Turk J Med Sci
34 (2004) 385-389

CLINICAL INVESTIGATIONS

The Rehabilitation Results of Hemiplegic Patients

Asuman DOĞAN, Güldal F. NAKİPOĞLU, Meryem DOĞAN ASLAN, Ayşe Z. KAYA, Neşe ÖZGİRGİN
Ankara Physical Medicine and Rehabilitation Education and Research Hospital, Ankara - Turkey

Received: 19.03.2004

Abstract: The aim of this study was to determine whether or not there was an improvement in the daily life activities and ambulation levels of the hemiplegic patients whom we took into our rehabilitation program. In this case series study, 92 hemiplegic patients were included in the rehabilitation program.

The ages, genders, educational levels, etiologies, hemiplegic sides, hemiplegic periods and the systemic diseases of the patients included in the rehabilitation program were recorded. The daily life activities of every patient at admittance and at discharge from hospital were evaluated using the Barthel Index (BI) and ambulation levels were evaluated using the Functional Ambulation Scale (FAS).

The average BI of the patients at admittance was 44.3 ± 23.3 and the average BI of the patients at discharge was 63.2 ± 25.4. Significance was determined by the t test results between the admittance and discharge BI values ($P < 0.01$). No statistically significant difference in BI values was determined among female and male patients between admittance and discharge ($P > 0.05$). According to the FAS levels, while 69 (74.9 %) patients were found to be at the FAS phase 0 and 1 levels on admittance to the hospital, 25 (27.1%) patients were found to be at the FAS phase 0 and 1 levels at discharge. While the number of patients at the phase 4 and 5 levels was 13 (14.1%) at admittance, this reached 52 (56.4%) at discharge.

The hemiplegic patients whom we included in the rehabilitation program recorded a statistically significant improvement, both in their daily life activities and in their ambulation levels, at the end of an average 40-day hospitalization period. These results show the importance of a suitable rehabilitation program in the improvement of patients from the functional and motor aspects and for independent ambulation.

Key Words: Hemiplegia, Rehabilitation outcome, Barthel Index, Functional Ambulation Scale

Introduction

Cerebrovascular accidents (CVAs) are one of the life threatening neurological diseases observed the most frequently. They occupy third place after heart disease and cancer as a cause of death and first place as a cause of morbidity (1,2). The incidence of this illness is gradually increasing, along with the extension of the average life expectancy (3,4). Of patients who suffer from CVA, 10% recover spontaneously within the first month. There is no response to treatment in another 10%, and 80% of the patients are candidates for rehabilitation. The objective in the rehabilitation of stroke patients is to have the patient reach a maximal functional capacity in the shortest possible time and to achieve as independent and productive a condition as possible. Nevertheless, rehabilitation programs for stroke patients necessitate a long period of hospitalization and expensive health treatment (1-6). This study was planned with the objective of determining hospitalization periods and the functional and ambulation levels upon admittance and discharge of the hemiplegic patients admitted for rehabilitation. Functional evaluation in neurorehabilitation patients was generally performed using the disability measurement. The Barthel Index (BI) and Functional Independence Measurement (FIM) are the disability measurements most used with the objective of determining functional changes. The BI, the validity and reliability of which have been proven among various

patient groups and different societies, basically evaluates mobility and the ability to take care of oneself. The BI is composed of 10 articles and evaluates feeding, transferring from chair to bed, grooming, toilet use, bathing, mobility, climbing up and down stairs, dressing, bowel control and urine control. Each article is scored separately and the total points are calculated. The total points vary between 0 and 100 (7,8). The BI is frequently used to evaluate the disability of hemiplegic patients (9-12). Ambulation levels were evaluated by the functional ambulation scale (FAS), which was developed by the Massachusetts General Hospital and is used for evaluation of patient's ambulation. The FAS is a scale evaluating human assistance rather than devices and supports (13,14).

Materials and Methods

A total of 92 hemiplegic patients admitted to our hospital's 5th Physical Therapy Rehabilitation clinic between November, 2001 and November, 2002, and taken into the rehabilitation program were included in the study. The ages, genders, educational levels, marital status, hemiplegic etiologies, the hemiplegic sides, the hemiplegic periods and the systemic diseases of the patients were recorded. The patient information was obtained from the patients and from their files. During the period the patients stayed in the hospital they were given range of motion (ROM), neurophysiological, balance and coordination and walking exercises. Those who had bladder-intestinal dysfunctions were given bladder-intestinal rehabilitation and those who had speech disorders were given speech therapy. Furthermore, the BI and functional ambulation levels of every patient at admittance and discharge were determined. The BI is the most widely used disability measurements, for determining functional changes. Ambulation levels were evaluated using the FAS.

SPSS 10.0 was used in the evaluation of the data. The Wilcoxon signed ranks test, t test and the Fisher exact test were used in the calculation of the statistical differences between values at admittance and discharge.

