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Heart Congress 2020: Adenosine–mediated Dynamic Myocardial Perfusion Imaging by Computed Tomography (ADMPI by CT): a new tool for myocardial ischemiae detection and better triage of patients suspected of coronary artery disease (CAD). - UC LOUVAIN Belgium

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Introduction:
During last two decades, coronary CT angiography (CCTA) has become a widely used non invasive diagnostic tool in coronary artery disease (CAD) assessement and the triage of patients needing further investigation and treatment in cathlab. CCTA has important known limitations, such as difficulty of interpretation of stenosis severity in the presence of large calcifications and kinetic artefacts as well as because CCTA allows only a semi-quantitative (more or less then 50%) evaluation of stenosis severity.
Perfusion defect depicting ischemiae, related to high grade CA stenosis, has beter predictive value then % of stenosis in patients referred to cathlab for revascularisation.
Moreover, iodine may be used as a marker of myocardial blood flow (MBF) and myocardial blood volume (MBV). MBF and MBV evaluation by contrast enhanced CT has been widely validated in animal models (vs microspheres) and in humans (PET and SPECT).
Therefore, the purpose of this study was to determine the feasibility and diagnostic accuracy of ADMPI by CT, in patients referred for CAD evaluation with an initial non-diagnostic or uncertain CCTA, in identifying hemodynamically significant CA stenosis as compared to conventional coronary angiography.

Methods: A total of 81 consecutive patients referred for suspected CAD who had a non diagnostic or uncertain initial CCTA, underwent ADMPI by CT. Among those patients, 17 with significant perfusion defects and 2 patients without any perfusion defects underwent coronary angiography for comparison. Significant perfusion defect was defined as at least two consecutive segments belonging to the same vascular territory and showing subendocardial perfusion abnormalities. Both CCTA and ADMPI by CT were performed on the 256-slice DSCT scanner (Somatom Definition Flash, Siemens Medical Systems, Forchheim, Germany). The delay between two scans was on average 7±2 days. Figure 1 shows the steps of the protocol during ADMPI by CT. A post processing sofware named VPCT myocardium (Siemens healthcare) were used two measure absolute values of MBF in both remote (normal) and abnormal vasculary territories based on data from the initial CCTA. All the patients were discharged within 17±10 minutes after the end of perfusion scan without any significant complication. Results were compared in a blinded fashion with conventional coronary angiography realized on average within 9±2 days after ADMPI by CT.

Results: Among 17 patients with abnormal ADMPI by CT, conventionnal coronary angiography confirmed in the suspected vascular territory a significant coronary stenosis in 14 patients. 2 patients with a normal ADMPI by CT underwent also to conventional coronary angiography with confirmation of absence for significant CAD. The MBF measurements were able to differenciate efficiently abnormal segments from remote segments in all vascular territories. Respectively in abnormal vs normal segments in mL/100mL/min; anterior territory :60±7 vs 110±17, postero-lateral territory:65±11 vs 112±18, inferior territory:67±8 vs 120±15.
The overall sensitivity for the detection of hemodynamically significant CAD was 0.86, specificity was 0.91, and accuracy was 0.86.

Conclusions: Our data suggests that ADMPI by CT allows non invasive detection of hemodynamically significant CA stenoses with accuracy in subjects suspected of CAD as compared to conventional coronary angiography when the initial CCTA is non diagnostic. The technique was feasible after short learning curve and was safe. Further multicentric clinical data is needed to assess if this technique may be implemented for better triage of patients referred to cathlab.

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