normal pregnancy also had BNP measurement; half being antepartum and half postpartum.
Results: Of the 152 women presenting with cardiac disease in pregnancy, the mean age was 28±6 years. Eighty percent presented antepartum at a median gestational age of 27 weeks (IQR 20-33 weeks). Within this cohort, the aetiology of cardiac disease consisted of congenital heart disease in 32% of the cases (15 patients having been previously operated on), valvular heart disease in 25% (15 operated on previously), cardiomyopathy in 21% (10% having hypertension-related cardiac disease, and the remainder having other diagnoses).
Median BNP levels were 95pg/ml(IQR 47-186) at baseline, and 91pg/ml (IQR 47-181) at follow-up. The baseline and follow-up BNP levels in patients with cardiac disease who either presented postpartum or within the first trimester of pregnancy were 2.5 times greater than those presenting during the 2nd and 3rd trimester (p=0.0003 and 0.0007, respectively). This differed from comparisons of BNP levels of 10 healthy pregnant women to 10 healthy women postpartum where the BNP levels postpartum were not statistically different to those antepartum (p=0.17). Interestingly, while there was a clear difference between BNP levels of cardiac patients who presented during the 2nd and 3rd trimester of pregnancy as opposed to postpartum/1st trimester, there was no demonstrable association between gestational age, nor premature delivery and the corresponding BNP levels. Despite a 16% sero-prevalence of HIV in our cohort, there was no association with BNP levels in this cohort.
In addition to elevated BNP in patients with left heart failure, patients with isolated right heart failure had BNP levels twice that of those without right heart failure (p=0.003), although this was not associated with any particular underlying primary diagnosis. Nine of the 152 patients died within the 6 months follow-up period (6%), with the majority dying in the postpartum period. Serum BNP levels at baseline and six-month each predicted LV dimensions and systolic function at each visit, respectively; as well as death. Furthermore, baseline serum BNP was able to predict LV size and dimensions at six months.
Conclusion: Serum BNP levels correlate well with LV dimensions, as well as LV and RV function and may prove useful as a simple tool for risk-stratification of pregnant and post-partum patients with cardiac disease who are at risk of poorer outcomes. Larger studies may help to distinguish more specific associations.

Clinical Characteristics of HIV positive patients presenting with Acute Coronary Syndromes

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Introduction: There are over 35 million people that are HIV positive worldwide with the majority residing in sub-Saharan Africa. Acute coronary syndrome (ACS) is the leading cause of death worldwide with the trend of non-communicable diseases increasing in South Africa. The aim of this study was to evaluate the incidence and clinical characteristics of HIV positive patients presenting with ACS at a large urban public hospital in South Africa.
Methods: A prospective study of all HIV positive admissions with ACS to Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) was performed over 2 years (July 2012 - July 2014).
Results: During the study period a total of 20 HIV positive patients with ACS were admitted to the Cardiology division of CMJAH. The mean age was

51 years including 13 males (65%). The majority were Black patients 17/20 (85%) followed by 3 White patients (15%) and 1 Coloured patient (5%). Thirteen patients (65%) were known to be HIV positive and 10 of these patients (77%) were on Antiretroviral therapy. There were 14 admissions (70%) with ST elevation myocardial infarction (7 Anterior, 7 Inferior), followed by 3 NSTEMI admissions (15%) and 2 patients with Unstable Angina (10%). Only 3 of the 14 STEMI patients were thrombolysed (21%). The average TIMI score was 2.15. None of the patients presented with a previous myocardial infarction. Risk factors included smoking 11/20 (55%), hypertension 6/20 (30%), diabetes 2/20 (10%), dyslipidaemia 2/20 (10%) and 1/20 (5%) with a family history of ischaemic heart disease. One patient had a previous history of tuberculosis. The average BMI was 24.4kg/m^2. One patient died of a recurrent myocardial infarction.

Conclusion: HIV patients present at a younger age with acute coronary syndromes. STEMI is the most common presentation and most are not thrombolysed as they are late presenting. Smoking is the predominant risk factor. Traditional risk factors such as hypertension, diabetes, dyslipiidaemia and obesity are less common than the general population.

Optimisation of micro-method for the isolation of pure high-density lipoproteins (HDL) from low volume serum samples

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Introduction: High-density lipoprotein (HDL) has a number of anti-atherosclerotic functions including antioxidative, anti-inflammatory and anti-apopototic effects. Whilst a number of methods for the isolation of HDL have been described, many of these involve quantification of HDL levels rather than analysis of functionality. For quantification of HDL functionality it is critical to attain a pure sample devoid of albumin contamination. In addition, traditional HDL isolation commonly requires large volumes (5ml) of serum. For functionality assays of HDL involving the use of animal samples as well as limited serum volumes, a technique for efficient isolation of pure HDL would be of great benefit.

Method: The current study involved optimisation of a micro-technique for the isolation of HDL from 200µl aliquots of human serum. Following removal of ApoB lipoproteins, sodium bromide was added to raise serum density and affect ultracentrifugation at 223 000g for 5, 16, 18 and 20 hour time intervals. The upper and lower fractions produced by ultracentrifugation were dialysed against sterile phosphate buffered saline (PBS) and purity was assessed using reducing SDS-Polyacrylamide electrophoresis (SDS-PAGE). Densitometric analysis of ApoA1 at approximately 28 kDa and albumin at approximately 70 kDa allowed for quantification of HDL and albumin in each lane.

Results: Results indicated a time dependent relationship between HDL purity and albumin content of upper fractions. Centrifugation for 5 hours resulted in a significantly lower yield of HDL with an average ApoA1 intensity of 5 534±1015 AU (arbitrary units) compared with 16 280±524 AU for 16 hours ($p<0.005$, $n=3$). Centrifugation for 16 hours significantly improved isolation of pure HDL with a lowered intensity of albumin contaminant (5 636±2328) compared to 15 148±328 AU present when centrifuged for 5 hours ($p<0.05$, $n=3$). Under the conditions employed in this study, isolation of pure HDL can be achieved following centrifugation for 16 hours. Interestingly, longer centrifugations between 18 and 20 hours resulted in lower purity of HDL.

Conclusion: Previous studies have described micro-isolation of HDL with little acknowledgment of the albumin contaminant which will render any functionality studies erroneous. Isolation of pure HDL by the method described in this study would permit further functional analysis of HDL and has potential application in the isolation of HDL from animal serum samples.