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Abstracts

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This Abstracts is brought to you for free and open access by Journal of the Hong Kong College of Cardiology. It has been accepted for inclusion in Journal of the Hong Kong College of Cardiology by an authorized editor of Journal of the Hong Kong College of Cardiology.
Background: Clinical burden of familial hypercholesterolemia (FH) in patients with myocardial infarction (MI) and coronary disease remain under-recognized, thus jeopardizing optimal therapeutic strategies. This study aims to unravel the burden of FH and the unmet clinical need in guideline-directed lipid control in these high-risk patients.

Methods: We investigated the burden of FH using the Dutch Lipid Clinic Network (DLCN) criteria in a cohort of patients with MI or coronary disease (n=493) enrolled in a Cardiac Rehabilitation Lipid Program at Tung Wah Hospital, Hong Kong. Preliminary criteria for FH study was aged <65y.o. at presentation and baseline LDL >4.0mmol/L. ESC/EAS 2019 guideline-directed LDL treatment target was defined as <1.4mmol/L and >50% reduction.

Results: 106 patients were aged <65y.o. at presentation with baseline LDL >4.0mmol/L. Among them, respectively n=37, n=8 and n=7 were clinically diagnosed as having possible (DLCN 3-5), probable (6-8), and definite (>8) FH. Total prevalence of possible to definite FH amongst MI/ coronary disease patients was 10.5% (n=52/493). Patients with FH were younger (50.5±7.4 versus 60.8±10.9 years, P<0.001), had a similar sex distribution (P=0.90), and had higher baseline LDL (4.2±1.1 vs 3.1±1.0, P<0.001), triglycerides (2.7±3.2 vs 1.6±1.4, P=0.026) and total cholesterol (5.8±1.3 vs 4.7±1.1, P<0.001). Importantly after treatment, 61.5% of these patients with possible to definite FH did not meet guideline-directed target for LDL control (n=32/52).

Conclusions: Up to 1 in 10 younger patients presented with MI/ coronary disease could have underlying FH. Screening and diagnosis may lead to targeted therapeutic strategies and improve risk control.
Conclusion
SAA can be utilized as a definitive biomarker for the prediction of IVIG resistance in KD patients younger than one-year old.

54 Impact of Sodium-Glucose Co-Transporter 2 Inhibitors on Cardiovascular Outcomes in Patients with Chronic Kidney Disease: Hong Kong-Wide, Observational, Propensity Score Matched Analysis

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Background: The impact of SGLT2i on patients with advanced chronic kidney disease (CKD) is limited. We aimed to compare hospitalization for heart failure (HHF) and cardiovascular (CV) death between new users of SGLT2i versus non-users across the spectrum of CKD stages.

Methods: We retrospectively analyzed 22,657 patients with CKD who were prescribed SGLT2i between August 2015 and August 2020 in 16 public hospitals in Hong Kong. Propensity-matched cohorts of SGLT2i users and non-users (n=3,704 per group) were generated on the basis of age, gender, baseline eGFR, co-morbidities and medications. Time to HHF and CV death was analyzed using COX proportional hazards model. Subgroup analysis was performed to detect heterogeneity of effect across stages of CKD.

Results: Of the whole cohort (N=22,657), the percentage of SGLT2i users in CKD stage G1 to G5 were 82.1%, 49.0%, 19.8%, 10.3%, 4.3%, and 1.6%, respectively. SGLT2i users and non-users groups were well balanced at baseline (mean age 64.7±12.7, female 37.1%), with a median follow-up of 2.8 (IQR: 1.1-5.1) years (22876.5 person-years). Overall, SGLT2i was associated with reduced risk of HHF and CV death in patients with moderate to severe CKD in a real-world setting. Our results suggest significant heterogeneity in reduction in HHF and CV death in patients with moderate to severe CKD in a real-world setting. Time to HHF and CV death was analyzed using COX proportional hazards model. Subgroup analysis was performed to detect heterogeneity of effect across stages of CKD.

Conclusion: Utilization of SGLT2i was associated with significant reduction in HHF and CV death in patients with moderate to severe CKD in a real-world setting. Our results suggest significant heterogeneity in reduction in HHF and CV death in patients with moderate to severe CKD in a real-world setting. Time to HHF and CV death was analyzed using COX proportional hazards model. Subgroup analysis was performed to detect heterogeneity of effect across stages of CKD.

82 Clinical Outcomes of Left Atrial Appendage Occlusion Versus Switch of Direct Oral Anti-coagulant in Atrial Fibrillation

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Background: Left atrial appendage occlusion (LAAO) has emerged as an alternative to oral anti-coagulation therapy for stroke prevention in atrial fibrillation (AF), but data comparing LAAO with direct oral anti-coagulant (DOAC) is sparse. Other retrospective studies have compared LAAO with incident DOAC usage, but this comparison may not be fair because LAAO, recommended as a second line therapy, is generally considered in those with adverse effects from DOAC. We sought to investigate the clinical outcomes of LAAO versus a switch from one DOAC to another DOAC in patients with non-valvar AF.

Method: This was a cohort study comparing LAAO (with or without prior anti-coagulation) with a switch of one DOAC to another DOAC in AF patients treated in public hospitals in Hong Kong. The primary outcome was a composite of all-cause mortality, ischemic stroke or transient ischemic attack and major bleeding. The secondary outcome was individual component of the primary outcome and cardiovascular mortality.

Results: A total of 2,350 patients (874 in the LAAO group and 1,476 in the DOAC switch group) were generated by 1:2 propensity score matching. After a mean follow up of 1052 ± 694 days, the primary composite outcome developed in 216 (24.7%) patients in the LAAO group and in 345 (23.3%) patients in the DOAC switch group (hazard ratio [HR], 0.49; 95% confidence interval [CI], 0.32 to 0.73; P=0.001), but similar risk of ischemic stroke or TIA (HR, 0.78; 95% CI, 0.60 to 1.02; P=0.075). The major bleeding risk was similar overall (HR, 1.18; 95% CI, 0.94 to 1.48, P=0.150), but was lower in the LAAO group after 6 months (HR 0.71; 95% CI 0.51 to 0.97; P=0.032). The LAAO procedure appeared safe. In the 874 patients underwent LAAO, only 22 (2.5%) patients had procedurally related major complications, including 19 (2.2%) with pericardial effusion and/or cardiac tamponade, 7 (0.8%) with vascular complications requiring open or endovascular repair and 1 (0.1%) with device embolization.

Conclusions: LAAO conferred a similar risk of composite outcome of all-cause mortality, ischemic stroke or TIA and major bleeding, as compared with DOAC switch.
Background: Heart failure with preserved Ejection Fraction (HFpEF) makes up more than 50% of all heart failure cases. Unfortunately, therapies that reduce mortality and morbidity in Heart Failure with reduced Ejection Fraction (HFrEF) have little effect in HFpEF, as the biology and the clinical course are very different. Therefore, there is an urgent need to better understand the underlying processes, and to develop targeted therapies for HFpEF.

Methods: Human ventricular cardiac tissue strips (hvCTS) and three-dimensional fluid-ejecting miniature human ventricular cardiac organoid chamber (hvCOC) were collagen-based engineered cardiac tissue with human pluripotent stem cell - derived human ventricular cardiomyocytes (hPSC-hvCMs). HFpEF phenotype was induced by a combined treatment of endothelin-1 (ET-1) and transforming growth factor-β1 (TGF-β1). Contractility and stiffness analysis were performed with our proprietary measurement systems. Bulk RNA sequencing was done with HFpEF modelling samples and compared to human heart failure data for gene-level analysis. For proof-of-concept, the SERCA2a mRNA was delivered into hvCTS to study the effect of SERCA2a in functional rescue of human HFpEF model.

Results: Combined ET-1/TGF-β1 treatment induced higher passive tension and tissue stiffness in hvCTS models. The treated group displayed slower contraction and relaxation kinetics. These data showed that ET-1/TGF-β1-treated but not control or singly-treated hvCTS uniquely displayed significantly changes in stiffness and contractile kinetics. Consistently, ET-1/TGF-β1-treated hvCOC model recapitulated HFpEF phenotypes with increased stiffness but no significant changes in the developed pressure, stroke volume, stroke work and ejection fraction. Bulk RNA-sequencing study showed that there were 29% and 33% overlaps of differentially expressed genes (DEG) between HFpEF patients versus HFrEF-hvCTS and HFpEF-hvCOC models, respectively. Comparative functional analysis further revealed that HFpEF-hvCOC was more similar to human HFpEF patients. It was found that SERCA2a was one of the most highly expressed gene in calcium signalling pathway and was also the most significantly down-regulated in HFpEF patients and engineered HFpEF- models. Indeed, results showed that AAV1-SERCA2a transduction rescued the disease phenotype in HFpEF-hvCTS by restoring the slowed contractile kinetics.

Conclusion: We conclude that the preclinical human HFpEF-hvCTS and -hvCOC models presented in this report can recapitulate characteristic phenotypes seen in patients. With the use of clinical-grade gene vector SERCA2a, it is demonstrated that the HFpEF engineered cardiac models are invaluable for investigating HFpEF mechanisms and facilitating the discovery of novel druggable targets or screening of promising therapeutics agents. These findings lead an open IND from our proprietary measurement systems.

Background: Regular heavy alcohol consumption is an important cause of secondary hypertension. Some believe that moderate consumption may even be beneficial. We studied the relationship between alcohol consumption and blood pressure (BP) in the general population in Shenzhen.

Methods: We analysed data on 1277 men and 1710 women aged 18–96 years who had valid data on alcohol consumption, BP and other related factors in the Shenzhen-Hong Kong United Network on Cardiovascular Disease, a population-based study. Subjects on anti-hypertensive medications were excluded. Multiple linear regression models were constructed to characterise the relationship between alcohol consumption and BP.

Results: The prevalence of hypertension in non-drinkers, infrequent drinkers and regular drinkers were 21.2%, 25.5% and 33.3%, respectively (P < 0.001). Alcohol consumption was associated with systolic blood pressure (SBP) before adjustment in the overall population (B = 0.116, P = 0.001). After adjustment for BMI, smoking, physical activity, hypercholesterolemia, and age, the association remained significant (B = 0.055, P = 0.006). The association was not significant in sex-specific analysis. Alcohol consumption was also associated with diastolic blood pressure (DBP) in the overall population (B = 0.175, P = 0.001) and in men (B = 0.085, P = 0.003) but not in women. After adjustment for BMI, smoking, physical activity, hypercholesterolemia, and age, the association remained significant (overall: B = 0.101, P = 0.001; men: B = 0.072, P = 0.016).

Conclusion: Our study suggests that there is a significant linear relationship between alcohol consumption and BP. Our findings support current health recommendations on alcohol consumption.

Comparison of the Potency of Atorvastatin, Rosuvastatin and Simvastatin Among Chinese Patients Initiated with Lipid-Lowering Therapy

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BACKGROUND: Despite the use of statins and other lipid-lowering therapies (LLTs), lipid management in China didn’t prove to be satisfying. Data reporting efficacy of statins were mainly collected in Caucasians, or only part of enrolled patients were statin-naïve.

PURPOSE: We aimed to investigate the efficacy of different doses of Atorvastatin, Rosuvastatin and Simvastatin on low-density lipoprotein cholesterol (LDL-C) lowering with a large sample of statin-naïve Chinese patients.

METHODS: In this retrospective observational study involving all 43 public hospitals or clinics in Hong Kong, statin-naïve patients initiated with either Atorvastatin, Rosuvastatin, or Simvastatin between 1 January 2020 and 31 July 2020 were included. LDL-C percentage reduction from baseline achieved by individual statin doses was investigated by a general linear model.

RESULTS: 42,918 statin-naïve patients with a mean age of 59.2±11.4 years old and a half of male were included. 32.3%, 31.1%, and 64.6% of the patients were initiated with Atorvastatin (A), Rosuvastatin (R) and Simvastatin (S), respectively. Among the 10 dose groups (Atorvastatin 10, 20 and 40 mg, Rosuvastatin 5, 10 and 20 mg, Simvastatin 5, 10, 20 mg, respectively.

Oral Abstracts Presentation

Blood Pressure is Related to Alcohol Consumption in the Chinese General Population

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and 40 mg/day), Atorvastatin, Rosuvastatin and Simvastatin decreased LDL-C by 37.9-48.0%, 31.8-42.2% and 28.5-37.0%, respectively. A40 achieved greater LDL-C reduction than R20 (48.0%, 95% CI 47.2%-48.9% vs. 42.2%, 95% CI 39.9%-44.4%, p < 0.001). Unlike Atorvastatin, doubling dose from R10 to R20 didn’t yield significant more LDL-C reduction (40.7%, 95% CI 39.1%-42.4% vs. 42.2%, 95% CI 39.9%-44.4%, p > 0.05), as well as from S20 to S40 (37.0%, 95% CI 36.5%-37.4% vs. 36.0%, 95% CI 32.2%-39.6%, p > 0.05). There was greater efficacy of statins in the males and diabetes mellitus (DM) patients than in the females and non-DM patients, respectively. CONCLUSION: High-potency Atorvastatin demonstrated better efficacy than Rosuvastatin on lowering LDL-C in Chinese dyslipidemia patients. Most doses of Atorvastatin and Simvastatin were as effective in Chinese as in Westerners, while the potency of Rosuvastatin appeared to be weaker.

Next Generation Sequencing Analysis of Hereditary Cardiomyopathy and Channelopathy in Hong Kong – Latest Update from a Regional Centre

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Background:
Next generation sequencing (NGS) is increasingly utilized for cardiac genetic diagnosis. Compared to Sanger sequencing, NGS panel testing allows simultaneous screening of multiple genes, and is highly cost-efficient. Hereditary cardiomyopathy and channelopathy encompasses a wide spectrum of diseases, which are genetically heterogeneous. This includes hypertrophic cardiomyopathy (HCM), dilated cardiomyopathy (DCM), arrhythmogenic right ventricular cardiomyopathy (ARVC), catecholaminergic polymorphic ventricular tachycardia (CPVT) and long-QT syndrome (LQTS). The spectrum of genetic variants in the local population is not well characterized. This work aims to review the clinical usefulness of NGS in cardiology, and improve understanding of the prevalence of genetic variants in local cardiac patients.

Methods:
Twenty-three adult cardiac cases referred from a single cardiac unit, from January 2021 to January 2022 were reviewed. NGS was performed on Illumina NextSeq 2000 platform. Virtual gene panels for HCM, DCM, ARVC, CPVT and LQTS were employed according to the phenotype and consent. Sanger sequencing was performed in selected cases for targeted analysis of intronic (GLA) or familial variants.

Results:
The review included 23 patients, with 13 males (57%) and 10 females (43%). The median age of diagnosis was 37 years (range 21 – 60 years). There were five cases of HCM (22%), involving variants in MYH7, PRKAG2, TNNT3; 12 cases of DCM (52%), with variants in BAG3, BRAF, DSP, FLNC, LAMA4, LMNA, MYH7, TTN; two cases of ARVC (9%), with variants in DSG2; one case of CPVT (4%), with variant in RYR2; and two cases of LQTS (9%), with variant in CACNA1C. GLA was implicated in one case (4%) of infiltrative cardiomyopathy. Two cases of DCM involved digenic inheritance, with variants detected in TTN and MYBPC3; TTN and PRKAG2 respectively. A total of 25 heterozygous variants were identified, the majority being missense (68%). The remainders were small deletions (28%) and insertion-deletion (4%).

There was a positive family history of cardiomyopathy, arrhythmia or sudden cardiac death in 14 cases (61%). Thirteen patients (57%) had received an implantable cardioverter-defibrillator (ICD) or cardiac resynchronization therapy defibrillator (CRT-D). Cardiac transplant was performed in two patients (9%). Apart from one patient who succumbed due to gastrointestinal bleeding and pneumonia, all other patients were stable on follow-up.

Conclusion:
The current findings expanded our understanding of cardiac genetics in Hong Kong. It also highlighted the indisputable advantage of using NGS for genetic diagnostics. NGS-based cardiac panel testing could be further applied for cardiac transplant work-up and investigation of sudden cardiac death.

Digital Nail-Fold Capillaroscopy to Evaluate the Efficacy and Safety of Oral Anticoagulation Therapy

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Aim of the study:
The significant increase in the number of patients requiring antithrombotic therapy necessitates the development of new tools to monitor treatment safety and predict thrombotic or haemorrhagic complications. Current guidelines recommend non-Vitamin K antagonists (NOAKs) as the first line in the majority of clinical settings. However, the monitoring of their effectiveness and safety is problematic due to the absence of universal diagnostic or laboratory tests for these heterogeneous pharmacological classes of medications. While quite rare, important bleeding events including life-threatening haemorrhages can occur in high-risk patients. At the same time, suboptimal anticoagulation on standard or reduces doses can lead to complications associated with the increased risk of thrombosis.

Material and methods:
We developed a non-invasive method based on the digital capillaroscopy of the nail-fold to monitor the blood rheological properties in patients with cardiovascular diseases. The appropriate software algorithm allowed classification and quantitative assessment of aggregates in the capillary bed. This included direct visualization and calculation of the number of aggregates per time unit to determine the “capillary haematoctrit” – the degree of capillary filling with red blood cells (Fig.1). Preliminary testing of the program showed that the degree of capillary filling with laminar blood flow is 75% of the vessel volume and above, while in rheological disorders the presence of RBC aggregates lead to significantly lower values of 55% or less. The randomized study included 114 patients with coronary artery disease and atrial fibrillation on antithrombotic treatment. In vivo analysis was performed with digital capillaroscopy and in vitro analysis – with laser scattering aggregometry ("Reoscan", Republic of Korea) and an optical laser trap for single erythrocytes.

Results and conclusion:
The developed technique showed excellent agreement with the results of approved diagnostic tests and proved its applicability for diagnosing disorders of blood rheology. Importantly, the software was also able to detect the presence of microhaemorrhages in the pericapillary tissues and their extent (Fig.2).
The total area of RBC diapedesis correlated with significant and non-significant bleeds.

Principal components. Principal component 1 described high loadings of tricuspid valve and right atrial morphological information; principal component 2 described high loadings of right ventricular morphological information; principal component 3 described high loadings of left ventricular topology. Based on these components, two clusters representing the morphological phenotypes “small” (Cluster 1; n=253) and “large” right atria and ventricle (Cluster 2; n=37) were derived (Figure A). Specifically, Cluster 2 was characterized by higher tenting area, larger conical-shaped right ventricle, greater right atrial area, and right ventricular-pulmonary artery decoupling (Figure B).

Compared with Cluster 1, Cluster 2 was associated with an increased risk of adverse outcomes (adjusted hazard ratio 2.04; 95% Confidence Interval [CI] 1.17-3.56; P=0.012). TR remained associated with adverse outcomes after adjusting for the clusters (adjusted hazard ratio 1.005; 95% CI 1.001-1.009; P=0.030). Cluster 2 was also associated with an increased risk of residual TR (Odds Ratio 2.31; 95% CI 1.06-5.00; P=0.034) after tricuspid annuloplasty.

Conclusions: Amongst the two distinct phenotypes of TR, a “large right atria and ventricle” is associated with worse clinical outcomes and a lower chance of repair success.
Conclusion: This study showed a positive association between VAI and PAD in normal-weight adults with hypertension among men but not among women.

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Clinical Outcome of Patients Referred for Advanced Heart Failure Therapy Related to Utilization of Short Term Mechanical Circulatory Support for Cardiogenic Shock in Hong Kong

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Background
With the improvement of technology and the approval of central reimbursement of veno-arterial extracorporeal membrane oxygenation (VA-ECMO) and percutaneous microaxial left ventricular assist device (IMPELLA) as life saving therapies in 2015 and 2020 respectively, the utilization of these short term mechanical circulatory support (MCS) devices in management of advanced heart failure and cardiogenic shock had rapidly evolved. However, data on clinical outcomes of these patients being referred for advanced heart failure therapy in Hong Kong is lacking.

Methods
All referrals to the heart transplant service related to VA-ECMO and/or IMPELLA use in Hong Kong from 2010 to 2021 were reviewed.

Results
There were 146 patients included for analysis (111 male 76.0%, mean age 49.4 years old). 102 patients were on VA-ECMO, 24 patients were on VA-ECMO and IMPELLA support, 8 patients were supported on IMPELLA, 7 cases were declined for VA-ECMO insertion due to ineligible for transplantation, and 5 cases did not escalate to VA-ECMO due to favourable recovery potential assessed by the transplant team. The number of referrals significantly increased from mean 2.5 cases per year in 2010-2015 to mean 21.8 cases per year in 2016-2021 (p<0.002). Among the referrals, 52 (35.6%) were declined for transplant candidacy, 32 (21.9%) were weaned from short term MCS due to improvement and eventually 62 were accepted for advanced heart failure treatment. Among the accepted 62 patients, 25 underwent surgically implanted external CentriMag as left ventricular assist device while 37 underwent surgically implanted durable left ventricular assist devices (LVAD). Thirty-day and one-year survival was 25% and 77.7% for the declined group; 87.1% and 58.6% for the accepted group; 100% and 96.9% for the improved group, respectively (p<0.001).

Conclusions
Among patients accepted for advanced heart failure therapy related to short term MCS use, durable LVAD was the best bridging strategy to transplantation.

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Genetic Variants of ISL1 Gene Promoter in Atrial Septal Defects and Analysis of Cellular Function

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Objective: Atrial septal defect (ASD) is a common type of congenital heart disease. As a crucial transcription factor, ISL1 has been reported to play an important role in heart development, whereas the variants of ISL1 gene promoter region in ASD patients have not been reported. We hypothesized that variants in ISL1 promoter may be involved in the formation of ASD.

Methods: We investigated the ISL1 gene promoter variants in 625 subjects (332 ASD patients and 293 healthy controls). Cellular functional experiment was performed by using the dual-luciferase reporter assay to analyze the activity of ISL1 promoter affected by variants. The electrophoretic mobility shift assay and online JASPAR database were used to investigate the effect of variants on the binding ability of transcription factors and to predict all possible transcription factor binding sites destroyed or newly generated by variants.

Results: Four variants in ISL1 gene promoter were found only in patients with ASD by sequencing. Three of the four variants (rs4923 G>C (rs541081886), g.5079 A>G (rs1371835943), g.5309 G>A (rs116222082)) significantly decreased the transcriptional activities compared with the wild-type ISL1 gene promoter (p<0.05). The EMSA revealed that the three variants (rs4923 G>C (rs541081886), g.5079 A>G (rs1371835943), g.5309 G>A (rs116222082)) significantly decreased the transcriptional activities in ISL1 promoter affected the affinity of binding sites of transcription factors. Further bioinformatic analysis with the online JASPAR database demonstrated that a cluster of putative binding sites for transcription factors may be altered by these variants.

Conclusion: The variants identified from the ISL1 gene promoter region in the Han Chinese patients with ASDs are likely involved in the development of ASD by affecting the transcriptional activity and altering ISL1 expression levels. Therefore, these findings may provide new insights into the molecular etiology and potential therapeutic strategy of ASD.

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High Power Short Duration (HPSD) Ablation Results in Low Esophageal Thermal Injury Rates and Improved Procedural Outcomes Versus Conventional Lower Power Longer Duration (LPLD) Ablation in Atrial Fibrillation: The Hi-Lo HEAT Multi-Centre Randomised Controlled Study

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Radiofrequency (RF) ablation is the predominant method for performing pulmonary vein isolation (PVI) in atrial fibrillation (AF). However, it is associated with risk of esophageal thermal injury (ETI). High power short duration (HPSD) ablation results in preferential local resistive heating over distal conductive heating, and could potentially further reduce the risk of ETI. No randomised study has compared HPSD with conventional lower power longer duration (LPLD) ablation focused on ETI risk.

Methods
88 patients undergoing their first PVI procedure were randomised 1:1 to HPSD or LPLD ablation. Anterior wall ablation was done at 40-50W, with ablation target of AI500-500/ LS15-5.5. Posterior wall ablation was done using 40-50W (HPSD group) or 25W (LPLD group), with target AI400/LS14. Circa multi-sensor esophageal temperature probe was utilized, with post procedural endoscopy performed in all patients. The primary outcome was ETI incidence, with secondary outcomes including procedural endpoints.

Results
Mean age of the cohort was 61 +/- 9 years, with 31% females. There were more hypertensive patients in HPSD (p = 0.02). ETI incidence was 4 (4.5%), with equal occurrence in HPSD and LPLD groups (p = 1.0). There was no difference in the median value of the maximal esophageal temperature reached (HPSD 38.6°C vs LPLD 38.7°C, p = 0.43), number of lesions with temperature rise above 39°C (84 vs 101, p = 0.21), and median duration in which esophageal heating remained above 38°C (HPSD 34.7s vs LPLD 33 s, p = 0.46). HPSD group had shorter total ablation time (23.8 vs 29.7 mins, p < 0.01), PVI RF duration (17.7 vs 23.9 mins, p < 0.01), and number of PVI lesions (66 vs 72.1, p = 0.04). First pass isolation rates and acute PV reconnection rates were similar. No procedural complication was encountered. Atrial arrhythmia recurrence was lower in HPSD after a median follow up of 12 ± 0.9 months (p = 0.04).

Conclusion
HPSD ablation, when compared with LPLD duration, was associated with similarly low rates of ETI. HPSD results in lower total / PVI RF ablation times compared to LPLD, with reduced arrhythmia recurrence on follow up. HPSD ablation is a safe and efficacious approach to PVI.

Background
 Coronary angiography-derived index of microvascular resistance (caIMR) is a vessel-based index that reflects the degree of coronary microvascular dysfunction, and was suggested as a less invasive alternative to wire-based index of microvascular resistance (IMR). In patients with non-obstructive coronary artery disease (NOCAD), the role of microvascular dysfunction is not fully known. The aim of this study was to evaluate the association between caIMR-based microvascular dysfunction and heart failure hospitalization (HFH) in NOCAD patients.

Methods
Patients with stable coronary artery disease and without ≥50% diameter stenosis in any of the coronary arteries on coronary angiography were included. For every patient, the global-caIMR value was calculated by averaging caIMR values measured in the three major coronary arteries, and it represents the overall microvascular status. Based on the threshold adopted from IMR studies, patients were stratified into high-global-caIMR group (global-caIMR ≥ 25U) and low-global-caIMR group (global-caIMR < 25U). The primary endpoint was HFH, defined as hospital admission with diagnosis of heart failure that extended for at least a change in calendar date. Fine-Gray model was used to adjust for death as a competing risk while performing analysis for primary endpoint.

Results
Among 325 patients included (mean age 63.4 ±11.0; male 57.2%), 105 patients were stratified into the high-global-caIMR group, and 220 patients were stratified into the low-global-caIMR group. The rate of HFH at 5 years was higher in the high-global-caIMR group compared to low-global-caIMR group (10.5% vs. 3.2%; P = 0.007). In multivariable analysis adjusted for age, gender, Charlson Comorbidity Index and baseline heart failure, global-caIMR ≥ 25U was associated with a higher risk of HFH at 5 years (subdistribution hazard ratio [sHR], 5.04; 95% confidence interval [CI], 1.86-13.67; P = 0.002). Adjusted for the same aforementioned variables, every 1U increase in global-caIMR was also associated with an increased risk of HFH at 5 years (sHR, 1.06; 95% CI, 1.02-1.10; P = 0.002).

