Multidetector computed tomography (MDCT) enables visualization of the origin and course of coronary arteries. The objective of this study was to investigate the prevalence of origin and termination coronary artery anomalies and the course of these anomalies in patients in a single center in Korea.

METHODS To diagnose coronary anomalies, the angiographic data of 8,864 consecutive patients undergoing 64- or 320-MDCT from September 2005 to November 2011 were analyzed retrospectively.

RESULTS Among the 8,864 patients, 103 (1.16%) had coronary anomalies. Ninety (87.4%) patients had origin and distribution anomalies, and 13 (12.6%) patients had a coronary artery fistula. The most common anomaly (41, 39.8%) was an anomalous origin of the right coronary artery (RCA). Of these, three patients received a coronary artery bypass graft.

CONCLUSIONS The prevalence of coronary anomalies in a single center of Korea was 1.16%. The incidence and patterns of coronary artery anomalies in our patient population were similar to those of previous studies.

GW27-e0183

Differences in haematological indices in chinese patients with an ischaemic stroke between those with and without a high risk patent

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OBJECTIVES Whilst a patent foramen ovale (PFO) is commonly found in patients with crytogenic stroke (CS) causative mechanisms remain speculative and deep venous thrombosis is rarely found.

So the purpose to compare demographic, haemodynamic and haematological indices between patients of ischaemic stroke (IS) without PFO and those of CS with a high risk PFO.

METHODS All patients were less than 60 years. The study group was CS patients with a high risk PFO [PFO≥4 mm with big amount right to left shunt (RLS)], combined ≥1 high risk factors]had a high risk PFO], whilst the control group was IS patients without PFO. Venous blood samples were obtained before administration of any anticoagulation (3 subjects on aspirin). All patients underwent brain CT and 2D echocardiography. Measurements of full blood count, inflammatory markers, clotting parameters were made.

RESULTS Patients without PFO were older (50±1 vs 44±2 years) and had higher systolic (138±4 vs 119±2) and diastolic blood pressure (87±2 vs 76±1 mmHg). Gender distribution was similar. Haematological parameters differed between the groups. In multiple regression analyses including age, significant differences were found for WBC, %monocytes, %lymphocytes, aPPT, PT, INR and fibrinogen. For patients aged 50 to 60 years significant differences in SBP, DBP, WBC, PT, TT, and fibrinogen were found between those with (n=29) and without (n=28) PFO.

CONCLUSIONS Patients presenting with CS and high risk PFO are younger, have lower blood pressure and differ in a number of haematological variables. Differences are not accounted for by age and may indicate differences in stroke aetiology.

GW27-e0246

3D printing for coarctation of the aorta

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OBJECTIVES Coarctation of the aorta (CoA) represents a birth defect in which the aorta is narrow. If CoA is severe, the baby needs surgery. Three-dimensional printing (3D printing) is commonly used as a means of rapidly producing prototypes for manufacturing technology [1, 2]. The 3D printed heart model has accurate anatomical structure of the heart.

METHODS Eight babies diagnosed of CoA were enrolled and scanner by 3D contrast-enhanced MR angiogram. Four are in control group, and the other four are in test group of 3D printing model. For the former group, the MR angiograms are offered to both cardiothoracic surgeons and patients' parents via displays of image workstation. For the latter group, an experienced cardiologist segments the region-of-interest manually. Postprocessing was performed to remove noises and smoothness. Mimics v14.01was used to segment heart and vessels, and then to create 3D surface models in STL format. Then, we input the STL file to a 3D-printer. The printed models are available to both cardiothoracic surgeons and patients' parents. We invite them to answer a questionnare to evaluate the two kinds of treatments.

RESULTS This statistics of questionnaire show that the cardiothoracic surgeons have a positive impression to use 3D printed model, mainly because the 3D printing sharply reduce the time needed for making surgery plans compared to the control group. The cardiothoracic surgeons also report the 3D printed model can show the heart structure in a more clearly way than the display, and it can show the detail of the CoA.

For the parents, they appraise the use of 3D printed model, since the preoperative communication time of 3D printing groups is significantly reduced compared to control group. They also report they understand the operative plans more easily.

CONCLUSIONS The 3D printing do benefits for both surgeons and patient's parents related to coarctation of the aorta.

GW27-e0323

Echocardiography in the Demonstration of Fetal Congenital Cardiovascular Disease

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OBJECTIVES To compare the demonstration accuracy of fetal cardiac chambers and great vessels by cardiovascular casting and prenatal echocardiography.

METHODS From March 2014 to June 2015, 18 fetal specimens prenatally diagnosed with congenital cardiovascular disease were enrolled in this study. Prenatal echocardiography findings of these 18 cases were reviewed and analyzed. Fetal cardiovascular cast models were made by injecting ABS perfusate via umbilical vein. All the cast models were carefully observed and analyzed, and cast findings were compared with prenatal diagnosis in overall level, atrioventricular level and great vascular level.

