Real world utilization of CT derived fractional flow reserve in stable angina from contemporary practice: Impact on downstream utilization of invasive coronary angiogram and clinical decision making.

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Background/Introduction - Fractional flow reserve (FFR), a pressure wire-based index used during coronary angiography to assess the severity of potential coronary stenosis, is considered as the reference standard for evaluating the severity of stenosis in coronary artery disease (CAD). Recently, computed tomography angiography-derived fractional flow reserve (FFRct) has been recommended for evaluating functional severity of stenoses as it improves diagnostic accuracy and reduces the need for invasive coronary angiography.

Purpose - To determine whether non-invasive FFRct predicts severity of coronary artery disease and whether its addition improves efficiency of proceeding to revascularisation and invasive coronary angiography (ICA) compared to coronary computed tomography angiography (CTA) without FFR.

Methods - This observational retrospective single center study included two cohorts of patients who presented in a District General Hospital in UK. The first group consisted of all patients who underwent coronary CTA for chest pain from January 2013 to December 2014. The second cohort consisted of all patients who proceeded to have measurement of FFRct from April 2018 to June 2019 after routine coronary CTA for chest pain. The two groups showed similar demographics. FFRct was analysed using the software HeartFlow. We determined the agreement of FFRct (positive if $<0.80$) with stenosis on CTA and ICA (positive if $>50\%$ left main or $>70\%$ other coronary artery) and whether it correlated with need for revascularisation. We also assessed if adding FFRct $<0.80$ improved efficiency of referral to ICA, defined as decreased diagnosis of mild or moderate stenosis ($<70\%$) and higher yield of severe disease ($>70\%$). The two cohorts were compared to determine the above specific endpoints.

Results - In the first cohort, data was collected for 915 patients. 240 (26.2\%) of these patients proceeded to ICA, which showed severe disease in 31 (3.3\%) patients needing revascularisation. In the second cohort of patients, 824 patients underwent coronary CTA and 201 (24.4\%) proceeded to have FFRct measurements. 99 (49\%) of these patients had a negative FFR and 65 (32\%) patients had a positive result ($<0.80$). There was agreement between FFRct and invasive coronary angiography/stress echo in 44 (77\%) patients, with regards to severity/revascularisation. The need for ICA was significantly reduced if coronary CTA and FFRct were both done (240/915; 26.2\% vs 54/824; 6.5\%; p value $<0.00001$).

Conclusion - Reserving ICA for patients with a positive FFRct ($<0.80$) could reduce the number of ICA after coronary CTA and augment the number of ICA leading to revascularisation. Use of FFRct as a gatekeeper to ICA will improve appropriate selection of patients referred and this in-turn will reduce the burden of complications associated with invasive procedures, reduce costs and ensure better utilization of Cath-lab resources.