13 PAEDIATRIC CARDIAC CT – CURRENT STATE OF PLAY AND ROOM FOR IMPROVEMENT

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Introduction Despite significant technologic advancements, application of cardiac CT techniques to paediatric imaging continues to push technology to its limit. We examined indications for paediatric cardiac CT and the impact of advances in technology on dose and use of ECG-gating techniques between 1st, 2nd and 3rd generation dual-source scanners.
Methods Retrospective collection of indications from a radiology information system. Comparison of cardiac, high-pitch spiral acquisitions during 6-month periods in 2014 (Definition DS), 2015 (Flash) and 2016 (Force) across 2 institutions. Whole-study DLP (32 cm phantom) used for simple comparison of dose. Proportion of scans performed as spiral, prospective and retrospective ECG-gated compared across generations of scanner.
Results The majority of CTs were for complex congenital heart disease assessment (shunts, pulmonary vessels and aortic anatomy including major aortopulmonary collateral arteries). In the 6-months' examined, 12 protocols were used on the definition DS, 17 on the Flash and 4 on the Force. 14.3% of cardiac scans were acquired with retrospective and 20% with prospective ECG-gating on the 1st generation machine with all examinations performed as high pitch spiral acquisitions on the 3rd generation machine. Moving from a 1st to a 3rd generation dual source scanner resulted in 72, 72 and 73% decreases in DLP in 0–2, 2–5 and 5–10 year-olds respectively.
Conclusions CT is capable of non-invasive complex anatomic assessment in neonates and children. As technology advances, application of cardiac CT in this hard to image population becomes simpler with fewer protocols, less need for multiphase acquisitions and lower ionising radiation doses.

14 EFFECTS OF CARDIOVASCULAR DISEASE ON THE ARTERIAL PATHLENGTH BETWEEN THE CAROTID AND FEMORAL ARTERIES

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Introduction Carotid-femoral pulse wave velocity (cf-PWV) is the gold standard of measuring PWV. The aorta becomes tortuous with ageing however reports of this impact on pathlength travelled by the pulsewave are conflicting. Additionally the effects of atherosclerotic cardiovascular disease on arterial remodelling is unknown. This study looks into age-associated changes in the arterial pathlengths amongst healthy volunteers and examines whether pathlength is altered by cardiovascular disease.
Methods To determine the effects of cardiovascular disease, 66 volunteers with known cardiovascular disease (CVD) (Age: 64.4±7.7 yrs, Female=16(17%)) were compared to 66 healthy volunteers (OHV) who were age, sex and height matched (Age: 64.6±7.2 yrs). To determine the effects of age, these were compared with 66 younger healthy volunteers (YHV) who were also sex and height matched (Age: 43.1±2.5 years). Whole body MR angiographies were performed. Curved MPRs were generated from the carotid-femoral arteries allowing true intra-arterial pathlengths to be measured.
Results Older healthy volunteers showed significantly increased intra-arterial distances compared with younger healthy volunteers (Right subtraction: YHV=431.6±50.1 mm, OHV=454.5 ±33 mm, p=0.005; Left subtraction:YHV=423.0±48.3 mm, OHV=449.6±34.9 mm, p=0.001). Those with cardiovascular disease showed no significant differences in true intra-arterial pathlength compared with young healthy volunteers (Right subtraction: YHV=431.6±50.1 mm, CVD=446.7±38.9 mm, p=0.094; Left subtraction:YHV=423.0±48.3 mm, CVD= 436.7±37.1 mm, p=0.129). These differences persisted on ANCOVA analysis, correcting for weight, blood pressure, BMI, and cholesterol levels.
Conclusion Increasing age results in a significant increase in the travelled pulsewave pathlength, however this difference is lost in those with atherosclerosis suggesting plaque has a cictrizing effect of the vasculature.

15 NO ASSOCIATION BETWEEN SYSTEMIC ARTERIOSCLEROSIS AND ATHEROSCLEROSIS ON CARDIAC MRI AND WHOLE BODY ANGIOGRAPHY: THE TASCFORCE STUDY

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Introduction Arteriosclerosis (arterial stiffening) and atherosclerosis (plaque formation) are pathophysiological processes afflicting the vasculature, both of which are associated with future cardiovascular events. However the degree to which they overlap or simply co-exist is poorly understood. The aim of the current study is to determine if these two processes are significantly associated with one another.
Methods 1651 volunteers with no clinical manifestation of cardiovascular disease and <20% 10-year cardiovascular risk underwent a cardiac MRI and whole body MR angiogram as part of the TASCFORCE study. Systemic arterial stiffness was measured using total arterial compliance (TAC) – calculated as the indexed stroke volume divided by the pulse pressure. Systemic atheroma burden (AB) was calculated by scoring 30 arterial segments within the body based on the degree of stenosis, summating these scores and normalising it to the number of assessable segments.
Results 1515 (574 male, 53.8±8.2 years-old) completed the study. On multiple linear regression age (B=–0.001 (95%CI –0.002–−0.000), p=0.004), heart rate (B=–0.003 (95%CI –0.003–−0.002), p<0.001) and blood pressure (B=–0.008 (95% CI –0.009–−0.008), p<0.001) were independently associated with TAC, while age (B=0.061 (95%CI 0.04–0.08), p<0.001), and smoking pack-year history (B=0.003 (95%CI 0.005), p=0.022) were independently associated with AB. TAC and AB demonstrated a significant correlation with each other (Spearman rho=–0.12, p<0.001), however on multivariable analysis

accounting for age, blood pressure, sex, BMI, smoking status and cholesterol no significant association persisted (B=–0.001 (95%CI –0.004–0.002), p=0.62).

