Available online at www.sciencedirect.com
ScienceDirect
journal homepage: http://www.elsevier.com/locate/pjnns

Original research article

Comparison of dystonia between Parkinson's disease and atypical parkinsonism: The clinical usefulness of dystonia distribution and characteristics in the differential diagnosis of parkinsonism

Won Tae Yoon *
Department of Neurology, Kangbuk Samsung Hospital, Sungkyunkwan University School of Medicine, Republic of Korea

ARTICLE INFO

Article history:
Received 4 May 2017
Accepted 5 November 2017
Available online xxx

Keywords:
Dystonia
Parkinson's disease
Atypical parkinsonism
Multiple system atrophy
Progressive supranuclear palsy
Corticobasal degeneration

ABSTRACT

Objective: Dystonia is occasionally found in patients with Parkinson's disease (PD) and atypical parkinsonisms. However, systematic comparative analysis of the association between dystonia and parkinsonism have seldom been reported. The goals of this study are to compare the clinical characteristics and distributions of dystonia between PD, multiple system atrophy (MSA), progressive supranuclear palsy (PSP) and corticobasal degeneration (CBD).

Methods: We prospectively enrolled 176 patients who presented with dystonia and parkinsonism out of 1278 patients with parkinsonism. We analyzed the clinical features of dystonia and parkinsonism.

Results: The frequencies of dystonia were 11.0% in PD, 20.9% in MSA, 40.7% in PSP and 66.7% in CBD. Dystonia symptoms were most frequent in CBD and relatively more frequent in PSP and MSA ($p < 0.001$). Moreover, multiple types of dystonia occurred most frequently in MSA ($p = 0.034$). According to the distribution of dystonia, cranio-facial dystonia (CFD) and cervical dystonia (CD) were more frequently observed in atypical parkinsonism ($p = 0.001$). In contrast, limb dystonia (LD) was more frequently observed in both PD and CBD, and truncal dystonia (TD) was more frequently detected in PD ($p < 0.001$). Levodopa medication related dystonia was markedly more frequent in PD than in atypical parkinsonism ($p = 0.030$).

Conclusions: In this long-term, observational, prospective study, we concluded that levodopa medication related LD and TD were more frequently observed in PD than in atypical parkinsonism. Conversely, levodopa medication non-related CFD and CD were more frequently observed in atypical parkinsonism, and coexisting of some types of multiple dystonia may be unique features of atypical parkinsonism. TD or multiple types of LD, might be representative of PD rather than atypical parkinsonism.

* *Correspondence to*: Department of Neurology, Kangbuk Samsung Hospital, Sungkyunkwan University School of Medicine, #29 Saemunan-ro, Jongno-gu, Seoul 03181, Republic of Korea.
E-mail addresses: wtyoon@skku.edu, wtyoon@gmail.com

https://doi.org/10.1016/j.pjnns.2017.11.004
0028-3843/

Please cite this article in press as: Yoon W.T. Comparison of dystonia between Parkinson's disease and atypical parkinsonism: The clinical usefulness of dystonia distribution and characteristics in the differential diagnosis of parkinsonism. Neurol Neurochir Pol (2017), https://doi.org/10.1016/j.pjnns.2017.11.004

1. Introduction

Dystonia is a syndrome that is characterized by sustained muscle contraction associated with twisting, repetitive, and patterned movements, abnormal posture, or both [1]. Dystonia may coexist with parkinsonism in a number of neurodegenerative, genetic, toxic, and metabolic disorders of which Parkinson's disease (PD) and atypical parkinsonisms are the most common [2,3]. Clinical associations between and dystonia and various parkinsonisms have been reported in some studies [4–7]. Although rare, one such study also reported the overall frequency and clinical features of dystonia in atypical parkinsonism [8].

However, the clinical relationships remain unclear; for example, one study commented that the true frequency and range of dystonia manifestations remain unknown in autopsy-proven cases of parkinsonism, including multiple system atrophy (MSA), progressive supranuclear palsy (PSP), corticobasal degeneration (CBD) and PD [9], and systematic prospective, comparative analysis of the clinical features of dystonia associated with parkinsonism have seldom been reported.

The aims of the present study were to investigate the clinical characteristics of dystonia associated with parkinsonism in a larger patient sample than that in previous reports and compare these characteristics among the various types of parkinsonism to identify the clinical usefulness of the distributive pattern of dystonia in the differential diagnosis of parkinsonism.

