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## Short report

# Mood disorder as a specific complication of stroke

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**SUMMARY** In an effort to discern whether cerebral vascular injuries provoke specific emotional disturbances, 20 consecutively admitted stroke patients were compared with 10 orthopaedic patients. Both groups were examined for functional disabilities (Activities of Daily Living) and for psychiatric symptoms. Reliable and valid instruments, the Hamilton Rating Scale, the Visual Analogue Mood Scale, the Present State Exam, and the Mini-Mental State Exam were employed to display the psychopathology. More of stroke patients than orthopaedic patients were depressed (45% versus 10%) even though the level of functional disability in both groups was the same. Patients with right hemisphere stroke seemed particularly vulnerable and displayed a syndrome of irritability, loss of interest, and difficulty in concentration, in addition to depression of mood (70% of right hemisphere stroke patients versus 0% left hemisphere stroke patients and 0% orthopaedic patients). We conclude that mood disorder is a more specific complication of stroke than simply a response to the motor disability. We suggest that a controlled trial of antidepressant medication is indicated for patients with this complication.

Persistent and refractory depression of mood has often been reported to follow stroke (Bleuler, 1924; Post, 1961; Adams, 1963; Bell, 1966). This symptom is commonly explained as an expected psychological reaction of the patient to his disability or restrictions in activity. We began to doubt the adequacy of this explanation when we admitted to the Psychiatry Service for the elderly at the Westchester Division of the New York Hospital, a 72 year old physician who, after a stroke manifest by a left hemiparesis, had developed incapacitation, symptoms of irritability and depression persisting for two years. After treatment with antidepressant medication these distressing symptoms were relieved and his interest and enjoyment of life returned. From this experience we were prompted to study the emotional symptoms of a group of patients with stroke, comparing them with the emotional symptoms of patients with non-neurological but disabling conditions. Our purpose was to discover any specific emotional changes after stroke. Such a

discovery might encourage an aggressive effort at pharmacological treatment of the symptoms perhaps overlooked because of the belief that they are the inevitable consequences of an unhappy circumstance.

## Methods

We studied the consecutive series of admissions to the Burke Rehabilitation Hospital of patients who were disabled by stroke or other conditions but were free of complicating systemic disease and who were suitable for rehabilitation. We excluded patients who had a history of previous neurological disorder and any patients suffering from current medical disorder such as severe congestive heart failure, infection, or poorly controlled metabolic disease, and any patients with stroke producing cranial nerve or cerebellar disorder so as to avoid the inclusion of brain stem infarctions with their potential for disruption of vital cardiorespiratory function. With these exclusions a series of 20 patients with cerebral vascular infarctions (10 right hemisphere and 10 left hemisphere), admitted 30 days after onset of stroke, were selected as were orthopaedically dis-

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abled patients admitted at the same time because of hip fracture or severe arthritis. We can thus report on an experience with 30 patients seen consecutively in a rehabilitation hospital. One of us (RM) examined all patients with standard medical, neurological, and psychiatric methods. All the stroke patients had been diagnosed previously as suffering from a vascular accident in a cerebral hemisphere, and focal disorder of the hemisphere had been discovered previously by such tests as electroencephalograms and brain scans. Our examinations agreed with these findings in every patient.

Simple scales measuring neurological impairment and performance of activities of daily living were constructed. For the documentation of psychiatric symptoms we carried out a thorough, structured psychiatric interview of proven reliability on all patients, the eighth edition of the present state examination (PSE) as described by Wing *et al.* (1974). We had become practised in the use of this instrument and reported our capacity with it to demonstrate psychiatric symptoms (Luria and McHugh, 1974). The PSE was scored by the construction of scales and categories thought to reflect differences between groups studied. The 'total PSE score' was obtained by adding scores on all items. Table 1 lists the criteria for the depression and irritability categories.

