TÜBİTAK

ORIGINAL ARTICLE

Turk J Med Sci
2006; 36 (5): 295-300
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E-mail: medsci@tubitak.gov.tr

Aphasia in Hemiplegic Patients

Asuman DOĞAN[1]
Münire MENGÜLLÜOĞLU[1]
Nermin ALTINOK[2]
Bülent GÜNDÜZ[2]
Serpil ALLUŞOĞLU[2]
Neşe ÖZGİRGİN[1]

[1] 5th Physical Medicine and Rehabilitation Clinic, Ankara Physical Medicine and Rehabilitation Education and Research Hospital, Ankara - TURKEY

[2] Speech Therapy Unit, Ankara Physical Medicine and Rehabilitation Education and Research Hospital, Ankara - TURKEY

Aim: The aim of this study was to define aphasia frequency and its clinical types together with the relationship between the clinical types and age, gender, hemiplegic side, etiology and educational level of the hemiplegic patients.

Methods: All hemiplegic patients who admitted to Ankara Physical Therapy Training and Research Hospital (APTTRH) from January 2002 to January 2003 were included in this study. During this period, 478 hemiplegic patients were hospitalized for rehabilitation. One hundred and five of these patients were identified to have speech disorders; seven patients were excluded from the study. The Mann-Whitney U test and Pearson chi-square test were used to investigate gender differences and predictive association among the variables of age, gender, educational levels and type of aphasia.

Results: Mean age of aphasic patients was calculated as 56.1 (21-79) years. Of 98 aphasic patients, 73 (74.4%) were non-fluent, and 25 (25.6%) were fluent. There was no statistically significant difference between the mean ages of fluent and non-fluent aphasics ($P > 0.05$). Mean age of Broca aphasics (48.7) was younger than of Wernicke (56.3) and global (62.1) aphasics, and this difference was of statistical significance ($P < 0.01$). There was no significant relationship between gender and etiology, dominant hand, hemiplegic side, educational level and types of aphasia ($P > 0.05$).

Conclusions: Aphasia is one of the most common complications to develop due to cerebrovascular accident (CVA). Accordingly, further research is in progress to examine the relation between age, gender and etiology and to probe its causes, using a criterion other than the presence of aphasia.

Key Words: Aphasia, hemiplegia, age, gender, type of aphasia

Hemiplejik Hastalarda Afazi

Amaç: Hemiplejik hastalarda afazi sıklığını, klinik tiplerini ve klinik tip, yaş, etyoloji ve eğitim düzeyi arasındaki ilişkiyi tamamlamak

Metot: Ankara Fizik Tedavi Rehabilitasyon Eğitim ve Araştırma Hastanesine (AFTREAH) ocak 2002-ocak 2003 tarihleri arasında başvuran 478 hemiplejik hasta alındı.105 hastada konuşma bozukluğu saptandı, 7 hasta çalışma dışı bırakıldı. Konuşma fonksiyonlarını değerlendirmek için gülhane afazi testi (GAT) kullanıldı. Cinsiyet yaş, hemiplejik taraf, etyoloji, öğrenim düzeyi arasındaki ilişki Mann Whitney U, Pearson ki kare ile araştırıldı

Bulgular: Hastaların yaş ortalaması 56.1 (21-79) yıl olarak bulundu. Afazik hastaların 73'ü (74.4) tutuk, 25'i (%25.6) akıcı tipte idi. Tutuk ve akıcı afaziklerin yaş ortalamaları arasında fark saptanmadı ($P > 0.05$) Broca afaziklerin (48.7) yaş ortalaması Wernicke afaziklerin (62.1yıl) ve global afaziklerin (56.3) yaş ortalamasından istatistiksel anlamlı olarak daha genç bulunmuştur ($P < 0.01$) Cinsiyet, etiyoloji dominant el, hemiplejik taraf, öğrenim düzeyi ve afazi tipi arasında anlamlı bir ilişki saptanmadı ($P > 0.05$).

Sonuç: Afazi serebrovasküler olaya (SVO) bağlı gelişen en yaygın komplikasyondur. Bu nedenle afazinin varlığı ve nedenleri ile yaş, cinsiyet ve etyoloji arasındaki ilişkiyi değerlendiren daha ileri çalışmalara yapılmalıdır.