Conclusion:
Microvascular dysfunction, based on caIMR assessment, is associated with a higher risk of HFH at 5 years in patients with NOCAD. The result of this study identifies the role of microvascular dysfunction in NOCAD patients, and provides clinical data that support the use of calMR.

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Microvascular Dysfunction Reflected by a Novel Angiography-Derived Index is Associated with Heart Failure Hospitalization in Patients with Non-Obstructive Coronary Artery Disease
7 Non-Invasive Remote Dielectric Sensing System and Computed Tomography to Quantify Lung Fluid Amounts

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Background:
The accuracy of the remote dielectric sensing (ReDSTM) system (Figure 1A), which is a non-invasive electromagnetic-based technology to quantify the lung fluid levels, remains uncertain particularly among those with small body size.

Methods: Hospitalized patients with and without heart failure underwent assessment of lung fluid levels with ReDS and successive chest computed tomography imaging. We performed a correlation analysis of the ReDS measurement, representing lung fluid levels, and computed tomography-derived percentage of high attenuation area, which also provides a spatial quantification of lung fluid level.

Results: A total of 46 patients (median 76 years old, 28 men), including 28 patients with heart failure, were included. The median ReDS value was 28% (interquartile: 23%, 33%) and median percentage of high attenuation area was 21.6% (14.4%, 28.5%). ReDS values and percentage of high attenuation area moderately correlated ($r = 0.65$, $p < 0.001$; Figure 1B), irrespective of the existence of heart failure. ReDS value independently predicted the percentage of high attenuation area seen on computed tomography ($p < 0.001$).

Conclusion: The ReDS system may be a promising non-invasive tool to quantify fluid lung levels, as validated by comparison with chest computed tomography imaging. Further studies are warranted to validate the utility and applicability of this technology to a variety of clinical scenarios.

8 Short Term Cardiovascular Event of COVID-19 Vaccine in Stable Post Percutaneous Coronary Intervention Patients

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Background:
Vaccine is an important weapon to fight against the COVID-19 pandemic. Monitoring and reporting of adverse event following immunization is essential to ensure vaccine confidence. However, some people refuse immunization because of fear of suffering from a cardiovascular event. We sought to investigate the incidence of cardiovascular event post COVID-19 vaccine in patients with history of percutaneous coronary intervention (PCI).

Methods
This was a single center, observational study of a patient level data registry. Patients with PCI performed between 2010 and 2020 were included into analysis. In Hong Kong, population-based COVID-19 vaccine rollout began on 26 February 2021 and all immunization record were recorded in public hospital database. The primary outcome is major adverse cardiovascular event (MACE) defined as a composite of cardiovascular (CV) death, non-fatal MI and non-fatal CVA.

Results
7,127 patients were screened and 5,737 were included into final analysis after excluding death and loss to follow up. 1,307 patients received COVID-19 vaccine which corresponded to a vaccination rate of 22.8%. Comparing with unvaccinated patients, those received vaccine tended to be younger and less had hypertension and previous acute coronary syndrome. Concerning outcome, we did not observe an elevated risk of MACE in patients after receiving COVID-19 vaccine (HR 0.648, 95% CI 0.418-1.004, $p=0.052$).

Conclusion
In our stable post PCI patients, the COVID-19 vaccination rate was low (22.8%) and there was no excess risk of MACE in those received COVID-19 vaccine. Further studies are required to determine whether COVID-19 vaccines can reduce overall cardiovascular morbidity and mortality during COVID-19 pandemic.

10 Exposure to Famine in Early Life and Hypertension in Adulthood in the Shenzhen-Hong Kong United Network on Cardiovascular Disease Study

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Conclusion
In our stable post PCI patients, the COVID-19 vaccination rate was low (22.8%) and there was no excess risk of MACE in those received COVID-19 vaccine. Further studies are required to determine whether COVID-19 vaccines can reduce overall cardiovascular morbidity and mortality during COVID-19 pandemic.

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Background: Famine exposure in early life has been postulated to lead to hypertension in adulthood. We investigated the association between exposure to the 1959-1962 famine in early life and hypertension in Chinese adults.

Methods: 3385 participants (1488 men and 1897 women) from the Shenzhen-Hong Kong United Network on Cardiovascular Disease cohort were studied. Participants were categorised as famine-exposed (1921-1962), non-exposed (1963-1982) and non-exposed (after 1983). In the subgroup analysis, famine-exposed was divided into fetal-exposed (1959-1962), childhood-exposed (1949-1958) and adolescence/young adult-exposed (1921-1948). Multiple logistic regression was used to analyse the association of famine exposure with hypertension.

Results: The prevalence of hypertension among participants in the non-exposed (1963-1982), fetal, childhood and adolescence/adult-exposed were 31.9, 50.3, 51.1 and 56.8%, respectively. Compared to non-exposed (1963-1982), exposure to famine in early life was associated with higher risk of hypertension in both men and women after adjusting for smoking, alcohol consumption, physical activity, and diabetes (men: OR = 1.64, 95% CI = 1.16-2.31; women: OR = 2.58, 95% CI = 1.93-3.45), which remained significant after further adjustment for BMI (men: OR = 1.85, 95% CI = 1.30-2.64; women: OR = 2.56, 95% CI = 1.90-3.45).

Conclusion: Our results suggest that there is a significant association of famine exposure with hypertension. Further studies with larger sample sizes are needed to elucidate the complex relationship between famine and hypertension.

11 How Well Do Anthropometric Measurements Predict Diabetes and Hypertension?

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Background: Waist circumference (WC), body mass index (BMI), and waist-to-height ratio (WHtR) are known to be associated with type 2 diabetes mellitus (T2DM) and hypertension. In this study, we compared these three anthropometric measurements as predictors of diabetes and hypertension in a Chinese population.

Methods: We analysed data on 3132 participants aged 18–96 years who had valid data on WC, BMI, WHtR, T2DM, hypertension and other related factors from the Shenzhen-Hong Kong United Network on Cardiovascular Disease, a population-based study that began in December 2020. The receiver operating characteristics (ROC) of the anthropometric measurements was evaluated for each gender.

Results: Altogether 1365 men and 1767 women were included. Their age ranged from 18 to 96 year with a mean (SD) of 44.1 (11.6) year. In men, the areas under the receiver-operating characteristic curves (AUCs) and 95% confidence intervals (CIs) for WC, BMI and WHtR to predict hypertension were 0.58 (0.55-0.61), 0.60 (0.56-0.63) and 0.59 (0.56-0.63) respectively. To predict T2DM, the AUCs and 95% CIs were 0.64 (0.62-0.68), 0.59 (0.61-0.67) and 0.66 (0.62-0.71). In women, the AUCs and 95% CIs for WC, BMI and WHtR for predicting hypertension were 0.65 (0.62-0.68), 0.64 (0.61-0.67) and 0.65 (0.62-0.68). To predict T2DM, the AUCs and 95% CIs were 0.78 (0.74-0.82), 0.74 (0.70-0.79) and 0.79 (0.76-0.83).

Conclusion: BMI is better than WC and WHtR in predicting hypertension in men while WC and WHtR perform equally in predicting hypertension in women. WHtR is better than the other anthropometric measurements in predicting T2DM in both men and women.

12 LDL-Cholesterol and Blood Pressure in Smokers and Non-Smokers in The Shenzhen-Hong Kong United Network on Cardiovascular Disease

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Background: Tobacco smoking, elevated low-density lipoproteins (LDL) and blood pressure (BP) are established cardiovascular risks and are inter-related. We studied the association of smoking with LDL and BP in the Shenzhen general population.

Methods: We analysed data on 1310 men and 1732 women aged 18–96 years who had valid data on smoking status, LDL, BP and other related factors in the Shenzhen-Hong Kong United Network on Cardiovascular Disease, a population-based study. Subjects who were on medications for hypertension or hypercholesterolaemia were excluded. We constructed multiple linear regression models to investigate the relationship of smoking status with LDL and BP.

Results: In multiple linear regression, smoking was associated with LDL levels in the overall population (B = 0.131, p = 0.001) and in men (B = 0.055, p = 0.001) before adjustment. After adjusting for physical activity, the association remained significant (overall: B = 0.127, P = 0.001; men: B = 0.055, P = 0.048). After further adjusting for age, the association was significant only in the overall population (B = 0.135, p = 0.001). Smoking was associated with both SBP and DBP in the overall population (SBP: B = 0.117, P = 0.001; DBP: B = 0.167, P = 0.001). The association remained significant after adjusting for BMI, alcohol consumption, physical activity, diabetes, and hypercholesterolaemia (SBP: B = 0.058, P = 0.020; DBP: B = 0.092, P = 0.001) and after further adjusting for age (SBP: B = 0.077, P = 0.006; DBP: B = 0.097, P = 0.001).

Conclusion: Smoking has a linear relationship with LDL and BP. Our findings add to the evidence on the health benefits of smoking cessation.

14 Acute Myocardial Infarction in Patient with Upper Gastrointestinal Bleeding

Dr Siti Adewiah, Dr Muhammad Diah, Dr Azhari Gani, Dr Fauzi Yusuf, Dr Azzaki Abubakar

Background: Smoking, elevated low-density lipoproteins (LDL) and blood pressure (BP) are established cardiovascular risks and are inter-related. We studied the association of smoking with LDL and BP in the Shenzhen general population.

Methods: We analysed data on 1310 men and 1732 women aged 18–96 years who had valid data on smoking status, LDL, BP and other related factors in the Shenzhen-Hong Kong United Network on Cardiovascular Disease, a population-based study. Subjects who were on medications for hypertension or hypercholesterolaemia were excluded. We constructed multiple linear regression models to investigate the relationship of smoking status with LDL and BP.

Results: In multiple linear regression, smoking was associated with LDL levels in the overall population (B = 0.131, p = 0.001) and in men (B = 0.055, p = 0.001) before adjustment. After adjusting for physical activity, the association remained significant (overall: B = 0.127, P = 0.001; men: B = 0.055, P = 0.048). After further adjusting for age, the association was significant only in the overall population (B = 0.135, p = 0.001). Smoking was associated with both SBP and DBP in the overall population (SBP: B = 0.117, P = 0.001; DBP: B = 0.167, P = 0.001). The association remained significant after adjusting for BMI, alcohol consumption, physical activity, diabetes, and hypercholesterolaemia (SBP: B = 0.058, P = 0.020; DBP: B = 0.092, P = 0.001) and after further adjusting for age (SBP: B = 0.077, P = 0.006; DBP: B = 0.097, P = 0.001).

Conclusion: Smoking has a linear relationship with LDL and BP. Our findings add to the evidence on the health benefits of smoking cessation.
Background: Massive gastrointestinal bleeding tends to be associated with myocardial infarction. However, it is often undiagnosed. Symptoms of AMI in patients with gastrointestinal bleeding often do not appear due to massive bleeding, especially in critically ill patients. Case: A 67-year-old male patient was presented to the emergency department with the complaint of hematemesis and melena that had started 3 days ago. The complaint of chest pain was denied. During one year patient is also having hypertension and smoking 1-2 packs/day. Laboratory results confirmed anemia and EKG showed old lateral myocardial infarction with incomplete RBBB. However after 2 days hospitalized, the patient’s having lost consciousness and EKG showed high lateral STEMI.

Decision-making: Gastrointestinal bleeding, which reduces perfusion to the heart and increases reflex tachycardia, thereby increasing myocardial oxygen demand, can be a precipitating factor for the occurrence of myocardial infarction. Hamid et al reported that 37.1% of adult patients with a chief complaint of gastrointestinal bleeding were found to have a myocardial infarction. In a study of 51 patients with GI bleeding associated with aspirin therapy, 9 patients had a myocardial infarction. A history of ischemic heart disease and extensive bleeding other supporting features: there was a prominent leftward shift of the inter-ventricular septum during jammed beats due to LV underfilling. With these findings, we referred the patient to the cardiothoracic surgeons for consideration of re-do MVR. Pre-operative coronary angiogram was normal. Fluoroscopy again showed intermittent jamming of the mitral valve, with a compatible arterial pressure tracing reflecting the reduction in cardiac output. The patient underwent surgery subsequently.

Conclusion

When evaluating a patient with valvular heart disease and heart failure, detailed echocardiogram is of utmost importance. Different imaging techniques (e.g. 2D imaging, colour Doppler, CW/ PW Doppler) and different modalities (e.g. TTE, TEE and fluoroscopy) should be used to complement each other. Uncommon diagnoses may also have uncommon presentations. While a jammed prosthetic valve usually presents more acutely and severely, one should still bear this in mind while evaluating a patient with insidious onset of heart failure symptoms.

20 Research and Application on Artificial Intelligence Diagnosis and Treatment of Hypoplastic Aortic Arch with Computer Fluid Dynamics

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Background: Hypoplastic aortic arch (HAA) is the representative of complex congenital heart disease. The diagnosis and treatment level of complex congenital heart disease is the basic benchmark for evaluating the clinical level of cardiovascular specialty among regions in China. The most common treatment for this condition is surgery. For patients with mild stenosis or postoperative restenosis, stent intervention along with balloon angioplasty can be employed. How to choose treatment methods to reduce complications is among trending clinical topics. Existing diagnostic criteria are mostly based on the calculation of imaging geometry, making the criteria inadequate to guide treatment decisions. Methods: Computational fluid dynamics (CFD) is widely applied in military industry, and other science and technology fields. Artificial intelligence (AI) can identify the differences between groups through 3D deep learning on images. The present project aims for fewer postoperative complications through patient classification before surgery and appropriate treatment selection according to the HAA.
protocol. Clinical and follow-up data will be collected from four groups: resection and anastomosis group undergoing different types of surgery, non-resection and anastomosis group without postoperative recurrence, normal group, and prospective group. The method features the establishment of an aortic arch imaging database for the first three groups. Firstly, the morphological and fluid differences between normal aortic arches and HAAs will be investigated using fluid dynamics. Then AI will be applied to define HAA parameters of different treatment types. In the end, an AI-powered diagnosis and treatment software will be developed to analyze the revisiting children before surgery in the prospective group and provide feedback to AI for deep learning combined with parameters of real cases.

Results: HAA is divided into four types corresponding to different treatment options.

Conclusion: The ultimate goal of the project is to collect and input radiomic data and provide an optimal treatment protocol based on classifications for HAA patients so as to reduce postoperative complications.

21 Health-Related Quality of Life in Children with Congenital Heart Disease Following Two Different Treatments: Interventional Closure and Minimally Invasive Closure

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OBJECTIVE: To evaluate and compare the health-related quality of life (HRQOL) of congenital heart defect (CHD) children who underwent either Minimally invasive closure (MIC) or Interventional closure (IC) therapy.

Methods: This observational, cross-sectional, and comparative study was conducted at the Children’s Hospital of Chongqing Medical University. Children aged 2 to 4.5 years old who underwent closure treatment for simple atrial septal defect (ASD) or ventricular septal defect (VSD) were included from February 2021 to September 2021. All children had their HRQOL assessed preoperatively using the PedsQLTM3.0 Cardiac Module and subsequently follow-ups.

Results: A total of 199 children’s data were collected from MIC group (n=116) and MIC group (n=83). Demographics, baseline characteristics and pre-operative data were generally balanced between the two groups. The duration of anaesthesia (45 mins vs. 109 mins), surgery (25 mins vs. 48 mins), and length of postoperative hospital stay (4.32 days vs 6.87 days) in the IC group were significantly lower compared to the MIC group (P < 0.001). The incidence of post-operative pneumonia in the MIC group was much higher than in the IC group (31.3% vs. 0 percent, P<0.001). HRQOL score increased significantly in both groups following treatment and follow-up evaluations (P < 0.001). The HRQOL score of the IC group at 3 months after therapy was significantly higher than that of the MIC group (88.9vs. 83), showing a larger increment from baseline scores compared to the MIC group (5.4 vs. 2.6, P <0.001). Six months after discharged from hospital, no significant difference of HRQOL score was found in children of those 2 groups.

Conclusion: HRQOL in CHD children showed a continuous improvement regardless of IC or MIC intervention. But IC could lead to better HRQOL in the early postoperative stage.

Key words: health-related quality of life; congenital heart disease; minimally invasive closure; interventional closure.
Analysis of the Adequacy of Antithrombotic Therapy in Patients with Atrial Fibrillation in Uzbekistan

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Purpose
To study the adequacy and structure of anticoagulant therapy in patients with AF at the prehospital stage.

Material and methods
915 case histories of patients discharged from the hospital from 01.05.2020 to 30.06.2020 were retrospectively studied. Various clinical forms of AF were detected in 96(10.5%) patients (57.3% men). The average age of patients was 64.6±11.2 years, of which 71.8% were diagnosed with nonvalvular etiology and 28.2% with valvular etiology. At the same time, the paroxysmal form of AF was found in 29.1%, the persistent form in 11.4%, and the permanent form in 59.5% patients. Compliance with the current ESC guidelines for the management of patients with AF and the quality of prehospital prophylaxis of thromboembolic complications with various antithrombotic therapy options were analyzed.

Results
The individual risk of thromboembolic events was assessed using the CHA2DS2VASC scale (3.7±1.3) and the risk of bleeding using the HAS-BLED scale (2.1±0.9). Among the comorbidities, hypertension accounted for 79.1% of cases (n=76), diabetes mellitus-21.8% (n=21), IHD-80.2% (n=77), chronic heart failure-51% (n=49). There were thromboembolic complications in the anamnesis in 15.6% of patients (n=15). 19 (19.8%) patients had no anticoagulation at the outpatient stage; monotherapy with antiplatelet drugs (ASA or clopidogrel) was taken by 26 (27.1%) and another 5 (5.2%) patients were on a combination of these drugs. 34 (35.3%) and 12(12.5%) were on warfarin and rivaroxaban. At the same time, only 8 (23.5%) patients on Warfarin maintain the TTR in the recommended range (>70%).

Conclusions
1) In 10.5% patients admitted to the RSSPCC, various clinical forms of AF were detected. Besides, patients with valvular AF etiology (28.1%) are more committed to taking ACT. 2) Most patients with AF had a high risk of thromboembolic complications (3.7 points on the CHA2DS2-VASC scale) and a low risk of bleeding (2.1 points on the HAS-BLED scale), which allows more than 90% to carry out the prophylaxis of thromboembolic complications in the anamnesis in 15.6% patients with AF and the quality of prehospital prophylaxis of thromboembolic complications with various antithrombotic therapy options were analyzed.

Association Between Triglyceride-Rich Lipoprotein and Hyperuricemia in Patients with Hypertension: The China H-Type Hypertension Registry Study

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Purpose: The aim was to explore the association of triglyceride-rich lipoprotein (TRL-c) with hyperuricemia in patients with hypertension.

Methods: A total of 14,227 hypertensive subjects were included in the current study. TRL-c= non-HDL-C-LDL-C, TRL-c is estimated by Friedewald formula and is about TG/5mmol/L. The outcome was Hyperuricemia, defined as SUA > 420 μmol/L (7.0 mg/dl) in males and SUA > 360 μmol/L (6.0 mg/dl) in females.

Results: Overall, there was a positive relationship between TRL-c (as a continuous variable) and Hyperuricemia in men and women. Consistently, when TRL-c was assessed as quartiles, compared with participants in quartiles 1 (< 0.64), the adjusted ORs (95% CI) for hyperuricemia in quartile 2 (1.17 to <1.76), quartile 3 (1.76 to <2.74), and quartile 4 (>2.74) were 1.14 (0.96, 1.37), 1.36 (1.14, 1.63), 1.90 (1.59, 2.28), respectively. Similar results were found for women. The subgroup analysis result shows that a significantly strong association between TRL-c and the prevalence of hyperuricemia only was found in participants with higher BMI levels (>24: OR, 1.34; 95% CI: 1.12, 1.16; vs. ≤24, kg/m2: OR, 1.88; 95% CI: 1.50, 2.35; P interaction = 0.02) among men. Only antihypertensive drugs (no vs. yes) significantly modified the associations between TRL-c and the prevalence of hyperuricemia in women (P for interactions = 0.05).

Conclusion: This cross-sectional study shows that TRL-c is positively associated with hyperuricemia in Chinese patients with hypertension, especially in men with higher BMI and women who do not take hypotension drugs.
CI 0.97-1.80, p<0.001) days, total hospitalization $2,461.16 (95% CI 1.12-5.48, p<0.05) compared to White AI patients. Black and API AI patients total hospitalization charge of -$12,664.05 (95% CI -18.874-6,453.32, p<0.001) and $20,911.15 (95% CI $1,389.70 vs $21,230.74, p<0.05) compared to White AI.

Conclusions

In patients admitted with AI, there was no statistically significance in mortality rate, overall adjusted odds of all-cause mortality and total hospitalization charge with the presence of IDA, however the presence of IDA was associated with increased LOS of 1.39 days. Native American AI patients had 2.48 increase in odds of all-cause mortality compared to White AI patients. IDA-AI patients were more females, Black, Medicaid, lower income, and had more cardiovascular comorbidities.

Cannabis Abuse in Paroxysmal Atrial Fibrillation – An Analysis of Patient Demographics and In-Hospital Outcomes

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Introduction

Paroxysmal atrial fibrillation (pAF) is one of the most common arrhythmias causing significant mortality and morbidity in patients. Little is known of the impact cannabis abuse (CA) has on pAF. Our aim was to characterize the patient demographics of pAF patients and investigate the effect of CA on pAF.

Method

This was a retrospective cohort study using the Nationwide Inpatient Sample database to identify admissions in adults with principal and secondary diagnoses of pAF and CA in 2019. Multivariate linear and logistic regression models were adjusted for age, gender, race, household income, insurance status, Elixhauser comorbidity score, hospital location, bed size and teaching status. Primary outcome was all-cause mortality, and secondary outcomes were length of stay (LOS) and total charge in USD.

Results

There were 1,879,275 admissions with pAF, out of which 5,079 patients had CA. Compared to Non-CA-pAF cohort, CA-pAF cohort had fewer females (23.13% vs 48.72%, p<0.001), White (58.76% vs 78.08%, p<0.001), Native American (1.18% vs 0.41%, p<0.001) patients, and more younger (55.95 vs 74.24, p<0.001), lowest household income (<25th percentile) (40.65% vs 26.01%, p<0.001), Black (29.53% vs 9.63%, p<0.001) patients. CA-pAF cohort had more AIDS (1.97% vs 0.26%, p<0.001), alcohol abuse (28.84% vs 3.54%, p<0.001), chronic pulmonary disease (58.78% vs 32.46%, p<0.001), depression (21.46% vs 13.43%, p<0.001), obesity (23.52% vs 20.83%, p<0.05), and less dementia (1.77% vs 10.64%), complicated hypertension (39.57% vs 47.10%, p<0.001), complicated diabetes mellitus (20.77% vs 27.71%, p<0.001), hypothyroidism (9.35% vs 21.09, p<0.001).

CA-pAF cohort had lower all-cause mortality rate (1.08% vs 3.52%, p<0.001), adjusted all-cause mortality OR 0.49 (95% CI 0.25-0.95, p<0.05), LOS -1.04 (95% CI -1.58-0.50, p<0.001), and total hospitalization charge -$8,063.80 (95% CI $-15,865.97-$261.65, p<0.05).

Conclusion

In patients admitted with pAF, the presence of CA was associated with a lower all-cause mortality rate, lower odds of all-cause mortality of approximately 50%, 1 day less in length of stay, and $8,063.80 less in total hospitalization charges. Among pAF patients, CA was present in more males, Black, lower income patients, and these patients had more comorbidities such as AIDS, alcohol abuse, depression, obesity but less dementia, hypertension, diabetes mellitus, and hypothyroidism.

Third Degree Atrioventricular Block in Acute on Chronic Systolic Heart Failure – An Analysis of Patient Demographics and In-Hospital Outcomes

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Introduction

Acute on chronic systolic heart failure (HF) is a common cause of hospitalization and is associated with significant morbidity and mortality. Little is known about the effect of 3rd degree atrioventricular block (AVB) has on HF. Our aim was to characterize the patient demographics of HF patients and investigate the effect of AVB on HF.

Methods

This was a retrospective cohort study using the Nationwide Inpatient Sample database to identify admissions in adults with principal and secondary diagnoses of HF and AVB in 2019. Multivariate linear and logistic regression models were adjusted for age, gender, race, household income, insurance status, Elixhauser comorbidity score, hospital location, bed size and teaching status. Primary outcome was all-cause mortality, and secondary outcomes were length of stay (LOS) and total charge in USD.

Results

Out of 660,245 admissions with HF, 8,065 patients had AVB. Compared to Non-AVB-HF cohort, AVB-HF cohort had fewer females (31.43% vs 35.37%, p<0.01), older (73.28% vs 69.45%, p<0.001), more White (70.86% vs 62.45%, p<0.001), and fewer Black patients (13.76% vs 21.84%, p<0.001), more commonly admitted in large size (61.25% vs 90.53%, p<0.001), urban teaching hospitals (83.32% vs 72.78%, p<0.001) in the Midwest USA (24.05% vs 20.26%, p<0.001), more Medicare (76.50 vs 68.45%, p<0.001), fewer Medicaid insured (7.07% vs 13.54%, p<0.001), and self-pay (2.29% vs 3.35%, p<0.05), more highest household income (>76th percentile) (22.57% vs 16.18%, p<0.001). AVB-HF cohort had less AIDS (0.19% vs 0.71%, p<0.005), alcohol abuse (2.73% vs 4.91%, p<0.001), drug abuse (2.73% vs 6.13%, p<0.001), chronic pulmonary disease (28.95% vs 36.55%, p<0.001), depression (8.62% vs 10.70%, p<0.01), obesity (18.29% vs 21.57%, p<0.01), and more complicated hypertension (52.70% vs 41.46%, p<0.001), and peripheral vascular disease (13.45% vs 11.21%, p<0.01).

Compared to Non-AVB-HF cohort, AVB-HF cohort had higher all-cause mortality rate (8.68% vs 5.55%, p<0.001), all-cause mortality OR 1.27 (95% CI 1.05-1.53, p<0.05), LOS 2.93 (95% CI 2.29-3.56, p<0.001) days, and total hospitalization charge $112,664.90 (95% CI $94,909.85-$130,420.00, p<0.001).

Conclusion

In patients admitted with HF, the presence of AVB was associated with higher all-cause mortality rate of 8.68%, higher all-cause odds of mortality of 27%, increase of 2.93 days in LOS, and increase of $112,664.90 in total hospitalization charge. The presence of AVB was associated with patients that were male, older, White, Medicare insured, and wealthier. The presence of AVB was associated with a lower prevalence of AIDS, alcohol abuse, chronic pulmonary disease, drug abuse, depression, obesity, but higher prevalence of complicated hypertension and peripheral vascular disease.

