

SPEECH AND LANGUAGE DISORDERS IN THE STROKE PATIENT. A FIVE YEAR REVIEW

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SYNOPSIS

The speech and language disorders present in 891 Stroke patients seen over a 5-year period, at the Department of Rehabilitation Medicine, Tan Tock Seng Hospital, were reviewed. The type of disorder and the severity were assessed at admission and at discharge. The number of therapy sessions and duration of stay in the department was recorded.

It was found that 37% of the stroke patient had a speech disorder. Dysarthria was commonest (46.8%) and 50.6% improved. Aphasia was present in 51% of the patients with speech disorders. Best results were obtained in the patients with Expressive Aphasia.

Results of this study were compared to those of other studies. The various factors influencing recovery, and suggestions for improving results were discussed.

INTRODUCTION

Stroke is one of the commonest causes of locomotor dysfunction. With adequate rehabilitation, about 20% of stroke patients will return to full work, and a further 30% will make a useful contribution about the home. Thus approximately 50% of those affected can achieve a working status. It is the impairment of intellectual function, and speech defects which are usually the stumbling blocks to resettlement, and these are related to the extent of the original lesion and the subsequent brain damage. (1) Persistent aphasia, particularly global has an adverse effect on rehabilitation.

A patient with aphasia is less able to comprehend and follow instruction. Successful rehabilitation depends not only upon the patient's ability to comprehend, but also to accept and adjust himself to his disability. He must also be able to cooperate with procedures designed to improve function e.g. exercises and use of aids and appliances.

The speech defect must be assessed and defined. The level of understanding of speech and the written word is assessed and a simple method of communication established, between the patient and the members of the rehabilitation team. Cooperation and collaboration between the therapy staff is essential.

The aim of this paper, is to show the incidence and pattern of speech defects seen in the stroke patients admitted to the Department of Rehabilitation Medicine, Tan Tock Seng Hospital. The results of speech therapy are compared to those of other studies and possible methods of improving results, outlined. Also studied was the distribution of strokes in the various age and ethnic groups in Singapore.

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MATERIALS AND METHOD

The Department of Rehabilitation Medicine, Tan Tock Seng Hospital Singapore was established in 1973 with a bed complement of 77. Patients are referred from the General Hospitals in Singapore, including the private sector. They are assessed by the Rehabilitation Physician and admitted for intensive therapy when suitable.

All the stroke patients, admitted to this department, between 1.3.76 — 28.2.81, who received a course of rehabilitation were studied. Readmissions, and those admitted for a 2 week trial of rehabilitation were not included.

Details were obtained by retrospective analysis of the Disability Profile Register, and rehabilitation summary notes. Speech therapy records were studied, and where necessary original case notes were traced.

Patients were categorised according to sex, age, ethnic group, side of the lesion, handedness and duration of stay. The pathological cause of the stroke was determined by the referring physician or neurologist.

Ethnic Groups — They were based on Census Population 1980 (2).

Speech Disorders

These were diagnosed and assessed as follows: *Dysarthria* — Syndrome of gross motor impairment characterised by paralysis or paresis of speech musculature and difficulty in swallowing and articulation. This is not necessarily related to language deficit (3).

Anarthria — Characterised by severe reduction in the flow of speech, marked phonemic disorders of expression such as elisions or substitution of phonemes and articulatory difficulties usually accompanied by oral apraxia. (4)

Expressive Aphasia — Symptoms predominant in inability to express by spoken or written symbols.

Receptive Aphasia — Symptoms predominant in inability to comprehend spoken or written symbols.

Mixed Aphasia — All language processes equally impaired, so that no one modality might be said to be superior.

Global Aphasia — All language processes extensively impaired, that no preceding category was applicable. (5)

Oral Apraxia — Inability to perform voluntary movements with the muscles of larynx, pharynx, tongue, lips and cheek although automatic movements of the same muscles are preserved. (6)

Dyslexia — Difficulty in comprehending printed symbols e.g. difficulty in reading.

Dyscalculia — Difficulty in recognition of numerals and calculations.

