Methods We evaluated the use of this anticoagulation method in a French population of GUCH (Grown-Up patients with Congenital Heart Disease) with mechanical valve.
Results Since September 2018, 52 patients of 37 ± 11 years old were asked to attend a training course of 2 hours on anticoagulation and Coaguchek INRange® use, provided by specialized nurses, before getting home with the device. Patients had to attend a 3 months' medical re-evaluation appointment. 29 (56%) patients had an aortic mechanical valve, 12 (23%) a mitral one, 8 (15%) a double aortic and mitral one, 2 (4%) a double aortic and pulmonary one and 1 (2%) a tricuspid one. 28 patients (54%) had a mechanical valve for ≥ 10 years (group 1). In group 1, patients were older (41 ± 10 years old vs. 34 ± 10, $P = 0.01$). Fluindione was the preferred oral anticoagulant (30 patients, 57%), and was more frequent in group 1 (18 patients, 64%). In group 1, 61% of patients usually managed themselves dosage adjustment whereas in the other group, 52% of patients referred to their doctor. Thirty-one patients (62%) had a higher target of INR than recommended in last European guidelines. Concerning follow-up, 26 patients (50%) did not attend the 3 months appointment and had to be rescheduled or contacted by phone. 8 patients (15%) did not use the device at 3 months: 5 for variation > 15% compared to laboratory plasma technique and 3 for not trusting the new device. INR at 3 months was obtained in only 40 (77%) patients, and was in the attended target in 62% of cases.
Conclusion GUCH patients with mechanical valves, especially when present for ≥ 10 years, seem to validate Coaguchek, even though evaluation remains hard since a great proportion of them did not attend follow-up appointment, stick to their old INR target and did not use the device as often as recommended.
Disclosure of interest The authors declare that they have no competing interest.

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P8

Single ventricle: Estimated cumulative irradiation during their life

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Background Irradiation in paediatric and congenital cardiology is of major concern. Patients with single ventricle will be irradiated on several occasions during their life (CT-scan, cardiac catheterization, and chest radiograph). Few data are available in the litterature, on this subject.
Method Using a database of 64 patients with single ventricle, we developed a fictive patient undergoing. 1 cardiac CT-scan, 3 cardiac catheterizations (before Glenn procedure, before and after Fontan procedure), and 17 chest radiograph (mainly postoperative Glenn and Fontan procedure). Available radiation doses for each step were recorded and means added to estimate total irradiation of the fictive patient. Organ exposure was calculated.
Results Total irradiation in our fictive patient reached 5.8mSv, the distribution of the effective dose was: 45% by for CT-scan, 44% for cardiac catheterizations and 11% for chest radiography. Specific organ exposure analysis is ongoing.
Conclusion CT-scan contributed the most to global irradiation. Organ exposure will be further analysed. The reduction of medical irradiation remains a major goal for congenital cardiology teams and will need further improvement of technologies and practices.
Keywords Single ventricle; Irradiation; CT-scan; Cardiac catheterizations; Chest radiograph
Disclosure of interest The authors have not supplied their declaration of competing interest.

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P9

3-Dimensional echocardiographic evaluation of right ventricular function in pediatric sickle cell disease population

