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Disturbances of cognitive processes in patients with schizophrenic psychoses. Verbal material acquisition processes

Anna Wrońska[1], Teresa Jakubowska[2], Marta Anczewska[1], and Magdalena Ślósarska[3]

[1]The First Psychiatric Clinic, [2]The First Neurological Clinic, [3]The Second Psychiatric Clinic of the Institute of Psychiatry and Neurology in Warsaw

All examined patient groups did worse in tests of auditory acquisition of new verbal material than healthy controls. Long-term schizophrenic patients scored lower in these tests than those hospitalised for the first time.

Key words: schizophrenia, memory disorders

Introduction

During last several decades much research was concentrated on disturbances of thought and abstract concept formation in schizophrenia [9,10]. The results of these studies indicate that the disturbances of these processes in schizophrenic patients are independent of exacerbation of the disease process, which implies that their causes should be sought in early and permanent damages to the brain. In the last ten years there appeared many publications devoted to neuropsychological deficits in the area of basic cognitive functions, such as attention, memory, learning, which accompany schizophrenia. It was found that neuropsychological deficits in schizophrenics resemble in many ways the deficits observed in patients with organic brain injury, and therefore may be linked to an early damage to nervous cells and disturbances in formation of their interconnections. This problem inspired much discussion [15].

It has been hypothesised [5] that the asymmetry of brain hemispheres is responsible for "dual deficit" of both automatic and controlled information processing in schizophrenics. O'Carroll et al. [11] cite the results of many studies, which indicate that uncontrolled (implicit) memory is significantly better than controlled (explicit) memory in schizophrenic patients, in a way similar to amnestic syndromes of patients with organic brain damage. This has implications for methods of memory training and therapeutic actions, since tolerating the mistakes committed by such patients may inadvertently lead to fixation of improper memory traces.

Among the studies on the neuropsychological deficits in schizophrenia relatively few were devoted to the problem of learning. There is no unequivocal answer to the

question whether the length of duration of illness is related to deterioration in learning ability (and other cognitive functions). The studies, in which the results of neuropsychological tests (e.g. learning tests) were compared, indicate that schizophrenic patients perform significantly worse than healthy controls, but no differences were found between the first episode patients and long term schizophrenics [1]. These results seem to indicate that the learning deficit accompanying schizophrenia is primary and stable over time, which makes it more similar to an encephalopathy feature than to a progressing dementia [14]. However, other authors report on a progressively worse cognitive performance in long term schizophrenics [8].

This work concentrates on the memory processes of patients with schizophrenia and patients with affective disorder (both in the period of symptom remission), patients with encephalopathy of different origin, and healthy control subjects.

Our aim here was to compare the results of a test measuring the ability to remember verbal material, obtained by the patients hospitalised (for the first or consecutive time) because of schizophrenia, depressive phase of affective disorder, or CNS damage. Other aspects of this study – concerning disturbances of attention in the same subjects are presented in part 1 of this paper.

Characteristics of the groups under study

The study included altogether 111 persons divided into five groups. One of the groups was that of healthy controls and the other four were comprised of patients fulfilling the ICD-10 diagnostic criteria of schizophrenia, affective disorder and encephalopathies of various origins. All psychiatric patients were examined during significant clinical improvement period, just before discharge. Their current clinical condition was evaluated by the psychiatrist in charge. Persons included in the study had no problems understanding instructions to the tests.

The groups were as follows:

1. MS Group (n=19) – patients who were hospitalised for the first time because of schizophrenia; mean age 25.5 ± 1.6 years; mean age at onset of disease 23.7 ± 1.3 years; mean duration of the disease 21.6 ± 6.2 months.

2. CS Group (n=20) – patients with multiple hospitalisations because of schizophrenia; mean age 35.4 ± 1.7 years; mean age at onset of disease 22.2 ± 1.2 years; mean duration of the disease 165.9 ± 18.0 months.

3. D Group (n=21) – patients hospitalised because of a depressive phase of the affective disorder; mean age 42.3 ± 2.2 years; mean age at onset of disease 33.5 ± 2.5 years; mean duration of the disease 100.3 ± 21.4 months.

4. O Group (n=31) – patients hospitalised because of encephalopathies of different origins; mean age 31.3 ± 1.7 years; mean age at onset of disease 25.6 ± 1.6 years; mean duration of the disease 68.4 ± 15.4 months.

The onset of disease was established from the moment of appearance of the first retrospectively identified symptoms, and from this time the duration of illness was estimated.

5. K Group (n=20) – healthy volunteers; mean age 26.7 ± 1.9. On the basis of the qualifying interview they were determined to be free of mental illnesses, substance dependencies, and previous head traumas.

Comparative data on the clinical state of the patients are presented in part 1 of this paper: *Attention disorders.*

Research tools

To study the acquisition of a new material we used the Auditory Verbal Learning Test – AVLT [13]. The results were based on the sum of the words from 5 repetitions and on the number of words recalled after a delay of about 30 minutes. The second task was based on a trial of remembering 10 pairs of associations in three repetitions (according to the method used in the Wechsler Memory Scale – the result is determined from the sum of easy associations divided by 2 plus the number of difficult associations) [4], pp. 429-430.

The results were evaluated with the help of a statistical software package "Statgraphics". The independent sample means were compared by Two Sample Analysis procedure and Pearson's correlation factors with their significance values were determined by Correlation Analysis procedure.

