Speech therapy for Parkinson’s disease

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SUMMARY Twenty-six patients with the speech disorder of Parkinson’s disease received daily speech therapy (prosodic exercises) at home for 2 to 3 weeks. There were significant improvements in speech as assessed by scores for prosodic abnormality and intelligibility and these were maintained in part for up to 3 months. The degree of improvement was clinically and psychologically important, and relatives commented on the social benefits. The use of a visual reinforcement device produced limited benefit over and above that from prosodic exercises alone, except to patients with severe speech disorder.

About one half of all patients with Parkinson’s disease show disorder of speech, its severity being generally but by no means universally related to the severity of physical disability. The main features are reduced intensity of voice, a tendency to increased and unvarying pitch, monotony of speech, and an abnormal rate of speaking. It contributes substantially to disability, and patients and their relatives regard speech difficulties as responsible for much embarrassment and social isolation. The speech disorder of Parkinson’s disease responds to levodopa and indeed improvement in speech is often the first objective evidence of response. Though obvious abnormality of speech frequently persists in patients on otherwise optimal drug therapy, formal speech therapy is usually considered of limited value. A small uncontrolled trial previously reported demonstrated that improvement in communication following speech therapy was possible and might last at least in part for up to 6 months. The present study attempts to provide controlled observations on a larger group of patients, and to assess the value of a visual reinforcement device.

Patients and methods

Forty-six patients with Parkinsonian speech disorder were referred by hospital consultants, general practitioners, and the Glasgow and District Branch of the Parkinson’s Disease Society. Twenty were excluded for the following reasons: their communication difficulty was subjectively slight, there was evidence of intellectual impairment, there was a history of stroke or other disorder likely to affect speech, there was significant impairment of hearing, drug therapy was likely to be changed in the ensuing few weeks, or they were for any other reason considered unlikely to be able to cooperate in an intensive treatment programme. The 26 remaining patients were randomly assigned to two treatment groups, A and B (table 1). Of the 13 in Group A, eight were on levodopa alone, two on anticholinergic drugs alone, two on levodopa and anticholinergics, and one on levodopa and bromocriptine; five were taking benzodiazepines. Of the 13 in Group B, seven were on levodopa and anticholinergics, two on anticholinergic drugs alone, one on levodopa alone, two on levodopa and bromocriptine, and one on bromocriptine and anticholinergics; four were taking benzodiazepines.

Assessments of speech were carried out in the patient’s own home (except for two patients who were in hospital) and at the same time of day in each patient. Speech was assessed before and after a 2 week period of non-intervention (assessments 1 and 2). Group A was assessed again after 2 weeks of prosodic exercises with the Vocalite and Group B after 2 weeks of prosodic exercises without the Vocalite (assessment 3). Group B was assessed after a further one week of prosodic exercises (assessment 4). In both groups a further assessment was carried out three months later (assessment 5). Paired pre-treatment assessments were not possible in three patients in Group B. Assessments after 3 months were not possible in three patients in Group A (two had died and one had suffered a stroke), and in one patient in Group B who had died. Prosodic abnormality scores were determined from tape-recorded test and spontaneous samples of speech collected by the speech therapist who supervised the therapy, and scored as shown in table 2. One point was given for any abnormality, to a maximum of seven. The tapes were also scrambled and scored blind by a second speech therapist, and the final score given was the mean of the two.
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Table 1  Prosodic abnormality score

<table>
<thead>
<tr>
<th></th>
<th>A. Volume</th>
<th>B. Pitch</th>
<th>C. Tone</th>
<th>D. Intonation</th>
<th>E. Vocal quality</th>
<th>F. Rate</th>
<th>G. Rhythm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal, Loud, Mono, Quiet, Fading</td>
<td>Normal, High, Low, Monotone, Breaks</td>
<td>Normal, Hyper, Mixed, Hypo</td>
<td>Normal, Monotone, Reduced, Inappropriate</td>
<td>Normal, Hoarse, Strident, Tremor, Aphonie</td>
<td>Normal, Too fast, Progressively increasing in speed, Progressively decreasing in speed</td>
<td>Normal, Stammerlik, Insufficient stressing, Inappropriate silences</td>
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Scoring 0: Normal 1: Any other

Total possible score = 7

Table 2  Patients studied

<table>
<thead>
<tr>
<th>Group</th>
<th>Sex</th>
<th>Age (years)</th>
<th>Duration of Parkinson's disease (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>6 F 7 M</td>
<td>66±SD 6</td>
<td>13±SD 13</td>
</tr>
<tr>
<td>B</td>
<td>2 F 11 M</td>
<td>66±SD 8</td>
<td>10±SD 4</td>
</tr>
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</table>

The intelligibility of speech was rated by the two speech therapists together on a scale of 0-3, the higher number representing the greater degree of unintelligibility. The tapes were also scored for intelligibility by two physicians independently, and blind as regards sequence or therapy, using a visual analogue scale of 0-100 mm. Again the higher number represents the greater degree of unintelligibility.