Dysgraphia — Difficulty in writing though motor function in the hands is intact.

Severity of the Speech Disorder

All patients with neurological deficit are profiled on admission and on discharge as follows:

Disability Profile: This denotes the organic state of the body and locomotor systems creating the physical disability. (7)

P 0 — 4 Physical condition and diseases of other systems.

U 0 — 4 Upper extremities. From normal 0, to 4 — complete motor paralysis, sensory loss and gross incoordination.

L 0 — 4 Lower extremities. Normal 0 — 4.

S 0 — 4 Sensory components. Speech, vision and hearing.

E 0 — 4 Excretory Function. Bladder and bowel control. Normal 0 — 6.

C 0 — 4 Cerebration status from normal — 0, to 4 — severe variation.

Speech is classified under S, and categorised into S 0 — S 4 as follows:

S 0 Normal or no gross abnormalities, considering the age of the individual.

S 1 Minimal Impairment, without causing, sight, hearing or

communication difficulties.

S 2 Moderate Impairment, causing mild sight, hearing or communication difficulties.

S 3 Severe Impairment, difficult to correct.

S 4 Complete loss of a sensory component e.g. Global Aphasia.

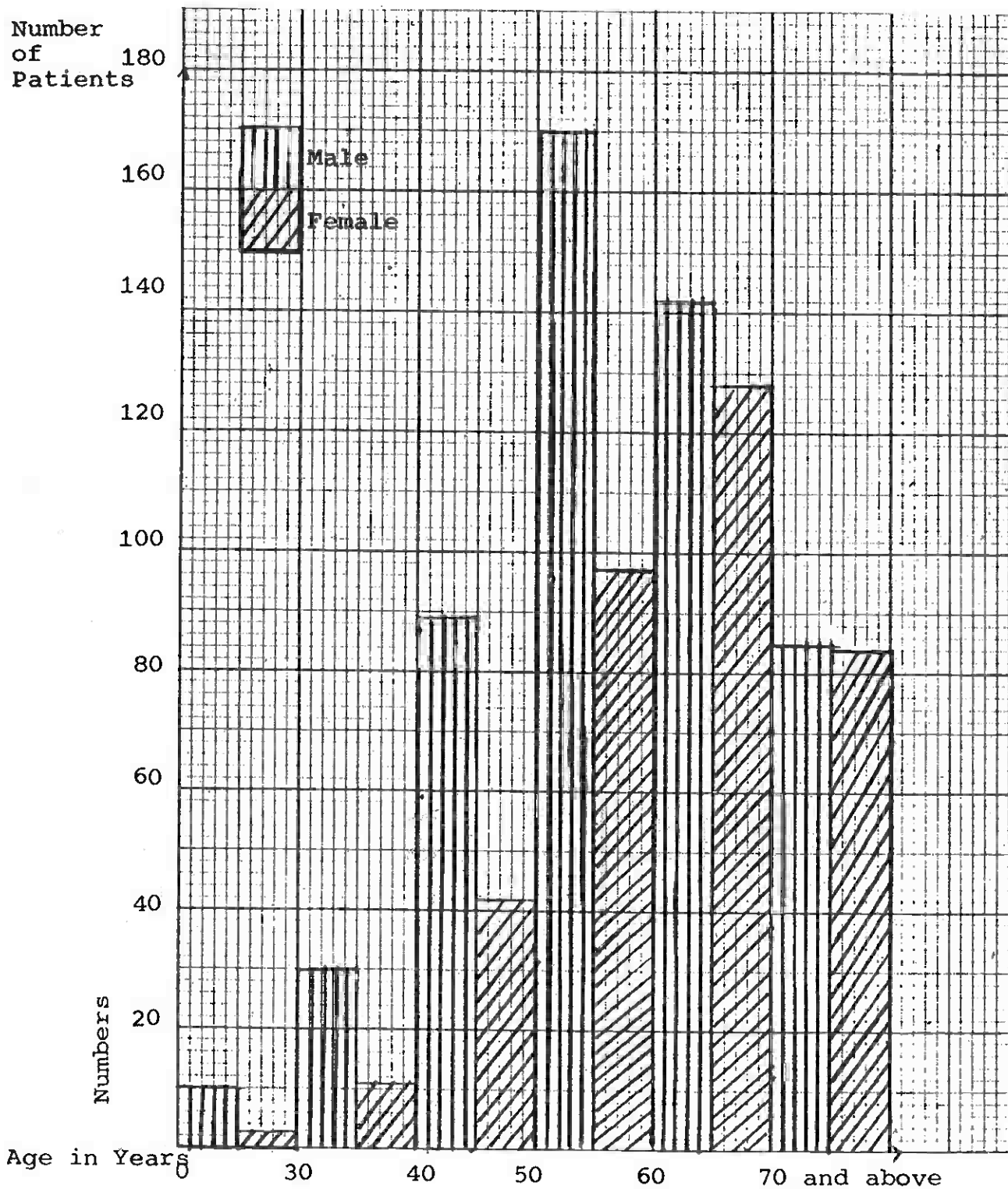
RESULTS

1. Table 1 shows the sex distribution of the stroke patients. There is a higher incidence in males when compared to population figures.
2. Figure 1 shows the age distribution in both sexes. In males, the highest incidence was in the 50 to 60 year age group, and in the females the largest number of patients was found in the 60 to 70 year age group. Above the age of 70, incidence was almost equal in both sexes.
3. The incidence of strokes in both sexes, in the various ethnic groups is shown in Table 2. When compared to population figures, there seemed to be a high incidence in Indians, and a low incidence in Malays. Indian males were more affected than females, the male/female ratio being 3.5:1. In the Malays, this ratio was 2.4:1.
4. Cerebral Thrombosis was the cause of 82.6% of the strokes. Table 3 shows the aetiology of the stroke. Table 4 shows the incidence of right and left sided strokes. Bilateral weakness was seen in 5.8%.
5. Only 3 left handed patients were found in this study. 2 had left hemiplegia. Only one had speech involvement and he was a right hemiplegic with severe dysarthria.