Successful Use of Treprostinil in a Pediatric Patient with Severe Pulmonary Arterial Hypertension and Small Atrial Septal Defect Who Turned out to be a Positive Response in Acute Vasoreactivity Testing afterwards
Background: Patients diagnosed with pulmonary arterial hypertension (PAH) are usually considered having less severe disease when having positive acute response during acute vasoreactivity testing (AVT). However, there was a PAH patient who was in high risk when coming to our hospital but showed favorable response to vasodilator.

Case: A six-year-old girl was administrated to our wards for an episode of syncope. She had a history of transcatheter small atrial septal defect(3.5mm) closure 2 years ago. At administration, the patient was in WHO-FC III. The blood test showed severe heart dysfunction with elevated BNP of 1309pg/ml, nt-proBNP of 7626pg/ml. Echocardiography showed extreme enlarged right ventricle (Figure1), the peak tricuspid regurgitant velocity was 4.21m/s and Tricuspid annular plane systolic excursion (TAPSE) was 11mm. We also performed other blood test and CT scan to exclude other etiologies.

Decision-making: After excluding left heart disease, the patient initiated Treprostinil therapy combined with Bosentan in addition to milrinone and diuretics. Treprostinil was initiated at 3.75 ng/kg*min and up-titrated to 17.5ng/kg*min. After 9 days treatment, BNP decreased to 305pg/ml, nt-proBNP decreased to 1246pg/ml. Echocardiography demonstrated significantly decreased right ventricle and increased left ventricle (Figure2). Peak tricuspid regurgitant velocity decreased to 2.9m/s and TAPSE increased to 22mm. Then the patient received right heart catheterization under local anesthesia. The result showed a positive response to AVT. At baseline, pulmonary artery pressure was 77/39(52) mmHg, aortic pressure was 108/72(91) mmHg and pulmonary vascular resistance index (PVRI) was 13.3 WU*m2. After inhaling iloprost, pulmonary artery pressure increased to 34/7(14) mmHg, aortic pressure increased to 106/73(90) mmHg and PVRI decreased to 1.94 WU*m2. Afterwards, the patient stopped Treprostinil gradually and started nifedipine therapy.

Conclusion: We presented a case of severe PAH who showed favorable response to Treprostinil therapy and AVT was positive. It suggests that for the PAH patients in high risk, Treprostinil therapy should be initiated as soon as possible without RHC examination when exclude the condition where PAH targeted medications cannot be used.
Q4 (TCBI ≥ 2399), the participants in group Q3 (TCBI ≥ 1476–2399), group Q2 (TCBI ≥ 920–1476), and Q1 (TCBI < 920) increased the prevalence of stroke by 42% (OR 1.42, 95% CI: 1.13, 1.78), 39% (OR 1.39, 95% CI: 1.08, 1.80) and 63% (OR 1.63, 95% CI: 1.20, 2.20), respectively. Subgroup analysis showed that there was an interaction between age and TCBI and stroke (P for interaction < 0.001).

Conclusion: We found an independent negative association between TCBI and the prevalence of stroke, especially in hypertensive patients under 60 years old.

39 Impact of StentBoost Guidance During Percutaneous Coronary Intervention on Stent Underexpansion: An OCT Study

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Background: StentBoost imaging (SB) has been developed to improve the visibility of coronary stents. The effect of this technique on stent expansion, however, is unknown. The purpose of this study was to compare stent expansion guided by SB to angiography alone during percutaneous coronary intervention as measured by optical coherence tomography (OCT).

Methods: This is a prospective, randomized, controlled trial. 114 patients undergoing drug-eluting stent (DES) implantation were randomly assigned to SB guidance group (N = 57) or non-SB guidance group (N = 57). OCT was performed after the procedure immediately. The primary end point was stent underexpansion at lesion level. Stent underexpansion was defined as stent expansion index < 0.80.

Results: 67 lesions in SB group (N = 57) and 73 lesions in non-SB group (N = 57) were implanted with DES. All the lesions were included in the final analysis. No difference in stent underexpansion at lesion level was found between the two groups (SB group vs, non-SB group: 64% vs. 68%, P = 0.589). However, SB guidance was associated with higher minimum stent diameter (MSD) and minimum stent area (MSA) after the procedure immediately when compared with non-SB guidance (MSD: 2.87±0.42 mm vs. 2.56±0.44 mm, P < 0.001; MSA: 7.55±2.37 mm2 vs. 6.35±2.30 mm2, P = 0.003).

Conclusion: Compared with DES implantation guided by angiography alone, SB guidance can improve the MSD and MSA after the procedure immediately, but no difference was found in stent underexpansion.

40 LMK235 Ameliorates Ventricular Remodelling Post-Mycardial Infarction by Suppressing LSD1-Related Pathway in Both Macrophages and Cardiac Fibroblasts

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Background: Following myocardial infarction (MI), macrophages are polarized to proinflammatory phenotype and cardiac fibroblasts differentiate into myofibroblasts, propelling ventricular remodelling. Histone deacetylase 5 (HDAC5) is an isof orm of class IIa HDACs, and LMK235 is an HDAC inhibitor with higher selectivity for HDAC5. Here, we aimed to explore the expression and subcellular localization of HDAC5, and determine the mechanisms underlying the impact of LMK235 on ventricular remodelling post-MI.

Methods: The MI model was established by left anterior descending branch (LAD) ligation of male SD rats, inflammatory macrophage polarization was induced by lipopolysaccharide (LPS) stimulation in RAW264.7 cell line, and cardiac fibroblast activation was induced by transforming growth factor-β1 (TGF-β1) stimulation in primary mouse cardiac fibroblasts (MCFs). To determine the expression and subcellular localization of HDAC5, noninfarct and infarct heart tissue at 7/14/21 days post-MI were collected to perform western blot and immunofluorescence, so did RAW264.7 and MCFs. To determine the mechanisms underlying the impact of LMK235 on ventricular remodelling post-MI, male SD rats were allocated into four groups: Sham, Sham+LMK235, MI and MI+LMK235. LMK235 or vehicle was intraperitoneally injected daily for 3 weeks. Cardiac inflammation was evaluated by HE staining and inflammatory biomarker expression, cardiac fibrosis was evaluated by Masson’ Trichrome staining and fibrotic biomarker expression. Furthermore, we applied western blot, immunofluorescence, wound healing assay and transwell assay to explore the effect of LMK235 on inflammatory macrophage polarization and cardiac fibroblast activation.

Results: 1) HDAC5 is upregulated and underwent phosphorylation-dependent nuclear export in the border zone post-MI

2. LMK235 ameliorated chronic inflammation, interstitial fibrosis in the border zone post-MI, which improved left ventricular dysfunction

3. LMK235 inhibited upregulation of LSD1 in the border zone post-MI

4. In RAW264.7, HDAC5 was dephosphorylated and imported into nucleus in response to LPS stimulation, LMK235 suppressed LPS-induced inflammatory macrophage polarization by inhibiting LSD1-NF-κB pathway activation

5. In MCFs, TGF-β1 induced phosphorylation-dependent nuclear export of HDAC5, LMK235 suppressed TGF-β1 induced cardiac fibroblast migration and myofibroblast transformation by inhibiting LSD1-NF-κB pathway activation

Conclusion: 1) HDAC5 undergoes phosphorylation-dependent nuclear export in infarct hearts and activated myofibroblasts; while HDAC5 was dephosphorylated and imported into nucleus in inflammatory macrophage polarization

2) LMK235 can attenuate chronic inflammation and interstitial fibrosis post-MI by inhibiting LSD1 expression, which improved cardiac function

3) the anti-inflammatory effect of LMK235 results from inhibition of LSD1-NF-κB pathway in macrophages, and the anti-fibrotic effect of LMK235 results from inhibition of LSD1-NF-κB pathway in cardiac fibroblasts

41 Risk Factors for Clinical Deterioration in Patients with Severe IPAH and Postoperative PAH Based on Cardiac Functional Assessment

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Background: Pulmonary vascular changes in postoperative pulmonary artery hypertension (PAH) are similar to those seen in idiopathic PAH (IPAH). The imaging of ventricular function in these two high-risk populations remains incompletely understood.

Methods: Patients with severe IPAH or postoperative-PAH referred to a large tertiary hospital between May 2018 and December 2021 were prospectively evaluated. Cardiac magnetic resonance (CMR) feature tracking was applied. For the LV free walls, interventricular septum and RV free walls, the time to peak (Tpeak) of radial, circumferential, longitudinal shortening (strain) were calculated. Each of them underw ent baseline clinical, hemodynamic, and follow-up. All patients have completed right heart catheterization (RHC), echocardiography and CMR within 7 days. The endpoint was the deterioration of 6MWD.
Results: 32 patients were studied, including 18 IPAH patients and 14 patients with postoperative PAH, with a median age of 21.7±7.8 and 24.2±8.7 years, respectively. PAH-specific drugs were used in 83% of IPAH patients and 79% postoperative PAH patients (p=0.127). Patients with IPAH had a shorter 6-minute walk distance and higher B-type natriuretic peptide levels than those with postoperative PAH at diagnosis (both p<0.001) (Table1). During a median follow-up time of 12.1 (interquartile range: 10.0, 37.9) months, 11 patients (34%) showed decreased 6MWD at last follow up time. The cardiac functional deterioration in the two high-risk populations was significantly different in S/D ration, RA area and RA/LA ratio in echocardiography (all p<0.05). No significant statistical difference was shown in TAPSE and S’.

Baseline mean pulmonary arterial pressure and pulmonary vascular resistance was higher in postoperative PAH patients compared with IPAH patients (p<0.001); while postoperative PAH patients had some degree response to acute vasodilator testing during RHC. There was no significant difference in the right ventricular function index between the two groups of patients but LVEDV, LVSV and LVCO were lower in IPAH patients (all p<0.05). There were significant differences in ventricular strain between the two cohorts. Patients with decreased 6MWD had lower peak strain (figure1).

Conclusions: The cardiac function status of these two cohorts is different. Comprehensive multimodality imaging assessment of cardiac function facilitates early identification of patients with clinical deterioration. For PAH patients, not only the right ventricle function should be concerned, but also the mutual influence of the left and right ventricle is of great significance.

Left and Right, United to Survive

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Background:
We are presenting a case of mRNA-based COVID-19 vaccine-associated fulminant myocarditis with biventricular failure supported by biventricular Impella (BiPella) approach. It was the first BiPella case in the Asia-Pacific region.

Case:
A 38-year-old lady with good past health had received her first dose of mRNA-based COVID-19 vaccine. After 2 weeks, she presented to a regional hospital for progressive exertional dyspnea since vaccination, together with intermittent low grade fever and chest discomfort. Bedside echocardiogram on admission showed mild hypokinesia of anterolateral wall of LV but otherwise good LV and RV systolic function. Cardiac MRI 2 days later showed mildly impaired biventricular ejection fractions and findings suggestive of acute myocarditis. She developed progressive pulmonary edema with type 1 respiratory failure and cardiogenic shock, and was put on CPAP, noradrenaline infusion and IABP support 2 days after MRI. Repeated bedside echocardiogram showed LV ejection fraction deteriorated to 15-20% only, and RV systolic function was also interrvaly impaired. She was transferred to our hospital for further management. She was taken to our catheterization laboratory with coronary angiogram and cardiac catheterization done, and then escalated to Impella CP on-table for LV support in view of worsening hypotension. Endomyocardial biopsy was performed. Her cardiac output and pulmonary artery pulsatility index (PAPI) remained depressed despite LV support by Impella CP, so another Impella RP was inserted for RV support as well, with improvement in hemodynamics. She was also given anti-
inflammatory therapy and gradually recovered, with both Impella devices removed. Biopsy showed lymphocytic myocarditis and etiological workup to exclude non-vaccine causes was overall unremarkable. She had a favorable recovery and was discharged at ambulatory state. Her follow-up echocardiogram and cardiac MRI imaging showed recovery of biventricular function.

Decision-making:
The main discussion point in this case is the hemodynamic evaluation and decision-making process on the choices of mechanical circulatory support in acute biventricular failure from fulminant myocarditis, especially the BiPella approach will be introduced and compared with other supportive strategies for applications and limitations. The diagnostic evaluation and management process of mRNA vaccine-associated myocarditis would also be discussed.

Conclusion:
Recognition of mRNA-based COVID-19 vaccine-associated fulminant myocarditis with biventricular failure, with biventricular support by BiPella approach, is feasible and safe with potential of favorable recovery.

45 Perioperative Outcomes of Anomalous Left Coronary Artery from the Pulmonary Artery in the Contemporary Era

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Background: Anomalous left coronary artery from the pulmonary artery (ALCAPA) is a rare congenital cardiac anomaly with limited data on its perioperative outcomes in the contemporary era.

Methods: We conducted a retrospective review of 130 patients who underwent surgical repair of ALCAPA with coronary reimplantation technique between 2013 and 2021 at Shanghai Children’s Medical Center. Patients were categorized into two groups (Era 1, 2013–2017; Era 2, 2018–2021). Major adverse cardiovascular events (MACE) were defined as the occurrence of postoperative mechanical circulatory support (MCS), cardiopulmonary resuscitation or hospital mortality. Risk factors for MACE were identified using multivariable logistic regression analysis.

Results: Median age at repair was 7 months (interquartile range, 4 months – 1.7 years), and mean preoperative left ventricular ejection fraction (LVEF) was 49.3% ± 17.1%. Seventy-five patients (58%) were in Era 1, and 55 patients (42%) in Era 2. Two groups of patients showed no difference in preoperative characteristics such as age and weight at repair, preoperative LVEF, and degree of mitral regurgitation. Concomitant mitral intervention was required in 62 patients (48%). Cardiopulmonary bypass time and aortic crossclamping time were similar between two groups. MACE occurred in 27 patients (21%). Preoperative LVEF was the only risk factor for MACE (odds ratio, 0.92; 95% confidence interval, 0.882–0.996; P = 0.001). MCS was used in 21 patients (16%), 13 with left ventricular assist device and 8 with extracorporeal membrane oxygenation. MCS survival rate greatly improved from 60% in Era 1 to 100% in Era 2, although with no significant difference (P = 0.123). Hospital mortality decreased significantly from Era 1 to Era 2 (15% versus 2%, P = 0.012).

Conclusions: Surgical outcomes of ALCAPA has improved significantly in the most recent years. Patients with low preoperative LVEF is associated with MACE after surgery, but could be successfully salvaged with MCS.

46 Early Renal Dysfunction Predicts Incident Heart Failure and Cardiovascular Death in Middle-Aged Adults: Clinical Implications for Early Detection

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BACKGROUND: Limited data is available on the role of mild renal dysfunction in incident heart failure and cardiovascular death in middle-aged adults.

METHODS: We studied 5699 subjects in the HKU Theme-Based Research Cohort (mean age 62.5±12.3 years, 60.9% men). Incident combined Cardiovascular (CV) endpoints including composite of myocardial infarction, acute coronary syndrome, ischemic stroke, congestive heart failure, peripheral artery disease, and cardiovascular death were prospectively studied. Baseline estimated glomerular filtration rate (eGFR) was derived using the Cockcroft-Gault Equation.

RESULTS: Over mean follow-up duration of 58±28 months, 642 combined CV endpoints developed (11.3%). Using Receiver-Operator Characteristics (ROC) curve analyses, baseline eGFR robustly predicted incident combined CV endpoints (C-statistic=0.74, P<0.001, Figure). Adjusted for potential confounders, multivariable Cox proportional hazards regression model showed that impaired eGFR by all stages was independently predictive of incident combined CV endpoints, with dose-response relationship (Stage 2: HR=1.7 [95%CI: 1.2-2.5], P=0.003; Stage 3a: HR=2.7 [95%CI: 1.8-4.1], P<0.001; Stage 3b: HR=4.0 [95%CI: 2.6-6.2], P<0.001; Stage 4: HR=7.6 [95%CI: 4.7-12.3], P<0.001; Stage 5: HR=8.1 [95%CI: 4.6-14.4], P<0.001, Stage 1 as referent). K-S Statistics showed maximum K-S metric at eGFR cut-off =63.5mL/min/1.73m2, with corresponding sensitivity=63.9% and specificity=73.4%.

CONCLUSIONS: Renal dysfunction, even in the early stages, predicts increased adverse CV events incorporating heart failure and cardiovascular death.

47 Differences in RNAs and Proteins Account for Different Patency in Arterial Grafts in Coronary Surgery

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Background: Patency of arterial grafts is a major determinant of long-term outcome in coronary surgery. However, the underlying molecular mechanisms differentiating patency are unknown.

Methods: A total of 120 patients undergoing coronary artery bypass grafting were recruited. Grafts were harvested at baseline, 3 months, 6 months, 1 year, and 5 years post-surgery. Gene expression was assessed using microarray analysis, and protein expression was measured using western blotting.

Results: Microarray analysis identified 1192 differentially expressed genes (DEGs) across the different time points. Western blotting confirmed the expression of 10 key DEGs in the grafts. The DEGs were significantly associated with both mRNA and protein expression (P<0.05).

Conclusions: These findings highlight the importance of assessing both mRNA and protein levels in evaluating graft patency, and provide a potential molecular basis for improving graft survival in coronary surgery.
Objectives: Autologous arteries (internal mammary artery [IMA] and radial artery [RA]) were usually used as grafts in coronary artery bypass grafting (CABG) surgery. The molecular mechanism for the difference in long-term patency affecting the survival is unclear although clinically important. The present study was designed to reveal the possible differences between IMA and RA at the RNA and protein level by using multi-omics approaches.

Methods: The discarded vascular segments of the human IMA and RA (n=48) from the CABG patients simultaneously receiving these two vessels were studied using transcriptomics and proteomics to reveal the similarities and differences. The discovered differential mRNAs/proteins were validated in samples from new cohort of patients.

Results: In transcriptomics studies, we finally identified 71,991 and 73,593 RNAs (mRNA, lncRNA, and circRNA) in IMA and RA. Further, 1,226 (739 mRNAs, 220 lncRNAs, and 267 circRNAs) were identified as differentially expressed (DE) RNAs. Similarly, total of 124,244 spectra, 12,547 peptides, 12,065 unique peptides, corresponding to 3,096 proteins were identified in proteomic studies. Of these proteins, 2.3% (71 of 3,096, 31 up-regulated and 40 down-regulated) were screened as differentially expressed proteins (DEPs). Pathways analysis showed that there were significant differences in 6 pathways (such as carbon metabolism). Comprehensive correlation analysis showed that 93.8% (2,903 of 3,096) proteins could be mapped to RNAs. Among the DE mRNAs and proteins, ITA8 and AL1A1 were enriched into regulation of actin cytoskeleton, retinol metabolism, and ECM-PI3K-Akt pathways, which were related to stenosis, angiogenesis, and atherosclerosis, likely accounting for the differences in long-term patency.

Conclusions: Using correlation analysis, we found that a larger number of RNAs and proteins accounting for the differences in the long-term patency as biological basis between IMA and RA. This discovery forms a new therapeutic target for improving the long-term results of CABG using IMA and RA.

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48 Novel Genetic Variants of FOXC1 in Familial and Sporadic Atrial Septal Defect and Functional Validation

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Background: Atrial septal defect (ASD) is one of the most common congenital heart defects. Genetic defects play important roles in the pathogenesis of ASD but are complex and unclear. Methods: In Stage I, in a family with 30 members, whole exome sequencing was performed in 4 ASD patients and the identified genetic variants were screened in the rest of the family members. In Stage II, 335 unrelated sporadic and isolated ASD patients were enrolled to test whether the genetic variants were involved in these patients. In Stage III, biological functions of the variants were elucidated at the cellular level and the CRISPR/Cas9 was used to construct variant-specific mutant mice in order to observe the abnormality of the heart structure.

Results: A novel heterozygous missense variant, FOXC1 c.518G>A (p.R173H) was identified in the ASD family by whole exome sequencing. Subsequently, other 4 heterozygous variants in FOXC1, including 2 novel deletion/missense variants: c.556-558delAAG (p.K186del) and c.559G>A (p.D187N) were identified in unrelated 335 sporadic ASD patients. In dual-luciferase reporter assay, the transcriptional activity of R173H decreased to almost 30% of the wild-type. In the Foxc1 R173H site-specific mutant mice, the interatrial septum became very thin in tissue slices of the heart that was similar to the echocardiographic finding in the above family members.

Conclusion: Variants in FOXC1 likely cause cardiac anomaly, particularly ASD. These findings provide a new insight into genetic mechanisms and counseling of familial and sporadic ASD.

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49 Genetic Variants of CITED2 Gene Promoter Region in Human Atrial Septal Defects and the Pathological Role

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Objectives: Atrial septal defect (ASD) is one of the most common congenital heart defects. Genetic variants in the coding region of the CITED2 gene is known to be significantly correlated with cardiac malformations, but variants of the CITED2 promoter region and its relationship with the formation of ASD are still unclear. We hypothesize that the variants of the CITED2 promoter may be related to pathogenesis of ASD. The purpose of this study was to screen variants in the promoter region of the CITED2 gene and to verify the effect of the variants on gene expression at the cellular level.

Methods: This study investigated variants in the promoter region of the CITED2 gene in blood samples of 332 ASD patients and 293 unrelated healthy children. The total DNA of all subjects was extracted, and the CITED2 promoter variants were detected by PCR combined with Sanger sequencing. The luciferase activity of the CITED2 promoter was measured by a dual luciferase reporter at the cellular level. Electrophoretic mobility change assay (EMSA) and Bioinformatics analysis were used to test the effect of CITED2 promoter changes on transcription factor binding sites.

Results: Four variants in the promoter region of the CITED2 gene were found only in the ASD patients with zero occurrence in the control subjects [1 case of g.4078A>C(rs1165649373), 1 case of g.4240C>A(rs1235857801), 4 cases of g.4935C>T(rs111470468), 2 cases of g.5027C>T(rs112831934)]. The cellular functional analysis showed that these four variants significantly changed the transcriptional activity of the CITED2 gene promoter in HEK-293 cells (P<0.05). EMSA results and database analysis showed that these variants created or destroyed a series of possible transcription factor binding sites, resulting in changes of the expression of CITED2 protein.
Conclusion: The variants of CITED2 promoter sequence in ASD patients affect transcriptional activity and are likely involved in the occurrence and development of ASD. These findings may provide new perspectives on the molecular pathogenesis and potential therapeutic insights of ASD patients.

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50 Analysis of Genetic Variants of the MYH6 Gene Promoter in Congenital Ventricular Septal Defects

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Objectives: Congenital heart disease (CHD) is the most common disease of human birth defects. It is known that ventricular septal defect (VSD) is the most common form of CHDs, accounting for 30-40% of all CHDs. Genetic variants in the coding region of the MYH6 gene are known to be significantly associated with cardiac malformations, but the variants in the MYH6 gene promoter region and their relationship to VSD formation are unknown. In this study, we aimed to screen for variants in the promoter region of the MYH6 gene and to verify the effect of these variants on gene expression at the cellular level.

Methods: In 604 subjects (311 isolated and sporadic VSD patients: 293 healthy controls), DNA from all subjects was extracted and MYH6 gene promoter variants were screened by Sanger sequencing. Luciferase activity of the MYH6 promoter was detected by a dual luciferase reporter at the cellular level. Electrophoretic mobility shift assay and bioinformatics analysis were used to detect the effects of MYH6 gene promoter variants on transcription factor binding sites and protein-protein interactions.

Results: In the MYH6 gene promoter, nine variants were identified by sequencing in VSD patients and controls, of which two variants [g.4085C>G (rs1222539675) and g.4716C>T (rs377648095)] were unique in VSD patients. Cellular function experiments showed that these two variants reduced the transcriptional activity of the MYH6 gene promoter (p<0.001). Further analysis of the online JASPAR database suggests that these variants may alter a set of putative transcription factor binding sites that may lead to changes in myosin subunit expression and VSD formation.

Conclusions: Our study identifies variants in the promoter region of the MYH6 gene in Chinese patients with isolated and sporadic VSD. These variants significantly reduced MYH6 gene expression and affected transcription factor binding sites, which may lead to VSD. Therefore, the present study may provide new understanding of the role of the MYH6 gene promoter region to better understand the genetic basis of VSD formation.

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51 Carotid Artery Stenting Prior to Coronary Artery Bypass Grafting in Patients with Concomitant Carotid and Coronary Artery Disease

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Background: It is not uncommon for patients suffering from concomitant coronary artery and carotid artery atherosclerosis. Presence of carotid stenosis increases peri-operative stroke risk. Mortality among patients who develop neurological complication following coronary artery bypass grafting has been reported up to 25%. Despite the availability of carotid endarterectomy and carotid artery stenting, the optimal mode and timing of carotid intervention in this setting remains controversial. Data among Chinese population is scarce. This study aimed to describe the feasibility and safety outcomes of carotid stenting prior to CAGB in a single center.

Methods: This was a retrospective registry-based study. Baseline characteristics and outcome measures were retrieved from the electronic records of Clinical Management System. The primary outcome was 30-day mortality. Other endpoints included ischemic stroke, intracerebral hemorrhage, acute coronary syndrome and non-cerebral bleeding.

Results: From January 2010 to June 2021, there were 48 patients referred to our unit for carotid artery stenting prior to CAGB. The median duration of follow-up was 81 months. The mean age was 69 years old with male predominance (83%). Hypertension, diabetes, hyperlipidemia were frequently observed in this cohort. All had carotid stenosis greater than 70%. Eleven patients (23%) had bilateral carotid stenosis while eight patients (16%) had symptomatic carotid stenosis. More than half of the cohort had history of acute coronary syndrome with 48% having left main disease and 96% with triple vessel disease. The median LVEF was 55%. Technical success of carotid artery stenting was achieved over 90%. Median duration of hospital stay was 7 days. The 30-day mortality was 8%. The 30-day risks of acute coronary syndrome, ischemic stroke, intracerebral hemorrhage were 12%, 8% and 4% respectively. Of the 4 patients who developed ischemic stroke within 30 days of carotid stenting, two developed ipsilateral stroke. Five more patients (10%) in the cohort developed ischemic stroke beyond 30 days with one of them occurring day 6 post-CABG.

Conclusion: Carotid artery stenting is not without risks, in particular among high-risk patients with concurrent carotid artery and coronary artery diseases. Patients may still develop stroke after carotid artery stenting. It should be reserved for patients with symptomatic carotid stenosis.

52 Effect of Hydrogen Sulfide in Cardioplegia on Myocardial Protection

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Background: Cardioplegic protection of myocardium during cardiac surgery is a key issue. This study aimed to investigate the effect of
hydrogen sulfide (H2S) added in cardioplegia on protection of myocardium.

Methods: Isolated Wistar rat hearts were perfused with Langendorff devices, after stabilization, cold ischemia for 120 min and reperfusion for 90 min. 60 rats were randomly divided into 5 groups: control, I/R, St. Thomas cardioplegia (I/R+S), St. Thomas plus H2S donor NaHS (I/R+S+H), St. Thomas plus NaHS and glibenclamide (an antagonist of H2S; I/R+S+H). The indices of left ventricular systolic pressure (LVSP), left ventricular end diastolic pressure (LVEDP), left ventricular developed pressure (LVDP), heart rate, and changes in heart rhythm were compared among different groups. Western blot was used to detect the changes of relevant myocardial enzymes among the groups.