Anahtar Sözcükler: Afazi, hemipleji, yaş, cinsiyet, afazi tipi

Received: May 03, 2006
Accepted: October 17, 2006

Correspondence
Asuman DOĞAN
5th Physical Medicine and Rehabilitation Clinic, Ankara Physical Medicine and Rehabilitation Education and Research Hospital, Ankara - TURKEY

asudogn@yahoo.ca

Introduction

Aphasia usually occurs due to cerebrovascular accidents (CVA) and can be of different form and severity depending on the localization of the lesion. The frequency of aphasia resulting from CVA has been reported in the literature to vary between 21-38% (1,2). Among the patients who had admitted to the Speech Therapy Unit, aphasia resulting from CVA ranks first among other causes. When patients who admitted to Gülhane Speech Diagnostics and Therapy Laboratory during 1986-1989 were investigated, 92% had CVA in their etiology (3). If we consider the fact that one-third of the patients experiencing CVA develop aphasia, we can conclude that aphasia is a common complication in this disease (3-5)

There is a close correlation between CVA and language disorders which can be explained by the proximity of the vascular anatomy of the brain to the areas responsible for language skills. When CVA occurs in the dominant hemisphere and affects the cortical fields responsible for language functions, sub-cortical structures and the connections thereof, aphasia ensues (3,4).

There are several definitions for aphasia. Dorland Medical Dictionary's definition is "defect or the loss of the power of expression by speech, writing or signs or of comprehending spoken or written language due to injury or disease of brain centers"(3). Dysarthria and speech disorders caused by dementia or psychiatric conditions are not included in this definition (6).

The neuroanatomy of language encompasses specific cortical fields, sub-cortical structures and the connections between these structures. Cortical fields responsible for speech are as follows: posterior part of the left inferior frontal gyrus [responsible for the generation of motor speech (Broca, Brodmann's area 44)], posterior superior temporal field [responsible for the comprehension of spoken language (Wernicke, Brodmann's area 42)], and angular gyrus located on the inferior parietal part of the dominant hemisphere (Brodmann's area 39). The last area has relationships with somatosensorial and auditory association cortices and is why it is possible for an individual to write and read an object that he/she has heard, touched or seen. As a result of the interaction between these two areas, language skills can be performed. Some of the high cerebral functions are related to the left and some others are related to the right hemisphere. Language is mostly related with the left hemisphere, whereas continuity of attention, its distribution, musical abilities and emotional diversity are related with the right hemisphere (3,4,6-8).

There is no consensus in the literature at present regarding the clinical diagnosis, classification, frequency and treatment efficacy in aphasia. It is very difficult to have a single classification scheme for aphasia. The differences between the types of aphasia not only relate to the size and the localization of the lesion but also to the individual responses given by different patients. As is true for the classification of aphasia, there is no consensus about the efficacy of and methods for treatment (3,6,9,10). Aphasia will hamper the interaction of the individual with his surroundings, will further add social and psychological problems to the already existing motor and functional problems and eventually will hinder the rehabilitation program of the individual (11). Thus, the presence of aphasia in hemiplegic patients, its clinical type, the factors influential on the clinical type and the response to treatment are of utmost importance.

The aim of this study was to investigate the frequency and the clinical forms of aphasia seen in patients admitting to Ankara Physical Therapy Training and Research Hospital (APTTRH) with hemiplegia and the relationship between their age, gender and educational status.

Materials and Methods

All the hemiplegic patients who admitted to APTTRH from January 2002 to January 2003 were included in this study. During this period, 478 hemiplegic patients (245 F, 233 M) were hospitalized for rehabilitation. One hundred and five of these patients were identified to have speech disorders. We have been evaluating aphasic patients since 1988 and conducting a rehabilitation program offered by a psychologist and physiotherapist who have been specifically trained on this subject. As speech problems resulting from psychiatric disturbances and dementia are not regarded as aphasia, seven patients were excluded from the study. Information was collected about the age, gender, educational level, CVA etiology and duration, hemiplegic side and dominant hand of the study population.

The type of speech disorder was identified by speech therapists. In order to evaluate speech function, Gülhane

Aphasia Test (GAT), developed by Oğuz Tanrıdağ (1986), was utilized. Auditory and reading comprehension and repeating and naming functions were evaluated. The functions were given scores and they were calculated as percentages of normal and recorded on the GAT chart. According to the Boston classification system, types of aphasia were classified as fluent and non-fluent.

The mean and percentage distributions were calculated in the study. Data analysis included the median test to assess similarity of age distributions among aphasic groups and the Mann-Whitney U test and Pearson chi-square test to investigate gender differences and predictive association among the variables of age, gender, educational levels and type of aphasia.

Results

Of the 478 patients hospitalized for hemiplegia rehabilitation from January 2002 to January 2003 in APTTRH, 98 (20.5%) had aphasia. Sociodemographical characteristics of the patients are demonstrated in Table 1.

Table 1. The characteristics of aphasic patients.

