CT-BASED ATTENUATION CORRECTION COMPARED TO CHANG'S METHOD FOR SEMIQUANTITATIVE EVALUATION OF 123I FP CIT SPECT STUDIES

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BACKGROUND-AIM

Semiquantitative interpretation of 123I FP CIT SPECT studies aids visual assessment leading to a more objective evaluation of nigrostrital dopaminergic degeneration. With the increasing diffusion of hybrid SPECT/CT scanners, a non-uniform approach for attenuation correction (AC) of SPECT data using computed tomography (CT) information has become available and is expected to be more accurate compared to the Chang's method. However, a different range of values of tracer binding is expected. The aim of the study was to compare two different approaches for AC, namely ChangAC and CTAC respectively relying on Chang's method and CT.

METHODS

167 patients with movement disorders underwent 123I FP CIT SPECT on a Symbia T SPECT/CT gamma camera (Siemens Healthcare), equipped with low-energy high-resolution parallel hole collimator. In a subgroup of 35 patients clinical diagnosis was available, with 15 essential tremor (ET) and 20 Parkinson's Disease (PD). The SPECT acquisition was immediately followed by a low-dose CT study. The AC options were: 1) AC using Chang's method (ChangAC) and 2) AC using the low dose CT study (CTAC). For the semiquantitative analysis of striatal tracer binding, an automated system (BasGan) was used analyzing DICOM images after transaxial reconstruction. Striatal specific binding ratios (SBRs) for CTAC and ChangAC were calculated as mean counts of striatal VOI–mean counts of background VOI/ mean counts of background VOI.

RESULTS

The correlation analysis showed a good correlation between ChangAC-SBRs and CTAC-SBRs (R2: 0.7). CTAC-SBRs are significantly higher than ChangAC-SBRs (mean CTAC-SBR±SD, 3.7±1.3 left caudate, 2.5±1.2 left putamen, 3.6±1.3 right caudate, 2.3±1.2 right putamen; mean ChangAC-SBRs±SD, 2.8±0.9 left caudate, 2±0.9 left putamen, 2.8±0.9 right caudate, 2±0.9 right putamen; p<0.05). The scatter plot shows a better discrimination of SBRs between patient with ET and PD using CTAC.

CONCLUSION

For semiquantitative assessment of 123I FP CIT SPECT studies, the relatively new approach for AC relying on CT data can be reliably used. However, the values of striatal tracer bindings obtained with the CTAC are significantly higher. Thus, the type of AC approach used has to be taken into account for setting a correct cut-off value to differentiate between normal and abnormal studies. In addition, for borderline studies, CTAC may lead to a more accurate differentiation between PD and ET.