Results: After reperfusion, I/R+S+H treatment significantly improved cardiac function (LVSP, LVEDP, and LVDP) compared to other groups (p<0.05), although no significant differences on heart rate were observed. Although normal rhythm was restored in all groups at the end of reperfusion, the incidence of ventricular arrhythmias was significantly lower in the I/R+S+H group than in the I/R group and I/R+S group. Further, the expression of relevant myocardial enzymes in the I/R+S+H group was significantly lower than that in the I/R group and I/R+S group (p<0.05).

Conclusions: Addition of H2S in St. Thomas cardioplegia significantly protects myocardium against global I/R injury and reduces arrhythmias. Therefore, H2S may be added in cardioplegic solutions to gain better myocardial protection in cardiac surgery.

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Potential Benefit in Cardiovascular Outcomes from Optical Coherence Tomography-Guided Percutaneous Coronary Intervention in STEMI Patients

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Background: The aim of this study was to assess 1-year cardiovascular outcomes of percutaneous coronary intervention (PCI) guided by optical coherence tomography (OCT) in patients with ST segment elevation myocardial infarction (STEMI).

Methods: Patients with STEMI undergoing PCI from February 2009 to December 2016 were identified. Data was divided into OCT-era before and non-OCT era after 2013. The choice of imaging modality (OCT or angiography only) was at the discretion of the operator. Primary endpoint was myocardial infarction (MI), all-cause mortality, and major adverse cardiac events (MACE) defined as a composite of death, MI, target vessel revascularization (TVR), and stent thrombosis (ST) at 1-year. Crude person-time rates were compared between OCT-era and non-OCT era to evaluate the impact of addition of OCT imaging on overall outcomes. Subsequent comparison was conducted between OCT and angiography-only in OCT era. Subgroup analysis was performed to test heterogeneity of effect across type of stent (BMS, DES, and balloon). Secondary outcomes included independent factors predicting utilization of OCT guidance derived from logistic binary regression.

Results: In total, 797 patients (mean age 62.1±11.3, 82.6% male) with STEMI were enrolled in this study, consisting of primary PCI (18.8%, n=184), post-thrombolysis or delayed PCI (81.2%, n=79). Patients who suffered cardiogenic shock (n=51) were excluded, leaving 928 patients in final analysis. 476 patients were classified into OCT-era group, whilst 452 patients non-OCT era group. OCT was utilized in 59.7% (n=284) patients in the OCT-era group. The emergence of OCT was associated with significant reduction in MI (incidence rate ratio (IRR) of 0.21(0.03-0.57), p<0.05), although no significant differences on heart rate were observed. Although normal rhythm was restored in all groups at the end of reperfusion, the incidence of ventricular arrhythmias was significantly lower in the I/R+S+H group than in the I/R group and I/R+S group. Further, the expression of relevant myocardial enzymes in the I/R+S+H group was significantly lower than that in the I/R group and I/R+S group (p<0.05).

Conclusions: Addition of H2S in St. Thomas cardioplegia significantly protects myocardium against global I/R injury and reduces arrhythmias. Therefore, H2S may be added in cardioplegic solutions to gain better myocardial protection in cardiac surgery.

Supported by National Natural Science Foundation of China [82170353 & 81870288]; the Non-profit Central Research Institute Fund of Chinese Academy of Medical Sciences [2020-PT310-007]; TEDA International Cardiovascular Hospital Internal Grant (2021-TD-006)

Table. Incidence rates and incidence rate ratio of cardiovascular outcomes

<table>
<thead>
<tr>
<th>Group</th>
<th>MACE</th>
<th>MI</th>
<th>All-cause mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCT-era</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>I/R</td>
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<td>0.84</td>
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<td>I/R+S</td>
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<td>0.30</td>
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<td>I/R+S+H</td>
<td>0.01</td>
<td>0.22</td>
<td>0.80</td>
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</table>

Comparison of OCT-era and non-OCT-era: I/R vs. I/R+S, p=0.05; I/R+S vs. I/R+S+H, p=0.05; I/R+S+H vs. non-OCT-era, p=0.05

55 Timing of Initiation of Sodium-Glucose Co-Transporter 2 Inhibitor in Patients with Diabetes and Chronic Cardiac Failure

Dr. Wen Sun, Prof Bryan PY Yan

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Background: Sodium-glucose co-transporter 2 (SGLT2) inhibitors reduce the risk of first hospitalization for heart failure (HHF) in patients with type 2 diabetes. We aimed to evaluate the impact of early initiation of SGLT2 inhibitors on recurrent HHF in diabetic patients with chronic cardiac failure.

Methods: We retrospectively analyzed 1,363 consecutive diabetic patients with chronic cardiac failure with index HHF between August 2015 and August 2020 in 16 public hospitals in Hong Kong who were prescribed SGLT2i (empagliflozin−1,009, 74% and dapagliflozin−354, 26%). Patients who initiated SGLT2i at discharge of index HHF were compared to those who were not. Risk of recurrent HHF was compared, using adjusted sub-distribution hazard ratios (aSHR) derived from Fine and Gray regression models, accounting for death as competing risk, adjusting for age, gender, concurrent medications. Comparisons were also conducted between initiation of SGLT2i ≤ 30 vs. >30 days; and ≤90 vs. > 90 days after discharge.

Results: Out of 1,363 patients (mean age 63.9±11.6, female 34.6%), 85% had no history of previous HHF at enrollment, 11.9% had up to 2 and 3.1% >3 HHF in the past 5 years. SGLT2i was initiated in 37.4% of patients at discharge of index HHF and the median time from index HHF to SGLT2i initiation for the other patients was 4.2 (IQR: 0-20.4) months. During a median follow-up of 1.3 (IQR: 0.2-2.7) years, initiation of SGLT2i at discharge was associated with lower risk of recurrent HHF (aSHR = 0.79, 95% CI: 0.68-0.92). Similar effect was observed between SGLT2i initiation ≤ 30 vs. >30 days (aSHR = 0.82, 95% CI: 0.70-0.95) but not between ≤90 vs. > 90 days (P=0.19).

Conclusion: Among patients with diabetes and chronic cardiac failure, the risk of recurrent HHF was reduced when SGLT2 was initiated early after index HHF.
Dilated Ventricles and Biventricular Dysfunction with Small Ventricular Septal Defect and Severe Mitral Regurgitation—Bystander, Consequence or Culprit?

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Background
The mechanism of heart failure (HF) and mitral regurgitation (MR) can sometimes be difficult to ascertain on echocardiogram especially when multiple pathologies are present. This is a case of concomitant severe MR, perimembranous SD (pmVSD) and dilated ventricles with biventricular failure where MRI aided the diagnostic and treatment decision process.

Case
A 37 year old man, a chronic drinker and smoker, with a small pmVSD presented with 1 week of shortness of breath and pitting edema to thighs.

6 years ago, when he was lost to follow up, he was able to walk up 7 floors. Echocardiogram showed normal biventricular size and function with a pmVSD with aneurysm and a 3.9mm left to right jet.

In this admission, chest X ray showed pulmonary congestion. Echocardiogram showed dilated ventricles with globally impaired biventricular systolic functions (LVEF 26%). There was possible anterolateral commissural prolapse with eccentric severe MR. The pmVSD was unchanged with a left to right jet. RVSP was 48mmHg.

There was no evidence of infection with normal white cell count, C reactive protein and negative blood cultures. HF medications were optimised alongside diuretics with symptom improvement.

Decision-making
At this juncture, discussion with cardiothoracic surgeon concluded that further work up was required before mitral intervention. Cardiac catheterisation revealed normal coronaries and showed Qp:Qs of 1. Pulmonary hypertension due to left heart disease was revealed with mPAP 33mmHg, PCWP 24mmHg and PVR 2.33 WU.

MRI heart confirmed dilated ventricles with global hypokinesia with LVEF 29% and RVEF 24%. There was significant eccentric MR with high regurgitation fraction 52%. A small septal aneurysm was noted in the membranous interventricular septum. There was mild diffuse increase in T1 signal. There were small focii of late gadolinium enhancement in the inferior septum at the RV insertion point level in the mid to basal LV.

One month later, he remained with NYHA class 2 symptoms and subsequently underwent MV repair and VSD closure. Intraoperative findings confirmed a small 5mm pmVSD prolapsed P1 and anterolateral commissure and dilated mitral annulus.

Post-op echocardiogram showed LVEF 40% with normal chamber sizes and normal RV function with mild MR and tricuspid regurgitation with RVSP 35mmHg.

Conclusion
Within the heart team, there were different views towards the mechanism of HF, the mechanism and severity of MR as it was eccentric and the importance of pmVSD. MRI was able to provide additional information to guide decision to MR and VSD intervention.

Real-World Coronary Lithotripsy Utilisation in an Asian Population: Cracking Insights from Intravascular Imaging

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Background:
Stent under-expansion can be predicted by optical coherence tomography (OCT) and intravascular imaging (IVUS)-based scoring system in calcified plaque. We describe the intravascular imaging findings and short-term outcomes of patients treated with intravascular lithotripsy (IVL) during percutaneous coronary intervention (PCI) in a real-world Asian cohort.

Methods:
Retrospective single-centre study of patients treated with IVL between July 2019 and March 2022. Lesions assessed by OCT or optical frequency domain imaging (OFDI) were scored as maximum angle >180° (2 points), maximum thickness >0.5mm (1 point) and length >5mm (1 point). Lesions assessed by IVUS were scored as calcium in >270° in >5mm (1 point), 360° calcium (1 point), calcified nodule (1 point) and vessel diameter <3.5mm (1 point). Risk of stent under-expansion was defined as an OCT or IVUS score of 4 and ≥2, respectively. Primary efficacy endpoint was procedural success without in-hospital major adverse cardiovascular events (MACE; cardiovascular death, myocardial infarction, target vessel revascularisation) and safety endpoint was freedom from MACE at 30 days.

Results:
Sixty-four patients (mean age 71.1±8.8 years, 73.4% men) with 66 lesions were treated with IVL. Diabetes and chronic kidney disease (CKD, estimated glomerular filtration rate <60ml/min/1.73m²) were present in 60.9% and 39.1% of patients, respectively. Five patients (7.8%) had end-stage kidney disease on long-term dialysis. 92.4% (n=61) of lesions were de-novo and 7.6% (n=5) were calcified in-stent restenosis. PCI were guided by intravascular imaging in 95.5% of cases (n=45 OCT/OFDI, n=18 IVUS) and 4.5% were guided by angiography alone.

Twenty-two lesions (48.9%) assessed by OCT/OFDI had concentric 360° calcium, and 41 (91.1%) had a calcium score of 4. The mean maximum thickness was 0.93±0.16mm, with no significant differences between eccentric and concentric lesions. Fifteen lesions (83.3%) assessed by IVUS had concentric 360° calcium, and 14 (77.8%) had a calcium score ≥2. Primary efficacy and safety endpoint of 30-day freedom from MACE were both 95.3%, driven by 3 (4.7%) in-hospital cardiovascular deaths.

Conclusion:
In this real-world cohort, a significant proportion of lesions requiring calcium modification with IVL had OCT or IVUS-based scores which identified them as high risk for stent under-expansion. Despite this, IVL is shown to be safe and effective in short-term follow-up.
Immediate Cardiac Life Support Course in a Hospital in which Cardiopulmonary Resuscitations are Rarely Undertaken

Kichiro Murase 1, Azusa Shimokawa 1, Kazue Takahashi 1, Eriko Inagaki 2, Osamu Ito 3

Background: Our hospital focuses on patients with complicated medical needs and longer admission days but who no longer require intensive care or extensive diagnostic procedures. Most of the in-patients are elderly or in advanced stage, or have dementia. “Do not attempt resuscitation” order is provided in many patients. Therefore, cases that need cardiopulmonary resuscitation (CPR) are rare. Reviewing CPR cases, we realized that we should be more prepared to CPR, and planned training according to the Immediate Cardiac Life Support (ICLS) course, which was launched by Japanese Association for Acute Medicine in 2002.

Methods: The contents of the course are shown in table 1. This course is one-day resuscitation course and teaches healthcare professionals the essential skills and team dynamics required to manage a patient in cardiac arrest for 10 minutes before the arrival of a cardiovascular team. The course consists of skill stations and cardiac arrest scenarios. The skill stations provide basic life support with automated external defibrillator, basic airway management and electrocardiographic monitoring using manual external defibrillator in order to provide rapid and safe defibrillation with minimum interruptions in chest compressions. In cardiac arrest scenario sessions, the participants repeatedly experience scenario-based team training of CPR with defibrillation and medication.

Results: Three doctors, one pharmacist, six clinical laboratory technicians, and 19 nurses attended the course. The average age of the attendees was 49.5. Most of them had no previous experience of scenario based off-job trainings, and reported that their skill and knowledge concerning treatment of the cardiac arrest patients were greatly improved after the course.

Conclusions: An experience of off job training of ICLS in a long-term care hospital in Japan was presented. We have to continue this ICLS course to avoid preventable death and other complications, since unexpected cardiac arrest can occur in any patient at anytime.

Recurrent Thrombus After Left Atrial Appendage Occlusion in Atrial Fibrillation: A Case Report

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Background: Patients with atrial fibrillation (AF) and multimorbidity still have a complex risk of thrombosis even after left atrial appendage (LAAC) occlusion. The importance of integrated management and optimized anticoagulant treatment of AF after LAAC should be emphasized, meanwhile the risk of vein thrombus is equal to that of artery thrombus.

Case: A 56-year-old male with persistent AF, dilated cardiomyopathy, heart failure (HF), atherosclerosis, and diabetes, underwent LAAC in September 2017. After the operation, the position of occluder was normal without residual leakage. Approximately 2 years after LAAC, recurrent device-related thrombus occurred on the the left atrium surface. The patient was treated with dabigatran 150mg bid, rivaroxaban 15mg qd, and rivaroxaban 15mg bid successively. In June 2019, no occluder thrombus in the left atrium was detected by transesophageal echocardiography (TEE). Due to the COVID-19 outbreak, there was no follow-up. According to the his later recall, the compliance with anticoagulant drugs was not good at that time. On the 5th January 2021 the patient had a sudden ischemic stroke with seizures and cervical vascular CT suggested acute thrombotic occlusion of the right carotid artery.

Decision-making: We actively treated the patient to improve heart function, including ANRI, SGLT2i, MRA, and beta blockers. Besides, we controlled for other cardiovascular risk factors, including blood glucose and LDL. After excluding cerebral infarction hemorrhage, the anticoagulant therapy was changed from aspirin 100mg to rivaroxaban 20mg. During his hospitalization, 4s long RR interval and polymorphic ventricular tachycardia were monitored by 24-hour holter. And the patient was implanted with an ICD. Duing 12 months’ follow-up, the patient’s condition was stable, and his quality of life was fair. Besides, no cardiovascular and cerebrovascular events occurred temporarily.

Conclusion: Patients with atrial fibrillation (AF) after LAAC commonly have with multimorbidity and high risk of thrombus, Cardiovascular concomitant diseases management should be valued. LAAC cannot prevent thrombus from the atrial surface in patients with heart failure or Left atrium dilatation due to changes in cardiac structure and hemodynamics. Long-term antithrombotic strategies after LACC in AF should weigh the risk of occluder, venous thrombus, and arterial thrombus.

Infected Endocarditis with Negative Blood Culture

Meihui Tai 1, Yu Tao Guo 1

1 PLA General Hospital, China

Background:
Up to 30% or even more of all infective endocarditis (IE) cases, blood culture is negative, meaning the causative agent has not been identified, meaning the pathogen. Timely diagnosis, identification of pathogenic microorganisms and targeted antibiotic treatment can significantly affect the prognosis of the disease and further affect the health status of patients.

Case: A 31-year-old male presented with fever. He was diagnosed with a “peritonsillar abscess” and underwent a left tonsillectomy at the local hospital. But during the operation, he was not found to have an apparent abscess and had a persistent fever. At the local hospital, he completed three transthoracic echocardiograms (TTE). The first one showed no abnormality, and the second two showed excrescence in the anterior mitral valve. In addition, two blood cultures were completed, both of which were negative. After transfer to our hospital, blood culture and respiratory virus screening were negative. TTE and TEE indicated vegetations in the mitral valve. Cardiac MRI showed thinning of the mitral valve. Cardiac CT: The mitral valve has vegetations.

Decision-making: The patient refused surgical treatment and was treated with piperacillin tazobactam for 14 days. When the temperature was normal, he was discharged.
Conclusion:
Even when blood cultures and echocardiography were negative on initial examination, careful history-taking, blood tests accounting for these pathogens, and repeated echocardiography are crucial for diagnosis. The role of CT in the diagnosis of IE should be highlighted, especially prosthetic IE that could not be confirmed by TTE.

Management of a COVID Patient with Ventricular Tachycardia Storm During the Outbreak

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Background
Coronavirus disease 2019 (COVID-19) has been associated with myocardial involvement, and could be a possible trigger for malignant ventricular arrhythmia. Management of electrical storm in such a patient during the outbreak of COVID-19 could be challenging.

Case summary
We describe a 72 years old gentleman with underlying ischemic cardiomyopathy, severe left ventricular systolic dysfunction, which had AICD implanted in 2018, presented with repeated ICD firing on the day of admission. He had upper respiratory tract symptoms for 3 days prior to admission, and confirmed COVID-19 infection through self rapid antigen test. Tracing from remote monitoring confirmed appropriate shock. During admission, incessant VT storm requiring ICD ATP therapy, lignocaine infusion and defibrillation, haemodynamic instability requiring inotropes and IABP. Emergency coronary angiogram was performed and urgent VT ablation performed on the next day. The patient recovered from COVID and did not had recurrent VT attack.

Discussion
This COVID patient presented with incessant VT storm during the COVID outbreak crisis. He had recurrent VT despite medical treatment. Urgent VT ablation was arranged with precaution taken for COVID confirmed patient.

Conclusions
COVID-19 infection could be a trigger for VT storm in patient with underlying ischaemic cardiomyopathy and severe left ventricular systolic dysfunction. Timely management could be difficult but feasible amid the COVID outbreak.

MicroRNA-455-5p Promotes Pathological Cardiac Remodeling Via Inhibition of PRMT1-mediated Notch1 Activation

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2 School of Public Health, Southern Medical University, Guangzhou, China
3 Department of Clinical Microbiology and Infection Control, The University of Hong Kong-Shenzhen Hospital, Shenzhen, China
4 Centre for Protein and Cell-based Drugs, Institute of Biomedicine and Biototechnology, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen, China

Background: Pathological cardiac remodeling is a series of cardiac alterations in response to pathological stimuli. Although these adjustments initially ekes out the balance between cardiac output and body's demand. In the long run, cardiac function was gradually deteriorated and eventually progressed to heart failure. Thus, it is of great importance to find new regulatory factors in the process of pathological cardiac remodeling and to elucidate the mechanism therein. Micro-RNAs (miRNAs) are a kind of non-coding RNAs, they are involved at the post-transcriptional level and block the transcription process by binding to 3' untranslated regions (3' UTR) of their target messenger RNA (mRNA). So far, numerous cardiac miRNAs have been found to function as negative or positive regulators of cardiovascular diseases. Among them, microRNA-455-5p (miR-455-5p) is reported to be involved in cardiovascular diseases such as atrial fibrillation, atherosclerosis and hypoxic damage. However, the potential role of miR-455-5p on pathological cardiac remodeling remains to be elucidated. The present study focused on clarifying the function and searching the direct target of miR-455-5p, as well as exploring its underlying mechanisms in pathological cardiac remodeling.

Methods: To clarify the function of miR–455-5p in pathological cardiac remodeling, miR-455-5p mimic and inhibitor were transfected into cardiomyocytes in vitro, miR-455-5p agomir and miR-455-5p antagonist were injected to caudal vein of mice; To exploring which echocardiographic parameter was significantly correlated to miR-455-5p level, quantitative primer chain reaction (Q-PCR) was utilized to measure the miR-455-5p level in patients with pathological cardiac remodeling; To find out the direct target of miR-455-5p, luciferase binding assay was employed; Co-immunoprecipitation assay (Co-IP) was used to testify whether asymmetric dimethylation of Notch1 was influenced by miR-455-5p level.

Results: miR-455-5p promotes pathological cardiac remodeling in vitro and in vivo; miR-455-5p mainly regulates left ventricular wall thickening via inhibition of Notch signaling pathway; By luciferase binding assay, protein arginine methyltransferase 1 (PRMT1) is confirmed to be a direct target of miR-455-5p; By co-immunoprecipitation, miR-455-5p is proved to impede PRMT1-induced asymmetric dimethylation of Notch1 and subsequent Notch1 activation.

Conclusions: The present study reveals that miR-455-5p provokes pathological cardiac remodeling by impediment of PRMT1 transcription and subsequent inhibition of Notch1 asymmetric dimethylation. Downregulation of Notch1 asymmetric level mediated by PRMT1 inhibition results in suppression of Notch signaling pathway. Thus, targeting the miR-455-5p/PRMT1/Notch1 signaling axis may suggest a novel therapeutic approach against pathological cardiac remodeling.
Fulminant Myocarditis During COVID Surge

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Background: A 62-year-old restaurant owner, also an avid marathon runner, presented to the AED with recurrent syncope. He recalled a few days of malaise prior. He was noted to be febrile, and ECG showed complete heart block with ST elevation over anterior precordial leads.

Case: Emergency transvenous pacing was arranged in the cath lab using the right femoral venous access. Coronary angiogram showed normal coronary arteries. Once transferred to the CCU, noncapture was noted and brief chest compressions were performed for asystole, after which patient regained consciousness. Manipulation of the pacing wire failed to achieve stable capture threshold; right internal jugular venous access was created for delivery of a balloon-tipped pacing wire to the RV apex. However, frequent noncapture was still noticeable, but by this time a junctional rhythm of 60 bpm emerged. Echocardiogram showed an LVEF of 50% and unremarkable cardiac valves. His clinical course took a sharp turn the next day, when his troponin went wrong.

On day 3, a flat arterial waveform was noted, and a quick echo revealed biventricular failure, a closed aortic valve, and spontaneous echo contrast in the LV. Impella CP was inserted to vent the LV; however, suction was frequently encountered and fluid was unable to resolve inadequate LV preload; it was subsequently attributed to progressive RV failure.

On day 4, endomyocardial biopsy of the RV was performed. Right heart catheterization showed low pulsatility of the PA waveform, and a wedge pressure of 14 mmHg. With a negative COVID PCR test, blood flow dropped precipitously. Echo showed the right heart wholly occupied by thrombus.

Decision-making:

What would be your immediate resuscitation plan?
Conclusion: We failed to support this patient to recovery, or a durable MCS. What went wrong?

Impact of Sleep deprivation on Cardiac autonomic activity: A Systematic Review and Meta-Analysis

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2 Faculty of Medicine, Al-Azhar University, Egypt
3 Faculty of Medicine, South Valley University, Egypt
4 Faculty of Medicine, Cairo University, Egypt
5 Faculty of Medicine, South Valley University, Egypt

Background: Sleep deprivation has detrimental effect on general health especially cardiovascular health. Sleep deprivation impairs attention, working memory, long-term memory, and decision making, so we performed this systematic review and meta-analysis to study the impact of sleep deprivation on cardiac autonomic activity on healthy adult subjects and who were diagnosed with sleep disorders as well.

Methods: We have assessed literature data available on this topic and conducted a systematic review and meta-analysis. We systematically searched PubMed, Scopus, Web of Science and Cochrane CENTRAL databases. Clinical trials (randomized or non-randomized) and observational studies were included. Our search approach was to publish all relevant articles until April 2022.

Results: Sleep deprivation showed an increase in resting HR, diastolic BP, and heart rate variability which reflects autonomic stress.

Conclusion: Sleep deprivation increased cardiac autonomic regulation, which raises the risk of cardiovascular events. So timely intervention is critical to diagnose and treat sleep disorders and irregular and shifting sleep-wake patterns.

Keywords: sleep deprivation; insomnia; cardiac autonomic activity; Heart rate variability.

Using Google Trends Data to Study Public Interest in Hypertension in Indonesia

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2 PKU Muhammadiyah Sampangan Hospital, Surakarta, Indonesia

Background: Hypertension is one of major health problems. Hypertension in Indonesia had increased from 25.8% in 2013 to 34.11% in 2018. Public awareness through disseminating information is one of strategy to combat hypertension. Using Google, the most popular search engine in Indonesia, we reveal the internet interest about hypertension. The aim of this study were to seek correlation Internet search patterns against Hypertension prevalence in 2018 and to characterize public search trends for Hypertension in Indonesia using Google queries.

Methods: We evaluated relative search volume (RSV) of Hypertension which included the individual search for hypertension. Data were described using Google relative popularity.
Results: Top three searches for the term “hipertensi” came from South-eastern Sulawesi, Gorontalo and North Sulawesi, while the highest three prevalence of hypertension came from South Kalimantan, West Java and East Kalimantan, respectively. The correlation between hypertension RSV and hypertension prevalence was not statistically significant (p = 0.47). The highest peak of RSV was in November 2018 when National Health Day was commemorated. Queries were categorized into (1) the most frequently searched concurrent terms (Top Terms) and (2) terms with the largest increase in concurrent search frequency (Rising Terms) in 2018. According to the popularity for this term, the definition of hypertension and hypertension treatment were the highest “two” public search trends.

Conclusion: There is no correlation between search interest about hypertension and hypertension prevalence. National Health day made public finding more about hypertension.

<table>
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<tr>
<th>No</th>
<th>TOP Queries</th>
<th>Value</th>
<th>Rising Queries</th>
<th>Value</th>
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</table>

Table 1. Related Queries for Stunting in Indonesia

Figure 1. Scatter Plot of Hypertension RSV

Figure 2. Geomaps of Hypertension RSV. As darker color of blue in sub-region, it gets the higher number of search about hypertension.

Identification and Validation of Candidate Gene Module Along with Immunocytes Infiltration Patterns in Atherosclerosis Progression to Plaque Rupture via Transcriptome Analysis

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Background: To explore the differentially expressed genes (DEGs) along with infiltrating immunocytes landscape and their potential mechanisms in the progression of atherosclerosis from onset to plaque rupture.

Methods: In this study, three atherosclerosis-related microarray datasets were downloaded from the NCBI-GEO database. Gene set enrichment analysis (GSEA) was performed for interpreting the biological insights of gene expression data. CIBERSORTx algorithm was applied to infer the relative proportions of infiltrating immune cells of the atherosclerotic samples. DEGs of the datasets were screened using R. The protein interaction network was constructed via STRING. The cluster genes were analyzed by Cytoscape software. Gene ontology (GO) enrichment was performed via geneontology.org. The least absolute shrinkage and selection operator (LASSO) logistic regression algorithm and receiver operating characteristics (ROC) analyses were performed to build machine learning models for differentiating atherosclerosis status. The Pearson correlation analysis was carried out to illustrate the relationship between cluster genes and immune cells. The expression levels of the cluster genes were validated in two external cohorts.

