

CT-FFR with computerised tomography coronary angiography (CTCA) against the gold standard of ICA in different real-world patient groups.

Methods We conducted a retrospective study of 477 patients referred for CTCA or CT-FFR for investigation of possible coronary ischaemia. Patients were excluded if the image quality was poor or inconclusive. Patient-based PPV was calculated to detect or rule out significant CAD, defined as more than 70% stenosis on ICA. A sub-analysis of PPV by indication for scan was also performed. Patients that underwent invasive non-hyperaemic pressure wire measurements had their iFR or RFR compared with their CT-FFR values.

Results In a patient-based analysis, the overall PPV was 59.3% for CTCA and 76.2% for CT-FFR. This increased to 81.0% and 86.7% respectively for patients with stable angina symptoms. In patients with atypical angina symptoms, CT-FFR considerably outperformed CTCA with a PPV of 61.3% vs. 37.5%. There was not a linear relationship between invasive pressure wire measurement and CT-FFR value ($r=0.23$, $p=0.265$).

Conclusion The PPV of CTCA and CT-FFR is lower in the real-world than in previously published trials, partly due to the heterogeneity of indication for the scan. However, in patients with typical angina symptoms, both are reliable diagnostic tools to determine the presence of clinically significant coronary stenoses. CT-FFR significantly outperforms CTCA in patients with more atypical symptoms and the targeted use of CT-FFR in this group may help to avoid unnecessary invasive procedures.

Conflict of Interest None

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WOMEN WITH EARLY ONSET HYPERTENSION ARE MORE LIKELY TO HAVE CARDIAC MRI FINDINGS ASSOCIATED WITH FUTURE DEVELOPMENT OF HEART FAILURE THAN MEN

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Introduction Hypertension (HTN) is a major risk factor for developing of heart failure (HF). Patients with early onset HTN (≤ 40 years) are at increased risk compared to those who develop HTN in later life. The transition from HTN to HF is incompletely understood but involves left ventricular (LV) changes at the cellular level. These include diffuse interstitial fibrosis, measured by extracellular volume fraction (ECV). Elevated ECV is associated with an increased risk of death and HF hospitalisation but the extent of elevated ECV in patients with early onset HTN is not known. In addition, among patients with HF with preserved ejection fraction (HFpEF), women outnumber men by a ratio of 2:1. The reasons for this are not known.

We aimed to investigate cardiac MRI parameters including ECV in patients with early onset HTN who do not have HF.

Methods Data from consecutive patients from a tertiary HTN clinic referred for CMR (Siemens, Germany) over a 3-year period was retrospectively analysed. Elevated ECV was defined

Abstract 167 Table 1 Factors assessed for differences between patients ≤ 40 years with ECV $\geq 28\%$ vs ECV $< 28\%$

Parameter	ECV $< 28\%$	ECV $\geq 28\%$	P value (test)
Age (years)	33.3 \pm 5.7	33.1 \pm 5.1	0.93 (t-test)
BMI (kg/m ²)	30.8 \pm 6.9	30.4 \pm 7.7	0.90 (t-test)
Office SBP (mmHg)	151 \pm 16	151 \pm 24	0.92 (t-test)
Office DBP (mmHg)	95 \pm 10	95 \pm 9	0.97 (t-test)
Number of antihypertensives taken	1.7 \pm 1.6	1.7 \pm 1.8	0.98 (t-test)
Treatment with ACE-inhibitor or ARB	13/20	6/9	1.0 (Fisher's exact)

as $\geq 28\%$ as this is associated with increased HF hospitalisation. Data are mean \pm SD. Alpha was set at 0.05.