Ability to acquire verbal material

Subjects were required to remember the verbal material presented to them by the person administering the test. Table 1 presents the mean results of the verbal acquisition tests in the groups of patients and controls. As mentioned above, the following tests were used:

- Learning of ten association pairs. The result of the test is expressed as a number representing half of the "easy" (logically connected – 6 pairs) association pairs, remembered in three trials, plus the number of properly remembered „difficult" (not connected logically – 4 pairs) associations. The highest attainable score is 21.
- Remembering of 15 words in 5 trials (AVLT). The result is expressed as a total number of properly remembered words. The maximum score in this part of the test is 75.
- The sixth AVLT trial requires remembering 15 words after a 30-minute delay – the maximum score here is 15.

Table 1

The results of association pairs and verbal acquisition learning tests obtained in the groups under study

(Means + SEM)

Time period before the therapy commencement since the first psychotic symptoms	Adolescents with schizophrenia N=150	
	N	%
Up to 6 months	39	26.0
Up to 12 months	79	52.6
Up to 24 months	116	78.6

In comparison to the control group K, the learning processes involving logical memory (10 pairs of associations) are impaired to a similar degree in all patients' groups ($p<0.01$). The differences between the O group and other patient groups are not statistically significant.

Memorisation of 15 words (AVLT – sum of 5 trials) was significantly ($p<0.001$) worse for all the patients than for the controls, but the groups MS, CS, and D scored better on this test than the O group ($p<0.05$). Schizophrenic patients admitted for the first time (MS) did better in this test than long term (CS) schizophrenics ($p<0.05$).

Durability of memory traces (AVLT – 6th trial after 30 minutes) was similar for all patients and significantly lower from controls ($p<0.001$).

Analysis of the interrelations among the variables

The results of the tests presented here are strongly correlated in the entire sample (Pearson's correlation coefficients ranging from 0.45 to 0.85). There are also negative correlations between these results and the clinical scales scores – PANSS, SANS-G, and SANS-S (r values ranging from –0.45 to –0.70). This means that the greater are the disturbances measured by clinical scales, the greater the disturbances of memory processes, although no such correlations were found for the results of attention measuring tests (see part 1 of this paper). The results of learning and memory tests were not correlated with the age of the patients or with the duration time of the disease.

In the MS and CS groups the range of the 15 word memorisation test results was relatively wide: from 27 to 57 words remembered. In the D group these results ranged from 30 to 55 words, and in the O group the range was widest – 15 to 59 words. In the K group the results were not only considerably better but also much more aggregated (47 to 67 words remembered).

Discussion

We found an evident deficit in the ability to remember the words and to store memory traces (i.e. learning deficit) in every group of patients examined, even though they were free from disease symptoms at the time of testing. In their review of literature concerning various neuropsychological deficits in schizophrenia, Randolph et al. [10]

speculate that memory disturbances may lay at the very basis of the schizophrenic process. The functions of coding, storing, and retrieving of memory traces are disturbed, which affects the ability to acquire new material.

Particular difficulties in learning by schizophrenics appear when a verbal material is to be remembered [2]. Our previous results [16] also indicate that acquisition of verbal material (Rey's AVL test) is disturbed in schizophrenics to a greater degree (none of the patients achieved a result within a normal range) than their ability to remember geometrical figures (Benton's Visual Memory test). Much discussion in recent years has centered on the fact that memory disturbances in schizophrenia reveal no specific modality, thus indicating a possible bilateral dysfunction of medial temporal lobes, which are thought to play a significant role in the processes of consolidation of memory traces [12].

We have found that the group of patients hospitalised for the first time with schizophrenia performed better in the task of five trial repetitions AVLT than the group of long-term schizophrenics. This result may be treated as a confirmation of a relatively better cognitive functioning of these patients [8], and another argument for the hypothesis that cognitive disturbances in schizophrenia have a tendency for progressive intensification. However, it may also mean that memory processes of younger people are more efficient as a result of recently experienced educational training.

Adaptive difficulties can be found among the consequences of disturbances in learning and cognitive processes [3,6]. Perception and information processing (the learning process) are of major consequence for many forms of therapeutic procedures. Disturbances in acquisition of verbal material by patients with schizophrenia, affective disorder, and encephalopathies of different origin (confirmed in the present study) may significantly impair the therapeutic contact. It would be, therefore, desirable to adjust each planned verbal therapeutic intervention to the patient's ability to acquire verbal material. It also means that in some cases such procedures as behavioural training, skill acquisition or task performance would be preferable to interventions based on verbal contact.

Conclusions

1. Patients in all the groups performed auditory verbal acquisition task on a similar level – much lower than the demonstrated by the healthy controls, even though they were free from disease symptoms at the time of testing.
2. Findings of learning impairments in patients with schizophrenia (regardless of a duration of the disease), and in patients with affective disorder may contribute to further discussions about a possible organic basis of these psychoses.
3. Worse results of the verbal material acquisition tests in the group of long-term schizophrenics in comparison to the group of patients hospitalised for the first time supports the hypothesis of a progressing nature of cognitive function disturbances in some forms of schizophrenia.

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Address:
I Klinika Psychiatryczna
Instytut Psychiatrii i Neurologii
Al. Sobieskiego 1/9
02-957 Warszawa
Polska