6. 37% of the patients in this study, had some speech involvement. Table 5 shows the distribution of the speech and language disorder, and its severity according to the Disability Profile System. Improvement was seen in 41% of these patient. The number of patients who improved, in the various speech disorder groups, are also shown in the table.
7. 168 patients had Aphasia. 148 of them had right hemiplegia. 9 had left hemiplegia, and 11 had bilateral weakness.
8. Table 6 shows the incidence of Apraxia, and other associated disorders. The largest number of these was found in patients with Mixed Aphasia.
9. The duration of stay at the Department of Rehabilitation Medicine, is seen in Table 7. The largest number of patients stayed 2 to 4 weeks. 67.3% were discharged in less than 6 weeks, as soon as they attained independence in ambulation and self-care activities.
10. Table 8 shows the relation between the number of speech therapy sessions, and the number of patients who showed improvement. The largest number of patients had 1 to 10 sessions. 4 out of the 5 who had more than 40 sessions improved. There were two main reasons for patients not receiving therapy. They were patients with very mild dysarthria who had spontaneous recovery, and, patients who were discharged because they were independent in ambulation and self-care, before they were seen by the speech therapist. These patients were referred for out-patient therapy, but did not attend.

DISCUSSION

This study showed a higher incidence of strokes, in males. The largest number of patients were in the 51 — 70 year age group. When compared to population studies, there was a significantly high incidence of strokes in Indians. Indian males were more affected than females. 37% of the strokes had speech and language disorders. Dysarthria was the

Fig 1 - SEX AND AGE INCIDENCE



commonest (46.8%) and the severity in most patients was S1 — S2. Anarthria was present in 7 patients. 5 were classified as S4 and 2 as S3. Only 1 improved with therapy.

Aphasia formed 51% of the speech and language disorders. Mixed aphasia was present in 36.5% and expressive aphasia in 11.9%. There was no patient with a pure receptive aphasia in this study. Greatest improvement was seen in patients with expressive aphasia (46.2%). 9 patients had global aphasia (S4) and only 2 improved after more than 40 sessions.