Results 29 patients ≤ 40 years underwent CMR during the study period; mean age 33 ± 5.4 years, 15/29 (52%) female. Elevated ECV was identified in 9/29 (31%) patients ≤ 40 years and the majority were female (8/9, $p=0.01$, Fisher's exact test). This gender difference was not seen in patients > 40 years old with HTN who underwent CMR during the same period (29/59 [49%] had an elevated ECV with 14/29 female, $p=0.19$, Fisher's exact test). Among patients ≤ 40 years, LV hypertrophy (all concentric) was more common in those with ECV $\geq 28\%$ (5/9) than those with ECV $< 28\%$ (2/20, $p=0.02$, Fisher's exact test). Among the female patients ≤ 40 years, there was a trend towards increased LV mass in the 8 patients with ECV $\geq 28\%$ compared to 7 with ECV $< 28\%$ (78 ± 14.4 g/m² vs 67 ± 3.8 g/m², $p=0.06$, t-test). Among patients ≤ 40 years, there were no significant differences between the ECV $\geq 28\%$ and ECV $< 28\%$ groups in LV ejection fraction or LV strain, strain rate, and diastolic strain rate. There were also no differences in the parameters in table 1.

Conclusions Among patients with early onset HTN, one in three had elevated ECV. This was independent of age, BMI, blood pressure (BP), and BP treatment. These patients are likely to be at increased risk of HF in later life. Patients with early onset HTN and an elevated ECV were more likely to be female. This may reflect an expected gender difference; recent studies indicate healthy females have higher ECV than healthy males, and this study further highlights the importance of separate ECV reference ranges for men and women. However it may also reflect early pathological fibrosis in response to HTN, particularly as in patients > 40 years old there was no gender difference among patients with an elevated ECV. Increased LV fibrosis at a younger age may be a contributor to the increased development of HFpEF among female patients.

Conflict of Interest None

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PREVALENCE AND ADVERSE CARDIAC EVENTS IN ANOMALOUS AORTIC ORIGIN OF CORONARY ARTERY (AAOCA) IN CT CORONARY ANGIOGRAPHY IN WEST OF SCOTLAND

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Background Anomalous aortic origin of a coronary artery (AAOCA) is a congenital abnormality of the origin or course of coronary artery. The clinical manifestations of coronary artery anomalies vary in severity based on its course. It is reported as a leading cause of sudden cardiac death in young

athletes. Computed tomography Coronary Angiography (CTCA) is an imaging modality of choice for identification and characterization of coronary artery anomalies. The prevalence of AAOCA is usually cited as 1%–2% of the general population and also reported at 0.8%–1.3% in invasive angiographic studies and 1%–5% in reported CTCA series. CTCA service is established in West of Scotland since 2015 and no data has been published about prevalence of AAOCA nor any directly related adverse cardiac events formally studied in these patients here.

Methods Patients with anomalous aortic origin of coronary artery (AAOCA) were identified in the CTCA series between February 2015 and October 2020 in a large tertiary referral centre that caters to most CTCA referrals in West of Scotland. The electronic medical records of these patients were retrospectively checked between February 2015 and February 2021 with a standard evaluation questionnaire and data was independently reviewed by the authors.

Results A total of 2840 patients' electronic records were evaluated and 79 patients with AAOCA were identified. There were 57 males (72%) and 22 Females (28%). The mean age was 47.4 years for males and 51.3 years for females. Out of 79 AAOCA, 59% were anomalous right coronary artery, 29% were anomalous left circumflex, 7% were anomalous left main coronary artery and 2% were anomalous Left anterior descending coronary artery. 86% were referred for symptom of chest pain (deemed atypical in 94% of these patients with further evidence of negative or inconclusive ETT), 6% had arrhythmia (no sudden cardiac death or ventricular arrhythmias were recorded), unexplained dyspnoea in 4%, Transient Loss of consciousness (no CPR needed for recovery) in 4% of patients. High risk (intra-mural, intra-myocardial, high origin or inter-arterial course) of AAOCA was noted in 47% patients (n=37; 84% originated from a different coronary sinus and 16% directly from another coronary artery). Obstructive coronary disease (CAD-RADS score = 3 and above) was noted in only 9% of AAOCA (n=7) compared to 29% (n=23) in non-anomalous coronary arteries. All AAOCA with obstructive disease were noted to be further referred for functional assessment of ischaemia or invasive coronary angiography. Only 14% (n=5 out of 37) with a high risk AAOCA course were referred by the clinicians for functional assessment of ischaemia or arrhythmia and the results were benign. There were 4 deaths noted in this observed cohort and none of them were directly related to coronary artery disease.