Results: Pathways related to immunoinflammatory responses were identified according to GSEA analysis, and the detailed fractions of infiltrating immunocytes were compared between the early and advanced atherosclerosis. Additionally, we identified 170 DEGs in atherosclerosis progression (\(\log2FC > 1\) and adjusted \(p < 0.05\)). They were mainly enriched in GO terms relating to inflammatory response and innate immune response. A cluster of nine genes including ITGB2, C1QC, LY86, CTSS, C1QA, CSF1R, LAPT5M, VSIG4, and CD163 was found to be significant, and their correlations with infiltrating immunocytes were calculated. The cluster genes were also validated to be up-regulated in two external cohorts. Moreover, C1QA and ITGB2 may exert pathogenic functions in the entire process of atherogenesis.

Conclusions: We reanalyzed the transcriptomic signature of atherosclerosis development from onset to plaque rupture along with immunocytes landscape, as well as revealed new insights and specific prospective DEGs for the investigation of disease-associated dynamic molecular processes and their regulations with immunocytes.

A Case Series of Snare-assisted Transcatheter Aortic Valve Implantation in Challenging Anatomy

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Background: Transcatheter aortic valve implantation is widely used for treating severe aortic stenosis. Self-expanding valve including the Evolut family has lower root complications in patients with severely calcified aortic complex. However, Evolut Implantation could be more challenging in the presence of a dilated aortic root and horizontal aorta. We hypothesized that the use of Snare-assisted technique can overcome
these challenges by centralizing the system to facilitate valve crossing, and hence improve the safety and efficiency of the procedure. 

Methods and results: 
We performed a retrospective analysis of TAVI in challenging aortic anatomy using the snare-assisted technique from 2021 to 2022. Five patients were identified. Three of them had type 0 bicuspid aortic valve and the other two had bioprosthesis valve failure. The bioprosthesis valves were the Magna Ease size 23 and Trifecta size 21. All of them had severe aortic stenosis except the Trifecta failure had severe aortic regurgitation. The Society of Thoracic Surgeons Scores (STS) were between 3.6 to 6%. The maximum aortic root size were between 35mm to 51mm. The angulation of the aorta was ranging from 51 degrees to 71 degrees. The procedure time from advancing the valve to the deployment of valve were between 10 minutes to 66 minutes. There were no LV wire switch required with the use of snare-assisted technique. One of the cases (51 degrees angulation of aorta) was converted from using the conventional method to using the snare-assisted technique after failed to advance the transcatheter valve to cross the aortic valve due to severe angulation and wire bias. After using the snare-assisted technique, the deployment time was minimized to 10 minutes only. All of them had successful procedures. The follow up echocardiography did not show any significant paravalvular leak. All of them have improved NYHA classification.

Conclusion:
These five cases have demonstrated the use of snare-assisted technique in TAVI using self-expanding valve has good procedural safety and efficiency in challenging aortic root anatomy.

### Waist Circumference, Body Mass Index and Risk of Arrhythmias in Patients with Type 2 Diabetes

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**Background:** Obesity and increased body mass index (BMI) were associated with increased risk of atrial fibrillation. We thought to investigate the association between BMI and waist circumference with arrhythmias in patients with type 2 diabetes.

**Methods:** Type 2 diabetic patients aged over 18 years without atrial fibrillation, bradyarrhythmia and ventricular arrhythmias were identified from the territory-wide Clinical-Data-Analysis-Reporting System from 2000 to 2015. Patients were followed-up until 31 December, 2020 for incident atrial fibrillation, bradyarrycdia or ventricular arrhythmias. Cox proportional hazards model was used to assess the association of BMI or waist circumference with atrial fibrillation, bradyarrhythmia and ventricular arrhythmias.

**Results:** A total of 64787 patients were included. Higher BMI was associated with incident atrial fibrillation (HR 1.05 [95%CI 1.04, 1.06]), and incident bradyarrhythmia (HR 1.03 [95%CI 1.01, 1.05]), but not ventricular arrhythmias. Compared to patients with BMI< 25.0kg/m2, patients with BMI> 25.0kg/m2 had a 27% and 26% higher risk of developing AF and bradyarrhythmia. Similarly, patients with higher waist circumference had increased risk of atrial fibrillation (HR 1.02 [95%CI 1.01, 1.02]), and bradyarrhythmia (HR 1.01 [95%CI 1.00, 1.02]), but not ventricular arrhythmias. In analyses according to waist circumferential categories. Patients in the 4th quartile indicated a higher risk of AF (HR 1.45 [95%CI 1.33, 1.58]) and bradyarrhythmia (HR 1.30 [95%CI 1.19, 1.56]).

**Conclusion:** In patients with type 2 diabetes, BMI and waist circumference were independently associated with incident bradyarrhythmia and AF.
postoperative inflammatory and nutritional status of patients could be useful to enhance the prognostication of valvular surgery.

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Comparing the Predictive Performance of Prognostic Scores in Brugada Syndrome: A Territory-Wide Retrospective Cohort Study

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Background: The management of Brugada Syndrome (BrS) patients at intermediate risk of arrhythmic events remains controversial. The present study evaluated the predictive performance of different risk scores in an Asian BrS population and its intermediate risk subgroup.

Methods: This is a retrospective territory-wide cohort study of consecutive patients diagnosed with BrS from January 1st, 1997 to June 20th, 2020 in Hong Kong. The study outcome is sustained ventricular tachyarrhythmias during follow-up. An intermediate risk subgroup was created by ranking the patients based on our score into quartiles and identifying those who were in the second and third quartiles. A novel risk score was developed based on variables and weighting from findings from different investigations.

Results: The cohort consists of 548 consecutive BrS patients (7% female, age at diagnosis: 50±16 years old, follow-up duration: 84±55 months). For risk stratification in the whole BrS cohort, the score developed by Sieira et al. showed the best performance with an AUC of 0.805 (95% confidence interval: 0.781-0.828) and the scores by Okamura et al. (0.673), Delise et al. (0.661), Letsas et al. (0.658) and Honarbash et al. (0.592). A novel risk score was developed based on the Sieira score, with the inclusion of univariable Cox predictors (arrhythmias other than ventricular tachyarrhythmias, early repolarization pattern in the peripheral leads, aVR sign, S-wave in lead I and corrected QT interval (QTc) ≥436 ms). The score has the highest AUC of 0.855 (95% confidence interval: 0.808-0.902) and 0.760 (95% CI: 0.655-0.865) for the whole cohort and the intermediate risk group, respectively.

Conclusion: The inclusion of findings from different investigation modalities is needed for accurate risk stratification in BrS, especially for the intermediate risk subgroup.

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The Role of Methylation and Polymorphism of Tumor Necrosis Factor Gene (TNF-α) in the Pathophysiology of Coronary Artery Disease

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Background: Coronary Artery Disease (CAD) is a multifactorial chronic disease caused by atherosclerosis. Although the initiation and progression of atherosclerosis depend largely on genetic, epigenetic factors and lifestyle factors, TNF-α can affect the development of coronary artery disease through the participation in the inflammatory response of atherosclerotic plaques, the formation and rupture of plaques. Our previous study showed a high male ratio in CAD patients, suggesting that it could be predominantly a disease of men. We also found that smoking was indeed the leading risk factor present in CAD patients. There was an abnormally higher level of total cholesterol and LDL in CAD patients.

Objectives: To study the comparison of Gene Expression and DNA methylation in coronary artery disease patients with controls.

Material and Methods: Genomic DNA from 100 CAD patients confirmed by angiogram and 100 controls was isolated using salting out method followed by PCR-RFLP for single nucleotide polymorphism and MSP-PCR for methylation.

Results: The current study showed significantly higher association of single nucleotide polymorphism (-308 G/A) in CAD in comparison with control patients (P=0.02). Sixty CAD patients (60%) were found methylated for TNF-α gene, whereas only two (2%) controls were found methylated. A statistically significant result of methylation was obtained for both CAD patients when compared with controls.

Conclusion: In conclusion, our results suggest that genotyping and methylation of TNF-α gene (-308 G/A) is significantly associated with risk of CAD and may play a role in inducing risk by altering the methylation level of the gene.

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Clinical Outcomes of Percutaneous Transluminal Angioplasty in Hong Kong Patients with Peripheral Artery Disease

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BACKGROUND: Globally and in Hong Kong, peripheral artery disease (PAD) has been an underestimated, underdiagnosed, and undertreated atherosclerotic disease albeit its poor prognosis. Percutaneous transluminal angioplasty (PTA) remains as part of the care for PAD patients with intermittent claudication (IC) and critical limb ischemia (CLI) but with a limited prognosis in those with significant risk factors. There is limited quality research on the outcomes of PTA on CLI and IC patients in relation to their risk factors and demographics.

PURPOSE: To assess the risk factors associated with worse outcomes in IC and CLI PAD patients after PTA treatment.
METHODS: This prospective cohort study since 2008 has been investigating the outcomes of PTA in patients with PAD. Post-procedural follow-up of the 704 patients have been at the 6th month and every year thereafter: classifying their degree of PAD, as well as evaluating their functional status, and cardiovascular risk factors. All PTA procedures were conducted by interventional cardiologists in the Prince of Wales Hospital in Hong Kong.

RESULTS: Amongst all post-PTA patients, those aged 60-79 had the worst outcomes in terms of requiring a repeat procedure and experience subsequent myocardial infarction. Patients aged 90+ had the worst outcomes in major adverse cardiac events (MACE), stroke and amputation of index limb. The group of patients aged 60-79 had the largest proportion requiring a repeat procedure. Patients 90+ had the worst MACE outcomes. Amongst CLI patients post-PTA, those aged 60-79 had the worst clinical outcomes aside from cardiovascular death and requiring a same limb procedure. Amongst patients experiencing post-PTA incidents of any MACE, myocardial infarction (MI), and amputation, the survival probability of patients with CLI after PTA is better than those with intermittent claudication. Amputation has the highest 1-year post-PTA incident rate in PAD patients overall and CLI patient, while a repeat procedure has the highest 1-year post-PTA incident rate in IC patients.

CONCLUSION: Old age is associated with worse outcomes in CLI patients compared to IC patients post-PTA. These results suggest that more attention needs to paid to post-PTA care and disease monitoring in older CLI patients compared to IC patients.

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Large Gaps in Public Awareness of Peripheral Arterial Disease in Hong Kong

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BACKGROUND: Peripheral arterial disease (PAD) is prevalent and associated with significant cardiovascular (CV) mortality and morbidity. However, awareness of PAD is low in the community, especially in Asian countries, which makes addressing the public health impact of PAD challenging.

PURPOSE: We aimed to assess awareness of PAD relative to CV risk factors and other CV diseases, perceived causes of PAD, and perceived consequences of PAD via a cross sectional study. Insights into public awareness of PAD will help develop strategies for behavioural change consultations and health promotion.

METHODS: 1,008 adults (mean age 64.0±11, 53.2% male) attending outpatient clinics at the Prince of Wales Hospital, Hong Kong were recruited between 21 Jan 2020 and 28 Aug 2020. Participants’ awareness was classified as i) not familiar, ii) somewhat familiar and iii) very familiar. Bivariate analysis for awareness of PAD by selected participant characteristics was performed, and differences between groups were analysed with Pearson’s chi-square tests.

RESULTS: Awareness of PAD was low (36.7%) compared with other CV risk factors and diseases such as diabetes (98.6%), hyperlipidemia (98.4%), hypertension (97.8%), coronary artery disease (87.9%) and cerebrovascular disease (96.2%). Interviewees are highly aware of PAD risk factors however as it shares the same risk factor profile as other CV diseases, the finding is not necessarily PAD-specific. Among patients who were aware of PAD, most associated the disease with walking difficulties (90.3%) and blood clots (75.7%) but less were aware of CV complications including death, heart attack, stroke and limb loss (57.0-66.8%).

CONCLUSION: Overall awareness of CV diseases and risk factors was high. However, the awareness of PAD was significantly lower compared to other CV diseases and risk factors. Education ought to emphasize on the severity and potential CV complications of PAD which are comparable to that of CAD and CVD.

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A Comatose Woman with Arrhythmia and Ventricular Dysfunction

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Background
Ventricular arrhythmia and Takotsubo cardiomyopathy may signal pathologic north of the heart.

Case
A 49-year-old woman was found comatose in her car. Her Glasgow coma scale was 3. Blood pressure was 130/70mmHg, pulse 80 beats per minute. She was intubated for airway protection. There was no circumanstential evidence of drug overdose. Urine toxicology tested negative for benzodiazepines, anti-depressants and drugs of abuse. Electrocardiography (ECG) showed anterolateral ST-segment elevation and T-wave inversion. Computed tomography (CT) of the brain failed to demonstrate any intracranial pathology despite artifacts at the skull base. She developed salvos of non-sustained ventricular tachycardia shortly after admission, for which amiodarone was started. Echocardiography revealed left ventricular dysfunction with akinesia of mid-ventricular walls but sparing the basal and apical segments. The area of akinesia extended to the right ventricular apex as well. Remarkably, a large kidney cyst was noted. Troponin was elevated at 200ng/L (normal<14ng/L). Aspirin and clopidogrel were given for presumed myocardial infarction. Twelve hours later, the patient remained comatose. Extensive investigations for mental depression were unrevealing, including serum ammonia and electroencephalography.

Decision-making
The pattern of ventricular dysfunction was inconsistent with any coronary distribution. The ECG evolved from ST-segment elevation into deep symmetrical T-wave inversion raising the concern of cerebral T-waves. A decision was made to repeat the CT brain as the initial scan was degraded by artifacts at the skull base. Not unexpectedly, CT brain performed a day later showed extensive subarachnoid hemorrhage and cerebral edema. CT angiogram confirmed rupture of a vertebral artery aneurysm. The patient was immediately transferred to neurosurgery but was deemed inoperable. She was certified brain dead three days into admission. Her family agreed to donation of her organs. Surprisingly, CT done as part of donor workup found multiple liver and kidney cysts suggestive of adult polycystic kidney disease.

ST-segment elevation and ventricular dysfunction does not equate myocardial infarction and can appear in other extra-cardiac conditions. Inadvertent prescription of antiplatelets can be detrimental as in this case.

Conclusion
Ventricular arrhythmias and Takotsubo cardiomyopathy can be result of cerebral pathologies including subtle subarachnoid hemorrhage that may be challenging to image.
Background
Tuen Mun Hospital has implemented a Pharmacist Anticoagulation Clinic (PAC) in September 2019. Protocol of the service was worked out with Medicines and Geriatrics Department. Referral to PAC was open to all M&G doctors for patients on warfarin, with priority given to those with heart valve replacement. The clinic aims to improve care of patients on anticoagulants, to optimize healthcare resources in M&G specialist outpatient clinic and to empower patients on drug management via pharmacist provided education and counseling.

Methods
Time to therapeutic ranges (TTR) was used as an quality indicator for PAC service. For the Pre-Post service evaluation, warfarin patients under MG care, excluding those already recruited to pilot pharmacist/nurse clinic before September 2019 or newly started on warfarin, were included.

For the ongoing service evaluation and the impact to M&G follow-up interval, all patients recruited from Sept 2019 to March 2022 were included.

The TTR were drawn from laboratory data and calculated by Rosendaal method. Hospitalization records were collected from electronic patient record (EPR) for determination of percentage of patients who had at least one hospitalization due to bleeding event or thromboembolic event. Appointment dates were collected from EPR for determination of follow-up interval by M&G Doctor before and after PAC referral.

Results
For the pre-post TTR study, 362 patients were included. The TTR before and after PAC implementation was 63.5% and 72.7% respectively with mean difference 9.2% (p<0.0001). The expanded TTR changed from 76.4% to 85.2%, with mean difference 8.8% (p<0.0001).

For the ongoing service evaluation, 702 patients were included with TTR and expanded TTR 73.1% and 85.6% respectively. An improving trend of TTR was observed over the past years. Percentage of patient with at least one hospitalization due to bleeding was 4.3% and thromboembolism was 0.7%. The average &M&G follow-up interval changed from 9.81 weeks to 22.2 weeks after PAC referral, i.e. the M&G Doctor follow-up interval was extended by 12.39 weeks (p<0.0001). Also, M&G doctor warfarin clinic consultation were decreased from 11078 (2018/19) to 4955 (2021/22), i.e. 6123 doctor consultations per year were saved.

Conclusion
The care model of PAC is safe and cost-effective. The collaboration of pharmacist and doctor in PAC demonstrated that pharmacists have potential to optimize patient health care in ambulatory care settings. Our hospital decided to increase the PAC session from 10 to 20 per week from Oct 2022.

Incidence, Clinical Correlates, and Prognostic Impact of Dementia in Heart Failure: A Population-Based Cohort Study

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Preparing Patients to Respond to Acute Myocardial Infarction Symptoms Using a Cognitive-Narrative Intervention: Interim Results of a Multicenter Randomized Controlled Trial

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Background
Despite decades of educational efforts, patients’ prolonged delays in making care-seeking decisions remain the greatest obstacle to successful management of acute myocardial infarction (AMI). This study aimed to compare the effects of a theory-based cognitive-narrative intervention with a didactic education approach on AMI survivors’ knowledge, intention to seek care for AMI symptoms,prehospital delay time, and use of an ambulance.

Methods
This multicenter randomized controlled trial recruited community-dwelling adult patients with AMI in Hong Kong from January 2018 to January 2021, and followed up for 1 year. The 8-week theory-based cognitive-narrative intervention focused on creating a vivid cognitive experience of complex decision-making and modeled desirable behavioral changes in AMI patients. The control group received education about AMI delivered through a didactic approach. The primary outcome was the behavioral intention reflected by participants’ attitudes and beliefs about care-seeking for AMI. The secondary outcomes were AMI knowledge, and prehospital delay time and use of ambulance for the participants who had a recurrent AMI attack within the follow-up period.

Results
A total of 608 participants (mean age: 67.2 [SD 8.3] years; male: 77.1%) were randomized to either the theory-based cognitive-narrative intervention group (n = 304) or the didactic education control (n = 304) group. Generalized estimating equation analysis indicated that the intervention group reported greater positive changes than the control group in their attitudes (β = -1.053, 95% confidence interval [CI] = -1.714 – -0.391, p = 0.002) and beliefs (β = -0.692, 95% CI = -1.354 – -0.180, p = 0.044) toward care-seeking at the 3-month follow-up. The effects were sustained at 12-month time point. The prehospital delay time among those with an AMI attack was significantly reduced in the intervention group (n = 42) compared to the control group (n = 21) (β = -0.07, 95% CI = -0.10 – -0.02, p = 0.011). There were no significant differences in the knowledge of AMI or the use of an ambulance between the two study groups.

Conclusion
This study indicated a novel approach of cognitive-narrative intervention was effective in improving patients’ care-seeking behaviors and reduce pre-hospital delay time among those who presented with a recurrent AMI. Longer term follow-up is warranted to determine the sustained effects of this intervention.

Quality Assessment of Timeliness in the Delivery of Electrocardiography Service in the Critical Areas of a Tertiary Hospital Using Time and Motion Analysis: A Systems Analysis

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BACKGROUND: Quality of service is described by the World Health Organization as accessible, timely and appropriate delivery of health care service to a medical need. This study is an observational time and motion cross-sectional study with a primary aim of analyzing the quality of the Clinical and Operational delivery of ECG service at the Acute Care Unit (ACU) and Medical Intensive Care Unit (MICU) in a tertiary referral hospital.

METHODS: The data set included ECGs of adult patients (≥19 years old) who were admitted the ACU and MICU. The observation began with the request for 12L ECG and ended with the official release of the ECG result in the hospital’s secure electronic medical record system.

RESULTS: A total of 761 ECGs were included, of which 629 ECGS were ordered from the ACU and 132 from the MICU. The median total wait times for clinical service delivery took 565 (range 40–10290) minutes at the ACU and 1402.5 (range 60–7275) minutes at the MICU. The total elapsed period for operational service delivery were 16629.5 (range 1722–54822) minutes and 9063.5 (range 3412–30245) minutes in the ACU and MICU, respectively.

CONCLUSION: The median clinical and operational delivery times of the ECG service were significantly delayed. Attention to simplification of the multi-step process, digitalization, strict adherence to protocol, dedication of machines, personnel and training may improve timeliness of ECG service.

Intramural Hematoma in the Left Main

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Background: Isolated ostial lesions of left anterior descending (LAD) or left circumflex (LCX) arteries are always tricky. It remains a dilemma for the interventional cardiologist whether to stent from left main to the LAD or LCX, or to do precise ostial stenting.

Case: A 43 years old female without significant risk factors presented with acute coronary syndrome. Angiogram revealed isolated ostial disease of LAD.

Decision-making: It was decided to do precise ostial stenting. After pre-dilatation with a 3.0x8 mm non-compliant (NC) balloon, a drug eluting stent (DES) 4.0x12 mm was deployed across the LAD ostium. Post dilatation was done with a 4.0x8 mm NC balloon. After that a filling defect was observed just proximal to the stent. Intravascular ultrasound (IVUS) was done which suggested a proximal edge dissection and an intramural hematoma in the distal left main. Another 4x8 mm DES was placed to cover that hematoma. Check angiogram and IVUS showed no residual hematoma and good stent apposition.
and expansion.

Conclusion: Ostial lesions of LAD or LCX are rarely isolated. Distal left main is involved in majority of cases. In majority of cases either the ostium will be missed or there will be too much protrusion in the left main. Therefore it is better to do cross-over stenting from left main to LAD/LCX rather than trying to nail the ostium.

105 Wide-complex Tachycardia One Week Post-CRT-D Implantation in a Patient with Pre-Existing Left Bundle Branch Block

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A 37-year-old female was diagnosed with dilated cardiomyopathy with left ventricular ejection fraction (LVEF) of 11%. She remained symptomatic with New York Heart Association Class III despite optimal medical treatment including an angiotensin-converting enzyme inhibitor, beta-blocker, aldosterone receptor antagonist and ivabradine for over 2 years. Her baseline ECG showed sinus rhythm and an LBBB pattern with a QRS interval of 140 ms. As part of her heart failure therapy, she received a cardiac resynchronization therapy defibrillator (CRT-D). One week post-implantation, she presented to the emergency department with palpitations, diaphoresis and chest discomfort. 12-lead ECG showed a wide-complex tachycardia (WCT) episode with a rate of 154 beats/min, which spontaneously converted to sinus rhythm. This was later diagnosed as typical slow-fast atrioventricular nodal re-entrant tachycardia. This case report outlines the differential diagnoses for WCT and the reasoning behind the eventual diagnosis, taking into consideration the device interrogation findings and results of the electrophysiology study.

Figure 1: Twelve-lead ECG obtained during the episode of palpitation and tachycardia. Wide-complex tachycardia with rate of 154 bpm with LBBB morphology, with no clear P wave identified.

106 Ablation Therapies for Paroxysmal Atrial Fibrillation: A Systematic Review and Patient-Level Network Meta-Analysis

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Background: Despite promising trials, catheter ablation is still regarded as an adjunct to antiarrhythmic drugs (AAD) in the treatment of paroxysmal atrial fibrillation (PAF). There remains a role for comparison of the effectiveness of various ablation therapies against each other, and versus AAD.

Methods: Randomized controlled trials or propensity score-matched studies comparing atrial tachyarrhythmia recurrence among any combination of ablation modalities or AAD were retrieved. Kaplan-Meier curves and risk tables for this outcome were graphically reconstructed to extract patient-level data. Frequentist network meta-analysis (NMA) using derived hazard ratios (HRs), as well as two restricted mean survival time (RMST) NMAs, were conducted. Treatment strategies were ranked using P-scores.

Results: Across 24 studies comparing six ablation therapies (5,132 patients), Frequentist NMA-derived HRs of AF recurrence compared to AAD were 0.35 (95% CI=0.25-0.48) for cryoballoon ablation (CBA), 0.34 (95% CI=0.25-0.47) for radiofrequency ablation (RFA), 0.14 (95% CI=0.07-0.30) for combined CBA and RFA, 0.20 (95% CI=0.10-0.41) for hot-balloon ablation (HBA), 0.43 (95% CI=0.15-1.26) for laser-balloon ablation (LBA), and 0.33 (95% CI=0.18-0.62) for pulmonary vein ablation catheter. RMST-based NMAs similarly showed significant benefit of all ablation therapies over AAD. The combination of CBA + RFA showed promising long-term superiority over CBA and RFA, while LBA showed favorable short-term efficacy.

Conclusions: The advantage of ablation therapies over AAD in preventing atrial tachyarrhythmia recurrence strongly suggests that ablation should replace AAD as the main treatment for PAF in patients fit for the procedure. The promising nature of several specific therapies warrants further trials to elicit their long-term efficacy and perform cost-benefit analysis.

Figure 2: Network meta-analysis of the comparison of ablation therapies versus AAD. The combination of CBA + RFA showed promising long-term superiority over CBA and RFA, while LBA showed favorable short-term efficacy.
An 8 Year Old Girl with Severe Hematemesis with a Cardiac Cause

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CASE:
The girl had multiple episodes of hematemesis. OGD found grade 3 esophageal varices. The workup for liver disease and portal hypertension including ultrasound, CT, hepatitis serology, liver function test and autoimmune markers, hepatic wedge pressure were all negative. Incidentally, the CT abdomen meant to look for abdominal pathology showed absence of normal left pulmonary venous drainage into the left atrium with markedly discrepant pulmonary artery sizes, with LPA hypoplasia. There was an aberrant left lower lobe pulmonary vein draining into the esophageal varices. Therefore a MRI cardiac + MRA was done for problem solving.

The girl had cardiac surgery in China at 2 month with the cardiac diagnosis of intracardiac TAPVD with four pulmonary veins to the dilated coronary sinus then to the right atrium. Immediate post op ECHO findings showing 4 pulmonary veins draining into the LA.

DECISION MAKING
A custom-MRI protocol for problem solving.

Diagnostic Techniques and their Most Important Findings:
3D IR FLASH MRA:
- Hypoplastic LPA, absent LPV to RA
- Confirmed the presence of a left lower lobe pulmonary vein which connects to the esophageal varices

TWIST MRA (time-resolved MRA)
- Illustrates the flow of the aberrant left lower lobe pulmonary vein, with the additional information that the varices were uphill. The TWIST MIP showed minimal perfusion of the left lung.
- In-plane PC of the LPA showed bidirectional flow with minimal forward flow.

Through-plane PC phase contrast of RPA, LPA, RUPV, LUPV.
- RPA:LPA flow ratio of 98:2
- The Qpa: Qpv was 1.095, which showed that some of the blood to the left lung was not draining back into the left atrium confirming an aberrant pathway for PV drainage.

