CLINICAL OUTCOMES OF PATIENTS WITH CARDIOGENIC CEREBRAL EMBOLI IN SRINAGARIND HOSPITAL

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Abstract. We retrospectively studied the functional outcomes and recurrence rates of patients 15 years and older in whom cardiogenic cerebral embolism was diagnosed at Srinagarind Hospital, Khon Kaen, Thailand, during the period of 1993-2002. Ninety patients were included in this study. Ages ranged from 16-80 years (mean 48.3 years). The majority of cardiac abnormalities were rheumatic heart diseases (with or without atrial fibrillation) and nonvulvular atrial fibrillation. At 3 months and 1 year after stroke, improvement in functional outcome (measured by RDS, motor strength, and GCS) were 74.4% and 55.6%, mortality rates of 13.3% and 16.7%; and recurrence rates of 8.9% and 16.7%, respectively. A GCS <9 or motor power ≤1 or RDS ≥4 upon presentation were poor prognostic factors.

INTRODUCTION

Ischemic stroke is the most common cause of neurologic disorders and hemiparalysis is the common presentation, causing morbidity and mortality. The major etiologies of ischemic stroke are atherosclerosis and cardiogenic cerebral emboli. Accurate prognostic factors could have a lot of important uses. First, they could guide patient-management. Second, they could allow more reliable information to be given to patients and their relatives. Lastly, they could improve planning for rehabilitation and discharge of patients. The purpose of this study was to evaluate the functional outcomes, mortality rate, recurrence rate, and prognostic factors that influence these outcomes at 1-year follow-up in patients with cardiogenic cerebral emboli at Srinagarind Hospital.

MATERIAL AND METHODS

Study population

The medical records of all patients 15 years of age or older in whom cardiogenic cerebral emboli were diagnosed at Srinagarind Hospital from 1993 through 2002 were reviewed. Criteria for the diagnosis of cardiogenic cerebral emboli were patients who experienced a new neurological deficit fitting the definition of ischemic stroke and associated with a cardiac abnormality detected on physical examination and/or echocardiogram.

The information was determined by review of medical records using standardized forms. The authors recorded the severity of neurological deficits, functional outcomes [motor strength, Glasgow Coma Score (GCS), and Rankin Disability Scale (RDS)], mortality rate, complications and recurrent stroke within the first 7 days, 3 months, and 1 year after the stroke.

The severity of disability was classified by the RDS: grade 1 denoted no significant disability, able to perform all usual activities of daily living; grade 2 denoted a slight disability, unable to perform some activities but able to look after his or her own affairs without assistance; grade 3 denoted moderate disability, requiring some help but able to walk without assistance; grade 4 denoted a moderately se-

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vere disability, unable to walk without assistance and unable to attend to his or her own bodily needs without assistance; and grade 5 denoted severe disability, bedridden, incontinent, and requiring constant nursing care and attention (Rankin, 1957). The changing of functional outcomes was based on a change of muscle strength by at least 2 grades or GCS by at least 2 scores or RDS by at least 1 point. Patients were diagnosed as having a recurrent stroke if 1) they had either a worsening neurological deficit fitting the definition of ischemic stroke, occurring after a period of unequivocal neurological instability or improvement lasting at least 24 hours and not attributable to edema, mass effect, or hemorrhagic transformation of the incident cerebral infarction or 2) a new neurological deficit explainable by an abnormality in new vessels.

Ethics

The Ethics Committee of the Faculty of Medicine, Khon Kaen University, approved this research.

Statistical analysis

The baseline characteristics of the patients, including underlying diseases, mortality rate, and recurrence rates were presented by percentages. The χ^2 test was used to compare the causes of cardiogenic cerebral emboli, RDS, GCS, and motor strength between those that survived and those which did not. p-value <0.05 was considered significant.

RESULTS

During the study period, there were 125 patients with cardiogenic cerebral emboli. However, 35 patients were removed from the study because clinical data were incomplete. Therefore, 90 patients were studied. The ages ranged from 16-80 years (mean 48.3 years). The clinical presentations and underlying heart disease are shown in Table 1. Of the 24 patients with aphasia, 10 cases had motor aphasia, 6 cases had sensory aphasia, and 8 cases had global aphasia. Of the 16 patients with alteration of consciousness, 4 cases had drowsiness, 7 cases had stuporous, and 5 cases had coma. Of the 54 patients with rheumatic heart diseases, the abnormalities of the valves included 25 cases (46.3%) with mitral stenosis, 12 cases (22.2%) with mitral stenosis and mitral regurgitation, 8 cases (14.8%) with mitral stenosis, mitral regurgitation, aortic regurgitation and tricuspid regurgitation, 4 cases (7.4%) with mitral regurgitation and aortic stenosis, 3 cases (5.5%) with mitral regurgitation, and 2 cases (3.7%) with mitral stenosis, mitral regurgitation and aortic regurgitation. A transthoracic echocardiogram was performed in 67 patients and a left atrial thrombus was found in 13 cases (19.4%).

The clinical outcomes are summarized in Tables 2 and 3. Three months after stroke, 12

Table 1
Clinical features.

