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Progressive Neuropsychological and Extrapyramidal Deterioration Resembling Progressive Supranuclear Palsy: is Aphasia Relevant for Correct Diagnosis?

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Summary. We describe the case of a woman presenting with a clinical syndrome closely resembling progressive supranuclear palsy, who also showed some progressive neuropsychological defects (aphasia and apraxia) not consistent with a simple loss of timing and activation as is generally postulated in this pathology. The case is discussed with regard to the definition of subcortical dementia and the possible alternative diagnosis of corticobasal degeneration.

Key words: Progressive supranuclear palsy – Aphasia

Introduction

Cognitive impairment of progressive supranuclear palsy (PSP), generally characterised as 'subcortical', should not include truly 'symbolic' defects (i.e. aphasia, apraxia and agnosia) which are typical of 'cortical' dementias (Albert et al. 1974). Cognitive derangement of PSP is often traced back to loss of mental functions such as timing and activation, and considered analogous to that brought about by bilateral anterior frontal damage. It is well known, in fact, that focal subcortical lesions can give rise to aphasic or apraxic disorders that are barely distinguishable from cases with typical cortical lesions. However, a true aphasic or apraxic picture has not been generally described in PSP and other degenerative subcortical diseases.

The existence of distinct patterns of dementia in PSP (and in Parkinson's and Huntington's diseases) and in Alzheimer's disease has been analysed in several clinical and neuropsychological investigations that have sometimes confirmed and sometimes cast doubt upon this claim (for a comprehensive review, see Brown and Marsden, 1988). On the other hand, the frontal aspects of PSP, confirmed by a number of studies (Cambier et al. 1985; Maher et al. 1985; Pillon et al. 1986) have suggested that in PSP frontal lobe 'control' functions are deactivated because of the functional separation of frontal areas from subcortical centres that are the real site of this pathology. By and large, structural data appear to support the latter interpretation. Although the cerebral cortex is not grossly affected by PSP (Steele 1972), Positron emission tomography has clearly demonstrated frontal lobe hypometabolism (Goffinet et al. 1989) and other studies (Ruberg et al. 1985) demonstrated reduced choline acetyltransferase activity in the substantia innominata and frontal cortex of PSP patients.

We describe a patient affected by a disorder closely resembling PSP, but although the neuropsychological disturbances are generally consistent with a 'frontal' pattern, they go beyond general and superordinate disturbances that could be explained by deactivation of the frontal cortex as a result of subcortical lesions.

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Subjects and methods

Clinical History

The female patient (VG) was 68 years old when her disturbances started. She had been married, had a healthy daughter and there was no family history of neurological disorders. Clinical data and disease progression are reported in Table 1. The patient died in 1991; unfortunately pathological examination of her brain could not be carried out.

Neuropsychological Examination

The first symptom was apathy, with reduction of spontaneous speech and severe, progressive dysarthria. VG was, however, proficient in mental calculations for al-

Table 1. VG's clinical data

1985
Motor disorders: slowing of gait and reduction of mimic movements
Neuropsychological deficits: reduction of spontaneous speech; intelligence, memory, calculation ability unimpaired; perseverative behaviour in several tasks
Neurological examination: hypokinetic-hypertonic syndrome, without tremor, but with marked axial rigidity, especially on the neck. Severe impairment in turning, ataxia; very slow and short-stepping gait;
Therapy: temporary relief with 1-DOPA, later discontinued;
EEG: bursts of slow waves (4 Hz) over anterior and middle regions of the left hemisphere;
NMR: no lesions, but mild enlargement of lateral ventricles prevailing on the left
1986
Motor disorders: worsening of axial rigidity and reduction of mimics; deambulation still possible, but with several falls; limitation of downward gaze
Neuropsychological deficits: speech severely dysarthric, barely intellegible, non-fluent aphasia;
Otoneurological examination and electronystagmography: dissociation between voluntary (abolished) and automatic ocular movements (preserved); saccades normal in the horizontal plane, but slowed and severely hypometric in the vertical plane, especially downwards
1987
Motor disorders: further worsening of the neurological status without any side asymmetry; VG had to resort to complex head and trunk movements in order to direct her gaze toward a given direction;
Neuropsychological deficits: articulatory disturbances, agrammatism, apraxia; mild memory impairment; mild impairment on intelligence task
1989
Neuropsychological deficits: speech almost unintillegible due to dysarthria, without any trace of sentence in conversation
1990: bedridden
1991: death following pulmonary infection

most 2 years (she still worked in a business enterprise) and had a remarkably good memory.

On clinical assessment, VG showed a consistent perseverative behaviour on several tasks: on Weigl's test (De Renzi et al. 1966) she continued to sort the test material by colour. When asked to imitate different kinds of rhythms she unfailingly produced the same monotonous sequence of beats, and when requested to name different animals and flowers she repeated the names she had already used several times. Nevertheless, during a clinical interview she showed correct cognition of political events and facets of everyday life.