Results

The sociodemographic characteristics of the 92 hemiplegic patients included in the study are given in Table 1.

Table 1. The Sociodemographic Characteristics of Our Patients

Mean age 62 (min.22 - max.82)		
	n	%
Gender		
Male	58	69
Female	34	37
Education		
Illiterate	25	27.2
Literate	17	18.5
Primary school	37	40.2
Secondary school	8	8.7
High school	2	2.2
University	3	3.3
Marital status		
Married	79	85.9
Widowed	13	14.1
Single	-	-

N: 92

When the etiologies of the patients were examined, 69 (75%) were thromboembolic and 23 (25%) were hemorrhagic. There was right hemiplegia in 46 (50%) of the patients, left hemiplegia in 44 (47.8%) and bilateral hemiplegia in 2 (2.2%).

There were one or more systemic diseases in 67% of the patients. The risk factors of the patients are given in Table 2.

Table 2. The Risk Factors Distribution in Our Patients

	n	%
Hypertension	54	58.7%
Heart disease	18	19.6%
Diabetes mellitus	12	13%
Lung disease	8	8.7%

As some patients had more than one disease, the percentage values were calculated at n = 92.

The period between the start of the patients' CVAs and the start of the rehabilitation program (period of illness) was an average of 58.4 ± 44.1 (min.14 - max.217) days.

The average period of stay in the hospital was 39.4 ± 17.9 (min.8 - max.90) days. Only 2 (2.2%) of the patients could not be taken into the active rehabilitation program due to systemic problems, and these were discharged with advice, whereas 90 of the patients participated in the active rehabilitation program and showed motor and functional development. The admittance and discharge functional levels of the patients

and the devices and supports provided are given in Table 3.

Table 3. The Functional Levels of Our Patients at Admittance and Discharge, and the Devices and Support Provided.

	Admittance		Discharge	
	n	%	n	%
Bedridden	12	13	2	2.2
Wheelchair	52	56.5	22	23.9
Ambulation dependent	18	19.6	-	-
AFO + quad cane	-	-	38	41.3
KAFO + quad cane	-	-	3	3.3
Quad cane	-	-	25	27.2
Without cane or device	10	10.9	1	1.08

AFO: Ankle Foot Orthesis KAFO: Knee Ankle Foot Orthesis

The distributions according to the BI of the functional evaluations of the patients when admitted and discharged from the hospital are given in Table 4. The average BI value at admittance was 44.3 ± 23.2 (min.5 - max.90) and the average BI value at discharge was 63.2 ± 25.4 (10-100). Significance was determined according to the t test results between the admittance and discharge BI values ($P < 0.01$). The average BI values of the female patients was 39.8 at admittance and 61.4 at discharge. The average BI values of the male patients was 47.3 at admittance and 64.3 at discharge. No statistically significant difference between the admittance and discharge BI values was determined between the sexes ($P > 0.05$). The average of the admittance BI values of the patients who started the rehabilitation program early (20 days earlier) was 34.3 ± 42.8, while the average of the BI values of the patients who applied late was 44.9 ± 17.4. The average of the BI values of the patients who applied early was 63.7 ± 23.5 at discharge and the average of the BI values of the patients who applied late was 62.5 ± 13.2 at discharge. No statistically significant difference was found between the BI values of the 2 groups at admittance and discharge, although at discharge the increase in BI values of the patients who applied early was greater.

Table 4. Barthel Indices of Our Patients at Admittance and Discharge.

	Admittance		Discharge	
BI	n	%	n	%
0-20 Completely dependent	17	18.47	9	9.78
21-60 Advanced degree dependent	55	59.78	29	31.52
61-90 Moderate degree dependent	20	21.73	45	48.91
91-99 Mild degree dependent	-	-	7	7.6
100 Independent	-	-	1	1.08
Mean	44.35 ± 23.23		63.19 ± 25.45	

Table 5. FAS Levels of Our Patients at Admittance and Discharge.

	Admittance		Discharge	
	n	%	n	%
Level 0	52	56.52	23	25
Level 1	17	18.47	2	2.17
Level 2	3	3.26	2	2.17
Level 3	7	7.60	13	14.13
Level 4	13	14.13	39	42.39
Level 5	-	-	13	14.13

When the patients were evaluated in terms of being aged over or under 65 it was determined that the BI value of those under 65 was 49.2 (5-85) at admittance and that the BI value of those over 65 was 38.8 (5-90) at admittance. It was determined that the BI value of those under 65 was 72.9 (5-100) at discharge and that the BI value of those over 65 was 52.4 (10-95) at discharge. No statistically significant difference was found between the BI values of the 2 groups at admittance, but at discharge the increase in the under 65 group was greater and a statistically significant difference was determined between the 2 groups ($P < 0.01$).