RESULTS In 18 cases, 94 abnormalities were diagnosed by prenatal echocardiography, including 48 atrioventricular abnormalities and 46 great vascular abnormalities. 18 fetal specimens were all successfully made into cast models. A total of 117 anomalies were detected in cast models, including 35 anomalies in atrioventricular level and 82 anomalies in great vascular level. When comparing the sonographic results and cast findings, we found 65 abnormalities were identified by both methods, including 29 and 36 abnormalities in atrioventricular and great vascular level, separately. There were 65 misdiagnosis in prenatal echocardiographic findings, which were corrected or added by casts, including 12 atrioventricular abnormalities and 53 great vascular abnormalities. However, there were also 18 malformations observed by fetal echocardiography could not be demonstrated in the cast models, including 16 atrioventricular malformations and 2 great vascular malformations.

CONCLUSIONS Fetal cardiovascular cast has more advantages in demonstrating anomalies of great vessels and their branches, but has some limitations in displaying intracardiac abnormalities. Cast models may help to understand the anatomic structure and spatial relationship of fetal congenital cardiovascular disease, which plays a vital role in prenatal diagnosis and clinical management.

GW27-e0375

Anomalous pulmonary venous connections: Comparison of the diagnostic accuracy by echocardiography versus surgery at a single medical center

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OBJECTIVES We sought to evaluate the value of echocardiography in the diagnosis of different types of anomalous pulmonary venous connections (APVC) and summarize the diagnostic experience.

METHODS Eight-four patients with APVC underwent surgical correction or computerized tomography angiography in the last 6 years (2008-2014) at the Wuhan Union Hospital.

RESULTS The total anomalous pulmonary venous connection (TAPVC) cases account for 60.7% and partial anomalous pulmonary venous connection (PAPVC) cases account for 39.3% among the 84 cases that were identified. The 51 TAPVCs were classified by the Darling method: type I (41.1%), type II (52.9%), type III (1.9%), and type IV (3.9%). The most common drainage path of type I was common pulmonary drainage to the left innominate vein via vertical vein and the coronary sinus drainage was the most common path in type II. Compared with surgical results, the sensitivity and specificity of echocardiography in the diagnosis of APVCs were97.6% and 99.9%. The echocardiography misdiagnoses were mainly seen in PAPVCs. Of the 50 cases of TAPVCs, the diagnostic accuracy of classification was 94%.

CONCLUSIONS Echocardiography has specific value in diagnosing and classification of APVC, especially the supracardiac and cardiac TAPVCs. Multiplane scan views and Color Doppler improving the display of drainage pathway.

GW27-e0999

The effects of anticoagulant therapy on coagulant state and platelet function following transcatheter closure of atrial septal defect

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OBJECTIVES Several studies have demonstrated coagulant system was activated after transcatheter closure of ASD, but changes of platelet function still remain controversial. Currently, it is not clear which anticoagulant regiment is more effective to prevent thrombosis and embolic events after device implantion. This study was to compare the effects of three anticoagulant regiments on coagulant state and platelet function following transcatheter closure of atrial septal defect (ASD).

METHODS A total 138 patients who underwent transcatheter closure of ASD were randomized into three groups to receive different anticoagulant therapy: unfractionated heparin (UFH) for 24 hours, low molecular weight heparin (LMWH) for 24 hours, and LMWH for 72 hours (pLMWH). Aspirin was given to all patients for 6 months after intervention. The laboratory measurements included beta-thromboglobulin (β-TG), platelet factor 4 (PF4) and prothrombin fragment 1+2 (F1+2) which were done before intervention as baseline, immediately after, and day 1, 2, 3, 7, 30 and 90 after intervention.

RESULTS In 3 groups, β-TG, PF4 and F1+2 elevated immediately after implantation procedure. β-TG and PF4 declined slightly on day 1 and 2, and rose to a highest level on day 3, then fell down to baseline on day 7. The F1+2 gradually returned to baseline on day 90. However, the F1+2 in pLMWH group was markedly lower than that in UFH and LMWH groups on day 3. No thrombo-embolic events were noted during follow-up.

CONCLUSIONS Transcatheter closure of ASD was associated with significant activation of both platelets and coagulation. These findings support an antithrombotic regiment after procedure including anticoagulant and antiplatelet agents. The F1+2 level fell down earlier in pLMWH group. However, there were no differences of clinical outcomes among three groups on day 90 after intervention. Therefore, a larger size and longer follow-up study is needed to further clarify this issue.

GW27-e1153

Echocardiographic Evaluation of Cardiac Dyssynchrony in Patients with Congestive Heart Failure

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OBJECTIVES To investigate the value of applying echocardiography to evaluate cardiac dyssynchrony in patients with congestive heart failure (CHF).