CONCLUSION:
- Pulmonary vein atresia is a complication of cardiac surgery. Aberrant drainage causing esophageal varices is a rare but important complication
- The girl had subsequent plugging of the left lower pulmonary artery

Fractional Flow Reserve [FFR] Guided Stenting of Left Main Coronary Artery in Acute Coronary Syndrome: A Single Centre Experience

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The present study assesses the clinical outcomes after left main coronary stenting, using clinical evaluation, angiography, and Fractional Flow Reserve (FFR). A prospective observational study was conducted on 72 patients undergoing left main coronary artery (LMCA) stenting, transthoracic echocardiography, coronary angiography, and percutaneous coronary intervention were done and FFR was recorded. At the end of 6 months, follow up check angiography, FFR study were performed. The stent was placed from LMCA to left anterior descending artery (LAD) artery among 45.83% of patients and 9.72% had from LMCA to Left circumflex artery. The mortality rate was 8.33%. The fractional flow reserve was 0.81 on an average ranging from 0.58 to 0.90. Relatively low incidence of major cardiac event was noted among patients with single vessel disease and ostial LMCA disease.
Balloon Mitral Valvuloplasty (BMV) for Calcified Mitral Valve

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A 71 year old male patient admitted with complains of Dyspnea on exertion
Cough with expectoration
Retrosternal chest pain
Past history: k/clo Valvular Heart Disease.
k/clo COPD, medical renal disease.
Left ventricular Ejection fraction (LVEF) in % - 60%
No Regional wall motion abnormality at rest
Good LV systolic function
Severe Mitral stenosis, PML motion restricted & calcified.
AML thickened and doming, calcified.
Mitral valve Wilkins score: T3 SV3 M3 C3 = 12/16
MVA by planimetry is 0.8 cm square
LA size : 58 mm,
RA RV mildly dilated with mild RV dysfunction. Colour Doppler study
MVA by PHT = 0.8 cm square , MVG = 26/15 mmHg
Severe Mitral stenosis
Mild Mitral regurgitation
Mild Aortic regurgitation
Mild Tricuspid regurgitation Mild Pulmonary hypertension, PASP by TR jet = 40 mmHg

Transcatheter Aortic Valve Implantation and Percutaneous Transvenous Mitral Commissurotomy: A Back-To-Back Double Valve Intervention

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Percutaneous catheter-based structural interventions, such as transcatheter aortic valve implantation (TAVI) and percutaneous transvenous mitral commissurotomy (PTMC), are viable options for isolated aortic stenosis (AS) and mitral stenosis (MS) respectively in eligible patients. However, for patients with both severe aortic and mitral valve stenoses, surgical valve replacement is generally the treatment of choice. We report an exceptional case of consecutive TAVI and PTMC performed successfully in an elderly patient who was deemed too high risk for surgical double valve replacement.

An 80-year-old female who was incidentally found to have AS and MS on a transthoracic echocardiogram (TTE) during a previous admission 4 months prior, was readmitted due to a 3-week history of gradually progressing heart failure symptoms. TTE showed good LV function and degenerative valve disease, predominantly severe AS and severe MS. She was stratified as high risk for double valve surgery. After a thorough discussion by the heart team with her family, the plan was to proceed with a percutaneous approach for both aortic and mitral valves. She underwent coronary angiogram, PTMC inflated to 22 mm, then TAVI using Venus A-valve 23 mm, in a single sitting. All procedures were successful with noted decreased mean gradients across both valves with increased valve areas.

While still with unrelieved severe AS, PTMC done before TAVI poses a risk for sudden volume overload and increased wall stress of the previously “protected” left ventricle. However, when PTMC is done after TAVI, the deployed prosthetic aortic valve is at risk of dislodgement during PTMC. Also, tachycardia pacing done during TAVI, while still with unrelieved MS, may compromise cardiac output further.

A heart team approach is crucial when choosing between surgical versus percutaneous treatment options. The risks, indications, hemodynamic consequences and technical performance of TAVI and PTMC must be carefully weighed when deciding on the sequence of performing these percutaneous procedures.

E-Cigarettes and Myocardial Infarction: A Systematic Review and Meta-Analysis.

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Background
With widespread awareness about the harmful effects of traditional smoking, many people are considering using an e-cigarette. However, many studies have shown that e-cigarettes are not entirely harmless, and their use has been implicated in causing major adverse cardiovascular events.

Methods
We adopted the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines to conduct this systematic review. An electronic search was conducted comprehensively through five databases to find the relevant articles. The odds ratio (OR) was used for comparing groups. Meta-analysis was conducted using R statistical software version 3.4.3. A random-effect model was used.

Results
A total of 4 studies were included in the analysis incorporating data on 585,306 individuals. Of these, 19,435 were e-cigarettes users, while 1693 used only traditional cigarette users, and 553,095 were non-e-cigarette users. 7.0% of e-cigarettes users suffered an MI (myocardial infarction), 21.7% and 6.5% of traditional smoking and non-e-cigarettes users suffered an MI. The OR of getting an MI in e-cigarettes users (e-cigarettes only or e-cigarettes + traditional smoking) users was 1.33 (95% CI = 1.14-1.56, p-value = 0.01) in comparison to non e-cigarette users.

Conclusion
Those using e-cigarettes have higher odds of suffering from an MI in comparison to not using e-cigarettes. However, using e-cigarettes reduces the risk of MI by half in comparison to traditional smoking.
117 Ambulatory Systolic Blood Pressure Variability Predicts Subclinical Atherosclerosis in Healthy Middle-aged Adults

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Background: Long-term fluctuation in blood pressure (BP) as reflected by visit-to-visit BP variability (BPV) is associated with subclinical atherosclerosis in general population. Nevertheless, there is limited data on short-term BPV as measured by 24-hrs ambulatory BP monitoring (ABPM) on the development of subclinical atherosclerosis.

Methods and Results: We sought to investigate the relationship between the 24-hrs ambulatory BP and BPV with the occurrence of subclinical atherosclerosis as measured by common carotid artery intima media thickness (CIMT) in a cohort of 305 healthy middle-aged Chinese individuals. Their mean age was 53.9±6.9 years, and 44.6% were male. None of them had known history of hypertension, hyperlipidaemia, diabetes or cardiovascular diseases. All subjects underwent ABPM and ultrasound of the common carotid artery. Subclinical atherosclerosis was defined as >75 percentile of CIMT of the overall study cohort. Univariate analysis revealed significant correlation between all BP parameters, and night-time SBP standard deviation (SD) and night-time DBP SD with CIMT (all P<0.05). However, linear regression models adjusted for sex, age, body mass index (BMI), smoking status revealed significant relationships between office, daytime and night-time systolic BP; and day-time SBP SD and day-time SBP coefficient of variation (CV) with CIMT (all P<0.05). Nevertheless, logistic regression analysis demonstrated that only ABPM day-time SBP (odd ratio [OR] 2.54, 95% confidence interval [CI]:1.29-5.00, P<0.01), night-time SBP (OR: 3.23, 95% CI:1.67-6.22, P<0.01), day-time SBP CV (OR: 0.47, 95% CI:0.26-0.86, P<0.05), night-time SBP SD (OR: 1.94, 95% CI:1.05-3.58, P<0.05), and night-time SBP coefficient of variation (CV) with CIMT (all P<0.05). Nevertheless, logistic regression analysis demonstrated that only ABPM day-time SBP (odd ratio [OR] 2.54, 95% confidence interval [CI]:1.29-5.00, P<0.01), night-time SBP (OR: 3.23, 95% CI:1.67-6.22, P<0.01), day-time SBP CV (OR: 0.47, 95% CI:0.26-0.86, P<0.05), night-time SBP SD (OR: 1.94, 95% CI:1.05-3.58, P<0.05), and night-time SBP coefficient of variation (CV) with CIMT (all P<0.05) predicts the occurrence of subclinical atherosclerosis.

Conclusions: In healthy middle-age individuals, ABPM day-time and night-time SBP provided the strongest positive predictive value for increased CIMT. Interestingly, increase day-time SBP BPV versus night-time SBP BPV have opposite effects on CIMT, suggesting diurnal fluctuations of SBP due to changes in autonomic tone contributing to the development of subclinical atherosclerosis.

118 Correlation between Echocardiographic Exam and Cardiopulmonary Exercise Testing in Pre-operative Patients: A Prospective Study

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Background Cardiopulmonary exercise testing (CPET) is now increasingly utilized in evaluation of peri-operative patients for their exercise capacity. However, integration of findings of transthoracic echocardiogram with CPET was infrequently performed, especially in patients without overt heart failure symptoms. It is hypothesized that several echo parameters including left ventricular global longitudinal strain (LVGLS) can detect exercise incapacity, and post exercise echocardiogram may find a closer correlation.

Methods
This was a single center, prospective, cross-sectional study conducted in New Territories West Cluster under the Department of Anesthesia and Operating Theatre.

We performed resting and post-exercise two-dimensional echocardiograms combined with cardiopulmonary exercise test in 30 patients for their exercise tolerance pre-operatively. Patient were classified into two groups according to their peak oxygen consumption (VO2peak).

Receiver operator characteristic (ROC) curves were plotted and areas under curves were calculated to determine the accuracy of different variables for identifying high-risk patients (VO2peak <15 mL/kg/min).

Results
8 (26.7%) patients belonged to the high-risk group and achieved a VO2peak <15 mL/kg/min.

The median left ventricular ejection fraction (LVEF) of the study population was 53.5%. LVEF correlated poorly with VO2peak (p=0.836), while averaged E/ e′ post-exercise (p=0.021, p=0.006), LVGLS at rest and post-exercise (p=0.036, p=0.003) correlated well.

Body mass index, H2FPEF score and 6-minute walk distance (6MWD) also correlated with VO2peak significantly (p=0.045, p=0.008, p=0.003).

Receiver operator characteristic curve analyses identified that LVGLS post-exercise higher than -13.2% (i.e., less negative) predicted a VO2peak <15.0 ml/kg/min with sensitivity of 71.4% and specificity of 100% (area under curve 0.879, 95% confidence interval 0.71-1.00).

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Conclusion
Post-exercise E/e′, resting and post-exercise LVGLS, together with other resting clinical variables accurately reflect exercise limitation. Combined transthoracic echocardiogram with CPET can facilitate risk stratification and offer a repeatable and reproducible diagnostic utility in patients pre-operatively.

Figure 3. Receiver Operating Characteristic Curves for Predicting exercise incapacity

119 Safety and Tolerability of Low-Dose Levosimendan Infusion in Patients with Refractory Heart Failure

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Background: Levosimendan is a calcium sensitizer used for treatment of heart failure (HF). However, there is limited data on its safety and tolerability in Chinese patients with refractory HF.

Methods and Results: In this retrospective cohort study, we report the safety and tolerability of levosimendan infusion in 36 consecutive patients with refractory HF patients who received treatment from January 1, 2015 to December 31, 2021 in the Queen Mary Hospital, Hong Kong. Their mean age was 63.6±14.3 years and 75.0% were male. The median duration from HF diagnosis was 1.02 years, and the etiologies for HF include ischemic cardiomyopathy (41.7%), idiopathic dilated cardiomyopathy (30.6%), valvular heart disease (8.3%), myocarditis (5.6%), amyloidosis (5.6%) and others (8.3%). The majority of patients (80.6%) had previous cardiac intervention, including 20 (55.6%) with cardiovascular implantable electronic device implantation, 18 (50.0%) with coronary revascularization, and 7 (19.4%) with valvular intervention. Their mean left ventricular ejection fraction was 24.6±11.4%, and 16 (44.4%) of them were treated with inotropes infusion (dopamine+/− dobutamine), including 10 (27.8%) patients were supported by percutaneous mechanical circulatory support device at time of levosimendan infusion. All patients were started on levosimendan infusion without a loading dose, and the mean dosage used was 5.6±2.9 mg infused over 26.1±7.2 hours. During levosimendan infusion therapy, only 2 (5.6%) patients developed cardiac arrhythmia, included rapid atrial fibrillation (n=1) and ventricular tachycardia (n=1) that requiring early termination of infusion. Seven patients (19.4%) failed to have initial response to levosimendan therapy whom requiring escalation of mechanical circulatory support with intra-aortic balloon pump (n=2), venoarterial extracorporeal membrane oxygenation (n=1) and left ventricular assist device (n=2), or died of cardiogenic shock (n=2). Nevertheless, 34 (94.4%) patients survived to hospital discharge after weaning off inotropes and temporary mechanical circulatory support.

Conclusion: Our results showed that low-dose levosimendan infusion without loading dose in patients with refractory HF is safe and well tolerated with only a small percentage of requiring early termination due to arrhythmias.

120 Repetitive Low-Dose Levosimendan Infusion as Maintenance Therapy in Patients with Advanced Heart Failure

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Background: Levosimendan is a myocardial calcium sensitizer that has been used as an inotropic support for acute heart failure (HF) decompensation. Nevertheless, there is limited date on the long-term use of levosimendan as maintenance therapy in patients with advanced HF.

Methods and Results: We report our experience in the use of repetitive low-dose levosimendan infusion as maintenance therapy in 8 patients (mean age 60.7±16.5 years, 87.5% male) with advanced HF treated between January 1, 2018 to May 31, 2021 in Queen Mary Hospital, Hong Kong. The median duration from HF diagnosis was 6.6 years, and the etiologies for their HF include dilated cardiomyopathy (n=5, 62.5%), ischemic cardiomyopathy (n=1, 12.5%), valvular heart disease (n=1, 12.5%), and amyloidosis (n=1, 12.5%). Their mean left ventricular ejection fraction was 23.8±13.3%, and all patients suffered from New York Heart Association Functional Class 3-4 symptoms. Five patients (62.5%) had previous cardiac intervention, including 4 (50.0%) with cardiovascular implantable electronic device implantation, 2 (25.0%) with coronary revascularization, and 2 (25.0%) with valvular intervention. Among them, only 3 patients were considered to be eligible for heart transplantation on waiting list. A total of 28 doses of levosimendan were given, with each patient receiving a median of 3 infusions and 1 patient receiving up to 7 doses. Median dosage of index levosimendan given was 5.49 mg infused over 27.0±4.24 hours. Median duration in between each levosimendan infusion was 38 days. Sixteen infusions (57.1%) were given by scheduled readmission and the remaining were given during unscheduled hospitalization for HF decompensation. Inotropic support with dopamine infusion was required during 6 (57.1%) infusion episodes. No patient required early termination of levosimendan infusion due to intercurrent arrhythmia or hypotension. Two patients (25%) received repetitive levosimendan during the same hospital stay but failed to respond and died of refractory HF. Among the remaining 6 ambulatory advanced HF patients who received repetitive levosimendan therapy, their survival at 6, 12 and 18 months were 83.3%, 80.0% and 60.0% respectively.

Conclusion: In patients with advanced HF especially for those who are not eligible for heart transplant, repetitive levosimendan is safe and well tolerated maintenance therapy for treatment of their HF.
phosphodiesterase 5 inhibitor (91.7% vs. 40.0%, p<0.001*), endotelin receptor antagonist (41.7% vs. 10.0%, p=0.003*), and dual therapy (41.7% vs. 12.5, p=0.011*) utilization at 12 months. Twenty-eight patients developed PAH-related adverse events occurred in 12 months, including 15 WHO functional class deterioration (16.3%), 15 PAH-related hospitalization (16.3%), and 7 deaths (7.6%). Systematic reassessment resulted in lower incidence of adverse events than historical control (0.0% vs. 35.0%, p =0.015*). At 12 months, improved mPAP (42.9±9.3 to 33.5±9.7 mmHg, p= 0.001*), PVR (9.3±4.8 to 4.7±4.1 WU, p =<0.001*), and NT-proBNP (741 pg/ml (IQR: 245 and 3,510 pg/ml) to 166 pg/ml (IQR: 86 and 321 pg/ml), p =0.010*) were observed in systematic reassessment group. Conclusion: Six-monthly systematic reassessment was associated with higher PAH medication utilization and lower adverse events.

123 Intestinal Microbiota Transplantation Improve Cardiac Dysfunction in Colorectal Cancer Mice

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Background: Cardiac dysfunction is found in a large number of cancer patients. Intestinal microbiota plays important roles in regulating the progression of colorectal cancer (CRC) and the risk of cardiac dysfunction. This study aims to explore the roles of intestinal microbiota transplantation (FMT) in ameliorating cardiac dysfunction in CRC mice. Methods: The CRC mouse model of intestinal microbial imbalance and cardiac dysfunction was established by using carcinogen azomethane oxide and inflammatory agent dextran sulfate sodium. FMT was performed to restore intestinal microbial disorder. Heart function was measured by using echocardiography and electrocardiograph monitor. ELISA was used to detect the level of cardiac troponin-I (Ctn-I) and soluble growth stimulation expressed gene 2 (sST2).

Results: Intestinal microbial disorder was restored by the treatment of FMT in CRC mice. Compared with normal mice, the weight of the heart and the thickness of cardiac wall were decreased in CRC mice. FMT reversed the decreased weight and thickness of cardiac wall. The cardiac contractile function of CRC mice was significantly impaired, which was shown as decreased fractional shortening while FMT increased the level of fractional shortening. Thickened interventricular septum and inceased diameter of left ventricular end-diastolic were also observed in CRC mice. FMT partly reversed the increase of these two indexes. In addition, FMT decreased the level of Ctn-I and Sst2 which were elevated in the serum of CRC mice. Conclusion: The cardiac function of CRC mice was significantly impaired and FMT improved cardiac function by regulating cytokines in serum.

128 Angiography Alone Versus Angiography Plus Intracoronary Imaging to Guide Emergency Percutaneous Coronary Intervention: Outcomes from a Single-Centre Retrospective Analysis

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Background: There is emerging evidence showing improvement in clinical outcomes with optical coherence tomography (OCT) and intravascular ultrasound (IVUS)-guided elective percutaneous coronary intervention (PCI). Yet data supporting their use in emergency setting are still conflicting. Methods: We included 426 patients from May 2012 to December 2020 who presented with ST-elevation myocardial infarction (STEMI) and underwent emergency PCI within 24 hours of hospital admission. Intracoronary imaging was used in 196 of them to guide PCI. Immediate angiographic outcomes in terms of TIMI flow grade (TFG), myocardial blush grade (MBG) and corrected TIMI frame count (CTFC) are compared. Clinical outcomes including major adverse cardiac events (MACE), target vessel revascularization (TVR), hospitalization for heart failure and all-cause mortality were also compared. Results: 196 patients (46%) underwent intracoronary imaging-guided PCI. Use of imaging was associated with a higher post procedural CTFC (27.0 vs. 25.8, p=0.11), yet it failed to reach statistical significance. Comparing with angiography-guided PCI, imaging-guided PCI was associated with significantly larger proportion of high CTFC post procedure (slow coronary flow) (OR, 0.62; 95% CI: 0.38-1.0, P=0.05), and this result was consistent after adjustment of variables (adjusted OR, 0.57; 95% CI: 0.34-0.98, P=0.04). Subjective measures of TIMI flow grade and MBG, however, were not different between the 2 groups. In the subgroup of patients with high Syntax score and AHA/ACC type C culprit lesion morphology, imaging guided PCI was associated with significantly worse post procedural MBG (OR, 0.36; 95% CI: 0.17-0.78, P=0.01 vs. OR, 0.40; 95% CI: 0.18-0.94, P=0.04), and the results were consistent after adjusting for variables. In the subgroup of patients with high Syntax score, imaging guided PCI was associated with significantly worse post procedural TIMI flow grade (adjusted OR, 0.35; 95% CI 0.12-0.95, P=0.05) and a trend towards higher CTFC (adjusted OR, 0.26; 95% CI: 0.06-0.94, P=0.05) after adjusting for variables. The cumulative incidences of all clinical outcome measures were not significantly different between the 2 groups before and after adjusting for confounders. Conclusions: Imaging-guided PCI was not associated with improved angiographic or clinical outcomes in all-comers patients with STEMI who underwent emergency PCI. Routine use of intracoronary imaging in emergency PCI was found to be associated with worse immediate angiographic outcomes.

129 Bioinformatic Analysis of Dysregulated Circular Rnas in Pediatric Pulmonary Hypertension Linked Congenital Heart Disease

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Background: Circular RNAs (circRNAs) may play important roles in the progression of pulmonary arterial hypertension. However, the potential roles they play in childhood pulmonary arterial hypertension associated congenital heart disease (CHD) progression remains unclear.

Methods: Thirteen human plasma samples including eight from pulmonary arterial hypertension secondary to CHD patients and five from a control group were analyzed using the Arraystar Human circRNA array. The relative expression levels of five differentially expressed circRNAs in pulmonary arterial hypertension were detected using real-time polymerase chain reaction (PCR) analysis. In parallel, these levels were also taken on control samples from 32 CHD patients. We used miRanda and TargetScan software packages to predict potential microRNA (miRNA) targets, which were then combined into a...
circRNA–miRNA–messenger RNA (mRNA) network.
Results: Twenty-seven circRNAs (three upregulated and 24 downregulated) were differentially expressed between the pulmonary arterial hypertension and control groups. Compared to control group levels, circ_003416 expression in the pulmonary arterial hypertension group was significantly downregulated, while circ_005372 expression, in contrast, was significantly upregulated. The differential expression of these circRNAs was mainly linked to variation in levels of oxidative phosphorylation and tight junction signaling.

Conclusions: We identified one overexpressed and one underexpressed circRNA in plasma samples from children with CHD associated pulmonary arterial hypertension. Bioinformatic analysis indicated these dysregulated circRNAs might be associated with the occurrence and regulation of pulmonary arterial hypertension.

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Hypertension in Adolescents: The Role of Obesity and Family History

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Background: Obesity and positive family history (FH) are the major determinants of essential hypertension in adults and children. However, there is a paucity of data in the joint effect of FH and obesity on the risk of hypertension.

Methods: We evaluated the combined effect of obesity and FH on the risk of hypertension in healthy Chinese adolescents. We studied 1,288 school-aged adolescents aged 16.0 ± 0.5 years (49.0% males) attending the medical examination for enrollment in the city of Nanning, China. Their blood pressure, weight, and height were measured. A questionnaire was administered to both adolescents and their parents to obtain information on the subjects’ medical history. Multiple logistic regression analysis, according to bodyweight categories and adjusted for age, gender, and body mass index (BMI), was done to determine the association of FH with hypertension.

Results: Hypertension was found in 14.1% of adolescents. The prevalence of hypertension was significantly higher in adolescents with obesity and positive FH than their normal weight and negative FH counterparts. For adolescents with normal weight and waist circumference (WC), those with a positive FH in parents compared to those without had an significantly increased risk for hypertension (odds ratio [OR], 2.15; 95% confidence interval [CI] 1.28–3.61, and 1.96; 95% CI 1.16–3.32, respectively). These findings were adjusted for age, gender, and BMI.

Conclusion: Our study showed that routine screening for pediatric hypertension should be performed in adolescents who are overweight and obese. Furthermore, parental FH of hypertension played an important role in predicting the hypertension phenotype among adolescents with normal weight.

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An Unusual Case of Aorto-Right Atrial Fistula: A Diagnostic and Surgical Challenge

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Background
Aorto-right atrial fistula is a rare and complex pathological condition with multiple participating causes. Operative mortality can be up to 25%, due to the complexity of anatomy, hemodynamic and organ functions dysfunction from the aorto-atrial blood flow.

Case
A young patient with previous mitral valve surgery presented with suspected panadol induced liver failure, and heart failure with new onset tricuspid regurgitation. Computer tomography showed chronic type A Aortic dissection with no visceral malperfusion. Deterioration required intensive care support and renal support for stabilization. Repeated transoesophageal echocardiogram showed varied tricuspid regurgitation upon renal support.

Intraoperatively revealed an aorto-right atrial fistula and aortic root dissection involving the right coronary ostium. Repair of the fistula and aortic root replacement with Cabrol procedure to right coronary ostium was performed.

Decision-making
Presentation of the suspected panadol overdose with recurrent liver failure that could not be explained by the aortic dissection anatomy created a diagnostic challenge. Varied echocardiographic findings had also imposed investigational uncertainty. Optimising multi-organ failure to balance risk of cardiovascular surgery with an appropriate timing of surgery is a common dilemma. The multidisciplinary team involvement in the care of this patient demonstrated the importance and integration of basic clinical skills, advanced clinical investigations and complex critical care support and surgical techniques.

Conclusion
Optimal outcome in rare and complex cardiovascular pathology, requires integration of basic clinical skills and advanced surgical techniques under a multi-disciplinary team.

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Infant With Dilated Cardiomyopathy and Repeated Decompensations: Diagnosis and Management of Barth Syndrome

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Background
Barth syndrome, is a rare X-linked recessive cardioskeletal mitochondrial myopathy caused by mutation in TAZ gene. Diagnosis and management of the condition can be challenging.

Case
A 9-month old boy presented with pericardial effusion and cardiomegaly antenatally, with a strong family history of intrauterine and early infant death of male members. Postnatal echocardiography showed dilated left ventricle (LV) and moderately impaired ventricular function, which is compatible with dilated cardiomyopathy (DCM). Refractory hypoglycaemia was evident. His heart failure was fairly controlled with medications (including Entresto), with repeated episodes of unexplained sudden deterioration with lactic acidosis requiring intensive care support. Initial metabolic work up was unrevealing. Genetic testing using whole exome sequencing can only identify a variant of unknown significance in SCN5A gene. Later he also developed growth failure and hypotonia. In view of the unusual clinical course of dilated cardiomyopathy, neutropenia, repeated lactic acidosis and family history suggestive of a X-linked condition, Barth syndrome was suspected. Research based genetic testing using whole genome sequencing identified a hemizygous variant of the TAFazzin gene in the intronic region (NM_000116.5): c.284+5G>A, inherited
from mother. Further cardiolipin analysis confirmed the diagnosis biochemically and the variant was upgraded to a pathogenic mutation. Decision making
The unusual clinical course of DCM, extra-cardiac features and specific familial inheritance pattern all lead to the suspicion of a metabolic disorder. Further testing was therefore arranged to target on the specific syndrome. Early involvement of metabolic specialist and geneticist would be important when we encounter these features in clinical setting to facilitate timely diagnosis and multidisciplinary management. Enzyme and gene therapies can be the potential treatments in the future.

Conclusion
Clinical course, extra-cardiac features and family history are all important in establishing diagnosis of cardiomyopathy. Barth syndrome was diagnosed with the use of whole genome sequencing and cardiolipin assay in this infant.

Altered Gut Microbiota Influences the Inflammation in CAWS-induced Kawasaki Vasculitis

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Background: Alterations in gut microbiota were found among Kawasaki disease (KD) patients during the acute phase. This study aimed to profile the gut microbiota composition and investigate its role in the KD mouse model.

Methods: Candida albicans water-soluble fraction (CAWS) were extracted and peritoneally injected into mice to induce KD-mimic vasculitis. Then, we used probiotic Clostridium butyricum (C. butyricum) and antibiotic cocktails to identify the influences of gut microbiota in CAWS-induced vasculitis. Gut microbiota were analyzed by 16S rRNA sequencing and its fecal metabolites short-chain fatty acids (SCFAs) by gas chromatography-mass spectrometry (GC-MS) analysis. The effects of gut microbiota on gut mucosal barrier and systemic inflammation markers were assessed. We further employed butyrate in RAW264.7 macrophages to explore the molecular mechanism.

