BRAIN FP-CIT SPECT IN THE CONTEMPORARY DIAGNOSTICS OF PARKINSON'S DISEASE

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ABSTRACT

The contemporary diagnostic process in Parkinson's disease is based on the well-known clinical criteria and on some neuroimaging methods. Brain FP-CIT SPECT was introduced in Europe in 2003. In Bulgaria this method is available only in the university hospitals in Varna and Sofia. The present study aimed at assessing the diagnostic value of FP-CIT SPECT in the diagnostics of Parkinson's disease in 35 patients, in a local clinical setting. Twenty-six of the patients had been previously diagnosed as clinically possible or definite Parkinson's disease, while the remaining 9, as essential tremor. Brain FP-CIT SPECT scanning was performed in all subjects. The results were assessed visually for normal or abnormal ligand striatal uptake. Abnormal results were found in 25 of 26 patients diagnosed clinically as having Parkinson's disease. The remaining 9 patients with clinical diagnosis of essential tremor showed normal scan results. Sensitivity of the method for the clinical diagnosis of Parkinson's disease was 96% and the specificity for essential tremor was 100%. Our results for specificity and sensitivity of the method are similar to those previously published in the literature and would thus allow us to emphasize on the high informative value of the method in our clinical setting.

Key words: Parkinson's disease, diagnosis, brain FP-CIT SPECT, specificity, sensitivity.

INTRODUCTION

Neurodegenerative disorders with tremor as dominant clinical symptom are frequent. Their exact diagnosis is essential because of the specific treatment options, prognosis, socio-economic sequelae and impact on quality of life. Brain FP-CIT SPECT (DaTSCAN, Amersham Health) is a novel method with high sensitivity and specificity for the differentiation between parkinsonism and essential tremor (ET), increasing the clinician's confidence for establishing a precise diagnosis in nearly all examined patients. Its introduction as a routine examination would allow shortening of the time needed for accurate diagnosis. It would not only permit patients to plan their social and professional activities earlier, but also provide opportunities for optimal symptom control and maintaining of satisfying quality of life by adequate treatment (1,2).

The present study aimed at assessing the diagnostic value of FP-CIT SPECT in the diagnostics of Parkinson's disease (PD) in our local clinical setting.

PATIENTS AND METHODS

Brain FP-CIT SPECT was performed in "Sveta Marina" University Hospital in 35 patients with tremor as a dominant symptom (20 females and 15 males), mean age of 64.9 years, mean duration of tremor 4.74 years. Twenty-six of them were diagnosed as clinically possible or definite PD and the remaining 9 as ET.

Diagnostic dose of 185MBq ^{123}I -FP-CIT was applied intravenously in each patient, according to standard protocols. The patients were examined in supine position, 3-5 hours after injection, using a Siemens Diacam single-headed gamma camera. Images were assessed visually and semi-quantitatively with dedicated software. Semi-quantitative analysis was performed after selection of regions of interest (ROI), including the areas of specific DAT binding in the striatum (without evaluation of sub-regions) and these with non-specific binding in the occipital cortex. The following indices were generated: "Specific/non specific binding" and index of

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asymmetry with evaluation of the images with best visualization of the striatum.

Visual assessment was performed by an investigator blinded to the clinical diagnosis. Results were defined as normal or at 1 of 3 grades of abnormal striatal ligand uptake: one-sided hypointensity, early bilateral hypointensity and marked bilateral hypointensity (4).

RESULTS

Visual assessment of the conducted scans revealed abnormal results in 25 patients, while the remaining 10 were interpreted as normal.

Patients with SPECT-established diagnosis of ET were 9 females and 1 male, aged $69,2 \pm 8,34$ years (58-76 years), with $6,5 \pm 3,6$ years (3-12 years) of tremor duration.

Twenty-five out of 26 persons with clinical diagnosis of PD showed abnormal scans (11 females and 11 males), aged $63,2 \pm 10,6$ years (39-80 years), with $4,04 \pm 3,87$ years (1-13 years) of tremor duration (Fig. 1).

Fig. 1 Brain FP-CIT SPECT images: A. Patient with ET ($n = 31$): normal radionuclide uptake.

Sensitivity of the method for clinical diagnosis of PD was 96%, and specificity for ET was 100%.

DISCUSSION

Analysis of our results shows similar specificity and sensitivity values to those published in the literature, namely 93-100% and 89-98%. Having in mind that before the introduction of imaging methods the diagnosis of PD was

only clinical and 100% accuracy was achieved only post mortem, we must emphasize on the perspectives of this promising method. The diagnostic error in clinical investigation is 8-35%, the levodopa test is not reaching 100%

B. Patient with PD ($n = 17$): decreased radionuclide uptake, more prominent on the left.

sensitivity, and the tremorogram alone cannot define the diagnosis (3).

PD is the second most frequent neurodegenerative disorder, with high medical, social and economic impact. These facts could explain the trends towards an accurate and early differentiation between PD and other diseases with dominant tremor, most often ET (3,4).

PD is hyperdiagnosed around the world in about 35% of the cases, especially in the early stages when the clinical picture is not yet fully manifested. That is the most frequent reason for ET patients to be misdiagnosed as PD and to receive expensive treatment without any practical effect for years (3,5).

CONCLUSION

Our results confirm previously published findings of different European centers about the efficacy of visual assessment of brain FP-CIT SPECT and its high specificity and sensitivity in the differential diagnosis between parkinsonism and ET. Together with its relatively low costs and availability, this could make it an easily applicable method of choice.

The introduction of this method in the routine clinical practice could allow early and accurate differential diagnosis, adequate treatment and optimal quality of life of patients with tremor disorders.

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