Acta clin Croat 2000; 39:277-280

OUTCOME OF ISCHEMIC STROKE: A FIVE-YEAR FOLLOW-UP STUDY

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SUMMARY – The outcome of ischemic stroke was investigated after a five-year follow-up period. The study included 175 patients, 86 (49.14%) females and 89 (50.86%) males, mean age 65.68 (range 29-88) years, who were treated at the Department of Neurology, Osijek University Hospital, for first-ever ischemic stroke during 1993. Data from the patients' medical sheets, treatment protocols and follow-up check-ups were analyzed, also using survey questionnaires to collect data on the patients' condition five years from discharge. The aim of the study was to identify more precise indicators of both short- and long-term outcome of ischemic stroke in the population, thus to enable comparison with data from other countries and to obtain a real estimate of ischemic stroke evolution. The following indicators were identified: deterioration of disease or progression of neurologic deficit upon hospital admission was recorded in 30.29% of patients; stroke recurrence in 30 days, in the first year and after a five-year period of first stroke was found in 5.14%, 10.62% and 21.58% of patients, respectively; global cognitive dysfunction in 30 days of disease onset was detected in 20%, and dementia syndrome after a five-year period in 31.51% of patients. Final outcome of the disease and grade of functional deficit were assessed by use of modified Rankin Scale (RS): at 30 days of admission, 13.72% of ischemic stroke patients completely recovered or were not dependent (RS 0 and 1); 32.57% of patients had mild functional deficit and were partially dependent (RS 2 and 3); 24% of patients had severe functional deficit and were completely dependent (RS 4 and 5); and 29.71% of patients died (RS 6). One-year mortality rate was 50.23%. Five years after the stroke, 8% of patients had RS 0 and 1; 20% had RS 2 and 3; 8.57% of patients had RS 4 and 5; and 63.43% of patients deceased (RS 6). In comparison with the data from developed countries, the mortality rate recorded in this study was slightly higher 30 days after hospital admission, and significantly higher at one year from hospital stay. This difference could be attributed to the lower level of hospital treatment and lower quality of post-hospital care and rehabilitation available. Other indicators such as five-year mortality, recurrence rate of stroke, and occurrence of dementia were approximately equal to the results of similar studies in developed countries. The study demonstrated the destructive impact of stroke on public health with its widespread and grave consequences that lead to functional incapacity and a drastic fall of the patient's quality of life. However, as the study was conducted during the war, the city of Osijek being under the siege, the socioeconomic factors should, at least partially, be considered responsible for the results obtained. Nevertheless, study results call for the community to provide better conditions for the diagnosis, treatment and prevention of this devastating disease.

Key words: *Cerebral infarction, epidemiology; Outcome and process assessment (health care)*

Introduction

Ischemic stroke accounts for 80% - 85% of all stroke cases, and the rest are hemorrhagic strokes. The outcome of stroke still looks grim: one third of stroke patients die,

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one third become totally dependent, and only one third are well recovered or less disabled[1]. Prospective follow-up studies have quantified short-term (30-day) and long-term (1-year, 5-year) outcome. It may help clinicians in the prognosis of death, disability, and stroke recurrence. Predictors of stroke outcome may help clinicians establish realistic goals for the treatment and rehabilitation of individual patients, allocate patients correctly in clinical trials of neuroprotection and thrombolytic agents, and give relatives a reliable prognosis. Predictors of stroke prognosis have been identified in univariate analyses (identification of a single factor the presence or absence of which indicates the probability of good or poor outcome), and in regression analysis (identification of independent, not inter-related factors that predict outcome)[2].

The aim of the present study was to determine more precise indicators of both short- and long-term outcome of ischemic stroke in our population, which would allow for comparison with data from other countries, and to make the prognosis of ischemic stroke evolution easier.

Patients and Methods

The study included 175 patients, 86 (49.14%) females and 89 (50.86%) males, mean age 65.68 (range 29-88) years, who were treated during 1993 at the Department of Neurology, Osijek University Hospital, for first-ever stroke. The patients' medical sheets, treatment protocols and follow-up check-ups were thoroughly analyzed. A special survey questionnaire was used to collect data from the patients who had not attended neurologist regularly during the five-year period from stroke. The diagnosis was made by brain computed tomography (CT) in 75.3%, brain scintigraphy in 21.4%, and by clinical examination (the cases with embolic stroke) in 3.3% of patients. The distribution of ischemic stroke subtypes according to TOAST classification is shown in Fig. 1.