Results: The gut dysbiosis was observed in CAWS-treated models. The supplement of C. butyricum significantly decreased inflammatory cytokine levels of IL-1β, IL-6 and attenuated coronary artery inflammation in CAWS models by immunohistochemistry (IHC) analysis, while the antibiotic cocktails-induced dysbiosis was associated with more severe inflammatory responses and exacerbated recruitment and infiltration of inflammatory immune cells. Moreover, the probiotic feeding of C. butyricum promoted the abundance of SCFAs-producing bacteria taxa including Firmicutes and Ruminococcus. Looking through the GC-MS analysis, C. butyricum promoted the fecal SCFAs production and increased the expression of mucosal SCFAs transporters in the meantime. In addition, CAWS-treated mice were observed with leaky gut, which could be alleviated with the supplement of probiotic C. butyricum. In vitro, we confirmed butyrate, a main product from dietary fiber fermentation, excelled in anti-inflammation over the other SCFAs acetate and propionate in CAWS-stimulated RAW264.7 macrophages. Molecularly, it showed that butyrate enhanced MAPK-1 expression to inhibit the phosphorylation of the MAPKs JNK, ERK1/2 and p38.

Conclusion: During the acute phase, the gut dysbiosis was observed in CAWS-treated mice. The altered gut microbiota regulated the inflammatory responses and modulated the integrity of intestinal barrier. And the microbial metabolite butyrate could be a potential anti-inflammatory agent in Kawasaki disease via the up-regulation of MAPK-1 to suppress MAPKs mediated pathways in macrophages.

Association Between Depressive Symptoms, Antidepressant Use and Metabolic Syndrome Components

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Background: While associations between depression and metabolic syndrome have been recognised, few studies investigated the relations between depressive symptoms and antidepressant use with individual components of the metabolic syndrome.

Methods: Participants were included from the US National Health and Nutrition Examination Survey 2005-March 2020. Metabolic syndrome components were defined according to the National Cholesterol Education Program’s Adult Treatment Panel III criteria: elevated blood pressure, elevated triglycerides, reduced high-density lipoprotein, central obesity, and elevated blood glucose. Depressive symptoms were assessed using the Patient Health Questionnaire-9 and classified as minimal, mild, moderate, or severe. Potential confounding factors were adjusted for using multivariable logistic regression.

Results: This study included 15315 eligible non-pregnant participants aged ≥20 years. 82.9% of participants (equivalent to approximately 165.7 million US adults) had one or more metabolic syndrome components. Amongst them, 7.5% (equivalent to about 12.5 million adults)
had moderate or severe depressive symptoms. Increased severity of depressive symptoms was associated with the clustering of metabolic syndrome components (P < 0.001). Participants with moderate and severe depressive symptoms were more likely to present at least one component of metabolic syndrome: odds ratios for developing one and five metabolic syndrome components in participants with moderate depressive symptoms were 1.54 (95% CI [1.02-2.31]) and 3.88 (95% CI [2.16-6.96]) respectively; whereas 2.04 (95% CI [1.26-3.29]) and 2.94 (95% CI [1.38-6.28]) in those with severe depressive symptoms. Antidepressant users were more likely than non-users to present four (1.48, 95% CI [1.02-2.14]) or five (1.79, 95% CI [1.17-2.76]) metabolic syndrome components. Antidepressant use was associated with elevated blood pressure (1.39, 95% CI [1.13-1.71]) and raised triglyceride (1.44, 95% CI [1.19-1.76]).

Conclusion: The number of metabolic syndrome components was positively associated with severity of depressive symptoms. Antidepressant use was associated with the clustered presence of metabolic syndrome components, and particularly elevated blood pressure and raised triglyceride. The findings highlight the importance of considering the risk of metabolic syndrome and its components in persons with depression and the use of antidepressants.

Best HKCC-HKPHCA Challenging/Interesting Clinical Cardiology Cases Presentation

29 Percutaneous Coronary Intervention Combined with Targeted Therapy for a Patient with Left Main Coronary Compression Syndrome Associated with Atrial Septal Defect Related Pulmonary Arterial Hypertension

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¹ Beijing Anzhen Hospital, Capital Medical University, Beijing, China

Background: Left main compression syndrome (LMCS) is a severe complication leading to sudden death in pulmonary arterial hypertension (PAH), which is due to extrinsic compression of the left main coronary artery by a dilated pulmonary artery (PA) caused by long-standing severe PAH.

Case: A 36-year-old women was hospitalized for exertional dyspnea in April 2021. She was diagnosed with ASD in 2006 and worsened in exercise capacity in recent 4 years. Echocardiography showed a dilated PA and right heart catheterization (RHC) showed severe PAH with pulmonary artery pressure of 93/39/56mmHg and PVR of 9.49 Wood*units. During the hospitalization, the electrocardiogram showed ST segment depression and abnormal T wave throughout the precordial leads and the elevated high sensitive troponin I (28 pg/ml) showed myocardial ischemia. Then Coronary angiography and coronary computed tomography angiography confirmed proximal left main coronary artery was compressed by the dilated pulmonary trunk.

Decision-making: After percutaneous coronary intervention (PCI) and PAH targeted therapy, the patient got improved in symptoms and hemodynamics at 6-month follow-up (Table). Coronary angiography confirmed excellent angiographic results without restenosis. Then, the patient received transcatheter defect closure using 34mm ASD occluder device. After the procedure, pulmonary artery pressure decreased to 61/27/39mmHg. One month after the defect closure, the patient was free of symptoms and echocardiography showed decreased PA diameter (Table).

Conclusion: LMCS should be considered in patients with PAH and myocardial ischemia. PCI and subsequently PAH targeted therapy could lead to good prognosis at short-term follow-up.

Table Clinical features and cardiac examinations

<table>
<thead>
<tr>
<th>Antidiagnosis</th>
<th>Before ASD closure</th>
<th>After ASD closure</th>
<th>1 month after ASD closure</th>
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<tr>
<td>WSO/PC</td>
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<td>HBP (mmHg)</td>
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<td>Np-proBNP (pg/ml)</td>
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<td>Nt-proBNP</td>
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<td>11</td>
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<tr>
<td>LVEF (L/min)</td>
<td>40</td>
<td>56</td>
<td>60</td>
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<tr>
<td>RVEF</td>
<td>2.04</td>
<td>2.08</td>
<td>1.65</td>
</tr>
<tr>
<td>PA pressure</td>
<td>48</td>
<td>45</td>
<td>37</td>
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<tr>
<td>Systolic PA (mmHg)</td>
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<tr>
<td>Mean (mmHg)</td>
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<td>PVR (mmHg/min)</td>
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<td>IAP (mmHg)</td>
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63 A Family of Cardiomyopathy

Dr Shing Lung Wong ¹
¹ Grantham Hospital, Hong Kong SAR

Background: Diagnosis of dilated cardiomyopathy is frequently made after echocardiography show dilated left ventricle and reduced ejection fraction. After coronary angiogram ruling out coronary artery disease, most physicians will focus on other heart failure management. This case illustrated how should we modify our approach to dilated cardiomyopathy with new advance.

Case: A 51-year-old man presented with heart failure symptoms in 2013. He was diagnosed with cardiomyopathy with ejection fraction of 20%. His father had sudden cardiac death at his 50s. He had two sisters and one of them was diagnosed dilated cardiomyopathy when he presented. Coronary angiogram showed normal coronaries. He was treated as dilated cardiomyopathy with guideline directed medical therapy and implantable cardioverter defibrillator. He was asymptomatic until 2015. He developed repeated heart failure decompensations with left ventricular assisted device finally implanted as a bridge and subsequently heart transplant performed in 2018. He was stable during follow up until one day in 2020, he told us his 20-year-old nephew in United State presented with ventricular fibrillation arrest and was resuscitated. His gene panel testing showed a novel frameshift truncating variant in filamin C gene (FLNC c.3702del).

Decision-making: We initiated testing to our patient and confirmed same genetic variant. We then conducted cascade testing to his two sisters, whose already had diagnosed dilated cardiomyopathy at the time of 2020 and both confirmed FLNC variants. The patient’s son, aged 29, has inherited the gene, but his daughter and another son were not yet tested. We drew a pedigree of this family and continued further genetic testing to his sister’s family.

FLNC variant is autosomal dominant with high penetrance. Genetic testing is important for this family to avoid another episodes of sudden
cardiac death and for early diagnosis of heart failure.

Conclusion:
This is a case of familial cardiomyopathy with FLNC variant. Genetic testing is a crucial tool in this case and should be in our toolbox in diagnosing cardiomyopathy.

A Case of Heart Failure During the Pandemic

Dr Ricky Leung
1 Queen Mary Hospital, Hong Kong SAR

Background:
This is a case of a 57-year-old lady, with background of aortic valve replacement (AVR) done in 2011 for severe aortic stenosis (AS), presented to the emergency department with acute heart failure symptoms for 3 days.

Case:
She presented mainly with acute shortness of breath and orthopnea. Around 10 days before the presentation, she had an episode of COVID-19 infection in which she experienced fever and mild upper respiratory symptoms. Deep throat saliva (DTS) test on admission confirmed positive test with CT value of 40.

On admission, she required 3 litres of oxygen therapy. She appeared in respiratory distress. JVP was elevated.

Electrocardiogram (ECG) showed sinus tachycardia of 120 beats per minute.

Chest X-ray (CXR) showed congested lung fields.

International normalised ratio (INR) was therapeutic at 2.5.

Decision-making:
In view of acute onset of heart failure symptoms, she was immediately brought to echo lab for echocardiogram next day.

Echocardiogram revealed impaired LVEF 40% with severe prosthetic AS with gradient of 103/64 mmHg and moderate to severe AR. There was also moderate to severe TR with estimated RVSP of 60 mmHg. IVC was dilated.

Subsequent fluoroscopy showed immobile bileaflets of the mechanical aortic valve.

Surgeon was immediately consulted. Redo AVR with tricuspid annuloplasty was performed at night on the same day. Intraoperatively, aortic valve was found to be jammed in a fixed partial opening position. Severe pannus and clot at ventricular side was noted.

Conclusion:
It is increasingly studied that COVID-19 predisposes patients to thrombotic events. This case illustrates mechanical valve thrombosis after COVID-19 infection despite a therapeutic and stable INR. In view of the widespread pandemic, we should have high index of suspicion of prosthetic thrombosis in relevant patients presenting with acute symptoms.

Gut Feeling in the Heart

Dr Chin Wai Lai 1, Dr Shing Ching 1, Dr Alexon Tsz Ki Lau 1, Dr Tak Shun Chung 1, Dr Chiu Sun Sunny Yue 1
1 United Christian Hospital, Hong Kong SAR

Background
Constrictive pericarditis is an uncommon cause of heart failure that can be challenging to diagnose. Bacterial pericarditis complicated with constriction is rarer yet potentially fatal especially in immunocompromised patients.

Case
A 44-year-old gentleman who had history of Crohn’s disease with colonic and complex enterocolic fistula on biologic therapy ustekinumab presented with acute pericarditis.

Electrocardiography showed diffuse ST elevation. Echocardiogram showed normal LVEF, no significant regional wall but thin rim of pericardial effusion. Microbiological and rheumatological workup were negative. He was treated with empirical tazocin and colchicine. A month later he returned in cardiac tamponade. Pericardiocentesis yielded 600ml purulent fluid which grew Bacteriodes. Pericardial urokinase was administered. Computed tomography with intravenous and oral contrast confirmed pericardial thickening, but no septic foci or fistulation between the bowel and pericardium. He received multiple courses of antibiotics to which clinical and biochemical inflammatory markers responded but not his symptoms of heart failure. Repeated echocardiogram showed septal bounce, enhanced interventricular dependence, exaggerated respiratory variation of mitral and tricuspid inflow, hepatic vein end-expiratory diastolic flow reversal and thickened pericardium diagnostic of constrictive pericarditis. Coronary angiogram was normal. Right heart catheterization demonstrated constrictive physiology including discordant respirophasic variation of right and left ventricular systolic pressures, prominent y-descent of right atrial pressure and square root sign of ventricular diastole. The patient received pericardectomy. Tissue biopsy cultured positive for Extended Spectrum Beta-Lactamase positive E. Coli. Antibiotic was changed to ertapenem. The patient was discharged with resolution of heart failure symptoms.

Decision making
Diagnosis of constrictive pericarditis was not immediately apparent, and only revealed after persistent heart failure symptoms prompting further investigations. A high index of suspicion and knowledge of key echocardiographic features is crucial for timely diagnosis and treatment. Purulent pericarditis as a cause of constriction is uncommon. Our patient was on ustekinumab for Crohn’s disease - a monoclonal
antibody targeting interleukins-12 and -23 rendering him susceptible to septicemia. Heightened clinical awareness of infectious complications is essential in patients on biologic immunosuppressants.

Conclusion
This case of purulent pericarditis complicated by constriction in an immunocompromised patient illustrates the importance of high clinical and echocardiographic vigilance in diagnosis of such potentially lethal condition.

99 Right Atrial Mass with Inflow Obstruction in a Patient with IgG4-Related Disease

Dr Joyce Shek1, Dr Lok Yi Wu1, Dr Chun Kit Wong1, Dr Wai Man Vivien Mak1, Dr Ngai Yin Chan1
1 Princess Margaret Hospital, Hong Kong SAR

Background:
We report a case of right atrial (RA) mass found in a heart failure patient with known immunoglobulinG4-related disease (IgG4-RD).

Case:
An 80-year-old Chinese man had a history of IgG4-RD with chronic lymphadenopathy and was on steroid. He presented with repeated admissions for heart failure. Echocardiogram showed a large heterogeneous mass in the RA, which measured 5cm across, occupying most of the dilated RA with extension to the intravenous cava. There was flow acceleration seen across the mass, causing a right ventricular inflow obstruction with a mean gradient of 4mmHg. Computed tomography showed a 7.5cm intracardiac mass and prominent mediastinal lymph nodes. He developed progressive renal impairment and thrombocytopenia. The IgG4 level remained stable.

Decision-making:
The differential diagnoses included multiple myeloma (MM) with extramedullary plasmacytoma involving the heart, cardiac involvement by IgG4-RD, or primary cardiac tumours like lymphoma, atrial myxoma, or cardiac angiosarcoma. Bone marrow examination showed a normocellular marrow without light chain restriction, excluding MM. Histologic evaluation was deemed necessary for a diagnosis that could guide definitive treatment. RA mass biopsy was done and histology came back to be diffuse large B cell lymphoma (DLBCL). The possible aetiological mechanism underlying the lymphomagenesis of IgG4-related disease has not been well-delineated, but it is known that chronic inflammation predisposes to lymphoma. It has also been postulated that DLBCL could represent clonal transformation from an underlying low-grade B-cell lymphoma co-existing with but undiagnosed during the time of IgG4-related disease. In our case, reduced intensity chemotherapy was started. Unfortunately, he could not tolerate chemotherapy and succumbed during the first cycle.

Conclusion:
We report a rare case of heart failure caused by DLBCL, which developed 6 years after the diagnosis of well-controlled IgG4-RD. To date, the number of similar published cases is less than 50. We should be alerted to this rare but potential linkage between IgG4-RD and lymphoma.

90 Syphilitic Aortitis and Ostial Coronary Stenosis Treated by Endarterectomy, Bypass Grafting and Aortic Valve Replacement

Dr Shavonne Ki-fung Ip1, Dr. Kevin Lim1, Dr. Randolph Hung Leung Wong
1 Prince Of Wales Hospital, Hong Kong, Hong Kong SAR

Background
The entity of syphilitic ostial coronary stenosis was first reported in 1935. It was the third most common presentation of cardiovascular syphilis, accounting for 26% of cases in Hegveit’s autopsy series.

Case
A 47-year-old woman presented to the emergency department with 2-day history of crescendo chest pain, palpitations, and shortness of breath on exertion. Echocardiography showed severe aortic regurgitation due to delayed closure of the left coronary cusp. Cardiac catheterization showed a slit-like left main ostium. ECG-gated CT of the aortic root demonstrated calcified plaque circumscribing the sinotubular junction, causing subtotal obstruction of the left coronary ostium and partial obstruction of the right.

Decision-making
This constellation of findings prompted investigations for myriad aetiologies of infectious and inflammatory aortitis. The Venereal Disease Research Laboratory test was positive, which was confirmed by a positive enzyme immunoassay for Treponema antibodies.

Through a median sternotomy, aortic valve replacement, coronary ostioplasty and coronary artery bypass grafting to the left anterior descending and obtuse marginal arteries was performed. Intraoperative challenges associated with the syphilitic aortic root were highlighted. After institution of cardiopulmonary bypass, cross-clamping and aortotomy, the fibrotic tissue in the aortic root obscured the view to both coronary ostia. Ice slush was applied and cold fibrillatory arrest was achieved. After exposure of the aortic root with traction sutures and endarterectomy close to the coronary ostia, it was possible to administer cardioplegia through the ostia to achieve electrical quiescence.

In deciding between coronary ostioplasty and CABG, durability was the primary concern. Although the aortic intima surrounding the right ostium was healthy and cardioplegia can be administered smoothly, the left ostium remained atretic and cardioplegia cannot be administered as smoothly as on the right. Thus, the decision was made to proceed to bypass grafting to the left coronary circulation and spare the right.

Conclusion
The classical clino-radio-pathological characteristics of syphilitic aortitis were demonstrated. Intraoperative challenges associated with the syphilitic aortic root were highlighted.
Plug and Clip: Percutaneous Repair of a Perforated Mitral Valve Complicating Severe Functional Mitral Regurgitation

Background

Perforation of mitral valve leaflet together with severe functional mitral regurgitation would be a challenging transcatheter case in high risk surgical patients. The case below demonstrated how to use a Plug and MitraClip to treat this patient.

Case

A 45-year-old lady with background of diabetes mellitus, hypertension, supravalvular aortic stenosis with repeated aortic root enlargement and mechanical aortic valve replacement (AVR), presented with persistent heart failure. Echocardiogram found a perforated A1 mitral valve (MV) scallop (6x4mm) near the lateral tricuspid and severe functional mitral regurgitation (FMR) due to bi-leaflet tethering. Decision Making

In view of high re-operative risk, Heart team recommended percutaneous plugging of the perforated leaflet and transcatheter edge-to-edge repair (TEER) to treat the FMR for persistent heart failure symptoms.

Device simulation on patient-specific 3D-printed model found the soft 6-4mm ADO II (Abbott) fit the defect optimally without obstructing the left ventricular outflow track (LVOT).

After transseptal access, a 7 Fr Judkins Right-4.0 (JR4) guiding catheter (Cordis) through an Agilis Medium Curl (Abbott) was used to engage the perforation. Then, a telescoping system was implemented using an angled-Glidewire (Terumo), a Navicross microcatheter (Terumo), a 5 Fr ST01 guiding catheter (Terumo) to cross the perforation. This eliminated the need of stiff wire, hence avoided potential injury or impingement to the soft mobile MV and hemodynamic instability. A 6/4mm ADO II was successfully deployed with trivial residual leak. TEE showed persistent severe FMR and TEER was performed over A2P2 segment using the MitraClip G4 NTW Clip (Abbott), reducing the MR to mild and V-wave from 83mmHg to 23mmHg.

Different from the previous report that used MitraClip to stabilize the mobile MV before plugging a perforation, our case illustrated that plugging a perforation in a mobile MV before plugging our case illustrated that plugging a perforation in a mobile MV facilitated by using telescoping delivery system followed by TEER for residual FMR is feasible. This approach 1) allows reassessment of severity of FMR after plugging, 2) reduce the risk of inadvertent dislodgement of MitraClip during plugging, 3) maintain safe access across the mitral valve in the presence of mechanical AVR if additional rail support is needed during plugging. The case also highlighted the importance of pre-procedural...
simulation on patient-specific 3D-printed model to choose the optimal device that seal the perforation without interfering LVOT and AVR.

Conclusion
This case highlighted the method of using the Plug and Clip together with 3D printed model to successfully treating this patient.

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Mechanical Thrombectomy for Devastating Embolic Stroke after Emergent Cardioversion for Severe Aortic Stenosis with Cardiogenic Shock

Dr Chun Kit Wong, Dr Jerome Wu  
Princess Margaret Hospital, Hong Kong SAR

Background:
A 74-year-old woman had been scheduled for heart team assessment for severe degenerative aortic stenosis, pending outpatient coronary angiogram.

Case:
She was sent to the emergency room of an outside facility for acute chest pain at night; she was tachycardic and in cardiogenic shock. ECG showed atrial fibrillation with fast ventricular response, ST elevation over leads aVR and V1, and reciprocal ST depressions in inferolateral leads. Urgent synchronized cardioversion was deemed necessary due to hemodynamic instability, and the patient returned to sinus rhythm with improved blood pressure afterward.

In the CCU, she required dopamine and amiodarone infusion. Upon receiving rising troponin result, dual antiplatelet therapy, together with low-molecular-weight heparin, were prescribed, and our unit was consulted for coronary angiogram. Right before transferal, the patient complained of left sided weakness, 13 hours after cardioversion. Plain CT brain showed no hemorrhage; after which she was taken over to our facility.

An urgent CT perfusion scan was performed immediately after arrival, after consulting with interventional neurologist - an abrupt occlusion was noted at distal right ICA, with a poorly collateralized right MCA and thus early MCA infarct. It was decided to proceed to mechanical thrombectomy noting a potentially salvageable penumbra; the needle-to-reperfusion time was 20 minutes, with a mTICI-3 flow to both right MCA and ACA. The patient regained left sided limb power afterward.

Intravenous heparin infusion was started.

Decision-making:
How would you proceed to manage this critically ill patient with recent embolic stroke and underlying severe AS and uncertain coronary anatomy?

Conclusion:
Unfortunately before any workup for heart surgery, the patient developed seizure requiring endotracheal intubation and mechanical ventilation. TEE demonstrated an alarmingly large LAA thrombus that was ready to embolize on each atrial contraction; elevated diastolic flow velocities of the left coronary artery also lent suspicion to coronary obstruction. This patient was deemed not a surgical candidate due to her neurological status and succumbed soon after from recurrent stroke.

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Use of Coronary Physiologic Index in the Treatment of a Rare Coexisting Coronary Artery Fistula and Severe Coronary Artery Disease: A Case Report

Dr Aiza-Meriam Tahil  
University of the Philippines- Philippine General Hospital, Manila, Philippines

INTRODUCTION:
Coronary Artery Fistula (CAF) is a rare abnormal communication between a coronary artery and a cardiac chamber, vein or intrathoracic vessel. Most are small and asymptomatic, but they may become complicated with age and subsequent alteration of normal coronary hemodynamic parameters. CAF combined with a severe coronary artery disease (CAD) is an even more uncommon occurrence, requiring careful assessment for safe and effective treatment. This may include use of a non-hyperemic physiologic index scan such as a Relative Flow Reserve (RFR) that can be utilized to document physiologically significant stenoses and possible coronary steal phenomenon for appropriate management.

CASE:
A 46-year-old female sought consult at our institution for a 2-year history of angina and heart failure symptoms. Work-up showed unremarkable ECG and 2D echo findings, but with a positive dobutamine stress echo of hypokinesia in the entire interventricular septum. A coronary angiogram was eventually done, which revealed a large CAF from the proximal left anterior descending (LAD) artery to the pulmonary artery, and an adjacent stenosis in the LAD artery.

DECISION-MAKING:
RFR was utilized to document functional significance of the coronary lesions before and after transcatheter coil embolization of the CAF, and normalization of physiologic index after deployment of drug-eluting stent for the LAD stenosis. There was resolution of symptoms post-procedure.

CONCLUSION:
A rare combination of a CAF and severe coronary stenosis may be treated by pursuing a stepwise strategy for treatment of both diseases, including utilization of coronary physiologic testing by RFR.
Percutaneous Left Ventricular Assist Device Circulatory Support for Salvage Ventricular Tachycardia Ablation in Patient with Cardiogenic Shock and Electrical Storm

Dr. Ho Ting Abe Ngan, Dr. Chor Cheung Tam, Dr. Ka Chun Timothy Un, Dr. Chun Ka Emmanuel Wong, Dr. Chun Yu Leung, Professor Hung Fat Tse

1 Queen Mary Hospital, Hong Kong SAR
2 Tseung Kwan O Hospital, Hong Kong SAR

Background: Mapping and ablation of hemodynamically unstable ventricular tachycardias (VTs) in patients with cardiogenic shock is challenging.

Case: We report a case with successful VT ablation supported by percutaneous left ventricular (LV) assist device (Impella) in a 61-year-old man with ischemic cardiomyopathy admitted for cardiogenic shock and VT storm, despite antiarrhythmics and device therapy. He has prior myocardial infarction and history of VF arrest with cardiac resynchronisation defibrillator. He had VT storm in 2017 which failed VT ablation but controlled after left stellate ganglion block. He presented with cardiogenic shock and VT storm in 2022. His LVEF was 12% and he had monomorphic ventricular tachycardia of different morphologies, requiring repeated anti-tachycardia pacing and defibrillation. Carto mapping guided substrate-based VT ablation was performed via transseptal approach (Figure 1A), with hemodynamic support with percutaneous LVAD. Substrate mapping was done in sinus rhythm and scar homogenisation was achieved with radiofrequency ablation (Figure 1B), achieving electrical quiescence in post-operative period.

Decision making: In advanced heart failure patient, control of ventricular arrhythmias is essential even if mechanical LVAD is being considered, due to potential reduction in pump flow secondary to incessant ventricular tachycardia and right ventricular failure. Given such poor LVEF, mechanical circulatory support is necessary to assist ablation procedure. We chose percutaneous LV assist device over VA-ECMO, as the latter would involve two large-bore catheters and vascular repair of the arterial access site after procedure.

Conclusion: We reported a successful case of Impella assisted VT ablation.

Recurrent Cyanotic Spells in an Octogenarian: Too Old to Have PFO?

Dr. Chun Kit Wong, Dr. Joyce Shek

1 Princess Margaret Hospital, Hong Kong SAR

Background:

An active and independent octogenarian received care in an outside institution for dyspnea. In her first hospitalization ever, she was immediately started on BIPAP for type 1 respiratory failure, which was quickly weaned off the next day. Despite being a smoker, CT thorax showed no significant pulmonary parenchymal or vasculature pathology. Inpatient overnight oximetry performed for episodic desaturation was normal. A transthoracic echo was unremarkable apart from age-compatible tortuous and dilated ascending aorta. She was treated with bronchodilator puffs for suspected COPD, pending formal lung function test.

Case:

She was admitted to our inpatient medical floor for dyspnea and desaturation. During the first week of hospitalization, she was noted to have orthodeoxia by the physiotherapist, with documented symptomatic desaturation improved by lying down. One night she was found cyanotic and lost consciousness; a decision to intubate was made by the on call physician and anesthetist.

