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Background: Quantitative evaluation of collateral flow by coronary computed tomography angiography (CCTA) has not been reported. We did a proof-of-concept study to determine the extent or direction of CCTA. **Methods:** From 105 patients (male gender 79%, age 61 years), the angiographic grade and direction of collateral flow in 121 totally occluded vessels was compared to the transluminal attenuation gradient of vessel distal to total occlusion (TAGdistal) derived from 64-detector CCTA. TAG is defined as the linear gradient of luminal attenuation along coronary artery, and was validated against angiographical stenosis and flow velocity in our previous study. **Results:** TAGdistal increased consistently and significantly with the degree of collateral flow, from -4.43 ± 4.02 HU/mm for Rentrop score 0 to 0.82 ± 1.08 HU/mm for Rentrop score 3 ($p < 0.0001$). TAGdistal was also significantly higher in retrograde flow compared to anterograde collateral flow (-2.44 ± 3.04 HU/mm versus 1.33 ± 2.59 HU/mm, $p < 0.0001$). The well-developed collateral vessel that have Rentrop score 2 or 3, which was found in 42.1% (51/121), could be predicted by the TAGdistal cutoff value of ≥ -1.28 HU/mm with area under receiver operating characteristic curve of 0.689, and with a sensitivity and specificity, positive and negative predictive value of 86.3%, 47.1%, and 54.3%, 82.5%, respectively. **Conclusions:** Using TAG method, CCTA appears to be able to measure quantitatively the degree and direction of coronary collateral circulation, and predict angiographically well developed collateral vessels. These abilities of CCTA may be useful for evaluation of patients with complex coronary artery disease.