Conclusions The observed prevalence of AAOCA in this CTCA series is 2.8% in West of Scotland and noted to be higher in males ($p<0.0001$). The prevalence of obstructive coronary artery disease in AAOCA was relatively low compared to non-AAOCA group ($p<0.001$). High risk (intra-mural, intra-myocardial, high origin or inter-arterial) course of AAOCA was significant among those identified with AAOCA ($p<0.001$) and 1.3% of whole study cohort. The rate of further functional assessment of such high risk AAOCA was noted to be low. No sudden cardiac deaths were noted and no directly AAOCA related mortality was noted. The data is limited by findings of AAOCA in patients that were mostly referred for 'rule out' CTCA investigation for low risk clinical cardiac symptoms. Further functional assessment and follow up of patients identified with high risk course of AAOCA is recommended as per current guidelines.

Conflict of Interest None

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REAL WORLD NHS EXPERIENCE OF CTCA WITH FFRCT FOR THE DETECTION OF SURGICAL CORONARY ARTERY DISEASE - THE CASE FOR ENHANCED PRE-PROCEDURAL PLANNING?

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Introduction CT coronary angiography (CTCA) with fractional flow reserve (FFRCT) is a key diagnostic tool in the guidance led evaluation of chronic coronary syndrome (CCS). A small percentage of those patients presenting with CCS will have a pattern of coronary artery disease (CAD) where they would be better served with surgical revascularisation. CTCA alone is increasingly used to rule out important CAD pre-valvular surgery in the absence of an invasive coronary angiogram (ICA). Thus, this study tested to see if CTCA with FFRCT was sufficient to predict surgical CAD relative to subsequent ICA findings.

Methods This retrospective single-centre study analysed all patients with CCS who underwent a CTCA with FFRCT, where findings led to a subsequent ICA from August 2018 to January 2021. Those patients who had significant left main stem (LMS) and/or flow limiting disease in three major epicardial blood vessels were included (3VD). Flow limiting disease was defined as an FFRCT of ≤ 0.8 (2 cm distal to the stenosis) in the left anterior descending (LAD), circumflex (LCx), principle obtuse marginal (OM) or right coronary artery (RCA). This was then compared to the ICA where significance was defined as a stenosis $>50\%$ for the LMS and $>70\%$ for the other epicardial vessels and/or iFR of ≤ 0.89 or FFR ≤ 0.8 .

Results A total of 565 patients had a CTCA with FFRCT, of which 164 had a subsequent ICA with sufficient data for analysis and 35 of these patients met inclusion criteria (LMS disease only 7/35, 3VD 25/35 and both LMS and 3VD 3/35 on CTCA with FFRCT). Relative to ICA the overall sensitivity, specificity, positive predictive value, negative predictive value and accuracy of CTCA and FFRCT for predicting surgical CAD was 83% (95% CI 61-95), 92% (95% CI 86-96), 61% (95% CI 47-74), 97% (95% CI 93-99) and 90% (95% CI 85-94) respectively.

Conclusion CTCA with FFRCT was insufficient for a direct decision on surgical revascularisation in this cohort, particularly given the different risk profiles of ICA, PCI and bypass surgery. Importantly, however, the performance of CTCA with FFRCT for detection of surgical CAD would enable enhanced pre-procedural planning. This includes providing an opportunity to counsel patients in more detail on potential findings and their preference if a surgical pattern of disease is confirmed, consider pre-ICA MDT discussion, and ensure likely complex, high-risk cases are placed on an appropriate list.

Conflict of Interest None

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SPECT MYOCARDIAL CORONARY FLOW RESERVE - THE INITIAL GLASGOW EXPERIENCE

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