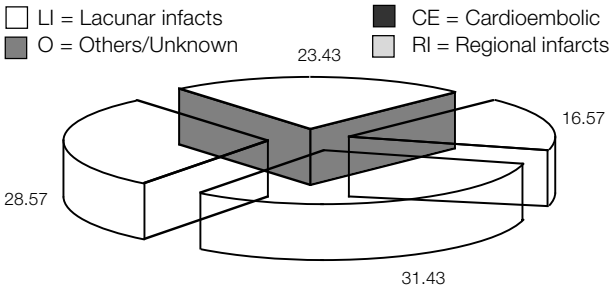

Fig. 1. Distribution of ischemic stroke subtypes (% of patients)

Results

Upon hospital admission, either deterioration in the course of the disease or progression of the neurologic deficit was found in 30.29% of patients. Recurrent stroke in 30 days of the first stroke onset was recorded in 5.14%, at one year in 10.62%, and at five years in 21.52% of study patients (Fig. 2). Global cognitive impairment was detected in 20% of patients after 30 days of treatment, while dementia syndrome was diagnosed in 31.51% of patients at five years of the ischemic stroke onset (Fig. 3). The level

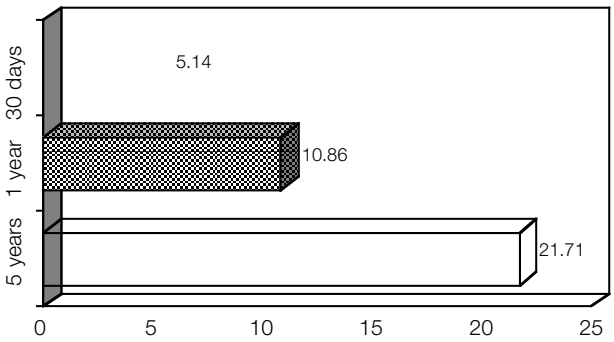

Fig. 2. Recurence of ischemic stroke (% of patients)

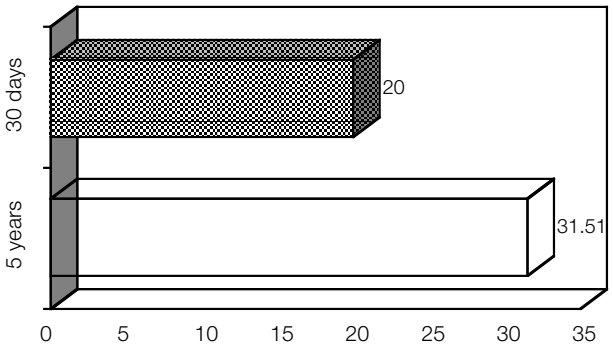

Fig. 3. Global cognitive impairment and dementia (% of patients)

of functional deficit was assessed by modified Rankin Scale (RS). At 30 days from hospitalization, complete recovery and independence (RS 0 and 1) were achieved in 13.72%, moderate neurologic deficit and partial dependence (RS 2 and 3) were present in 32.57%, severe neurologic deficit and complete dependence (RS 4 and 5) were found in 24%, and fatal outcome (RS 6) was recorded in 29.71% of study patients. At five years from the ischemic stroke, 8% of patients were independent, 20% were partially dependent, 8.57% were completely dependent, and 63.43% died (Fig. 4).