While the FAS values of our patients were at the level of FAS level 0 and level 1 ambulation in a total of 69 (74.99%) patients at admittance, only 25 (27.2%) of the patients were at level 0 or level 1 ambulation at discharge. The FAS values of the patients at admittance and discharge are given in Table 5.

Discussion

In parallel with the increase in the elderly population, the number of newly developing CVA cases is also increasing. Hemiplegia developing after CVA is one of the most important causes of disability. The rehabilitation of hemiplegia, the prevention of its secondary complications and patients reaching an independent functional level in a short period of time would to a great extent alleviate the socioeconomic burden on society, of the elderly population, which consumes 40% of health expenditure. For this reason, hemiplegia rehabilitation constitutes one of the most important areas of rehabilitation.

The average age of our patients was 62.1 ± 12.7 (min.22 - max.82), with 48.9% aged under 65. It is reported stated in the literature that the incidence of cerebrovascular disorders increases with age and that only 28% of hemiplegic patients are under 65 (14). As of 1997, it was estimated that the average age in Turkey was 72.37 (15). We think that in the future, with the increase in life expectancy and with the early diagnosis of the risk factors and treatment, hemiplegia patients will also be older.

Studies have shown differences in the ratios of females to males. CVA incidence in Japan was reported to be 3.94 per 1000 in males and 2.52 per 1000 in females. This was found to be equal to the levels in Western European countries (14). In our study, 37% of our patients were female and 63% were male, and the ratio of females to males was approximately 1/3. We did not determine any difference in either the admittance or discharge BI values of female and male patients. Carod-Artal et al. also reported that they determined no significant difference between the genders at the beginning and at follow-ups 1 year later (9).

When educational levels were examined, it was observed how low the levels of literacy and education among our patients were. Carod-Artal et al. did not determine a relationship between a low educational level and quality of life in their studies, but they stated that there is a significant relationship between a high educational level and a high quality of life (9). Dambovy et al. also stated that educational level would affect the rehabilitation program (10). Due to the fact that there was only a small number of secondary school, high school and university graduates in our study, no statistically significant relationship could be determined between the educational levels and BI values of the patients ($P > 0.05$).

Engström et al. determined that in societies where the socioeconomic level is low, the incidence of CVA is significantly high among females and males (11). Furthermore, if we consider the social security status of our patients, approximately 1/5 of patients had no fixed income and had a low socioeconomic level. However, more detailed studies including many factors, such as average income, unemployment rate, social status, rate of regional migration and social assistance, which would determine the socioeconomic level better, would provide more objective data on this subject.

In a study conducted by Dambovy et al. the prognosis of lacunary CVA was better than that of hemorrhagic CVA, and the BI values of the former group 1 year later were found to be better than those of the latter group(10). Those with the worst prognosis are hemorrhagic CVA patients (12). In this study, there was no statistically significant difference between the BI values, at either admittance and discharge, of hemorrhagic and thromboembolic CVA patients.

The period between the CVA onset and patients' applying to the rehabilitation program was an average of 58.4 ± 44.1 (min.14 - max.217) days. A period of 30 days before starting rehabilitation is among the probable bad prognosis indicators that negatively affect functional level (12). A total of 72 (79.27%) of our patients applied for rehabilitation more than 30 days after the onset of CVA and this shows the deficiency and delay in the orienting of hemiplegic patients in Turkey towards rehabilitation. Furthermore, the inadequate number of rehabilitation centers and patients having to wait for a bed also contribute to this delay. In the group that started rehabilitation within 20 days, the effectiveness of treatment was found to be significantly high. The shorter of the period between the start of paralysis and the onset of rehabilitation training, the greater the advantage to the patient (16,17). In our study, although there was no statistically significant difference between the BI values of those patients who started the rehabilitation program early (20 days or less) and of those who started late (more than 20 days), as the patients who applied to the rehabilitation program late spent a major part of the rapid improvement period at home, their admittance BI values were high. However, at discharge, the patients who applied early exhibited a greater increase in BI.

One or more systemic diseases were present in 67 of our patients. The most frequently encountered systemic disease was hypertension, at a level of 58.7%, and this was the greatest risk factor. Carod-Artal et al. determined in a study on 90 hemiplegic patients that hypertension was present in 65.56% of patients, heart disease in 38.89%, diabetes mellitus in 30% and chronic lung disease in 8.89% (9).

At the end of the rehabilitation period, the 69.5% level of being bedridden and in a wheelchair was reduced to 26.1%, and 72.9% of patients had some level of ambulation. If it is considered that 70-80% of the patients who suffered from CVA benefited from

rehabilitation, then this result is not different from what was expected (5, 6).

