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Short Report

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Efficacy of a clinical stroke score in monitoring complications in acute ischaemic stroke patients could be used as an independent prognostic factor

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Abstract

Background: Presence of medical complications in stroke patients has been established. The efficacy of a stroke score in intensive monitoring of these complications in acute ischaemic stroke patients has not been studied.
Methods: Eighty-seven patients with acute ischaemic stroke were assessed with National Institute of Health Stroke Scale (NIHSS) by the examiner within days of admission; (1, 7, 30, and 90 days). Onset and types of complications were documented within the duration of the study period, using a questionnaire and laboratory investigations.
Results: Fifty-nine [67.8%] patients in the study population had complications, with mean initial NIHSS score 17.1 ± 7.9; mortality was 39%, and 27.8% of survivors had good recovery. In patients without complications, the mean initial NIHSS score was 11.4 ± 6.0; mortality was not observed, and 50% of survivors had good recovery.
Conclusion: All patients without complications survived. High NIHSS scores, (with minimal changes below baseline) were related to high mortality and morbidity in the complications group.

Keywords: Complications, outcome, prognostic score, stroke

Résumé

Contexte: Présence de complications médicales en AVC a été créé. L'efficacité d'une partition de l'accident vasculaire cérébral en surveillance intensive de ces complications chez les ischaemc aiguë AVC n'a pas été étudiée.
Méthodes: Quatre-vingt sept patients de ayant subi des AVC ischémique aiguë ont été évalués avec National Institut de la santé contre les accidents cérébrovasculaires Scale (NIHSS) par l'examinateur dans les jours d'admission; (1, 7, 30 et 90 jours respectivement). Apparition et les types de complications ont été documentées dans la durée de la période d'étude, en utilisant une enquête questionnaire et laboratoire.
Résultats: Cinquante neuf [67,8%] patients dans l'étude de la population avaient complications, avec moyenne initiale NIHSS scores 17.1 ± 7,9; la mortalité était de 39% et 27,8% des survivants avait bon rétablissement. Chez les patients sans complications, les scores moyens de NIHSS initiales était de 11,4 ± 6.0; mortalité n'a été observée et 50% des survivants avaient bonne récupération.
Conclusion: Tous les patients sans complications ont survécu. Le taux élevé de mortalité et de morbidité dans le groupe de complications. concernaient des notes NIHSS élevées, (avec un minimum de changements sous la ligne de base)

Mots clés: contre les accidents cérébrovasculaires, note pronostiques, complications, résultat

Introduction

Knowledge of complications, frequency, and timing after an incidence of stroke is important in terms of direct patient care and planning of future services.[1]

Complications are disease[s] concurrent with another disease.[2] This could be acute [<7 days],

sub-acute [>7 days], and chronic [>30 days].[3] Risk factors for medical complications that have been reported in the past include severity of stroke, admission disability level, length of rehabilitation stay, low serum albumin level, pre-stroke disability, location of stroke in the anterior cerebral circulation region, urinary incontinence,[4] and implementation of the acute care prospective payment system. Frequency of medical complications during inpatient stroke rehabilitation have been reported from 48%-96%, depending on criteria for defining complications, method of investigations and specific patient group studied. Davenport *et al*. found that complications in ischaemic and haemorrhagic stroke patients were associated with an increased risk of death during admission.[4] Roth *et al*. looked at potential prognostic factors in predicting outcome in stroke patients and concluded that death after two weeks were primarily due to cardiac and pulmonary complications.[5] Most of the complications are potentially preventable when recognised early, though some clinical interventions might not be effective when started immediately after a stroke.[6,7] The National Institute of Health Stroke Scale (NIHSS) is a physical deficit scale, used as a prognostic score in acute ischaemic stroke patients.[8] The aim of this report was to evaluate the different types of complications and the outcome using a standard clinical stroke scale (NIHSS).

Materials and Methods

This was a prospective non-interventional study, carried out in Lagos University Teaching Hospital (LUTH) from April 2000 to July 2001, a study period of 16 months after approval of the research by the Ethics Board of LUTH. A total of 137 consenting patients presented at the medical emergency unit; of these, 87 had ischaemic stroke following the World health Organisation (WH0)[9] criteria and the Siri-raj Stroke Score[10] (SSS).

