Clinical Review on Complications of Stroke Patients Admitted Oriental Medical Hospital

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Background and Purpose : In the acute stage of stroke, many medical and neurological problems complicate and affect the clinical course of patients, according to previous reports. Although some of them may be predicted, few data exist about them. So we were to investigate the characteristics of complications in hospitalized patients due to stroke. Methods : We retrospectively examined the clinical notes of patients admitted in Won Kwang oriental medical hospital after stroke. Two observers inspected the clinical notes using predefined diagnostic criteria and recorded the type, timing, and frequency of complications that occurred during hospitalization. Results : Total 78 subjects were included in this study. Medical complications(88%) were more frequently complicated than neurological ones(65%). The most common medical complication was constipation(29%) followed by fever(28.2%) and overflow incontinence associated with dysuria(28%). The most common neurological complication was dysphagia(23.7%) and the second was agitation or Insomnia(36%) and the third was headache(21%).Conclusion : Complications after acute stroke were commonly observed. And There were more frequent medical complications than neurological ones. So we should have much knowledge about medical complications and treat them actively. The differences between our study and previous studies are attributable to the different methods including patient selection and diagnostic criteria.

Key words : Neurologic Complications, Medical Complications, Stroke, Cerebral Infarction, Cerebral Hemorrhage

Introduction

Stroke is the main cause of death at present in Korea and so many patients suffer from many sequela after stroke for the rest of their lives. Also, as the life expectancy of people in Korean increases, there is an increased rate of stroke incidence.[1] According to previous studies, the death rate within the first month after stroke is about 20%, 85% of acute stage of stroke patients suffer from several types of complications, and 95% of acute stage of ischemic stroke patients suffer from more than one type of complications.[2-4] The cause of death within 2-3 days after stroke is a direct result of damage in the cranium. However, the causes of subsequent death after stroke are the preventable complications such as infection, venous thrombus or embolus, and heart disease.[2,10-14] Also, it was suggested[15] that due to the fact that the complications were adequately identified and managed, it was possible to decrease the death rate of stroke patients. It is estimated that more than 50% of patients admitted in the Oriental medical hospital are stroke because there is a high dependency on oriental medical treatment for the stroke in Korea. There has been a few studies on the causes of cerebrovascular diseases, but their complications were rarely studied in Korean and there has been only a few studies overseas.[2-6] The purpose of this study is to gain enough knowledge of complications of stroke through clinical reviews of patients who were admitted to Wonkwang Oriental Medical Hospital due to the stroke and use it to provide active prevention and treatments for the stroke patients. In this way, it may be possible that this study would eventually contribute to reducing death rate and disability caused by stroke.

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Subjects and method

1. Subjects

Seventy eight stroke patients were included of which 51 cases were admitted to Intensive Care Unit (ICU) from February, 2000 to August, 2000 and 27 admitted to general ward. The average age of the subjects was 68±12.58 years old and there were 32 males and 46 females. Patients whose stroke onset was more than 5 days ago or transferred to other hospital at first examination were excluded. Of 76 subjects 22 cases were diagnosed as cerebral hemorrhage and 56 cases as

cerebral infarction based on Brain CT or Brain MRI. During admission days, patients were treated with acupuncture and herbal medicines and other tests and western medicine were used if necessary.

2. Method

Medical charts were examined by two Oriental Medical Doctors. The complications of stroke were investigated by defined criteria and when the symptoms were not defined, the terms used in other foreign studies were included in the complication. There were thorough investigation of medical chart, history, nursing record, prescription note, progression note, radiological report, and laboratory results of each patients. Stroke patients were divided into two groups as hemorrhage and infarction. Each group was examined for neurological and medical complications. Neurological complications were defined as those related to nervous system and medical complications were all other symptoms recorded.