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Introduction Sickle cell disease (SCD) is characterized by chronic hemolytic anemia and intermittent vaso-occlusive events associated with cardiac abnormalities.
Aim To assess 3-dimensional (3D) echocardiographic of right ventricle (RV) volumes and function in a pediatric SCD population.
Methods Eighteen patients with SCD aged 4 to 17 years old (mean age: 8.0 ± 4 years, 56% male, body surface area (BSA) 1.0 ± 0.35) and 18 healthy controls matched for age, gender and BSA were prospectively included and compared. Echocardiograms were performed using a commercially available ultrasound Philipps EPIQ 9 system using matrix X5-1 transducer. 3D indexed RV volumes and ejection fraction (3D-RVEF) were obtained using full volume acquisitions. RV free wall strain, tricuspid S-wave, tricuspid annular plane systolic excursion (TAPSE), indexed cardiac output, systolic pulmonary pressure (sPAP) and hemoglobin were assessed. Data were finally analyzed with TomtecArena© software (v2.3), Germany.
Results Cardiac output was significantly higher in SCD children (4.5 vs. 3.6 $l/min/m^2$, $P = 0.025$), as sPAP (24.9 vs. 21.9 mmhg, $P = 0.015$), 3D-RV diastolic volume (58.1 vs 47.5 ml/m^2, $P = 0.25$) and 3D-RV systolic volume (28.8 vs. 21.4 ml/m^2, $P = 0.005$). 3D-RVEF and RV free wall strain were significantly altered in SCD compared to control population (respectively 51.9 vs. 56.3%, $P = 0.018$; −28.6 vs. −32, $P = 0.017$). There were no difference regarding TAPSE and Doppler S-wave. Mean hemoglobin in SCD population was 9.6 ± 1.7 g/dl.
Conclusion These findings suggest that 3D-RVEF and RV free wall strain are altered and associated to an augmentation of 3D-RV volumes, without alteration of longitudinal traditional RV parameters in this SCD population. Chronic anemia generating volume overload but also elevation of sPAP increasing RV afterload can explain these findings. This data need to be confirmed with cardiac magnetic resonance imaging.
Keywords Sickle cell disease; 3D echocardiography; Right ventricle; Longitudinal strain; Pediatrics
Disclosure of interest The authors have not supplied their declaration of competing interest.

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P10

Three-dimensional mitral annulus structure in repaired Atrio-Ventricular Septal Defect, a transthoracic echocardiographic comparison

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Introduction Understanding of cardiac structure has been improved by 3D cardiac echocardiography. The anatomy and geometry of the mitral valve annulus (MVA) has been previously described with advanced imaging techniques, allowing for a better comprehension of valve dysfunction and providing significant information for the surgical repair.
Aim To apply transthoracic 3D echocardiography (3DTTE) for quantitative and qualitative assessment and comparison of the pathologic MVA in congenital cardiopathies (CC) of the valve with a normal group.
Methods Patients with repaired atrioventricular septal defect (AVSD) attending consultation were prospectively included and matched with a control group of healthy children by sex, age and body surface area (BSA). 3DTTE full volume and 3D zoom acquisitions were performed on a Philips EPIQ7. The 3D shape of the annuli was reconstructed and analysed with TOMTEC^{TM} 4D MV-ASSESSMENT© (Fig. 1). The assessed and compared parameters were annular area (2D & 3D), circumference, high-low distances (height), anterolateral-posterolateral (ALPM), and anteroposterior (AP) axes, non-planar angle (NPA), sphericity index, angle between the aortic annulus and AP axe (AAoAP angle). All measurements were indexed by BSA.
Results A total of 18 participants were recruited. Both groups were comparable in age (10.67 ± 3.45 years) and BSA (1.13 ± 0.27 m^2). All acquisitions could be analysed with need of minimal editing of the annulus after automated detection, leaflets couldn't be analysed in the AVSD group. Significative differences between both groups were found in the NPA with an increase in the nonplanarity for the patients with a repaired AVSD (144.5 vs. 132.9; $P < 0.01$) and

