Freezing of gait in patients with advanced Parkinson’s disease

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Summary. Background. Freezing of Gait (FOG) is one of the most disturbing and least understood symptom in advanced stage of Parkinson’s disease (PD). The contribution of the underlying pathological process and the antiparkinsonian treatment to the development of FOG are controversial.

Objective. To study the relationships between clinical features of PD and therapeutic modalities in patients with advanced PD and FOG.

Methods. Consecutive patients with 5 years or more of PD symptoms (n = 172) (99 men) with mean age at symptoms onset of 58.3 ± 13.2 years and mean symptoms duration of 11.8 ± 5.6 years were studied. Clinical data were collected during the last office visit through physical examination, detailed history, review of patients’ charts, and other documents. A patient was considered as “freezer” if he/she reported recent experience that the legs got stuck to the ground while trying to walk. The presence of dyskinesia, early morning dystonia or significant postural reflex abnormalities were assessed through history and neurological examination. Duration of treatment with antiparkinsonian drugs was calculated from history charts. Chi square and t test were used to compare the patients with and without FOG. Logistic regression was used for the comparison of association between the presence of FOG (dependent variable) disease duration and disease stage (explanatory variables) and duration of treatment with anti-parkinsonian drugs.

Results. The study population consisted of 45 patients at Hoehn and Yahr (H&Y) stage 2.5 (26%), 104 patients at stage 3 (60.5%), and 23 patients at H&Y stages 4–5 (13.5%). Ninety one patients (53%) reported FOG at the time of the study. Severity of the disease expressed by H&Y stage at “off” was a significant contributing factor for FOG with a significant trend (z = 4.38, p < 0.0001), as was longer duration of levodopa treatment, and confirmed by FOG using the multivariate logistic regression (p = 0.01 and p = 0.004, respectively). Using a univariate model, longer duration of treatment with dopamine agonists contribute to the appearance of FOG (p = 0.07) while longer duration of amantadine treatment decreased the appearance of FOG.
There was a significant association between FOG and the presence of dyskinesia \( (p < 0.002) \), early morning foot dystonia \( (p < 0.003) \) and significant postural instability \( (p < 0.0005) \).

**Conclusion.** FOG is a common symptom in advanced PD. It is mainly related to disease progression and levodopa treatment.

**Keywords:** Parkinson’s disease, freezing of gait, complication, advanced stage.

**Introduction**

The modern therapeutic approach to Parkinson’s disease (PD) has enabled patients to remain ambulatory and mobile throughout most of the disease course. However, the progression of the disease in conjunction with long term side effects of antiparkinsonian medications created a complex motor disturbances. Gait disturbances are playing an important role in the clinical picture of advanced PD cases affecting the degree of ambulating ability and independence of the patients. These include choreic or dystonic gait as well as festinating gait at the “on” state while shuffling gait or hypokinetic bradykinetic gait pattern frequently accompanied by dystonia are seen during the “off” state.

Freezing of gait (FOG) is one of the common and most disabling gait disturbances accompanied the clinical syndrome in advanced stages of PD.

FOG has been reported at the early stages of the disease even prior to anti-parkinsonian treatment but it is relatively rare and usually short in duration (1–2 seconds) with minor functional disability (Giladi et al., 1992, 1996; Lamberti et al., 1996). FOG is rare as the presenting symptom of PD (Lamberti et al., 1997) and if it is the major disturbing symptom in the early stages of the disease one should suspect the diagnosis of other parkinsonian syndromes like progressive supranuclear palsy (PSP) or vascular parkinsonism (Giladi et al., 1997; Giladi and Fahn, 1998).

In contrast, at the advanced stages of the disease FOG is a very disabling symptom lasting seconds to minutes and frequently associated with falls and injuries. It appears at initiation of gait (start hesitation), at doorways, narrow spaces or in stressful situations (Giladi et al., 1992; Lamberti et al., 1997).

FOG may become the most disabling symptom which force the patient to stay at home or use a wheelchair. The basic mechanism responsible for FOG is unclear. Disease progression by itself is playing an important role as shown in the DATATOP study (Giladi et al., 1996) but clearly dopaminergic, therapies are playing an important role (Ambani and Van Woert, 1973; Barbeau, 1972, 1976).

The purpose of the present study was to assess the frequency of FOG at the advanced stages of PD and to associate it with other parkinsonian symptoms or therapeutic modalities. Such study even if retrospective in nature is of importance trying to understand the role of the disease itself and the contribution of current treatment modalities to the development of FOG. In order to look at a relatively homogeneous group of PD patients we excluded patients with less than five years of parkinsonian symptoms.