Combinatory use of $^{123}$I-FP-CIT-SPECT and cardiac $^{123}$I-metadobenzylguanidine scintigraphy for the diagnosis of Parkinsonisms

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Introduction

- Parkinson’s disease (PD) is the second most common neurodegenerative disorder in an aging population.
- Early intervention is beneficial but early diagnosis is still difficult.
- Single-photon emission computerized tomography of the dopamine transporter (DAT-SPECT) is useful for differentiating parkinsonian syndromes from other movement disorders, Cardiac $^{123}$I-metadobenzylguanidine (MBG) scintigraphy is useful for differentiating PD from other parkinsonian syndromes.
- Recent studies indicated a possible usefulness of the striatal asymmetry index (SAI) of DAT-SPECT for differentiating parkinsonian syndromes.

Methods

Participants

Consecutive patient with parkinsonism
August 2014 ~ July 2016 at FHU (N=84)

Excluded diabetes mellitus, heart disease, family history of PD (N=10)

Excluded MBG Positive (N=37)

Excluded DAT Negative (N=5)

Group 1: PD (N=13)

Group 2: MSA (N=4), PSP (N=3), CBD (N=5) UP (N=7)

* SBR (specific binding ratio) of the striatum was semi-quantitatively calculated using DAT VIEW software (Nihon Medi-Physics, Tokyo, Japan). The SAI of the SBR was also calculated automatically with the software using the following formula:

$$\text{SAI} = \frac{| \text{SBR}_{\text{left}} - \text{SBR}_{\text{right}} |}{\text{SBR}_{\text{left}} + \text{SBR}_{\text{right}}} \times 10$$

Please refer reference (4) for more details!

Clinical features

All patients

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>PD</th>
<th>CBD</th>
<th>PSP</th>
<th>MSA</th>
<th>UP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>13</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

Age at onset, mean ± SD (range, y)

- PD: 67.6 ± 14.8 (42-85)
- CBD: 65.4 ± 7.5 (54-72)
- PSP: 71.0 ± 12.8 (57-82)
- MSA: 69.0 ± 7.9 (62-80)
- UP: 64.4 ± 15.9 (33-82)

Male/Female

- PD: 5/8
- CBD: 1/4
- PSP: 1/2
- MSA: 1/3
- UP: 3/4

Interval from onset to DAT-SPECT, mean ± SD (range, m)

- PD: 40.5 ± 31.0 (10-120)
- CBD: 68.5 ± 52.8 (11-120)
- PSP: 66.3 ± 35.3 (34-104)
- MSA: 28.3 ± 11.1 (13-37)
- UP: 59.0 ± 31.3 (8-98)

Follow-up period from diagnosis, mean ± SD (range, m)

- PD: 16.4 ± 6.1 (10-30)
- CBD: 15.4 ± 8.2 (7-29)
- PSP: 14.3 ± 11.0 (11-31)
- MSA: 12.2 ± 1.3 (11-14)
- UP: 4.8 ± 2.2 (8-22)

PD patients

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Parkinson’s Disease patients (n=13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Hoehn &amp; Yahr (H&amp;Y) stage</td>
<td>2.15±0.8</td>
</tr>
<tr>
<td>1(3), 2(5), 3(5), 4(0), 5(0)</td>
<td></td>
</tr>
<tr>
<td>Patient number of each H&amp;Y stage</td>
<td>1</td>
</tr>
<tr>
<td>Clinical Subtype (number)</td>
<td>Akineti-rigid (6)</td>
</tr>
<tr>
<td>Tremor-dominant (7)</td>
<td></td>
</tr>
<tr>
<td>Non motor symptoms (number)</td>
<td>Constipation (3), Anosmia (2), Orthostatic hypotension (3), Hallucination (1), Memory impairment (1)</td>
</tr>
</tbody>
</table>

Results

- SAI = | (SBRleft − SBRright) | / (SBRleft + SBRright) | × 10
- SAI = 15.2
- ROC curve analysis

Conclusions

- PD patients in early stage showed more symmetry in their DAT-SPECT examination.
- The combined use of the MBG scintigraphy and the SAI on DAT-SPECT is useful to make a differential diagnosis of the early phase Parkinson’s disease.
- Further investigations using a larger cohort of patients over a longer period is necessary to confirm the applicability of the present data in future.

References


PD: Parkinson's disease, MSA: multiple system atrophy, PSP: progressive supranuclear palsy, CBD: corticobasal degeneration, UP: unclassified parkinsonian syndrome, ROC: receiver operating characteristic curve, AUC: area under the curve

COI: none

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