Results

1. Types and lesions of cerebrovascular diseases

Out of 78 patients, 56 whose average age was 68±4.47 years old had a cerebral infarction, and 22 whose average age were 68±1.23 years old had a cerebral hemorrhage. Of 56 patients with cerebral infarction 15 cases were lesions in the territory of middle cerebral artery (MCA) in which 10 cases in the proximal part of MCA and 5 cases in the subcortical branch of MCA. Among them 3 patients has a history of cardiac disease which cause cardiogenic embolic infarction. And there were 3 cases of larcunar infarction and 1 case of PCA-infarction. The rest were 3 cases of multiple infarction, 2 cases of pons infarction, and 2 cases whose lesion sites were not identified either due to broad brain ischemia or due to being unidentified on CT scan. Out of 22 patients with cerebral hemorrhage, there were 2 extensive hemorrhage, 9 at basal ganglia, 5 at thalamus, 2 at subcortex, and 6 other lesions. The highest amount of blood examined was 24 cc and the average was 20±3.47cc.

2. Average time taken for hospital admission after stroke and average admission period in ICU

34(67%) patients were directly admitted and 17(33%) patients were transferred from other hospital after stroke. Among those from other hospital, 8 (47%) were with infarction and 9 (53%) were with hemorrhage and 2 of hemorrhage patients were transferred from other hospital after operation and they admitted at 39 days and 83 days after stroke, respectively. The average time taken for admission after stroke were 1.4 days for patients with infarction and 1.3 days for patients with hemorrhage excluding 2 hemorrhage patients who had operation. The average time admitted in ICU were 9 days for patients with infarction and 10 days for patients with hemorrhage.

3. Neurological and medical complications

There were more medical complications than neurological ones in both groups. Of 78 total subjects, 69(88%) cases had more than one medical complications where 51(65%) cases had more than one neurological ones. The most frequent complication was dysphagia in 38 cases (48%) of which 33 cases were 5 days after stroke. The second most frequent one was nervousness or insomnia in 28(36%) patients followed by headache in 16 patients (21%) of whcih 27% with infarction and 5 % with hemorrhage respectively. There were 7 patients with increased intracranial pressure whose symptoms of deterioration of mental state, change of pupil size, asynchronized respiration, headache, and vomiting. There were evidence of cerebral edema on CT scan due to enlargement of lesion or hemorrhagic transformation and transtentorial herniation was assumed, so they were transferred to 3rd grade hospital for supplement treatments. During the admission, there had been recurrent hemorrhage or infarction in 6 cases in which 2 cases during treatment after diagnosed as cerebral hemorrhage, 2 cases of hemorrhagic transformation (Table 1).

Table 1. Distribution of Neurological Complications

Neurological Complication	Hemorrhage		Infarction		Total	
	n	%	n	%	n	%
Reattack						
-Hemorrhage	2	9	2	4	4	5
-New Infarction	0	0	2	4	2	3
Increaed ICP& Brain Herniation	0	0	7	13	7	9
Dysphagia	7	32	31	55	38	49
Seizure	0	0	1	2	1	1
Irritability(agitation) or Insomnia	7	5	21	38	28	36
Confusion or Dementia	0	0	4	7	4	5
Headache	1	5	15	27	16	21

* ICP = intracerebral pressure

The most frequent medical complication in both infarction and hemorrhage groups was dysuria in 19(34%) cases of infarction group and 13(59%) of hemorrhage group respectively. The second most was constipation in 20(36%) cases and 9(41%) cases respectively. There were 19% in fever and respiratory disease respectively. Fever was shown in 15 (29%)cases of infarction group and 7 (32%)cases of hemorrhage group and respiratory disease was shown in 10 (18%)cases of infarction group and in 5 (23%)cases of hemorrhage group

respectively (Table 2).