Morbidity	No. of patients	(%)
Sex, male	40	(44.4)
Presenting symptoms		
Hemiparalysis	42	(46.7)
Hemiparalysis and aphasia	18	(20)
Hemiparalysis and alteration of consciousness	16	(17.7)
Hemiparalysis and seizure	5	(5.6)
Aphasia	6	(6.6)
Others[a]	3	(3.3)
Underlying heart disease		
RHD with AF	32	(35.5)
RHD without AF	22	(24.4)
Nonvulvular AF	22	(24.4)
Ischemic cardiomyopathy	6	(6.6)
Bacterial endocarditis	6	(6.6)
Mitral valve prolapse	1	(1.1)
Endomyocardial fibrosis	1	(1.1)

[a]Including gait ataxia in 2 cases and internuclear ophthalmoplegia in 1 case; RHD = Rheumatic heart disease; AF = Atrial fibrillation.

patients had died (9 patients died within 1 week of hospitalization from cerebral herniation and 3 patients had died from hospital-acquired infection). Of the 8 patients with recurrent stroke, 3 cases occurred within 1 week, 1 case occurred within 8-30 days and 4 cases occurred within 31-90 days of the first stroke. Two cases that occurred within 1 week did not receive anticoagulant. The other 6 cases were treated with warfarin and the INR values were within normal ranges. During 3 months -1 year after stroke, 3 patients had died (1 case with cardiogenic shock, 1 case with severe pneumonia and 1 case with intracerebral hemorrhage). Five patients had recurrent stroke; all of them had normal INR values. The other neurological complications at follow-up included seizures (2 cases, occurred during the 2nd and 6th months) and intracerebral hemorrhage from warfarin overdose (2 cases). Comparing those who survived and those who did not, patients with a GCS <9, motor strength ≤1or RDS ≥4 on presentation had a poor prognosis (p-values = 0.001, 0.000, and 0.000, respectively).

Table 2
Clinical outcomes.

Outcomes	At 3 months after stroke No. of patients (%)	At 1 year after stroke No. of patients (%)
Improvement (RDS, motor power, GCS)[a]	67 (74.4)	50 (55.6)
Stable	3 (3.3)	3 (3.3)
Death	12 (13.3)	15 (16.7)
Recurrence	8 (8.9)	13 (14.4)
Loss to follow-up	0 (0.0)	9 (10.0)
Total	90 (100.0)	90 (100.0)

[a] RDS = Rankin Disability Scale; GCS = Glasgow Coma Score.

Table 3
Parameters of functional status at initial presentation, 3 months after stroke and 1 year after stroke.

Parameter	Initial presentation N = 90	3 months after stroke N = 70 [a]	1 year after stroke N = 53 [b]
GCS			
<9	9	0	0
9-11	23	8	0
12-15	58	62	53
Motor power			
0 - 1	58	10	0
2 - 3	18	32	16
4-5	14	28	37
RDS			
1 - 2	12	26	39
3	10	41	14
4-5	68	3	0

RDS = Rankin Disability Scale; GCS = Glasgow Coma Score.
[a]Twenty patients were excluded because 12 cases had died and 8 cases had recurrent stroke.
[b]Twenty-seven patients were excluded because 15 cases had died, 13 cases had recurrent stroke, and 9 cases were lost to follow-up.

DISCUSSION

Cardioembolic stroke accounts for approximately 20% of all strokes (Palacio and Hart, 2002; Kelley and Minagar, 2003). The major-risk cardiac sources are atrial fibrillation (AF), mitral stenosis, prosthetic valves, infective endocarditis, and recent myocardial infarction (Palacio and Hart, 2002). In Western countries, nonvulvular AF is the most common risk factor for cardioembolic stroke and usually occurs in the elderly with hypertension. Anticoagulant therapy generally has been found to be the most effective means of preventing cardiogenic brain embolism. There is scant information regarding functional outcome, survival, and recurrence in patients with cardioembolic stroke. Hornig and Dorndorf (1993) retrospectively evaluated 566 patients with cardioembolic TIA or stroke. According to the functional deficit at discharge from the hospital, 75 cases (13.2%) had a TIA/RIND, 163 cases (28.8%) had a minor stroke, 238 cases (42.1%) had a major deficit, and 90 cases (15.9%) had a fatal event. A cumulative risk of recurrent stroke was 2.9% within 3 weeks (Hornig and Dorndorf, 1993). The other report revealed that cardioembolic stroke had a poorer functional outcome than other subtypes of ischemic stroke. At 90 days and 1 year after stroke, patients with RDS of 4 and 5 or death were 56.8% and 63.4%, respectively. Risks of recurrent stroke at 7 days, 3 months, and 1 year after first stroke were 2.4%, 8.6%, and 13.7%, respectively (Petty *et al*, 2000).

The results of this study show the majority of cardiac sources were RHD (with or without AF) and nonvulvular AF, which differs from Western countries. This may be due to a difference in socioeconomic status. Our patients had better functional outcomes than previous reports. This may be due to the type of underlying cardiac disease and younger age of patients. The risk of recurrent stroke is similar to previous reports. The percentage of recurrent stroke in the first few weeks after stroke was very low. Therefore, to avoid hemorrhagic stroke, early anticoagulant therapy may not be necessary.

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