(n=98)	n	%
Gender		
Female	47	48
Male	51	52
Educational levels		
Illiterate	35	35.7
Literate	8	8.2
Primary school	37	37.8
Secondary school	9	9.2
High School	9	9.2
Type of lesion		
Thromboembolic	81	82.7
Hemorrhagic	17	17.3
Hemiplegic side		
Right	92	93
Left	5	5.1
Bilateral	1	1
Dominant hand		
Right hand	89	90.8
Left hand	7	7.1
Ambidextrous	2	2

Mean age of aphasic patients was calculated as 56.1 (21-79) years. The mean time elapsed since the beginning of the disease was 119 (5 - 545) days. Nineteen (19.4%) patients had admitted during the first 30 days of the disease, 41 (41.8%) between days 30-90, 20 (20.4%) between days 90-180, 9 (9.2%) after six months, and 9 (9.2%) after one year.

Certain clinical features of aphasic patients and the distribution of types of aphasia according to gender are given in Table 2. There was no significant relationship between gender and etiology, dominant hand, hemiplegic side and types of aphasia ($P > 0.05$).

Table 2. Clinical characteristics of aphasia patients and the distribution of types of aphasia according to gender.

	Male		Female	
	n	%	n	%
Etiology				
Thromboembolic	43	84.3	38	80.9
Hemorrhagic	8	15.7	9	19.1
Hemiplegic side				
Right	44	86.3	45	95.7
Left	5	9.8	2	4.3
Bilateral	2	3.9	-	-
Type of aphasia				
Broca	13	13.2	14	14.2
Transcortical motor	12	12.2	10	10.2
Global	10	10.2	11	11.2
Transcortical mix	1	1	2	2
Anomic	5	5.1	1	1
Conduction	-	-	1	1
Wernicke	8	8.1	5	5.1
Transcortical sensory	2	2	3	3

The distribution of aphasic patients according to Boston classification system and their mean ages are depicted in Table 3. Of 98 aphasic patients, 73 (74.4%) were non-fluent and 25 (25.6%) were fluent. Mean age of non-fluent aphasia patients was 53.5 years versus 59.9 years for those fluent. Mean age of Broca aphasics was 48.7 years, of global aphasics 56.3 years and of Wernicke aphasics 62.1 years. Mean age of Broca aphasics was younger than of Wernicke and global aphasics and this difference was statistically significant ($P < 0.01$). There was no statistically significant difference between the mean ages of fluent and non-fluent aphasics ($P > 0.05$).

Table 3. The distribution of aphasic patients according to Boston classification system and their mean ages.

	Non-fluent				Fluent		
Type of aphasia	n	%	Mean age	Type of aphasia	n	%	Mean age
Broca	27	27.5	48.7 ± 16.5	Anomic	6	6.1	57 ± 10.4
Transcortical motor	22	22.5	58.9 ± 12.1	Conduction	1	1	49 ± 12.8
Global	21	21.4	56.3 ± 13.7	Wernicke	13	13.2	62.1 ± 9.8
Transcortical mix	3	3	55.5 ± 23.3	Transcortical sensory	5	5.1	63 ± 2.8
Total	73	74.4	53.5 ± 19.3	Total	25	25.6	59.9 ± 17.2

The distribution of types of aphasia according to etiology and education level is given in Table 4.

According to Boston classification, there was no relationship between fluent and non-fluent aphasia and etiology and education level ($P > 0.05$).

The GAT score distribution of patients on comprehension by hearing and comprehension by reading, repetition and naming is given in Table 5. Scores for comprehension by reading and naming were lower in women, whereas there was no gender difference for comprehension by hearing and repetition.

Discussion

The frequency of aphasia due to acute CVA is reported as 21-38% in the literature. In a study by Brust et al. (1) on 850 CVA patients, the incidence was 21% and in the study by Pedersen et al. (2), the incidence was reported as 38%. Laska et al. (9) evaluated 90% of their patients within the first 11 days of acute CVA, reporting an aphasia incidence of 28%. The most important factors contributing to an incidence ranging between 20-40% is the time during which the patients are evaluated; in this study the mean time that elapsed until the patients were evaluated was calculated as 119 days (5-545). Only 19.2% of the patients had admitted during the acute stage. In the literature, it is reported that even the aphasic patients who do not receive any treatment have rapid improvements within the first three months and that this improvement might lengthen up to a year (10,12). Spontaneous recovery is more common within the first month (10,12,13); however, age, the severity of aphasia and the dominant hand have been shown as

Table 4. The distribution of types of aphasia according to etiology and educational level.

			Type of aphasia			
			Fluent		Non-fluent	
(n=98)	n	%	n	%	n	%
Etiology						
Thromboembolic	81	82.6	13	13.2	68	69.3
Hemorrhagic	17	17.7	12	12.2	5	5.1
Education level						
Illiterate	35	35.7	7	7.1	28	28.5
Literate	8	8.1	2	2	6	6.1
Primary school	37	37.6	10	10.2	27	27.5
Secondary school	9	9.1	3	3	6	6.1
High School	9	9.1	3	3	6	6.1

Table 5. The distribution and the means of the scores of the patients for auditory comprehension, reading comprehension, repetition and naming according to GAT.