Total patients with dysphagia were 37. From these patients only one patient did not show any complication and there were 12 (32%)cases in aspiration pneumonia. Aspiration pneumonia was related to the method of food ingestion. Aspiration pneumonia occurred in 6 (75%)patients out of 8 patients who used Levin tube, being with highest incident rate. 2 cases of 7 patients with NPO (Nothing per oral) and 4 cases of 23 patients with oral ingestion, respectively experienced aspiration pneumonia.

Table 2. Distribution of Medical Complications

Medical Complication	Hemorrhage		Infarction		Total	
	n	%	n	%	n	%
PSVT	0	0	2	4	2	3
Sinus Tachycardia	0	0	3	5	3	4
Aute Heart Failure	0	0	1	2	1	1
Respiratory Disease	5	23	10	18	15	19
-Lung Abscess	1	4.5	0	0	1	1
-Aspiration Pneumonia	2	9	10	18	12	15
-Bronchial Asthma Attack	2	9	0	0	2	3
Fever						
-Unknown Origin	2	9	5	11	7	12
-Respiratory Disease	5	23	10	18	15	19
Upper Gastrointestinal Symptoms						
-Diarrhea	0	0	4	7	4	5
-Constipation	9	41	20	36	29	37
-Dyspepsia	1	5	6	11	7	9
-Anorexia	1	5	2	4	3	4
Paralytic Ileus	0	0	3	5	3	4
Gastrointestinal Bleeding	2	10	2	4	4	5
Hematuria	2	9	2	4	4	5
Dysuria & Overflow Incontinence	13	59	19	34	32	41
Myalgia & Arthralgia	2	9	4	7	6	8
Skin trouble	2	9	3	5	5	6
Phlebitis	0	0	1	2	1	1

* PSVT = paroxismal supraventricular tachycardia

4. Patients treated with Intensive care and transferred to other hospital

No patients in hemorrhage group who were in ICU transferred to other hospital but 12 cases of 29 infarction group were transferred to 3rd graded hospitals. From 12 patients of infarct group who were transferred to other hospital, 7 cases (58%) were transferred for craniectomy, and 6 of these patients MCA-infarction and 1 of PCA-infarction. The rest of the 5 (42%)patients were transferred for further treatment of medical complications. They were complicated with aspiration pneumonia, asthma, tachyarrhythmia, lower gastrointestinal bleeding, or renal failure which require emergency lab test and treatment.

discussion

It is important to know that stroke patient could have variety of complications other than those related to intracranial vessels and these complications could cause death or interfere with a successful rehabilitation treatment.[6] In this study average of 77% of total patients experienced either medical or neurological complications. This is similar to 59%, 60%, 95% of Davenpor[4], Kalra[5], Johnston[3]. The reason in difference in the rate of complication in each study is thought to be difference in samples and definitions of complications. There was 88% of medical complications which was higher than 65% of neurological ones and it is important because some medical problems can be prevented contrary to neurological ones. And dysphagia was the most frequently complicated one, that is 49% of the total, 55% in the infarction group, and 32% in the hemorrhage group. Several previous studies showed that dysphagia occurred approximately 16.5-50% of the stroke patients[36-40], and 40-70% in the brain stem-infarction[41-43], higher than others, which was assumed that because the swallowing-controlling nuclei are in the reticular formation of medulla oblongata[44]. However, without direct damage to swallowing center in the brain stem, metal deterioration in the early stage of stroke of any lesion could cause dysphagia.[10] In this study, out of 38 dysphagia patients there was only one case of direct brain stem lesion, which was confirmed as pontin infarction. Furthermore, dysphagia itself, especially within the 3rd day from the stroke, could complicate chest infection, including aspiration pneumonia, malnourishment, loss of function and increase hospitalization day and mortality, according to the previous studies[8,12,13]. It was also reported that aspiration pneumonia occurred in 65% of immobile patients with dysphagia using Levin tube[14]. In this study, there were respiratory complications such as aspiration pneumonia, lung abscess, and asthma attack in about 37% of patients with dysphagia.