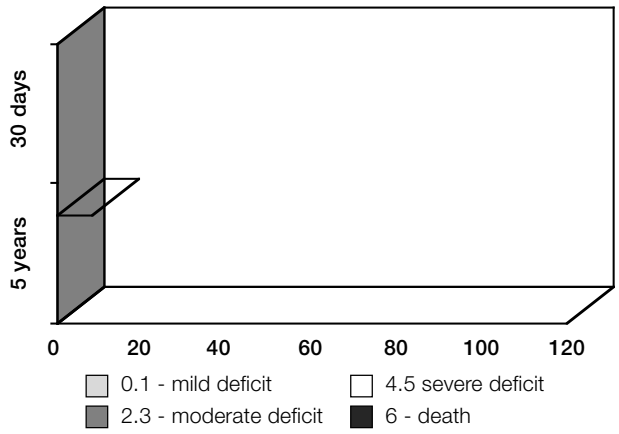

Fig. 4. Functional outcome: modified Rankin Scale

Discussion

Compared with literature data, we found a slightly increased stroke fatality rate in 30 days of hospitalization, whereas the mortality of ischemic stroke at one year of the disease onset significantly exceeded the data reported for developed countries[3]. The factors indicative of poor prognosis and outcome of stroke, currently used in univariate analyses, are demographic including advanced age and male sex; stroke risk factors including diabetes mellitus, arterial hypertension and cardiac diseases; clinical features including fever, dysphagia and incontinence; neurologic symptoms including impaired consciousness, severe neurologic deficit, total anterior circulatory syndrome, impaired proprioception and cognitive deficit; biochemical and hematologic disturbances including increased glucose level, increased hematocrit, white blood cell count, erythrocyte sedimentation rate, increased creatine kinase activity and increased level of cortisol; and neuroimaging findings including infarct location, infarct extension and midline shift[4,5]. The well established predictors of stroke recurrence are stroke subtype, history of transient ischemic attacks (TIA), arterial hypertension, cardiac valve disease, atrial fibrillation, congestive heart failure, glucose level, male gender, and ethanol abuse. Particularly important factors that may influence stroke outcome are complications in the acute phase of stroke: cerebral edema, transtentorial herniation, hemorrhagic transformation, seizures, depression; systemic: pulmonary embolism, endocrine abnormalities, hypertension; infection: urinary, pneumonia, septicemia, fever, pressure sores, aspiration; cardiac: myocytolysis, increased cardiac enzymes, cardiac arrhythmias, uncontrolled hypotension, sudden death[6,7].

Inadequate bed capacity, scarce room capacity, outdated equipment, nonexistence of a stroke unit, insufficient neuroimaging diagnostics, and low interdisciplinary co-operation with other medical specialties at the time of the study, and especially poor general conditions due to the war in the region, made regular use of modern approaches to the management of stroke at our Department difficult, which was additioanlly deteriorated by the siege of the city of Osijek that substantially contributed to the increased rate of early stroke mortality. Also, insufficient post-hospital care and treatment of these patients must have, in our opinion, added to the worse long-term prognosis of the disease as well as to the relatively high level of their functional impairment, thus to the reduced quality of life in stroke survivors. Some improvement was seen after the introduction of outpatient centers for post-hospital care and rehabilitation, however, this form of rehabilitation is only available to a limited number of stroke patients, or is performed over a limited period of time upon discharge from the hospital. Data on other predictors, such as five-year stroke mortality, stroke recurrence rate, and post-stroke rate of dementia, were found to be comparable with those reported from similar studies in developed countries.

The results of this study suggest that there is a need of reorganization of the stroke health care system in Croatia, and that a National Project of Stroke Prevention and Treatment, similar to those developed in other East European countries should be prepared and implemented[8]. The strategic points of the project should include: (a) analysis of stroke epidemiology in Croatia with regard to regional differences (community based study, hospital based study – Stroke Registry); (b) decline in stroke incidence by better primary and secondary prevention; and (c) decline in stroke mortality and stroke disability by organization of stroke units and improvement of rehabilitation.

Conclusion

Our study demonstrated the devastating nature of stroke and its wide and grave consequences for public health, causing severe functional impairment and drastic fall in the quality of life of stroke patients. As these results were obtained during the extremely unfavorable general conditions of war, they also pointed to the significant role of general socioeconomic conditions and their impact on treatment results. The study results should be consid-

ered a warning pointing to what should be done in the forthcoming period of time to ensure better conditions for the diagnosis, treatment, rehabilitation and prevention of cerebrovascular diseases and stroke in the Osijek area.

