Can CT Coronary Angiography (CTCA) be Used as a Non-Invasive Estimate of SYNTAX Score?

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The SYNTAX score is used for evaluation of patients with complex coronary artery disease undergoing revascularisation. It is usually calculated off-line, meaning that in suitable patients, PCI is performed at a later date. The ability to non-invasively estimate SYNTAX score would allow the heart team to recommend optimal treatment prior to invasive coronary angiography (ICA), thus enabling the diagnostic and therapeutic procedure to be performed at the same session. We aimed to test the agreement between CTCA and ICA in patients who had undergone both procedures within a 2 month period and had at least one significant stenosis by ICA.
Methods: CT scans were performed on a 64S scanner. SYNTAX score was independently and blindly calculated by 2 experienced readers of CCTA and 2 invasive cardiologists in 104 patients, age 57±10, with significant (>50%) stenoses in 1.7±0.7 vessels. Calcium score averaged 597±727 Agatston units.
Results: Agreement between ICA and CCTA for conventional vessel based analysis (presence of >50% stenosis per vessel) was good with kappa 0.66 and accuracy 83%. The mean SYNTAX score was 14.1±10.0 by ICA and 10.2±6.8 by CTCA, with a significant underestimation of 3.9 by CCTA ($p<0.001$). Weighted kappa was 0.33, indicating only fair agreement. If only good quality CCTA's were used, kappa improved to 0.56. Analysis of the cause of the bias showed ICA to identify more lesions per patient (2.2±1.3 vs. 1.7±1.0, $p<0.001$), while the mean score per lesion was not different (6.4 vs. 5.9, p=ns). Regarding various components of the SYNTAX score, CCTA identified 12/24 occlusions (kappa 0.6); agreement for calcified lesions was fair (kappa 0.36), while agreement regarding bifurcation lesions and long lesions was poor.
In summary, CCTA, despite having a good agreement in conventional vessel based analysis, showed only a fair agreement for the calculation of SYNTAX score, and cannot be currently used as a substitute for diagnostic ICA for this purpose.