Conclusion Systemic arteriosclerosis and atherosclerosis are separate entities with each determined by different risk factors. Future efforts in cardiovascular risk prevention should seek to address both of these pathophysiological entities.

16 PULMONARY ARTERIAL STIFFNESS IN COPD: PULMONARY BIOMARKER OR ANOTHER MEASURE OF SYSTEMIC ARTERIOSCLEROSIS?

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Introduction Both pulmonary and systemic arterial stiffening have been described in COPD. It is not currently clear whether these reflect separate disease processes within the pulmonary and systemic circulation or whether they are both due to a global arteriosclerosis. The aim of the current study is to assess arterial stiffness using pulse wave velocity (PWV) within these two arterial beds to determine whether they are separate or linked processes.

Methods 58 participants with COPD underwent pulmonary function tests, six-minute walk test, and cardiac MRI (CMR), while 21 age and sex matched non-smoking healthy volunteers underwent CMR. CMR was used to quantify right and left ventricular mass and volumes, with phase contrast imaging of the main pulmonary artery and ascending and abdominal aortic aorta performed in order to calculate pulmonary (pPWV) and systemic (sPWV) arterial stiffness using pulse wave velocity (PWV).

Results Compared with controls, pPWV (COPD: 2.63±1.3 ms^{-1} vs. HC: 1.76±0.7ms^{-1}, p=0.006) was significantly elevated with a trend towards higher sPWV (COPD: 8.67 ±2.7ms^{-1} vs. HC: 7.35±2.1ms^{-1}, p=0.06). pPWV showed a trend towards an association with smoking pack years (rho=0.22, p=0.053), while sPWV showed a significant association with age (rho=0.47, p<0.001), systolic blood pressure (rho=0.32, p=0.02), and percentage predicted DLCO/VA (rho=0.43, p=0.001). There was no significant association between sPWV and pPWV (rho=–0.004, p=0.97).

Conclusion Pulmonary and systemic arterial stiffening were associated with different risk factors and are independent processes in COPD. Further work is warranted to determine if both can be targeted by similar pharmacological therapy or whether different strategies are required for both.

17 CORONARY ANGIOGRAPHY IN A DISTRICT GENERAL HOSPITAL

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Introduction CTCA is now an established diagnostic tool in the evaluation of chest pain, and with the recently up-dated NICE CG95 guidelines its use is likely to increase nationally.[1] We aimed to assess the demographics of our local patient cohort, protocol use, radiation dose and the accuracy and outcomes from our CT service.

Methods Demographic and outcome data was collected for a 17 month period from Jul 2015–Nov 2016. The CTCA result was compared with the invasive angiogram in patients who had both investigations.

Results 689 scans were performed with 95% for rule out of coronary artery disease. 8% of the scan protocols used were calcium scores only, 25% were prospectively ECG triggered spiral acquisition (FLASH), 60% prospective, 4% retrospective and 3% required more than 2 contrast scans. Mean BMI was 29±11 Kgm^{-2}, median DLP 137 mGy*cm (IQR 87–230 mGy*cm), mean acquisition heart rate 61±21 bpm and median IV metoprolol dosage used was 8mg (IQR 0–20 mg). 98% of scans were diagnostic. 11% were referred on for angiography, 88% were recommended medical therapy and 1% were referred for MRI. There was 80% agreement with coronary angiography with 65% proceeding to intervention. 0% of patients who had a negative CTCA required subsequent intervention (before 15/11/16).

Conclusion Our real-world data demonstrates that CTCA in a district general hospital is an accurate and effective way to rationalise investigations, particularly in the management of coronary artery disease.

18 DOWNSTREAM INVESTIGATION OF NON-CARDIAC INCIDENTAL FINDINGS IN PATIENTS UNDERGOING CT CORONARY ANGIOGRAPHY: FINDINGS FROM THE MULTI-CENTRE RANDOMISED CONTROLLED SCOT-HEART TRIAL

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Introduction Non-cardiac findings can be identified on computed tomography coronary angiography (CTCA). We assess the follow-up of non-cardiac incidental findings, and impact of changes in lung nodule follow-up guidelines.

Methods This sub-study of the SCOT-HEART randomised controlled trial assessed images and health records of patients who underwent CTCA. Non-cardiac incidental findings were classified as the cause of symptoms (yes, probable, unlikely, no) and significant findings were those requiring further investigation, follow-up or treatment. Recommendations for lung nodule follow-up were provided as per 2005 Fleischner guidelines. We assessed potential changes using the 2015 British Thoracic Society (BTS) guidelines and 2017 Fleischner guidelines.

Results CTCA was performed in 1778 patients and non-cardiac findings were identified in 677 (38%). 173 (10%) were