Exclusion Criteria: All patients having hemiplegia from other causes like subdural haematoma and brain tumours. Patients who presented with haemorrhagic strokes by the WHO and SSS criteria and patients who did not give consent were excluded.

The Study Instrument: A standard questionnaire was used to obtain all the relevant information, which included detailed aspects of the following: personal and clinical data, investigations, treatment, complications, WHO[9] criteria, Siri-raj stroke scale,[10] NIHSS,[8] the Glasgow outcome scale,[11] and the Glasgow coma scale.[12] Acute presentations were defined as complications observed 7 days before and sub-acute as those observed after 7 days, and chronic complications for those that persist after 30 days.[3] The outcome in terms of morbidity and mortality was measured using the Glasgow outcome scale.[11]

Statistical Analysis: Sample size for the study was based on the objective, which sought to compare the mean NIHSS score at presentation with the means score after treatment. The minimum difference between the scores at presentation and end of treatment was set at 2 points.[8] Quantitative variables, NIHSS scores were computed with measures of mean and standard deviation. For discrete variables, the Chi-square test for paired observations was used. Paired *t* test was used for the significance of difference between the continuous variables. Statistical significance will be achieved where *P* values are ≤ 0.05.

Results

Subject characteristics [Table 1]

Different kinds of complications were observed within the study period. Infection-related complications were observed in 54% of patients [which was 36.7% of the study population]. Urinary

Table 1a: Frequency of different types of complications

Complications [Cx]	No. of patients	% of total
Neurological	19	21.82
Cardiac related	12	13.79
Chest related	8	9.19
Infection related	32	36.78
Metabolic related	15	17.24
Others	10	11.49

*Some patients had more than one complication.

Table 1b: Types of complications

Subgroups	Types
Neurological	Cerebral oedema, seizures, coma, haemorrhagic transformation, new stroke, vasovagal syncope, depression, parkinsonism
Cardiac related	Systemic hypertension, cardiac arrthymias, biventricular failure, cardiogenic shock, left ventricular failure, hypotension, sub-acute bacterial endocarditis
Chest related	Aspiration pneumonia, pulmonary embolism, acute pulmonary oedema, cheyne strokes respiration
Infection related	Pneumonia, urinary tract infection, otitis media, vaginal candidiasis, open wound sepsis, dental abscess, cellulitis, conjunctivitis
Metabolic related	Hyperglycaemia, hypoglycaemia, hypokalaemia, azoteamia
Other	Upper gastrointestinal bleeding, deep vein thrombosis, decubitus ulcers, scrotal oedema, blisters, drug reactions

tract infections were the most common followed by patients who had pneumonia. A total of 59 patients (67.8% of the study population) developed complications. About 40 patients had single complications, while 19 patients had more than one complication. Complications were observed within the first 30 days. All neurological complications, 19 patients (21.8%) presented within the first 7 days.

NIHSS subgroups and frequency of complications [Table 2]

The 87 patients presenting with NIHSS scores were in the range of 3-30. All sub-classes had patients with complications. There was a direct relationship from subgroup 15-19 and more complications as well. It was also observed that subgroup 6-10 had the largest group of patients [39%] with no complications.

Mean NIHSS among patients with complications [Table 3]

The highest scores (21.7) were found in those with pure neurological complications and the lowest scores (15.6) among those with non-neurological complications. However, the mean NIHSS score in all patients with complications was greater than 15.

Mean NIHSS of two groups at specific times [Figures 1 and 2]

The two different groups of patients at different times during the study period had sustained decline in scores, though a significant observation was that the scores in the complication group were lagging behind prognostically when compared with that of the no complications group. Declining scores in the complications group was secondary to the death of patients with higher scores.

