عنوان مقاله:

Evaluation of the Reconstruction Parameters of Brain Dopamine Transporter SPECT Images Obtained by a Fan Beam Collimator: A Comparison with Parallel-hole Collimators

محل انتشار:

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خلاصه مقاله:

Objective(s): The purpose of this study was to examine the optimal reconstruction parameters for brain dopamine transporter SPECT images obtained with a fan beam collimator and compare the results with those obtained by using parallel-hole collimators.Methods: Data acquisition was performed using two SPECT/CT devices, namely a Symbia T6 and an Infinia Hawkeye 4 (device A and B) equipped with fan-beam (camera A-1 and B-1), low- and medium-energy general-purpose (camera A-2 and B-2), and low-energy high-resolution (camera A-3 and B-3) collimators. The SPECT images were reconstructed using filtered back projection (FBP) with Chang'sattenuation correction. However, the scatter correction was not performed. A pool phantom and a three-dimensional (3D) brain phantom were filled with 123I solution to examine the reconstruction parameters. The optimal attenuation coefficient was based on the visual assessment of the profile curve, coefficient of variation (CV) [%], and summed difference from the reference activity of the pool phantom. The optimal Butterworth filter for the 3D-brain phantom was also determined based on a visual assessment. The anthropomorphic striatal phantom was filled with 123I solution at striatum-to-background radioactivity ratios of 8, 6, 4, and 3. The specific binding ratio (SBR) of the striatum (calculated by the CT method) was used to compare the results with those of the parallel-hole collimators.Results: The optimal attenuation coefficients were 0.09, 0.11, 0.05, 0.05, 0.11, and, 0.10 cm-1 for cameras A-1, A-2, A-3, B-1, B-2, and B-3, respectively. The cutoff frequencies of the Butterworth filter were 0.32, 0.40, and 0.36 cycles/cm for camera A, and 0.46, 0.44, and 0.44 cycles/cm for camera B, respectively. The recovery rates of the SBRmean with camera A were 51.2%, 49.4%, and 45.6%, respectively. The difference was notstatistically significant. The recovery rates of the SBR with camera B were 59.2%, 50.7%, and 50.8%, respectively. Camera B-1 showed significantly high SBR values.Conclusion: As the findings indicated, the optimal reconstruction parameters differed according to the devices and collimators. The fan beam collimator was found to provide promising results with each device.

کلمات کلیدی:
SPECT/CT, dopamine transporter, fan-beam collimator