Parameter	Mean	SD	Min-max
Auditory comprehension	50.8	26.6	0-100
Reading Comprehension	25	52.5	0-95
Oral repetition	37.8	35.2	0-100
Object naming	30.8	34	0-100

important prognostic factors (14). In our study, most of the rapid improvement period had been spent at home, which explains why the incidence of aphasia was found to be lower than that reported in the literature.

In the literature, age and gender were compared with the type of aphasia. Obler et al. (15) reported the mean age of aphasics as 56 years - Broca aphasics were younger (51 years), Wernicke aphasics were older (63 years), and the mean age for other types (conduction 57.5, global 56, anomic 54) were within the same range. In the study by Kertesz et al. (16), the mean age of Broca aphasics was 55 years and the age range for Wernicke, conduction, anomic and global aphasia was reported as 64.5-65.7 years; however, the difference between these groups was not of statistical significance. In the study by Brust (1), Broca aphasics were of a younger age. Eslinger (17) had a series of 64 patients, and there was no difference between Broca and conduction aphasics in terms of age; however, Broca aphasics were younger than both global aphasics and Wernicke aphasics. The basis of the relationship between the type of aphasia and age has been explained by certain mechanisms and certain hypotheses have been brought forward. There might be certain neuropathological variations with increasing age – younger patients have a dominance of anterior infarcts and older patients have a dominance of posterior infarct; cerebral blood flow changes with age; the higher incidence of Wernicke aphasia in elderly patients is influenced by the cumulative effects of low mentality accompanying old age; in elderly patients, the improvement in comprehension defects is not as rapid as in younger patients, resulting in an increase in the incidence of Wernicke aphasia prevalence. In the literature, the mean age of aphasic patients is older than of the stroke patients who are not aphasic (11). In this study, we did not make a comparison between aphasics and those who are not aphasic with regards to age. In accordance with the above-mentioned literature, the age of Broca aphasics was found to be significantly younger than that of both Wernicke aphasics and global aphasics.

In the literature, the correlation of gender with the type of aphasia and its prognosis has not been investigated. In the study by Pedersen et al. (18), aphasic patients at acute and chronic stage were evaluated; age, gender and type of aphasia did not differ between acute and chronic stages, yet only after one year non-fluent aphasics became fluent aphasics. Neither age, gender nor type of aphasia was a determinant of recovery from aphasia; the main determinants were the severity of the stroke and the severity of the aphasia. There are also studies investigating the correlation between neurological deficit, size of the lesion and the type of aphasia. Paolucci (11) reported that cardiac embolism was higher in aphasic patients than those who were not aphasic. On the other hand, Knepper (19) and Bogousslavsky (20) demonstrated the correlation between cardiac embolism and Wernicke aphasia. In this study, no relationship could be identified between the type of aphasia and gender and etiology. In their series of 177 patients, Brust et al. (1) identified non-fluent aphasia in 32% and fluent aphasia in 68% of their patients; however, mean ages of these groups were not different from each other. Ferro and Madureira (21) reported that the mean age of non-fluent aphasics was less than that of fluent aphasics. In Pedersen's study, no age difference was mentioned between fluent and non-fluent aphasics during the acute stage; however, during the chronic stage fluent aphasics were much older. In our study, 74% of the patients were non-fluent aphasics and 25.6% were fluent aphasics; this ratio was in reverse correlation with that reported by Brust (1). However, the mean age of non-fluent aphasics (53.5 years) was younger than that of fluent aphasics (60 years). The different rates for aphasics can be explained by the fact that the patients in the Brust series were in the acute stage and those in our series had been evaluated quite late and usually after four months.

In a study carried out in India, gender and education level were found to be influential on the type of aphasia (22). Though this study also failed to reveal a relationship between educational level and the type of aphasia, as a result of their better educational status, the functions such as comprehension by reading and naming were found to be higher among males.

In conclusion, aphasia is one of the complications developing after a cerebrovascular accident. As the communication of the aphasic individual with his/her surroundings is hampered, psychological problems are added to the already existing medical problems, which is why aphasia should be regarded as an important health problem in hemiplegics. There is no concrete data for the relationship between the type of aphasia and age, gender, etiology as well as the localization of the lesion. There are several studies on this subject and several others in progress. However, the structures of languages are different, there are neuro-anatomical variations among individuals and the duration of aphasia is another confounding factor, all of which combine to render reaching a consensus difficult. Therefore, performance of analytical studies on this topic is certainly needed.

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