The two visual analogue scores were averaged.

The patient's relatives were asked to comment on any abnormality of the voice, and on loudness, monotony of speech, abnormality of rate, social withdrawal, and difficulties in using the telephone.

Treatment was carried out in five one-hour sessions per week in the patient's home, with prosodic exercises. The method followed essentially the intonation exercises described by Halliday, and designed to improve prosodic abnormality by increasing the patient's awareness of his problem and practising him in more normal patterns of intonation and conversational speech. The exercises emphasised the variety of prosodic patterns commonly found in conversational speech, particularly the role of volume and intonation. The Vocalite was used as a visual reinforcement device. This is a voice-operated light source, designed by the Department of Clinical Physics and Bio-engineering of the West of Scotland Health Boards, and manufactured by Greenwood Electronics (Glasgow). It enables the patient to monitor some of the prosodic features of his own speech.

Results

The prosodic abnormality scores given to 94 of 110 tapes by the two speech therapists were identical, across the whole range of scores; only 16 (15%) differed, none by more than one point.

Table 3 shows the relationships between the three assessment methods used. Increasing prosodic abnormality scores are associated with increasing visual analogue scores, though the high values for the standard errors of the visual analogue scores show the wide scatter in the latter. The intelligibility rating is also closely related to both the visual analogue and the prosodic abnormality score.

Tables 4 and 5 show the mean values for the prosodic abnormality scores, the intelligibility ratings, and the visual analogue scores at each assessment in each group.

Comparison between assessments 1 and 2 showed no significant difference on either group. The mean prosodic abnormality and visual analogue scores in Group B are somewhat greater than those in Group A, though not significantly so. Changes in scores between assessments 2 and 3 show substantial improvement, and a significant reduction in all scores except the visual analogue score in Group A. Between the assessments at the end of treatment and three months later (that is assessments 3 and 5 in Group A and 4 and 5 in Group B) there was a significant deterioration, particularly in the prosodic abnormality scores. However between assessments 2 and 5 there had been some benefit maintained, at
least in Group B. None of the three patients who died within 3 months had shown any improvement during therapy.

Comparison between groups A and B over the 2 weeks period of prosodic exercises with and without and Vocalite (assessments 2 and 3) showed little difference. The fall in the prosodic abnormality score was greater in the former group (mean 2.50 as against 1.75) but there was no difference in the intelligibility rating or visual analogue score. Comparison between assessments 3 and 4 in Group B shows no significant difference, but this conceals the fact that all four patients with prosodic abnormality scores of 4 or more at assessment 3 improved, by an average of 2.0 points, whereas there was no significant change in any of the nine patients whose initial score was 3.5 or less.

Before therapy relatives of 24 patients commented on the abnormalities of speech that they had noticed, (comments were not possible on the two hospitalised patients). They commented on the abnormalities of voice quality in 23 patients, of volume in 22 and monotony of speech in 19; abnormality of rate was noted in nine. Social withdrawal and difficulties with the telephone were also noted in almost half of the subjects. Improvement was recognised in all the characteristics mentioned, and indeed this was commented upon after therapy in respect of several patients where no problem had been noted initially by relatives. All relatives commented that they thought therapy had been worthwhile.

**Discussion**

Intelligibility of speech is only one aspect of language as a communication system, and a description of the speech disorder of Parkinson’s disease purely in terms of difficulty with intelligibility would thus be incomplete. The present study leans heavily on the concept of prosody as described by Monrad-Krohn. Prosody is defined as that aspect of spoken language which consists in correct placing of pitch and stress on syllables and words. It is responsible for conveying subtle changes of meaning, independently of words or grammatical order. In addition to this semantic role, it makes a major contribution to the emotional content of speech. As Monrad-Krohn pointed out, the abnormality of prosody in Parkinson’s disease may convey to others the impression that the patient is demented, depressed, apathetic, or cold and unfearing. Facial movement and gesture are also part of the emotional content of communication, and their deficiency in Parkinson’s disease undoubtedly contributes to the same impression.

The scoring system for prosodic abnormality used in the present study shows the high degree of reproducibility previously demonstrated. There should be no difficulty in its use by speech therapists trained to appreciate the various features of prosody set out in table 2. The prosodic abnormality score is also related to the two measures of intelligibility of speech, as table 3 shows, and thus ranks patients in order of their overall severity of communication disorder.

