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