Table 2: NIHSS subgroups and patients with and without complications

NIHSS groups	Parameters						Significance	
	N	%	Cx	%	No. Cx	%	χ^2	*P* value
0-5	10	11.5	6	60	4	40	0.71	0.2
6-10	21	24.2	10	47.6	11	52.3	6.61	0.003
11-14	13	14.9	6	46.1	7	53.8	3.67	0.02
15-19	20	23.0	15	75	5	25	0.39	0.29
>20	23	26.4	22	95.6	1	4.34	5.49	0.95
Total	87		59		28			

Cx = number of patients with complications; No. Cx = number of patients without complications; χ^2 = Chi square; N = Total number of patients in the group; % = Percentage

Table 3: Comparing NIHSS of patients with complications and those without complications

No complication Mean NIHSS	Type of complications	N	Significance		
			Mean NIHSS	t Value	*P* Value
11.4 ± 6.1	All	59	16.2 ± 7.3	t = 9.0	$P < 0.003$
11.4 ± 6.1	Neuro	3	21.7 ± 6.1	t = 2.8	$P < 0.008$
11.4 ± 6.1	Non-N	44	15.6 ± 7.1	t = 2.6	$P < 0.012$
11.4 ± 6.1	Both	12	17.1 ± 7.9	t = 2.5	$P < 0.017$

N = patients number

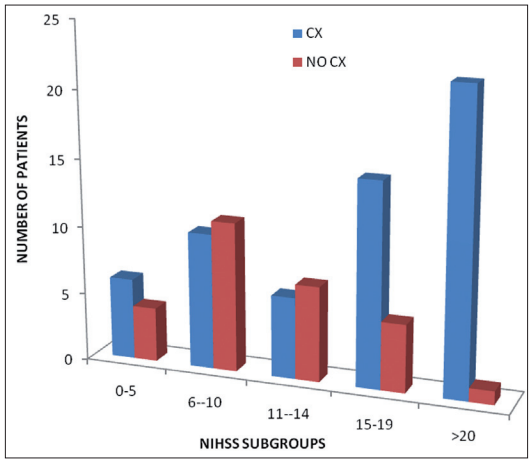

Figure 1: NIHSS subgroups and patients with and without complications

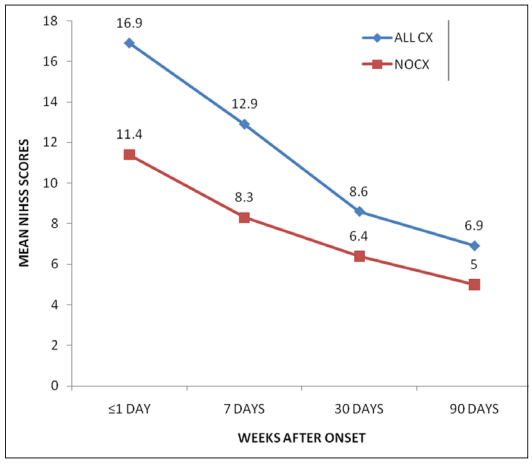

Figure 2: Comparism of NIHSS scores of the two groups at specific times. (r =+0.007)

Discussion

Types and frequency of complications

Of the 87 patients studied, 59 (67%) had complications, a finding that agrees with those in previous studies.[7] Of these, 32% had single complications and 52% had more than one complication in comparison with Davenport *et al*. study, which had 59% and 62,% respectively.[4]

Infections dominated in the different types of complications observed. Langhorne *et al*. in their study confirmed the relative frequency of infections, particularly urinary tract infections.[7] Our study had 32 (37%) patients, of which 20 patients had at least one episode of urinary tract infection.

NIHSS and Complications

Complications peaked in patients with NIHSS scores greater than 15-19, which was consistent with the scores in a study by Roth *et al*.[5] Roth *et al*. also suggested that severe strokes contribute to an increased risk of complications. The mean NIHSS score for patients with complications in our study were within this range. However, the NIHSS subgroup 6-10 had the highest number of patients with no complications. Since higher NIHSS scores were a reflection of severe neurological deficit, we observed the proportionate increase in complications with higher scores in this study as observed in previous studies.[4,5]

NIHSS, Complications, and Mortality

Mortality was total in patients with only neurological complications and least in those with non-neurological complications. However, mortality was high irrespective of NIHSS score in patients with combined complications. The overall mortality in patients with complications was 39%, which is similar to the findings by Silver *et al*. who reported 40%, but at variance to studies by Bounds *et al*. who reported more than 50% and Kalra *et al*. who reported the mortality at 60%.[6] Overall mortality in this study population was 26%. Mortality was not observed in patients without complications. Previous authors have noted a strong association between post-stroke complications and poor outcome and have suggested that complications may act as barriers to recovery.[7]

The NIHSS scores in this study were reflective of the minimum score for complications to commence, different types of complications, and a predictable outcome.

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