First Examination (February 1985)

A standard language examination (Basso et al. 1979) showed a much reduced and moderately dysarthric verbal output which was marked by simplification of sentence structure, but, however, fairly informative. Oral confrontation naming was 95% correct, with a few phonemic substitutions and deletions. Written expression was similar: when requested to write a letter she only wrote "tanti saluto" ("many greeting-"), and in a written naming task made some spelling errors. Auditory and written comprehension of single words was normal, with some confusion between semantically related items. On the Token test she scored 20 out of 36 (normal >26).

In conclusion the patient presented moderate, non-fluent aphasia.

Second Examination (September 1987)

Language. In this examination we carried out several linguistic tasks designed the better to explore phonological, lexical and syntactic aspects of language. Apart from fluency and naming tasks, where normative data were available (Novelli et al. 1986), each task was also performed by five control subjects matched for age, sex and education.

She had a weak, monotonous voice, her speech lacked proper stress, and there was slurring and distorting of consonants and vowels which often rendered her speech unintelligible. The patient was able to discriminate whether two phonemes were identical, but performed tasks demanding oral or written production of syllables and non-words poorly. The five control subjects made only one or two errors when copying and writing the non-words to dictation.

Tasks of lexical decision were performed well, while fluency and naming tests were at a pathological level. On naming, errors were mainly in the form of phonological substitutions. During an oral word comprehension tasks (pointing to command) the patient made only two errors out of ten commands: she did not point to any picture after the name 'apple', and pointed to the picture of a rucksack after the name 'bag'. None of the five controls made any error during this task. If we do not take the dysarthric alterations and phonological deviations from the intended word into consideration, the few errors on transposition tests (repetition, reading aloud, writing to dictation and copying) were not due to lexical substitutions, but rather were phonemic and graphemic substitutions and refusals.

The syntactical plausibility of sentences was almost correctly judged, but during a comprehension task the patient indicated the wrong picture five times out of 42 commands (given two or four pictures to chose from): all failures were limited to sentences with syntactic cues ($N=21$), and VG pointed to the pictures with an inversion of thematic roles with respect to the given item (control subjects judged perfectly whether sentences were syntactically written well or not, and in a syntaxic comprehension task, consisting of 21 reversible sentences, errors ranged from zero to two). Description of an event was informative, but many sentences were made up only of nouns, the number of nouns greatly prevailed over verbs. Two out of nine verbs produced were

used in the infinitive form and function words were often omitted.

In summary: VG's language was greatly impaired by articulatory disturbances, but this problem could not fully account for all her failures. Her speech was frankly agrammatic, and there was also evidence of syntactic defects in her verbal comprehension. Apart from these disturbances, fluency of speech was greatly reduced. Testing showed that performance in all tests had worsened since the last language examination and showed evidence of definite agrammatic defects.

Neuropsychological examination was also performed during the same session with other tests where normative data were available. Raw scores were adjusted for age and education and were judged against the threshold of the lower 5% of the normal population (Capitani and Laiacona 1988).

Praxic Abilities. The test was performed to detect the presence of ideomotor apraxia and required that the patient should imitate single and sequences of arm and finger movements made by the examiner (De Renzi et al. 1980). Overall, VG scored 30/72 (cut-off of adjusted scores for pathology < 53). Her difficulties were of a complex nature: in several instances the beginning of the movement was preceded by a short burst of involuntary jerks of the proximal segments of both upper limbs. Moreover, gestures, such as rhythmic beating on the desk were often repeated. We were nevertheless convinced that her performance was marked by true apraxic errors, i.e. errors of choice between equally difficult gestures, substitutions and deletions of parts of the requested movement. For example, instead of making a funnel of her hand and blowing into it, she blew at her open hand. Finger movements were more impaired than were arm and hand movements (7 out of 36 and 23 out of 36, respectively). Sequences (8/36) were more impaired than single movements (22/36).

VG's performance on an oral apraxia test (Spinnler and Tognoni 1987) was also impaired, and she scored 7/20 (cut-off of adjusted scores for pathology < 17). In response to several commands she produced the verbal sound of the movement she was asked to perform. For instances, when requested to whistle, she said "fi-fi", and requested to clear her throat she said "ca-ca".

A test of constructional apraxia (Spinnler and Tognoni 1987) was performed poorly (4/14, pathological if the adjusted score is < 8).

Memory. VG also underwent memory tests (Spinnler and Tognoni 1987): she was able to repeat a string of three spoken bisyllabic words (borderline), and on a prose memory task she also showed borderline performance. Gestural difficulties prevented us from examining spatial memory with the Corsi block tapping test.

Non-Verbal Intelligence. The patient was given the Raven's progressive matrices (PM47), and scored 17/36, which also corresponds to a borderline performance (Basso et al. 1987).

Perception. The patient was not given formal tests of visual perception, because her complaints were mainly concerned with motor and speech performances. However, most of her picture-naming errors were of a phonological nature, implying correct perception of the visual material. We did not observe unilateral neglect for either side of her body or the extrapersonal space.