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Sažetak

PETOGODIŠNJE PRAĆENJE ISHODA ISHEMIJSKOG MOŽDANOG UDARA

D. Kadojić, S. Mišević, I. Bradvica, B. Barac, D. Jančuljak i M. Kadojić

Autori su istraživali ishod ishemijskog moždanog udara (IMU) kroz petogodišnje razdoblje. Studijom je obuhvaćeno 175 bolesnika, 86 (49,14%) žena i 89 (50,86%) muškaraca srednje dobi od 65,68 (raspon 29-88) godina, koji su tijekom 1993. godine liječeni na Neurološkoj klinici u Osijeku zbog prvog IMU. Podrobno su analizirani podaci iz povijesti bolesti i protokola liječenja, ambulantni nalazi neuroloških kontrola, a posebnim anketnim upitnikom prikupljeni su podaci o stanju bolesnika kroz petogodišnje razdoblje nakon preboljelog IMU. Cilj ovoga istraživanja bio je utvrditi preciznije pokazatelje kratkoročnog i dugoročnog ishoda IMU u našoj populaciji, koji bi omogućili usporedbu s podacima iz drugih zemalja i olakšali prognozu bolesti. Dobiveni su sljedeći pokazatelji: pogoršanje bolesti ili progresija neurološkog deficita nakon prijma u bolnicu zabilježeni su u 30,29% bolesnika; recidiv bolesti u prvih 30 dana od nastupa bolesti zabilježen je u 5,14%, u prvoj godini u 10,62%, a u petogodišnjem razdoblju u 21,58% slučajeva. Globalna kognitivna disfunkcija je u prvih 30 dana zabilježena u 20%, a pet godina nakon IMU demencija je zapažena u 31,51% bolesnika. Ukupan ishod bolesti i stupanj funkcionalnog deficita preživjelih bolesnika izražen modificiranom Rankinovom ljestvicom (RS) bili su kako slijedi: 30 dana nakon akutnog IMU 13,72% bolesnika potpuno se oporavilo i bili su neovisni o tuđoj pomoći (0. i 1. stupanj RS); 32,57% bolesnika imalo je umjeren neurološki deficit i djelomice su ovisili o tuđoj pomoći (2. i 3. stupanj RS); 24% bolesnika imalo je težak neurološki deficit i potpuno su ovisili o tuđoj pomoći (4. i 5. stupanj RS); umrlih je bilo 29,71% (6. stupanj RS). Godinu dana nakon IMU umrlo je 50,23% bolesnika. Pet godina nakon IMU 8% bolesnika bilo je neovisno o tuđoj pomoći, 20% bolesnika bilo je djelomice ovisno, 8,57% bolesnika potpuno je ovisilo o tuđoj pomoći, a umrlo je 63,43% bolesnika. U usporedbi s literaturnim podacima, smrtnost naših bolesnika bila je nešto veća u prvih 30 dana, a u prvoj godini nakon IMU značajno veća nego u razvijenijim zemljama. Razlog su tomu vjerojatno bili lošiji uvjeti bolničkog liječenja, te slabija poslijebolnička njega i liječenje ovih bolesnika u nas. Ostali pokazatelji kao što su smrtnost u petogodišnjem razdoblju, učestalost recidiva inzulta i demencije približno su bili jednaki rezultatima sličnih istraživanja u razvijenijim zemljama. Ovo je ispitivanje pokazalo razoran značaj moždanog udara, opseg i težinu posljedica što ih ova bolest ostavlja na zdravlje pučanstva izazivajući funkcionalna oštećenja i dramatičan pad kvalitete života oboljelih osoba. Kako su ovi rezultati dobiveni na bolesničkom materijalu tijekom rata, u gradu Osijeku pod opsadom i s poznatim ograničenjima, oni upozoravaju na socijalne i ekonomske čimbenike važne u liječenju neuroloških, osobito cerebrovaskularnih bolesti. Time rezultati ispitivanja upozoravaju na potrebu stvaranja boljih uvjeta za dijagnostiku, liječenje i prevenciju ove teške bolesti.

Ključne riječi: *Moždani infarkt, epidemiologija; Ishod i procjena procesa (zdravstvena zaštita)*