METHODS A total of 348 consecutive CHF patients who were referred for cardiac resynchronization (CRT) and presented with low ejection fraction (EF) and wide QRS duration were enrolled in this study, along with 388 healthy individuals.

RESULTS (1) Compared with the control group, FT/RR was decreased while PED, IVMD, LOWD and RSPWD were increased in the CHF group ($P<0.01$). (2) In the CHF group, FT/RR was negatively correlated with the QRS duration, LV end-diastolic diameter (LVESd), LV end-diastolic volume (LVEDV) and LV end-systolic volume (LVESV) ($P<0.01$) and positively correlated with the LVEF ($P<0.01$). Additionally, PED, IVMD, LOWD and RSPWD were positively correlated with the QRS duration, LVESd, LVEDV and LVESV ($P<0.01$) and were negatively correlated with the LVEF ($P<0.01$). (3) The CHF group was divided into three subgroups according to the varying degrees of LVEF. FT/RR decreased successively from the LVEF-1 group to the LVEF-2 group to the LVEF-3 group, while the PED, IVMD, LOWD and RSPWD successively increased in the same order ($P<0.01$). (4) The CHF group was divided into three subgroups according to the varying degrees of QRS duration, and FT/RR decreased successively in a sequence from the QRS-1 group to the QRS-2 group to the QRS-3 group, while the PED, IVMD, LOWD and RSPWD successively increased in the same order ($P<0.01$). (5) Speckle tracking radial dyssynchrony $\geq$130 ms was predictive of an EF response in QRS-1 interval patients (78% sensitivity, 83% specificity), QRS-2 interval patients (83% sensitivity, 77% specificity) and QRS-3 interval patients (89% sensitivity, 79% specificity).

CONCLUSIONS Echocardiography is a convenient and sensitive method for evaluating cardiac dyssynchrony in patients with CHF.

GW27-e1204

Pulmonary hypertension and massive or sub-massive pulmonary embolism are the high risk factors for paradoxical peripheral arterial embolism

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OBJECTIVES Paradoxical peripheral arterial embolism is an important clinical entity and potentially morbidity-threatening. However, the risk factors of paradoxical peripheral arterial embolism are unclear. We investigated what clinical presentations are likely risk factors for paradoxical peripheral arterial embolism and whether combined medical therapy can reduce the recurrence of paradoxicalembolism.

METHODS Eleven consecutive subjects who were hospitalized in the cardiovascular center of our hospital from July 2012 to Dec 2015 with peripheral arterial embolism associated with intracardiac shunts (patent foramen ovale or/and atrial septal defect) and venous thromboembolism (deep venous thromboembolism or/and pulmonary embolism) were enrolled in this study. The control group comprised 14 patients with symptomatic venous thromboembolism (VTE) coincided with patent foramen ovale (PFO) or/and atrial septal defect (ASD). For clinical treatment, subjects with arterial embolism were treated with catheter-directed thrombolysis or/and anticoagulation. Patients suffered with VTE were treated with thrombolysis or/and anticoagulation according to recommendations from guideline of ACCP9 (American College of Chest Physicians). Patients with pulmonary hypertension were also administered by reducing pulmonary artery pressure. Baseline characteristics and transthoracic ultracardiogram were analyzed between the two groups. All subjects were followed-up by 6 months to 42 months. The end point was a composite of death, nonfatal stroke, TIA, or peripheral embolism. Continuous data between groups were analyzed by independent samples t-test. Categorical data were compared using chi-square test.

RESULTS Pulmonary hypertension occurred in 10 of the 11 patients (90.9%) in paradoxical embolism group, compared with control group (1/14, 7.1%) (90.9% vs 7.1%, $P=0.000$), while massive or sub-massive pulmonary embolism occurred in 9 of the 11 patients (81.8%) in paradoxical embolism group, compared with control group (2/14, 14.3%) (81.8% vs 14.3%, $P=0.001$). Age, gender, smoking, the presence of hypertension, diabetes, dyslipidemia, non-congenital heart disease, cancer and the size of PFO or ASD were not significant variables in the analysis. The mean duration of follow-up was 2.1 years in the study group and 2.0 years in control group. The end point occurred in 1 (nonfatal stroke) of the 11 patients (9.1%) in the study group and in 1 (nonfatal stroke) of the 14 patients (7.1%) in the control group, respectively (9.1% vs 7.1%, $P = 0.94$).

CONCLUSIONS Pulmonary hypertension and massive or sub-massive pulmonary embolism are the high risk factors for paradoxical peripheral arterial embolism. For secondary prevention of paradoxical peripheral arterial embolism, combined medical therapy can result in a significant reduction in the risk of recurrent embolic events or death.