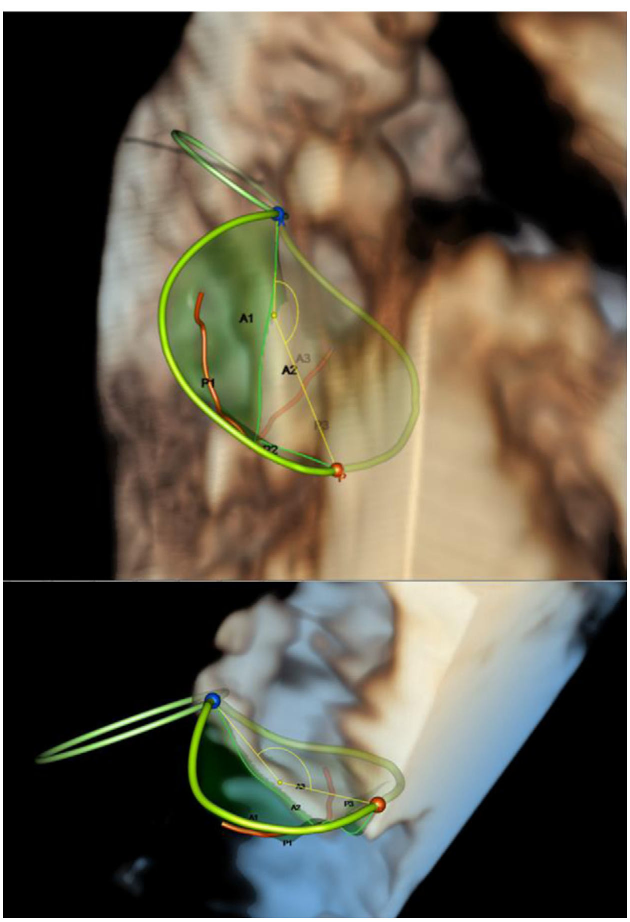

Fig. 1 Modelisation of AVSD left atrioventricular valve annulus (upper) and normal mitral valve annulus (inferior).

a more circular shape represented by a higher sphericity index (0.99 vs. 0,85; $P = 0.01$). No difference was found in indexed height, area and diameters were similar between both groups.
Conclusions The specific and exclusive shape of the MVA in patients with repaired AVSD was revealed in the patients studied, resulting in a loss of the saddle shape structure. Those results could help in the comprehension of anatomic changes of the mitral valve annulus occurring after AVSD surgery.
Keywords Congenital Heart Diseases; Children; 3D echocardiography; Mitral Valve Annulus; Atrioventricular Septal Defect
Disclosure of interest The authors have not supplied their declaration of competing interest.

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P11

4D Flow versus Conventional 2D MRI for Measuring Pulmonary Flow after Tetralogy of Fallot Repair

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Background After tetralogy of Fallot (TOF) repair, pulmonary regurgitation and right ventricular function must be monitored. Conventional (2D) cardiac magnetic resonance (CMR) is currently the clinical reference method for measuring pulmonary regurgitation. However, 4D CMR has been reported to provide a more comprehensive flow analysis than 2D CMR. We aimed to compare 4D CMR to 2D CMR for assessing pulmonary regurgitation and flow, as well as aortic flow, in children and adults after surgical repair of TOF.
Methods Retrospective analysis of patients with repaired TOF admitted for cardiac MRI with 4D flow acquisition from 2016 to 2018. Linear regression was used to assess correlations and Bland-Altman analyses were performed.
Results The 60 included patients had a mean age of 18.2 ± 10.4 years (range, 2—54 years).
Significant correlations between the two techniques were found for pulmonary regurgitant fraction ($R^2 = 0.6642$, $P < 0.0001$), net pulmonary flow ($R^2 = 0.6782$, $P < 0.0001$), forward pulmonary flow ($R^2 = 0.6185$, $P < 0.0001$), backward pulmonary flow ($R^2 = 0.8192$, $P < 0.0001$), and aortic valve flow ($R^2 = 0.6494$, $P < 0.0001$). The Bland-Altman analysis showed no significant bias, narrow limits of agreement, and few scattered points. The correlation between pulmonary and aortic flow was better with 4D CMR than with 2D CMR ($R^2 = 0.8564$, $P < 0.0001$ versus $R^2 = 0.4393$, $P < 0,0001$, respectively). Interobserver reliability was good.
Conclusion These results establish the feasibility and reliability of 4D CMR for assessing pulmonary flow in a large paediatric and adult population with repaired TOF. 4D CMR may be more reliable than 2D MRI for pulmonary flow assessment after TOF repair.