Carod-Artal et al, in their study conducted on 90 patients stated that the average BI at admittance was 65.8 and that this rose to 88.5 at follow-ups 1 year later. While 16.6% of their patients were completely dependent and 23.3% were dependent to an advanced degree at admittance, 18.47% of our patients were completely dependent and 59.78% were dependent to an advanced degree at admittance (9). In addition, in the same study, at BI evalution 1 year later, 1 (1.1%) patient was completely dependent, 9 (10%) were dependent to an advanced degree, 20 (22.2%) were dependent to a moderate degree, 13 (8.4%) were dependent to a mild degree and 47 (52.2%) had reached a completely independent level (9). In conclusion, despite the fact that the BI of our patients were lower at admittance, the increase in BI values over an average period of 40 days was significantly high. We intend to follow-up our patients for a long time since functional improvement will continue for up to 1 year.

In our study there was a significant improvement in the ambulation levels of patients under the rehabilitation program. Hesse et al. determined that the FAS level was 0, 1 or 2 in all patients before rehabilitation, and that this increased to the FAS levels 3 and 4 in all patients after the rehabilitation program (18).

The hemiplegic patients whom we included in the rehabilitation program recorded a statistically significant improvement, both in their daily life activities and in their ambulation levels, at the end of an average 40-day hospitalization period. These results show how important rehabilitation is in the improvement of patients from the functional and motor aspects and for their being independently ambulant.

Corresponding author:

Asuman DOĞAN

Kent-Koop Mahallesi, 5. Cad. Tes-İş 1 Sitesi,

D Blok ,No: 4 Batıkent, 06370, Ankara - Turkey

e-mail: asudogn@yahoo.com

References

1. Adams RD, Victor M. Principles of Neurology 4th Ed. Mc Graw-Hill Company. New York 1989, pp:617-92.
2. Garison SJ, Rolak LA. Rehabilitation of stroke patients. Rehabilitation Medicine:Principles and Practise. Ed. DeLisa J.A. 2nd Ed. JB Lippincott Company. Philadelphia 1993, pp: 801-24.
3. Henry JM, Bernet J et al. Stroke Pathophysiology Diagnosis and Management. 2nd Ed. Churcill living stone. New York 1992, pp: 859-66.
4. Oğul E. Uludağ Üniversitesi Temel ve Klinik Nöroloji. Bursa 1996, pp: 105-45
5. Dinçer K. İnme. Fiziksel Tıp ve Rehabilitasyon. Eds. Beyazova M, Gökçe-Kutsal Y. Güneş Tıp Kitabevi. Ankara 2000, pp: 1936-50.
6. Özcan O. Hemipleji Rehabilitasyonu. Tıbbi Rehabilitasyon. Ed Oğuz H. Nobel Tıp Kitabevi. Ankara 1995, pp: 388-390.
7. Law M, Lextts L. A Critical review of scales of daily living. American Journal of Occupational Therapy 43: 522-8, 1989.
8. Shah S. Inprasie of the Brometric and psychometric qualities of the Barthel index. Physiotherapy 80: 769-79,1994.
9. Carod Artal J, Egido JA et al. Quality of life among stroke survivors evaluated 1 year after stroke. Stroke 31: 2995-3006, 2000.
10. Dambovy ML, Sandok BA et al. Rehabilitation for stroke. Advances in Neurology 47: 265-76, 1988.
11. Engström G, Jerntorp I et al. Geographic distribution of stroke incidence within an urban population. Stroke 32: 1098-1107, 2001.
12. Özgirgin N. Hemiplejide Fonksiyonel Rehabilitasyon. Gazi Üniversitesi Tıp Fakültesi Fiziksel Tıp ve Rehabilitasyon Anabilim Dalı Hemipleji ve Rehabilitasyon Sempozyumu Kitabı. Gazi Üniversitesi. Ankara 1999, pp: 61-78.
13. Holden MK, Kathleen MG et al. Clinical gait assesment in the neurologically impaired. Rehability and meaningfulness. Phys Ther 66: 1530-9, 1986.
14. Roth EJ, Harvey RL. Rehabilitation of Stroke Syndromes. Physical Medicine and Rehabilitation. Ed. Braddom RL. W.B.Saunders Company. Philadelphia, London, Toronto, Montreal, Sydney, Tokyo 1996, pp: 1053-87
15. Aydın ZD. Yaşlanan dünya ve geriatri eğitimi. Geriatri 2: 179-87, 1999.
16. Miller VT. Lacuner stroke: a reassesment. Arch Neurol 40: 129-34, 1983.
17. Keith RA. Status of measurement in stroke rehabilitation on outcomes. Stroke 21: 30-1, 1990.
18. Hesse, C.Bertelt et al. Treadmill training with partial body weight support compared with physiotherapy in nonambulatory hemiparetic patients. Stroke. 26: 976-81, 1995.