Table 1 *Criteria for depression and irritability categories*

<i>Criteria for depression category (8 of following PSE items)</i>	<i>Criteria for irritability category (7 of following PSE items)</i>
Depression or low spirits	Subjective irritability
Crying or wanting to cry	Lack of interest
Diurnal variation	Loss of concentration
Anorexia	Subjective memory difficulty
Insomnia	Anhedonia
Constipation	Psychiatrist ratings of:
Slower muddled thinking	Irritability
Lack of energy	Self-neglect
Lack of self-confidence	Suspiciousness
Non-specific aches and pains	Distortion of symptoms
Crying during the interview	Patient is guarded
Looks and sounds depressed	Inattention and preoccupied
Noted depressed by the examining psychiatrist	Need to ask numerous questions to obtain satisfactory information

The visual analogue mood scale, another instrument of demonstrated reliability and validity in our hands (Folstein and Luria, 1973) and the Hamilton Rating Scale for Depression were employed as well. For measurement of cognitive function we employed our Mini-Mental State

(Folstein *et al.*, 1975) and the Peabody Vocabulary and Ravens Matrices.

## Results

A greater percentage of stroke patients than orthopaedic patients were in the depression category (Table 2). A trend was noted for the stroke patients to appear more depressed than the orthopaedic patients on the Hamilton Rating Scale and the visual analogue scale (Table 2). A higher incidence of depression was found in the stroke patients statistically matched for physical disability (Activities of Daily Living scores) (Table 3). Although depression was frequent after both right and left hemisphere infarction in the group of stroke patients, the right hemisphere group suffered from an increase in overall psychological symptoms as seen in the increased total PSE scores (Table 2). The increase of symptoms in the right hemisphere patients was characterised particularly by scores on the irritability category. Seven of 10 right hemisphere damaged patients were in the irritability category as compared to none of 10 in the left hemisphere damaged patients (Table 2).

## Discussion

With these methods we discovered that mood disorder is a common and specific symptom of patients recovering from stroke. Since none of the study patients were being evaluated or treated psychiatrically, even though psychiatric consultants were available, we must assume that this disorder had been unrecognised as a psychiatric complication. The plausible hypothesis that may have interfered with recognition and attempt at treatment was that depression in stroke patients is explained adequately by an understandable psychological reaction to motor disability. But this hypothesis is refuted since patients suffering comparable disability from skeletal pathology did not suffer comparable psychiatric symptoms. However, another hypothesis is that infarction of the brain can produce the appearance of a mood disorder. In fact, the appearance of certain affective symptoms after right rather than left hemisphere lesions adds support to such a hypothesis. The mechanism for the appearance of depression after stroke has been suggested by the work of Robinson *et al.* (1975) who reported that brain stem catecholamines are depleted after experimentally induced cortical cerebral infarction in the rodent and that the behavioural dis-

Table 2 Results of examinations for functional and psychiatric disabilities in stroke and orthopaedic patients

	All stroke	Left hemisphere	Right hemisphere	Orthopaedic
Number of patients	20	10	10	10
Age (yr)	63.3	60.9	64.6	67.5
Sex (M/F)	9/11	3/7	6/4	3/7
Depression category (%)	45	50	40	10
Hamilton Rating Scale	12	11	15	8
Visual Analogue Mood Scale	41	42	40	56
Total PSE score	45 ± 6	35 ± 9	54 ± 9	20 ± 3
Irritability category (%)	35	0	70	0
Mini-Mental State	22	21	24	26
Ravens Matrices	7	7	8	9
Peabody Vocabulary	110	105	118	108
Activities of daily living	42	40	44	57
Neurological impairment	5	6	4	—
Duration of illness (days)	47	57	39	360

Table 3 Analysis of stroke and orthopaedic patients in depression and irritability categories

	Stroke	Orthopaedic
Number of patients	8	8
Age (yr)	65	70
Sex (M/F)	4/4	2/6
Depressive category (%)	50	13
Hamilton Rating Scale	12	8
Visual Analogue Mood Scale	53	49
Total PSE score	44 ± 7	20 ± 3
Irritability category (%)	50	0
Mini-Mental State	24	26
Ravens Matrices	8	9
Peabody Vocabulary	117	126
Activities of daily living	56	54

order produced by the lesion was altered by desipramine. In view of the possibility suggested by these results a clinical trial of tricyclic antidepressants is indicated. This may document further a specific mood disorder in stroke patients as well as provide knowledge for the relief of these symptoms.

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