Therefore, it is essential to manage and prevent dysphagia and following respiratory complications in patients with acute stage of stroke. It was known that in patients of dysphagia, aspiration pneumonia was four times more frequent in oral ingestion than other food-taking method such as Levin tube or gastrostomy.[14] And gastrostomy was more recommanded than Levin tube for reducing respiratory complications and improving nutritional state.[15] The second most frequent neurological complications were nervousness and insomnia in 36% of patients in contrast with 14% (nervousness 8%, insomnia 6%) in the study of Johnston et al. The third most frequent complication was headache in 21% of patients which was similar to 22% of the study done by Johnston et al. The fourth most frequent neurological complication was an increase of intracranial pressure followed by transtentorial herniation in 9% of patients. Previous study stated that 20% of patients admitted in ICU died within a

month and the main cause of death within the first week after stroke was cerebral edema followed by trantentorial herniation.[2] In cerebral infarction, cytotoxic edema is noticeable within 2-6 hours after stroke and vasogenic edema is peaked in 1-5 days. During 3-5 days, the mass effect caused by cerebral edema is noticed in CT scan and it decreases 1 week after stroke.[11] In this study, 52 patients were in acute stage of 5 days after stroke. Among the 10 patients with total MCA territory infarction, 6 patients who admitted within 12hours had a mass effect due to either increased intracranial pressure or hemorrhagic transformation and transferred to other hospital for craniectomy on 3rd day after stroke. This agrees with the above statement that the main cause of death within the first week after stroke was cerebral edema followed by transtentorial herniation. In medical complications, the most frequent one is urinary incontinence in 34% of infarction group and in 59% of hemorrhage group respectively. According to Brittain et al[23] urinary incontinence was an important factor in predicting mortality, functional deficiency, and prognosis after discharge. And urinary incontinence was frequently observed in the lesion of frontal lobe, which mainly control the bladder function, temporal lobe, and basal area of internal capsule.[28] The recent study stated that in urinary control the size of lesion more important than the site of the lesion[29]. But, urinary incontinence can be also caused by damage in micturition center in the pons and by other than urogenital problems such as cognition problems, language problems, motor dysfunction, fecal impaction, drug or over-taken fluids[29-31]. The second most one was constipation in 37% of total, 36% of infarction group, and 41% of hemorrhage group. The main lesion and other possible cause of constipation roughly same above-mentioned dysuria. The third most frequent medical complication was fever in 31% of total patients, 29% of infarction group, and 32% of hemorrhage group. There were aspiration pneumonia or similar respiratory symptoms in 18% and 23% of infarction and hemorrhage groups respectively. This is lower than 61% of previous study[20]. This may be due to the effect of oriental medical treatment including herbal medicine applied in the beginning of the treatment which was different to other study. According to the previous studies, more than 37.5℃ at the acute stage of stroke promotes necrosis of center of infarct and infarction of periphery of infarct increasing the mortality, size of infarct, and disability[19,20]. Therefore, it is essential to apply active treatment to manage fever in patients of acute stage of stroke. The main cause of death in the first week of stroke were due to neurological complications and in the second or third week due to medical complications which affected long-term rehabilitation at 3 months after the stroke[5]. Therefore, the active investigation on possible prevention and treatment of complications of stroke should be made as early as possible after stroke. This study has many limitations on method, sample selection and size or retrospective examination of complications which need to be mentioned. Firstly, there is a bias in selection of patients. This study included more patients from ICU than general ward. Therefore, number of complications may have been higher. Secondly, the number of complications of stroke may be affected by treatment form and quality on patients. The general ward has a less number of nurses looking after patients, which may affect in early discovery or missing of complications of stroke. Lastly, there may be a less number of complications in a retrospective study due to being more careless than a prospective one. Problems mentioned above are to be thought carefully in future studies. However, there were some fruitful results. It was one of recent studies which rarely involved systemic investigation into complications of stroke patients admitted to Oriental Medical Hospital. As a result, it was made possible for medical staffs of Oriental Medical Hospital to have a new perception towards complications of stroke and to provide an active management. Also, it may be an important example when a similar study is proposed.