Attention. A formal assessment of attention could not be carried out as the patient's motor disorders prevented her from giving timed and accurate motor responses. Nevertheless, the patient was always alert and cooperative, and the fact that she showed reactions of disappointment associated with her failures means that, for a long time, she was probably able to retain a correct monitoring of her performance.

Third Examination (February 1989)

On this occasion the patient was found to be even more dysarthric and her speech almost unintelligible. Requested to say something about her illness, her previous job and her family, she could only utter a few words in a very dysarthric way; that frequently prevented the examiner from understanding the intended word. We did not find any trace of a sentence in her conversation. On this occasion, VG was given a standardised aphasia battery (the Italian version of the Aachener Aphasia Battery; Luzzatti et al. 1987), which enables comparison of the relative severity of the different language modalities, with respect to the average severity shown by a large sample of focal left-hemisphere-damaged patients. The Token test scored at the 63rd centile rank of the left-hemisphere-damaged control group; repetition at centile 23, written test at centile 36, naming at centile 37 and comprehension at centile 52. On the whole, the aphasic pictures of the patient, if found in focal brain-damaged patients, would have been given the diagnosis of Broca's aphasia with 100% confidence. Since the second examination dysarthria had worsened considerably and sentence structure was completely absent.

Discussion

The patient described here presented with many of the typical traits of PSP, namely a progressive gait disturbance and rigidity, and supranuclear gaze palsy. Although pathological examination could not be carried out, VG's clinical picture conforms to the criteria suggested by Lees (1987) for diagnosis of PSP. She also showed the simultaneous progression of some neuropsychological disturbances that cannot be simply ascribed to a 'loss of timing and activation' but would rather point to a structural dysfunction of more posterior regions of the left frontal and left parietal lobe.

Language disorders in PSP patients have been recently reviewed by Podoll et al. (1991). They described neuropsychological findings in six patients with clinically diagnosed PSP (one of whom was submitted to postmortem pathological examination which confirmed the diag-

nosis). In this study, besides dysarthria and reading and writing disturbances, no evidence of primary aphasic disorder was found. Podoll et al. (1991) acknowledge that there have been some reported cases of dysphasia in the literature (Perkin et al. 1978; Kish et al. 1985), but tend to interpret these findings as exceptional or questionable. In our patient, we observed some 'true' syntactic disturbances, although they were merged in a background of production disorders that originated at a more 'peripheral' motor level. The case of praxic ability ties in with the same conclusion. Since a postmortem examination was not performed in our patient, we are in doubt as to whether it is better to question the diagnosis of PSP or the fact that PSP patients are exempt from true aphasic and apraxic disorders.

Patients with progressive disorders that asymmetrically affect the cerebral cortex have been frequently reported. The best example can be found in the recently described cases affected by progressive aphasia or apraxia without dementia of a degenerative nature (Mesulam 1982; DeRenzi 1986). Moreover, there are some degenerative disorders in which supranuclear palsy can be present. Gibb et al. (1989) recently described three patients who presented with a progressive disease resembling PSP, but displayed some pathological features of Pick's disease. In these cases, pathological examination showed frontoparietal atrophy, with cortical cell loss, gliosis and Pick cells, and neuronal inclusions in the substantia nigra which were reminiscent of the globose neurofibrillary tangles observed in PSP. Some nigral inclusions were similar to those in Pick's disease. Gibb and colleagues (1989) reviewed the cases described in the 1960s by Rebeitz et al. (1968) and also discussed some other cases of atypical PSP reported in the literature. They suggested grouping these cases under the definition of corticobasal degeneration. From a clinical point of view, there are many similarities between VG and the cases described by Gibbs and colleagues (1989). Besides supranuclear gaze palsy, bradikynesia and postural disability, which were present in all three cases, one of them had definite language disorders and apraxia (case 1), two had constructional disabilities (cases 1 and 2), all had gait ataxia and short-stepped gait, two (cases 2 and 3) had a certain degree of involuntary movements resembling those observed in our patient at the beginning of her voluntary movements. This last aspect is stressed in the study of Riley et al. (1990), who describe 15 cases of corticobasal degeneration. In the same study severe apraxic disorders (ideomotor and oral-facial) are reported in the majority of patients.

Unfortunately, it is impossible to make a definite diagnosis in this case; another alternative diagnosis could be diffuse Lewy body disease (Lewis and Gawel 1990) that (though less frequently) may present with neuropsychological disturbances and progressive supranuclear ocular movement disturbances. Summing up, we think that a diagnosis of PSP is less likely in patients with true aphasia. The similarities between VG's clinical disturbances and those described in corticobasal degeneration suggest corticobasal degeneration as a possible alternative diagnosis. For the neuropsychologist, it seems interesting and perhaps necessary to underline that it may be hazardous to discuss topics as the contrast between cortical and subcortical dementia on the basis of cases which have been given a clinical diagnosis of PSP without pathological confirmation.

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