The number of speech therapy sessions ranged from 1 — 49. The patient who had 49 sessions had mixed aphasia, and improved from a S3 to a S0. 80% of patients with over 40 sessions improved. Only 1 out of 3 with 31-40 sessions showed some improvement. The other 2 however had

severe global aphasia (S4). 90% of patients with 11-20 sessions showed improvement. The majority of them were in the S1 — S2 category.

Several factors influence the recovery of speech and language including age, motivation, psychosocial factors and the severity of aphasia. Vignolo (4) suggested that anarthria has a significant retarding effect on the recovery of expression. Poor results were obtained with anarthria. Butfield et al (8) showed that most favourable results were given by the cases of predominantly expressive aphasia, and that nearly three-quarters of cases of this type improved. 34% of the severely disabled patients remained unchanged. Formal reeducation was terminated when patients improved to a point of little or no remaining disability or in less responsive cases, until the condition remained

**TABLE 1
SEX DISTRIBUTION**

Sex	Number of Patients	Percentage	Population of S'pore 1980 (2)
Males	526	59%	51%
Females	365	41%	49%
Total Number of Strokes	891	100	100

Table 2 — RACE AND SEX DISTRIBUTION

Race	Sex	Percentage of Strokes	Percentage of Population 1980 (2)	Male/Female Ratio in Strokes
Chinese	Total	81.2%	76.9%	1.3 : 1
	Male	55.7%	50.4%	
	Female	44.3%	49.6%	
Malays	Total	6.4%	14.6%	2.4 : 1
	Male	70.2%	51.7%	
	Female	29.8%	48.3%	
Indians	Total	10.6%	6.4%	3.5 : 1
	Male	77.9%	57%	
	Female	22.1%	43%	
Others	Total	1.8%	2.1%	1.3 : 1
	Male	56.2%	51.8%	
	Female	43.8%	48.2%	
Total	Males	59%	51%	1.4 : 1
	Females	41%	49%	

Table 3 — PATHOLOGICAL CAUSE OF THE STROKE

Aetiology	Number of Patients	Percentage
Cerebral Thrombosis	736	82.6%
Cerebral Haemorrhage	109	12.2%
Cerebral Embolism	46	5.2%

Table 4 — SIDE OF HEMIPLEGIA

Side of Hemiplegia	Number of Patients	Percentage
Left Hemiplegia	423	47.5%
Right Hemiplegia	416	46.7%
Bilateral weakness	52	5.8%

Table 5 — TYPES OF SPEECH DISORDER AND PATTERN OF IMPROVEMENT

Types of Speech Disorder	Dysarthria				Mixed Aphasia				Global Aphasia				Expressive Aphasia				Anarthria				Total
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Number	154				120				9				39				7				329
Percentage	46.8%				36.5%				2.7%				11.9%				2.1%				37%
Severity S1 — S4																					
Number of Patients	73	46	25	10	2	14	32	72	—	—	—	9	7	14	16	2	—	—	2	5	
Number that improved	78				36				2				18				1				135
Percentage	50.6%				30%				22.2%				46.2%				14.3%				41%

Table 6 — ASSOCIATED DISORDERS

Speech Disorder	Apraxia	Dyslexia	Dysgraphia	Dyscalculia
Mixed Aphasia	38	4	4	1
Expressive Aphasia	7	0	0	0
Anarthria	1	0	0	0
Total	46	4	4	1

Table 7 — DURATION OF STAY AT THE DEPARTMENT OF REHABILITATION MEDICINE

Number of weeks	0 — 2 weeks	2 — 4 weeks	4 — 6 weeks	6 — 8 weeks	8 — 10 weeks	Above 10 weeks	Total
Number of Patients	85	282	233	161	56	74	891
Percentage	9.5%	31.6%	26.2%	18.1%	6.3%	8.3%	

Table 8 — SPEECH THERAPY SESSIONS AND IMPROVEMENT

Number of Speech Therapy Sessions	Number of Patients	Number that Improved	Percentage of Patients that Improved
0	107	32	30%
1 — 10	173	64	37%
11 — 20	31	28	90%
21 — 30	10	6	60%
31 — 40	3	1	33%
More than 40	5	4	80%
Total	329	135	41%

stationary despite prolonged reeducation. Results of this study were similar to those of Vignolo (4) and Butfield (8).

