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TRANSLATIONAL IMAGING IN DIAGNOSTIC WORKUP OF NEURODEGENERATIVE PARKINSONIAN SYNDROME

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BACKGROUND-AIM

When movement disorders occur, neuroimaging plays a pivotal role in neurodegenerative parkinsonian syndrome (NPS) diagnosis. FP-CIT SPECT is a functional assessment performed for basal ganglia evaluation; it has already shown to be sensitive, but overall accuracy should increase if imaging has to become the reference tool for NPS early diagnosis. MR scanning is routinely used to rule out morphological alterations which could potentially be related to symptoms. Aim of this study was to perform an automated integration of MR and FP-CIT SPECT by voxel-based morpohometry (VBM) to optimize diagnostic accuracy in NPS.

METHODS

Sixty-two patients with Parkinson's disease suspicion (age 66±11, 33 M) underwent FP-CIT SPECT and brain MR. Final diagnosis was assessed by neurologist on clinical base at least two years later and NPS was confirmed in 31 patients. SPM was used to normalize SPECT images with our FP-CIT template and MR images with built-in template. VOIs including voxel with significant differences between the two groups (NPS patients and NPS-free subjects) were drawn with SPM from SPECT and MR images, respectively. VOIs were used to extract data with MarsBaR software. Multivariate logistic regression was used to evaluate the correlation of both SPECT and MR semi-quantitative data with diagnosis.

RESULTS

At SPECT, basal ganglia uptake was significantly lower in NPS compared to NPS-free ($p=10^{-5}$). In T1 images, SPM detected differences between the two groups in thalami and in anterior cingulate ($p=0.005$ and $p=0.04$, respectively): in both occurrences MR accuracy was lower than SPECT accuracy. Multivariate analysis showed that MR data of thalami were independently and significantly correlated with diagnosis and that these data inclusion improves diagnostic accuracy from 77% (SPECT alone) to 87% (SPECT + MR). Multivariate analysis showed that MR cingulate data were no longer significant (component probably dependent from thalami).

CONCLUSION

SPECT is mandatory when NPS is suspected and gives reliable information; in these patients, MR is generally performed to ascertain SPECT diagnosis. Automated images analysis allows increase of both sensitivity and specificity; integration by voxel-based morphometry of FP-CIT SPECT and MR leads to diagnostic accuracy optimization. Thus, translational imaging should be encouraged in order to fully develop the strength of both structural and functional imaging in patients with suspected NPS.