The patients included in this study are probably representative of patients with the speech disorder of Parkinson’s disease, in respect of age, duration of disease, and current therapy. The overall severity of the disease is shown by the mortality of over 10% within 3 months. The reasons for the exclusion of

**Table 4 Results of assessments**

<table>
<thead>
<tr>
<th>Assessment No.</th>
<th>1 vs 2</th>
<th>2 vs 3</th>
<th>3 vs 4</th>
<th>3 vs 5</th>
<th>4 vs 5</th>
<th>2 vs 5</th>
</tr>
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<tbody>
<tr>
<td>Prosodic abnormality score</td>
<td>Group A</td>
<td>NS</td>
<td>&lt;0.001</td>
<td>—</td>
<td>&lt;0.005</td>
<td>—</td>
</tr>
<tr>
<td>B</td>
<td>NS</td>
<td>&lt;0.005</td>
<td>NS</td>
<td>—</td>
<td>&lt;0.025</td>
<td>NS</td>
</tr>
<tr>
<td>Intelligibility rating</td>
<td>A</td>
<td>NS</td>
<td>NS</td>
<td>—</td>
<td>NS</td>
<td>—</td>
</tr>
<tr>
<td>B</td>
<td>NS</td>
<td>&lt;0.025</td>
<td>NS</td>
<td>—</td>
<td>NS</td>
<td>—</td>
</tr>
<tr>
<td>Visual analogue score</td>
<td>A</td>
<td>NS</td>
<td>NS</td>
<td>—</td>
<td>NS</td>
<td>—</td>
</tr>
<tr>
<td>B</td>
<td>NS</td>
<td>&lt;0.025</td>
<td>NS</td>
<td>—</td>
<td>NS</td>
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</table>
patients were practical, in that those with hearing difficulties or intellectual impairment would not be able to participate in treatment, and those whose drug therapy was not optimal or stable, and might be changed, could not usefully be assessed for any value of speech therapy alone.

The two patient groups differ in three important respects (table 1). Group B contains more men, and more patients on anticholinergic drugs, and the overall severity of the speech disorder is also somewhat greater (table 4). There was no relationship between the prosodic abnormality and visual analogue scores and either male sex or anticholinergic drug therapy, and it is uncertain why this difference occurred. It does not, as will be seen, affect the principal conclusions of the study.

Although a formal double-blind controlled trial of speech therapy in Parkinson’s disease cannot be easily envisaged, the observations during the control period show that the speech disorder, as expressed by the tests used, has a very small range of spontaneous variation. The differences between the scores in assessments 2 and 3 make it clear that two weeks’ speech therapy is associated with functional improvement, expressed as a highly significant and substantial reduction in the various scores, only the visual analogue score in Group A showing no significant change. The relatives’ impressions of the changes after speech therapy are that the latter are of practical and social importance. Even small changes in prosodic abnormality and intelligibility could be associated with substantial improvement in social communication, for instance in the patient’s confidence in his ability to use the telephone, with consequent change in the level of independence achieved.

Comparison of the changes in Group A and B between assessments 2 and 3 suggest that the use of the Vocalite as a visual reinforcement device may add perhaps 25% to the improvement associated with the two weeks of prosodic exercises alone. One week’s treatment with the Vocalite was given to Group B to compare one week’s therapy with two. One week’s therapy in a group of patients already improved by prosodic exercises produces no significant further overall change, but for individuals with severe speech disorder there may be substantial benefit. It is tempting to speculate that the patient with severe speech disorder derives particular benefit from visual reinforcement because he has poor auditory perception of the prosodic aspects of his own and others’ speech. The findings in the fifth assessment, after 3 months, are in agreement with those previously published,9 in that the improvement produced by treatment tends to regress, but there is at least some residual benefit some months after treatment. This has important consequences for the planning of programmes of speech therapy, and suggests that follow-up treatment is necessary.

It is possible to consider the logistics of a programme of treatment for the speech disorder of Parkinson’s disease. There seems little doubt that treatment should initially be carried out in the patient’s home, as the cost of domiciliary speech therapy may well be less than that of conveying patients by ambulance to a hospital centre, and there are substantial additional benefits in terms of contact with patients, and, even more important, with relatives. Intensive group therapy could also be envisaged during admission to hospital (but a crucial factor could then be the motivation of hospital staff in maintaining any gains in communication), or on an outpatient basis (for example in a Speech Therapy Department or a geriatric day hospital) or during a residential holiday, under the supervision of a speech therapist; experiments along these lines are being considered by the Parkinson’s Disease Society. In addition to the present study, five patients received one week’s daily group therapy as outpatients. Such a form of treatment is certainly practicable, provided that transport arrangements are satisfactory.

The conclusion from this study is that two weeks of the form of speech therapy used can produce substantial and socially important improvements in the speech disorder of Parkinson’s disease. Patients should therefore be referred for assessment and consideration of therapy at an early stage. The use of the visual reinforcement provided by the Vocalite may be of additional benefit, particularly perhaps to those most severely affected. The exercises emphasise the variety of prosodic patterns used in speech. These are specific to certain situations, so that the appearance of a pattern not normally used in English will give rise to a foreign-sounding utterance, and may lead to misunderstanding. The inappropriate use of patterns may also result in embarrassment, and cause the listener to misconstrue the intended message. Finally the exercises emphasise the role of attitude as conveyed by prosody.

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References

3 Oxtoby M. Survey of patients in contact with the Parkinson’s Disease Society, 1981.