Vignolo (4) concludes that reeducation has a specific effect provided that it lasts more than 6 months. Its influence seems decisive in patients examined for the first time, 2 to 6 months from the onset. In Butfield's study (8) the smallest number of sessions was 5 and the largest 290.

Godfrey and Douglass (5) show that the various aetiological factors, duration of the condition before reeducation, extent of therapy and the age of the patient, influences progress. Eisenson (9) and Wepman (10) stressed the importance of age, psychological adjustment and physiological progress. Sands et al (11) suggest the prognostic importance of time and the age of the patient at the onset, in the recovery of aphasia. They concluded that significant improvement often occurs after the first year following the stroke. Prognosis was better in patients less than 50 years of age than in those over 60 years of age.

Wepman (12) states that "what must be carefully considered is the factor of frustration. Not only the level of frustration tolerance in the patient, but the actual act of frustration itself". He further maintains that the aphasic patient like the rest of us functions best when he reaches a psychological state of high motivation. Recovery from aphasia is a global event; the neurological component adapted to, the linguistic progression enhanced, the social events — both inter and intra-personal, exposed and adjusted (13).

Thus, it may be concluded that age, psychological factors, aetiology and the severity of the disorder, affect progress. However better results can be obtained when treatment is started early, and when patients are given more therapy sessions. Speech therapy must continue until little or no disability remains. In less responsive cases it should end only when speech remains unchanged even after prolonged treatment. Aphasia is a multi-functional disorder, where it is evident that an inter-disciplinary approach to rehabilitation is essential, with full understanding and co-operation between every member of the rehabilitation team.

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REFERENCES

1. Nichols P J R: Rehabilitation Medicine. The Management of Physical Disabilities. 2nd Edition. Butterworths. 1980 Page 4.
2. Khoo C K: Census Population 1980. Singapore. Department of Statistics. Singapore. 1980.
3. Schuell H M, Jenkins J J, Carroll J B: A Factor Analysis of Minnesota Test for Differential Diagnosis of Aphasia. *Journal of Speech and Hearing Research* 1962; 5: 349-69.
4. Vignolo LA: Evolution of Aphasia and Language Rehabilitation: A Retrospective Exploratory Study. *Cortex* 1964; 1:344-67.
5. Godfrey C M, Douglass E: The Recovery Process in Aphasia. In: Sarno MT, Aphasia — Selected Readings. Appleton — Century — Crofts 1972 Pg. 361- 69.
6. De Renzi E, Pieczuro A, Vignolo L A: Oral Apraxia and Aphasia. *Cortex* 1966; 2: 50-73.
7. Don R G et al: Disability and Rehabilitation Profile System. Department of Rehabilitation Medicine, TTSH 1973.
8. Butfield E, Zangwill O L: Reeducation in Aphasia — A Review of 70 cases. *Journal of Neurology, Neurosurgery and Psychiatry* 1946; 9: 75-9.
9. Eisenson J: Prognostic Factors related to Language Rehabilitation in Aphasic Patients. *Journal of Speech and Hearing Disorders* 1949; 14: 262-4.
10. Wepman J M: Recovery from Aphasia. Ronald Press Co. New York 1951.
11. Sands E S, Sarno M T, Shankweiler DP: Long term assessment of Language Function in Aphasia due to Stroke. *Archives of Physical Medicine* 1969; 50: 202-7.
12. Wepman J M: A Conceptual Model for the Processes involved in Recovery from Aphasia. *Journal of Speech and Hearing Disorders* 1953; 18: 4-13.
13. Wepman J M: Aphasia Therapy: Some "Relative" Comments and Purely Personal Prejudices. In Sarno MT, Aphasia — Selected Readings. Appleton — Century — Crofts 1972 Pg 436 — 44.