2. Materials and methods

Between January 2002 to December 2004, we investigated 185 consecutive patients who presented with dystonia combined with parkinsonism. Among these patients, we prospectively enrolled 176 patients who presented with dystonia combined with parkinsonism out of 1278 patients with parkinsonism registered at the Movement Disorder Clinic of the Samsung Medical Center during the same period, from January 2002 to December 2004. We included patients with long-term follow-up data over five years (to December 2009), full evaluations for parkinsonism and clinical diagnoses confirmed by at least two specialist neurologists from movement disorder clinics. Under the established diagnostic criteria [10–15], 1278 patients with parkinsonism were divided into 1045 patients with PD, 191 patients with MSA, 27 patients with PSP and 15 patients with CBD. Moreover, we excluded 9 patients with uncertain diagnosis of parkinsonism ($n = 2$), those lost to follow-up ($n = 2$) and those with combined dystonia due to medical or neurological reasons other than parkinsonism with the following other diagnosis: dementia with Lewy bodies (DLB) ($n = 2$), normal pressure hydrocephalus (NPH) ($n = 1$), metabolic encephalopathy ($n = 1$), and post-stroke parkinsonism with dystonia ($n = 1$).

We clinically diagnosed dystonia using the established definition [2,16] and analyzed the clinical features of dystonia and parkinsonism, including demographics, the temporal profiles of the symptoms, the distribution and characteristics of dystonia, the clinical diagnosis of parkinsonism and the relationship with levodopa treatment. Dystonia was subclassified as cranio-facial dystonia (CFD), cervical dystonia (CD), truncal dystonia (TD) and limb dystonia (LD) according to the distribution of dystonia among the enrolled parkinsonism patients, and we also clinically examined cases of unusual dystonia phenotypes, such as dystonia preceding parkinsonism (Pre-Dystonia) and clinically dominant dystonia if there were multiple coincidently emerging variant types of dystonia (Multi-Dystonia), as occurred in one parkinsonism patient.

All data are presented as the mean ± standard error of the mean (SEM). The PASW (Version 22.0; IBM SPSS Inc., Chicago, IL) program for Windows was used for statistical analysis. The baseline demographic and clinical data were analyzed by Student's *t*-test, and data regarding sex differences and the number of subjects with the presence of dystonia between each group were analyzed using the chi-square test. Data related to age of onset, the interval from onset to parkinsonism, and the number of characteristics regarding dystonic symptoms were analyzed using one-way analysis of variance (one-way ANOVA). Fisher's exact test was used to evaluate the difference in the number of dystonias between each group, and the statistical significance level was set at $p < 0.05$.

3. Results

Among 176 dystonic patients with parkinsonism, 115 patients were clinically diagnosed with PD, 40 were probable MSA, 11 were probable PSP, and 10 were probable CBD. Fig. 1 shows the patient flow, including information about 9 excluded patients. Demographic and clinical profiles of the dystonic patients in each parkinsonism group are presented in Table 1. Among the total 1278 parkinsonism patients (1045 PD, 191 MSA, 27 PSP and 15 CBD), the frequencies of dystonia among each parkinsonism type were 11.0% (115/1045) in PD, 20.9% (40/191) in MSA, 40.7% (11/27) in PSP and 66.7% (10/15) in CBD. Overall, dystonia symptoms were more frequent in CBD and PSP than in PD ($p < 0.001$), and in terms of sex differences, dystonia was more frequent in men than in women among PSP patients ($p = 0.019$). The onset age of initial dystonic symptoms was older in CBD and younger in PD ($p < 0.001$).

In CBD patients, only limb dystonic symptoms without other types of dystonia were observed, with no unusual Pre-Dystonia phenotypes. Despite the small number of patients, Multi-Dystonia was relatively more frequent in MSA than in PD or PSP ($p = 0.034$). Aside from these findings, no other significant clinical demographic differences were observed among the various types of parkinsonism (Table 1).

According to the distribution of dystonia, CFD and CD were more frequently observed in atypical parkinsonism (39/61, 63.9% and 7/61, 11.5%, respectively) than in PD (16/115, 13.9% and 1/115, 0.9%, respectively) ($p < 0.001$). In contrast, TD and LD were more frequently observed in PD (32/115, 27.8% and 66/115, 57.4%, respectively) than in atypical parkinsonism (2/61, 3.3% and 13/61, 21.3%, respectively) ($p = 0.001$). TD, including camptocormia, was detected only in PD and levodopa medication non-related MSA ($p < 0.001$). In terms of the relationship with levodopa treatment, levodopa medication related dystonia was markedly more frequent in PD than in

Please cite this article in press as: Yoon W.T. Comparison of dystonia between Parkinson's disease and atypical parkinsonism: The clinical usefulness of dystonia distribution and characteristics in the differential diagnosis of parkinsonism. Neurol Neurochir Pol (2017), https://doi.org/10.1016/j.pjnns.2017.11.004