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Reference

1. Jeon JS, Jeon SY, Park SH, Peak SY, Kim DA. Recent Epidemiology of Stroke. The Journal of Korean Academy of Rehabilitation 22:1159-63, 1998.
2. Silver FL, Norris JW, Lewis AJ, Hachinski VC. Early mortality following stroke. Stroke 15(3):492-6, 1984.
3. Langhorne P, Stott DJ, Robertson L, MacDonald J, Jones L, McAlpine C et al. Medical complications after stroke:a multicenter study. Stroke 31(6):1223-9, 2000.
4. Johnston KC, Li JY, Lyden PD, Hanson SK, Feasby TE, Adams RJ et al. Medical and Neurological Complications of Ischemic Stroke: Experience From the RANTTAS Trial. Stroke A Journal of Cerebral Circulation 29(2):447-53, 1998.
5. Chambers BR, Norris JW, Shurvell BL, Bachinski VC. Prognosis of acute stroke. Neurology 37(2):221-5, 1996.
6. McClatchie G. Survey of the rehabilitation outcomes of stroke. Med J 1:649-51. 1980.
7. Donnan GA. Lifesaving for stroke. Lancet 342:383-4, 1993.

8. Smithard DG. O'Neill PA. Park C. Morris J. Wyatt R. England R et al. Complications and Outcome After Acute Stroke: Does Dysphagia Matter?. Stroke A Journal of Cerebral Circulation 27(7):1200-4, 1996.
9. Sellars C, Campbell AM, Stott DJ, Stewart M, Wilson JA. Swallowing abnormalities after acute stroke: A case control study. Dysphagia 14(4):212-8, 1999.
10. Amella EJ. Dysphagia: The Differential Diagnosis in Long-Term Care. Lippincott's Primary Care Practice. Lippincott Williams & Wilkins 3(2):135-49, 1999.
11. Lee SH. Cranial CT and MRI. : McGrawHILL; p.557-65, 1999.
12. Meng NH, Wang TG, Lien IN. Dysphagia in Patients with Brainstem Stroke: Incidence and Outcome. American Journal of Physical Medicin&Rehabilitation 79(2):170-5, 2000.
13. Teasell RW, McRae M, Marchuk Y, Finestone HM. Pneumonia associated with aspiration following stroke. Archives of Physical Medicine & Rehabilitation 77(7) : 707-9, 1996.
14. Nakajoh K, Nakagawa T, Sekizawa K, Matsui T, Arai H, Sasaki H. Relation between incidence of pneumonia and protective reflexes in post-stroke patients with oral or tube feeding. Journal of Internal Medicine 247(1):39-42, 2000.
15. Bath PM, Bath FJ, Smithard DG. Interventions for dysphagia in acute stroke. Cochrane Database of Systematic Reviews 2:CD000323, 2000.
16. Karatas M, Dilek A, Erkan H, Yavuz N, Sozay S, Akman N. Functional outcome in stroke patients with atrial fibrillation. Archives of Physical Medicine & Rehabilitation 81(8):1025-9, 2000.
17. Burney TL, Senapti M, Desai S, Choudhary ST, Badlani GH. The Journal of Urology 156(5):1748-50, 1996.
18. Khan Z, Starer P, Yang WC, Bhola A. Analysis of voiding disorders in patients with cerebrovascular accidents. Urology 35(3):265-70, 1990.
19. Terent A, Andersson B. The prognosis for patients with cerebrovascular stroke and transient ischemic attacks. Upsala Journal of Medical Sciences 86(1):63-74, 1981.
20. Castillo J, Davalos A, Marrugat J, Noya, M. Timing for Fever-Related Brain Damage in Acute Ischemic Stroke. Stroke 29(12):2455-60, 1998.