After starting mechanical ventilation, it was noted that she would sustain horrifying periods of cyanosis, with bedside SpO2 down to 50%, and the hypoxemia was confirmed by arterial blood gas sampling, despite breathing an FiO2 1.0; saturations would miraculously returned to normal without any intervention. Bedside transthoracic echo during desaturation found a flap-like structure in the interatrial septum, which was subsequently confirmed to be a 8 mm-wide PFO on transtesophageal echocardiogram. Agitated saline bubbles passed...
freely to the left atrium during flap opening; the tortuous ascending aorta together with the dilated aortic root caused extrinsic compression onto the right heart, causing some degree of functional tricuspid stenosis, anatomically and preferentially shunting blood to push open the flap instead of following the normal path to the pulmonary circulation. The extrinsic PEEP only served to worsen this physiology.

Decision-making:

There was aspiration pneumonia peri-intubation, and she was not fit for extubation. PEEP was stepped down to low levels. Was she too old for urgent PFO closure?

Conclusion:

Emergency PFO closure was performed under TEE guidance.

Paediatric Cardiology Program - Free Paper Session (Abstract Presentations)

1 Risk Of Atrial Fibrillation in Patients with Congenital Heart Disease: The Known, the Unknowns, the Unforgettable

Prof Wei Syun Hu1,5

1 Physician, China Medical University Hospital, Taiwan

Aim: The objective was to compare the rate of atrial fibrillation (AF) onset in patients with congenital heart disease (CHD) compared to controls.

Methods: Using a large number of samples extracted from nationwide cohort data in Taiwan, the authors used a propensity-matching procedure and multivariable Cox models to assess the risk of AF by CHD.

Results: A cohort of 19,439 CHD patients and a non-CHD control cohort included in this study. The cumulative incidence of AF was significantly higher in the CHD cohort than in the non-CHD cohort (p < 0.001). After controlling for confounding factors, the adjusted hazard ratio (aHR) of AF was 4.23 (95% confidence interval [CI] 3.31-5.41) in the CHD cohort, compared to the non-CHD cohort.

Conclusions: A significant association between CHD and AF risk was found.

19 Metabolomic Profiling Reveals Metabolic Alterations of the Serum in Kawasaki Disease

Ms Xue Fan1, Mr Ke Li1, Mr Mingguo Xu1, Mr Xin Guo1, Mr Lemin Zheng1

1 Longgang District Maternal & Child Healthcare Hospital of Shenzhen City, Guangdong/Shenzhen, China

Background: With the continuous development of metabolomics, more and more researches were applied in cardiovascular diseases. Kawasaki disease (KD) is a characteristically multi-systemic vasculitis syndrome. However, the role of metabolism in KD pathogenesis remains unclear.

Methods: A total of 142 subjects from 4 clinic centers were collected, including 82 normal children and 60 KD patients. Untargeted metabolomics and Trypophan-targeted metabolomics were conducted, then, we established LCWE-induced KD coronary arteritis mice model to explore the role of metabolism in KD by imiquimod (IMQ). Meanwhile, we analyzed the public single-cell RNA sequencing data in our previous study about KD peripheral blood mononuclear cells. Results: Through the non-targeted metabolomics approach, we detected distinct clusters of metabolites in serum between KD patients and health controls. Further targeted metabolomics confirmed the changed trends. The levels of tryptophan (Trp) and indole acetic acid (IAA) were significantly lower in KD patients, whereas the levels of L-kynurenine (Kyn) and kynurenic acid (Kyna) were significantly increased in both cohorts. ROC curve of the combination of Trp, IAA, Kyn and Kyna indicates a very good ability to determine the presence of KD in two independent cohorts (AUC=0.970, AUC=0.942 respectively). Moreover, the trends of Trp, IAA, Kyn and Kyna in KD coronary arteritis mice model were consistent with those in KD patients. These expression of aromatic hydrocarbon receptors (AHR) in KD patient was significantly increased than normal child from the KD single-cell RNA sequencing data in our previous research, which was consistent with the speculation.

Conclusions: Our results suggested Trp metabolic pathway are significantly altered in KD, especially the metabolism of Trp, IAA, Kyn and Kyna, which may play key roles in the pathogenesis of KD. These metabolic indicators may become new biomarkers and provide new strategies for the diagnosis and treatment of KD.

Table 2 Demographics of KD patients and healthy control subjects in the validation cohort

<table>
<thead>
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<th>(Cohort)</th>
<th>KD patients</th>
<th>Healthy control subjects</th>
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<tr>
<td>Male</td>
<td>33 (52.4%)</td>
<td>36 (59.0%)</td>
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<tr>
<td>Female</td>
<td>30 (47.6%)</td>
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<td>Age in years</td>
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<td>4.2 ± 3.21</td>
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36 Aortic Regurgitation Requiring Unplanned Surgery following Transcatheter Closure of Ventricular Septal Defect in Children: Incidence and Risk Factors

Mr Kaijun Zhang1, Dr Penghui Yang1,2,4,5, Dr Dan Yin1,2,4,5, Prof Mi Li2,3,7, Dr Xiaohua Liang2,4,5,6,7, Prof Tiewei Lx1,2,4,5, Prof Jie Tian1,2,4,5, Dr Min Zheng1,3,4,5, Prof Ping Xiang1,2,4,5

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2 Department of Cardiovascular Medicine, Children’s Hospital of Chongqing Medical University, Chongqing, China
3 National Clinical Research Center for Child Health and Disorders, Chongqing, China
4 Ministry of Education Key Laboratory of Child Development and Disorders, Chongqing, China
5 Chongqing Key Laboratory of Pediatrics, Chongqing, China
6 Clinical Epidemiology and Biostatistics Department, Children’s Hospital of Chongqing Medical University, Chongqing, China
7 China International Science and Technology Cooperation Center of Child Development and Critical Disorders, Chongqing, China

Objective: To investigate the incidence and risk factors for aortic regurgitation requiring unplanned surgery after transcatheter closure of ventricular septal defect (VSD) in children.

Methods: Medical records of 876 children with VSD who underwent transcatheter closure from July 2009 to September 2018 in our hospital were retrospectively reviewed. Groups with and without new-onset or increasing aortic regurgitation requiring unplanned surgery were compared. Univariate and multivariable analyses were used to identify the possible risk factors.

Results: A total of 29 children (3.16%) underwent unplanned surgery after transcatheter closure new-onset or increasing aortic regurgitation. Multivariable regression analysis revealed that preoperative mild aortic regurgitation (OR: 60.296, 95%CI 11.512–315.811, P < 0.001), lager ratio between diameter to body surface area (OR: 1.253, 95%CI...
1.012–1.553, P=0.039), intracristal VSD (OR: 34.039, 95% CI 4.063–285.147, P < 0.001), and shorter distance from the upper edge of defect to the aortic valve (OR: 0.0117, 95% CI 0.050–0.273, P < 0.001) were risk factors for new-onset or increasing aortic regurgitation requiring unplanned surgery.

Conclusions: Preoperative mild aortic regurgitation, lager ratio between diameter to body surface area, intracristal VSD and shorter distance from the upper edge of defect to the aortic valve could increase the risk of severe aortic regurgitation requiring unplanned surgery after transcatheter closure of VSD.

Use Of Treprostinil in Pediatric Patients with Idiopathic Pulmonary Arterial Hypertension —— From Single Center Experience

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Background: The prognosis of children with idiopathic pulmonary arterial hypertension (IPAH) were deemed poor. Previous studies demonstrated prostacyclin analogue could improve clinical symptoms in IPAH patients. However, the high cost of medicines brings a large economic burden to patients, and most patients cannot use them for a long time. We aimed to describe the outcomes of pediatric IPAH patients who had used Treprostinil when seriously ill then withdrew that therapy. There would be clinical worsening after withdrawn Treprostinil. Selexipag could be an alternative when patients were not in high risk.

Methods: We retrospectively reviewed the data of patients who had used Treprostinil from 2008.8 to 2021.6 in our medical center, all patients at least had one follow-up after withdrew Treprostinil therapy. Results: We included thirteen patients with an average age of 10.99±5.01 years, ten of whom were proved to be genetic mutation carriers. At baseline, all patients were in WHO-FC III-IV. Blood test revealed right heart dysfunction with average BNP of 438.±38.62pg/ml. All patients received right heart catheterization (RHC) at baseline. Three patients received RHC after initiating Treprostinil for severe heart failure. Ten patients received RHC before initiating Treprostinil and three of them developed pulmonary hypertension crisis after the procedure. The results showed a significantly elevated mean pulmonary artery pressure which was higher than mean aortic artery pressure with elevated pulmonary vascular resistance index (PVRI) of 24.46±7.76 WU*m2. Acute vasoreactivity test were negative for all.

Eleven patients received dual oral medication of ERA and PDE5i and two patients received ERA only. The median duration of Treprostinil therapy was 4.31 (2.85,6.41) months with a median dose of 20ng/kg*min. Clinical symptoms were significantly improved (Table). All patients were in WHO FC II after the therapy and BNP decreased to 62.38±37.10 pg/ml. Echocardiography demonstrated left ventricle dimension increased and right ventricle dimension decreased. After withdrew Treprostinil, three patients added selexipag and ten patients sustained original oral medications. Patients were followed up for 5.7 (3.95,7.85) months after withdrew Treprostinil. Two patients died during the follow up. For the rest of eleven patients, two patients had clinical worsening, nine patients were still at WHO-FC II. However, BNP and right ventricle dimension increased at follow-up for the eleven patients (Table). Among whom, the three patients with triple oral medications had decreased right ventricle dimension (24.67±4.93 VS 28.00±11.79 mm).

Conclusion: There was improvement in clinical characteristics by use of Treprostinil, however, there would be clinical worsening after withdrew Treprostinil. Selexipag could be an alternative when patients were not in high risk.

Table: clinical characteristics of patients

<table>
<thead>
<tr>
<th>WHO-FC</th>
<th>Baseline (n=13)</th>
<th>Withdraw Treprostinil (n=13)</th>
<th>Follow-up (n=11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>0</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>III</td>
<td>4</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>IV</td>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>BNP(pg/ml)</td>
<td>438.00±79.07</td>
<td>62.38±37.10</td>
<td>101.29±174.30</td>
</tr>
<tr>
<td>TRVmax(1/min)</td>
<td>465.38±38.62</td>
<td>417.81±40.94</td>
<td>403.55±74.69</td>
</tr>
<tr>
<td>RVD(mm)</td>
<td>27.99±7.12</td>
<td>22.13±7.46</td>
<td>23.82±7.21</td>
</tr>
<tr>
<td>LVD(mm)</td>
<td>33.85±6.79</td>
<td>39.46±4.96</td>
<td>38.91±6.73</td>
</tr>
</tbody>
</table>

TRVmax: peak velocity of the tricuspid valve regurgitant jet; RVD: right ventricle dimension; LVD: left ventricle dimension

Reversed Potts Shunt for Treatment of Drug-Refractory Idiopathic Pulmonary Arterial Hypertension in Children: A Short Series of Three Cases and Review of Literature

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Background: Reversed Potts shunt has been proposed as a palliative procedure in children with supra-systemic idiopathic pulmonary arterial hypertension to improve right ventricular function, functional capacities, and survival. This study aimed to review the outcomes of patients after reversed Potts shunt in our unit.

Methods: The clinical, echocardiographic, and functional outcomes of three children who underwent surgical Potts shunt creation for idiopathic pulmonary arterial hypertension at the Department of Paediatric Cardiology, Queen Mary Hospital were reviewed.

Results: Pre-operatively, all three children (aged 6.3 to 8.1 years) were in World Health Organisation (WHO) functional class III or IV. Two had been listed for lung transplantation, and one was dependent on continuous intravenous inotropic infusion. Early post-operative death occurred in one patient with severe pre-operative right ventricular failure. The two survivors were both discharged with improved right ventricular function, WHO functional class, and ongoing transplant-free survival at 29 and 54 months after surgery (at the most recent follow-up). One surviving patient experienced spinal cord ischaemia with likely permanent neurologic deficit.

Conclusions: Reversed Potts shunt creation has the potential to improve right ventricular function, WHO functional class, and transplant-free survival duration in paediatric patients with supra-systemic idiopathic pulmonary arterial hypertension. Spinal cord ischemia is a
rare complication, and extreme caution to avoid systemic embolisation should be observed.

Results

Among international risk scoring systems, modified Kobayashi score demonstrated fair sensitivity (52.5%), good specificity (75.1%), PPV (31.1%), NPV (88.2%) and diagnostic odds ratio (3.4) in the retrospective cohort. CUHK-KD score was constructed based on two independent significant predictor, urea and lymphocyte count, with a unique scoring methodology in capturing its underlying variability. CUHK-KD score outperforms international risk scores in our population with good sensitivity (70.3%), good specificity (72.4%), PPV (35.6%), NPV (91.8%) and diagnostic odds ratio (6.2). The prospective cohort confirms CUHK-KD score’s performance with good sensitivity (83.3%), good specificity (72.7%), PPV (52.6%), NPV (92.3%) and diagnostic odds ratio (13.3).

Conclusion

A novel scoring system CUHK-KD score is accurate in forecasting IVIG resistance in paediatric Kawasaki disease in our population and is deployable for clinical use.
Background: Circular RNAs (circRNAs) have been found to be involved in the development of pulmonary arterial hypertension (PAH). However, their diagnostic value in pediatric PAH remains unclear. This study aimed to examine the characteristic expression of the circRNA hsa_circ_0003416 in the plasma of children with PAH caused by congenital heart disease (CHD); the potential of hsa_circ_0003416 as a diagnostic biomarker was also investigated.

Methods: The plasma expression levels of hsa_circ_0003416 were determined via quantitative reverse transcription–polymerase chain reaction in 50 CHD patients, 50 PAH patients, and 20 healthy subjects; the associations between hsa_circ_0003416 levels and clinical data were analyzed thereafter. Receiver operating characteristic curves were employed to determine the diagnostic capacity of this circRNA. Enrichment analysis was conducted based on the target genes of hsa_circ_0003416.

Results: Expression levels of hsa_circ_0003416 in plasma were lower in the PAH-CHD group than in the CHD and healthy control groups (P<0.01). Serum albumin level and Z score of the left main coronary artery at baseline were warning indicators for CAA development. More intensified or adjunctive therapies and close follow-up should be considered for high-risk patients with these risk factors.

Conclusions: In the Chinese pediatric population with KD, the Xie Liping scoring system is the most appropriate method for identifying high-risk patients, and IVIG resistance could be predicted based on the B/A ratio. Serum albumin level and Z score of the left main coronary artery at baseline were warning indicators for CAA development. More intensified or adjunctive therapies and close follow-up should be considered for high-risk patients with these risk factors.

Two-dimensional Speckle-tracking Echocardiographic Study on Dyssynchronous Ventricular Contraction for Children and Adolescents with Wolff-Parkinson-White Syndrome

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Background
In this study we use longitudinal speckle-tracking echocardiography (2D-STE) to evaluate ventricular contraction synchronicity in pediatric patients with WPW syndrome before and after transcatheter ablation. We also study the concordance between 2D-STE and endocardial mapping or electrocardiographic algorithm in pathway localization.

Methods: Seventeen WPW syndrome patients with mean age 11.0 ± 5.9 years underwent conventional echocardiography and longitudinal 2D-STE and the results were compared with 7 healthy controls. A repeat echocardiography was performed for patients who underwent electrophysiology study (EPS) and pathway ablation. To assess the concordance of the pathway localization methods, echocardiographic performers were blinded to the endocardial mapping and electrocardiographic pathway localization algorithm results.

Results: Compared with controls, WPW patients showed no difference in global systolic and diastolic function. The ventricular dyssynchrony parameters were significantly worse in WPW patients, including pre-ablation time difference between right and left ventricles (mean 12.1 ± 6.9 ms vs -14.1 ± 21.6 ms, p<0.005), septal to posterior wall motion delay (SPWMD)(mean 70.6 ± 33.8 ms vs 27.3 ± 7.1 ms, p=0.003), maximum intraventricular delay corrected to RR interval (mean 155.8 ± 48.1 ms vs 66.6 ± 30.3 ms, p<0.001) and 17-segments mechanical dispersion index (PSD) (mean 49.4 ± 13.4 ms vs 30.5 ± 6.4 ms, p=0.002). Five WPW patients underwent EPS and pathway ablation. Among the 3 with successful ablation, there was significant improvement in ventricular synchronization with mean SPWMD reduced from 77.3 ± 14.2 ms to 23.3 ± 6.7 ms (p=0.029) and mean PSD reduced from 57.8 ± 13.6 ms to 45.6 ± 13.7 ms (p=0.013).

2D-STE accurately matched with endocardial pathway localization in all 5 patients who had EPS. For the other 12 patients, 2D-STE data matched with the electrocardiographic pathway localization in 11.

Conclusion: In pediatric patients with WPW syndrome, there was association of accessory pathway with dyssynchronous ventricular contraction and preliminary data showed improvement after pathway ablation. 2D-STE showed good concordance with electrocardiographic prediction and endocardial mapping.
Paediatric Cardiology Program - Free Paper Session (Interesting Case Presentations)

110 Fetal and Neonatal Chiari Network Mimicking Atrial Myxoma

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**Background**

Fetal intracardiac masses are rare and may carry sinister consequences. We hereby describe a multi-disciplinary managed case of suspected fetal atrial myxoma with neonatally diagnosed huge Chiari network. Key echocardiographic features are elucidated.

**Case**

A 30-year old lady with no family history of cardiac tumour was referred for suspected fetal atrial myxoma. Fetal echocardiogram revealed an irregular mass 4.4 x 5.2 x 7.2mm within right atrium. The mass was attached to the posterior wall of the right atrium through a stalk and appeared freely mobile. As cardiac intervention was anticipated, perinatal management was discussed jointly among obstetrician, neonatologist, paediatric cardiologist and cardiothoracic surgeons.

Baby girl was delivered at 38 weeks and 2 days with a birth weight of 2.69kg. Baby was supported with continuous positive airway pressure after birth for mild respiratory distress. Vital signs and physical examination were normal. She was transferred to paediatric cardiology centre after initial stabilization.

Neonatal echocardiogram showed a right atrial mobile irregular iso-echogenic mass oscillating in a whip-like motion with string-like attachments originating from the orifice of inferior vena cava (IVC) and the atrial wall, compatible with a Chiari network. The network transversed the tricuspid inflow with no significant inflow obstruction. She was managed conservatively and remained asymptomatic at three months old with echocardiogram showing a similar Chiari network.

**Decision-making**

Fetal and neonatal myxoma is rare, can occur in any cardiac chambers, and is usually hyperenhogenic with small lucencies and calcifications. One short broad-based pedicle attaching to the chamber wall can be identified. In contrast, large Chiari network presents itself as a mobile mass of varying size and shape with a whip-like motion with each cardiac cycle on sonography.

**Conclusion**

Fetal and neonatal echocardiographic features can be used to delineate atrial myxoma and Chiari network.

115 Right Ventricular Outflow Tract Stenting with Hybrid Surgical Cut-Down for Access in a Neonate with Pulmonary Atresia with Sub-arterial Type of Ventricular Septal Defect: The Decision-making, The Procedure and Its Complication

**Dr Kwong Man Yu** 1, Dr Hay Son 1, Robin Chen 1

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**Background:**

A newborn with antenatal diagnosis of membranous type of pulmonary atresia, sub-arterial ventricular septal defect (VSD), right aortic arch, patent ductus arteriosus (PDA) from left innominate artery and partial anomalous pulmonary venous drainage with left superior pulmonary venous vein draining to innominate vein via an ascending vein was transferred to HK Children’s Hospital for further management.

**Case:**

The newborn was born small for gestational age and was put on prostaglandin E2 (PGE2) for ductal patency. Radiofrequency (RF) assisted opening of right ventricular outflow tract (RVOT) followed by stenting was performed at 1-month-old when she was 3.2kg. Surgical cut-down of left common carotid artery was accessed for retrograde access.
RVOT stenting. First attempt of RF assisted puncture under fluoroscopic and transthoracic echocardiographic guidance complicated with RVOT perforation and result in small pericardial effusion. Second attempt was successful. The RVOT was dilated with 3/12mm coronary balloon, followed by RVOT stenting using resolute ONYX Zotarolimus eluting stent (5/12mm). The patient was discharged home with dual anti-platelet. In follow-up the RVOT stent was fractured on chest X-ray. Echocardiography revealed the proximal portion of stent in satisfactory position at RVOT and patent. Distal portion was located at the insertion of PDA at pulmonary stump. Branch pulmonary arteries were patent. The PDA was closed.

Decision-making:
Several options of intervention were considered. RF assisted opening and stenting of RVOT stenting with antegrade approach was difficult in sub-arterial VSD as lack of sub-pulmonary infundibulum to stabilize the catheter tip. PDA stenting was not feasible as the guidewire straightened the PDA and it was large up to 6mm. One stage total correction in neonatal period remained the last resort for its high surgical risk.

Conclusion:
Hybrid intervention of RF assisted opening RVOT retrogradely with surgical cut down of left common carotid artery followed by stenting was performed as a staged procedure to secure pulmonary blood flow. The patient was planned for total correction in the next stage.

Flail Tricuspid Valve: A Rare Cause of Neonatal Cyanotic Heart Disease – A Case Report

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2 Hong Kong Children’s Hospital, Hong Kong SAR

Background
Severe tricuspid regurgitation (TR) due to flail tricuspid valve is a rare but potentially fatal cause of cyanosis in newborns. The presentation, diagnosis and management of flail tricuspid valve will be discussed. Case
A full-term female newborn presented with severe cyanosis and respiratory distress soon after birth, requiring endotracheal intubation and mechanical ventilation. A grade 3/6 pansystolic murmur over the left sternal border was noted on physical examination and chest-x-ray showed cardiomegaly.

Subsequent echocardiogram showed flail anterolateral leaflet of the tricuspid valve with severe TR. The right ventricular papillary muscles appeared echogenic with no chordae attached. There was also functional pulmonary atresia with limited opening of pulmonary valves and poor antegrade pulmonary blood flow. A large patent ductus arteriosus (PDA) with left-to-right shunting towards the pulmonary valve was evident. Other segmental structures of the heart were normal.

Decision-making
Sildenafil and inhaled nitric oxide were given to promote antegrade pulmonary blood flow. Prostaglandin (PGE2) infusion was also given initially to maintain ductal patency and left-to-right shunting, but was later stopped in an attempt to reduce the PDA jet from hindering pulmonary valve opening. However, the oxygen saturation deteriorated when the ductus started closing and hence, PGE2 infusion was resumed again. She also developed hypotension requiring inotropic support, including dopamine and milrinone infusion. Despite escalation of medical therapy, the antegrade pulmonary blood flow remained poor and TR remained severe. Tricuspid valve repair surgery was eventually performed on day 4 of life. Postoperatively, she was able to wean off from ventilator and inotropic support within one week of surgery. Serial postoperative echocardiograms showed only mild TR, satisfactory antegrade flow via the pulmonary valves and satisfactory biventricular function. She was thriving well on follow-ups and her latest echocardiogram at 6 months post-operation showed residual mild to moderate tricuspid regurgitation with satisfactory right ventricular function.

Conclusion
Neonatal flail tricuspid valves due to ruptured chordae or papillary muscle is a rare but potentially fatal cause of neonatal cyanosis. Timely diagnosis, urgent medical stabilisation and early surgery are important to prevent morbidity and mortality.

Coronary Functional Study and Intravascular Ultrasound in a Paediatric Patient with Known Kawasaki Disease Complicated by Thrombosed Giant Aneurysm and Post Coronary Artery Bypass Graft.

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2 Department of Radiology, Hong Kong Children’s Hospital, Hong Kong SAR
A 12 years old boy had history of refractory Kawasaki disease requiring repeated doses of IV immunoglobulins, pulse steroid and infliximab at 8 month of age developed giant aneurysms of left anterior descending artery (LAD) and mid right coronary artery (RCA). He had episode of myocardial infarction over LAD territory at 13 months old and was treated with streptokinase and anticoagulation and remained stable afterwards. Coronary angiogram showed thrombosed and calcified giant aneurysm at proximal LAD with severely stenotic and partial flow to distal LAD. There was mid-RCA stenosis with good collateral supply. Stress cardiac MRI showed stress-induced perfusion defect at LAD territory and old infarct at mid and apical anterior LV wall. Coronary bypass graft surgery with left internal mammary artery (LIMA) to LAD anastomosis was performed in Dec 2018 at 15 months of age. He was put on warfarin and clopidogrel and remained stable and asymptomatic afterwards. Follow-up CT coronary 6 months after surgery showed attenuation at distal LIMA graft while stress MRI showed stress-induced perfusion defect over basal septal region with interval improvement compared to last stress MRI and satisfactory ventricular function. Repeat coronary angiogram was performed recently which showed similar stenotic LIMA to LAD anastomosis with retrograde collateral supply from RCA branches. Functional coronary study was performed with instantaneous wave-free flow ratio (iFR) showing the distal LAD to aortic ratio of 0.31 and a step up flow was noted across the stenotic site which confirmed significant coronary ischemia. Intravascular ultrasound (IVUS) also demonstrated luminal narrowing (area 5mm2) and vascular wall thickening of the left main coronary artery. Since surgical and transcatheter intervention were considered high risk and patient remained asymptomatic, optimization of medical treatment with anticoagulant, statin and beta-blocker was given with follow-up stress MRI later. This case illustrated how functional coronary study (iFR) and IVUS help in the assessment of coronary artery reserve and ischemia in paediatric KD patients complicated with complex coronary lesions and after CABG.

An Unusual Cause of Bidirectional Ventricular Tachycardia - Andersen-Tawil Syndrome

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3 Department of Paediatrics and Adolescent Medicine, University of Hong Kong, Hong Kong SAR

Background: Bidirectional Ventricular Tachycardia (VT) is an unusual rhythm. Its differential diagnoses are limited, but important. Here we introduce a case of asymptomatic bidirectional VT with dysmorphism. The diagnosis was confirmed genetically.

Case: A 14-year-old girl was referred by Student Health Service for asymptomatic irregular heartbeat. 12-lead ECG showed frequent ventricular ectopy with alternating axis, with a normal corrected QT interval of 432ms. Holter showed 9.2% ventricular ectopy with non-sustained runs of bidirectional VT. Longest run consisted of 16 beats at a heart rate of 130 per minute. Physical examination showed micrognathia and clinodactyly. She also reported episodes of weakness following prolonged rest. A provisional diagnosis of Andersen-Tawil Syndrome (ATS) was made and was confirmed by genetic testing with a targeted gene panel. A heterozygous pathogenic variant NM_000891.3(KCNJ2): c.244C>T p.(Arg82Trp) was identified in the KCNJ2 gene.

Decision making: ATS is an important channelopathy as a differential diagnosis of bidirectional VT, apart from catecholaminergic polymorphic VT. Recognition of the dysmorphic features and the history of periodic paralysis helped raise suspicion for ATS. Flecainide was effective in reducing the amount of ventricular ectopy in this case.

Conclusion: Detailed history taking and physical examination are crucial in the diagnosis of ATS, which carries a risk of life-threatening arrhythmic event and has important genetic implication. Cascade screening is recommended.