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Original Article

Lesion Location Predicts Risk of Aspiration in Supratentorial Ischaemic Stroke

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Abstract:

Stroke is defined as focal or global neurological deficit of non-traumatic vascular origin which lasts 24 hours or more if the patient survives. Many researchers showed that risk of aspiration after stroke has been related to brain stem lesions. Moreover, assessing the risk of aspiration pneumonia in supratentorial ischaemic stroke has been established in a few recent studies. Aims of study was to see the association of lesion location and of risk of aspiration pneumonia in supratentorial ischaemic stroke. The study was done by random sampling from hospital-based stroke patients. Out of these patients we collected data from 100 acute hemispheric infarct patients who got admitted in Dhaka Medical College Hospital from July 2013 to December 2013. Subcortical infarcts were associated with higher proportion of risk of aspiration on day 1 with relative risk 2.63 which was statistically significant (95 percent CI 1.43 - 4.86, p-value 0.001). Extended risk of aspiration on day 7 was also found more in these patients (relative risk 8.29, 95 percent CI 1.96 - 35.09, p-value 0.0004). Moreover, risk of aspiration was found in 32 percent patients, of which 14 percent was proved to have extended risk at day 7. Subcortical infarction is associated with higher risk of aspiration pneumonia in supratentorial ischaemic stroke.

Key words: Risk of aspiration, Supratentorial ischaemic stroke.

Introduction:

Stroke is defined as focal or global neurological deficit of non-traumatic vascular origin which lasts 24 hours or more if the patient survives[1]. The high number of disability-adjusted life-years lost due to stroke (485 per 10000 people) shows that stroke severely impacts the economy of Bangladesh[2].

Ischaemic stroke constitute approximately 80 percent of total stroke patients[3]. Prevalence of stroke in Bangladesh is approximately 3 per 1000 person-year overall and 10 per 1000 person-year in people aged 70 years or more[4]. No data on incidence of ischaemic stroke have been recorded in Bangladesh. Ischaemic stroke comprised 60 to 80 percent of all stroke patients in studies conducted in Chittagong, Dhaka and Mymensingh Medical College Hospitals in the past decade[3].

Dysphagia is a common sequel of ischaemic stroke occurring in approximately 50 percent cases[5] and associated with increased morbidity and mortality[6]. Approximately half of the dysphagic patients fail to recover swallowing function within 1 week and are subject to an increasing risk of aspiration related complications[7]. Traditionally, risk of aspiration after stroke has been related to brain stem lesions[8]. However, aspiration is not uncommon in supratentorial ischaemic stroke[9].

According to guidelines, patient with insufficient oral intake for ≥7 days qualify for enteral tube feeding. Enteral tube feeding should be started within 72 hours of stroke onset[10], emphasizing the need for an early and accurate prediction of aspiration.

A recent study on Swiss population revealed certain anatomical supratentorial locations and higher infarct size are associated with increased risk of aspiration[11]. Another study on ischaemic stroke patients in Baltimore, USA showed increased risk of aspiration

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among subcortical infarctions[12]. CT scan holds the key position in diagnosis and location of ischaemic stroke. Its evaluation in assessing the risk of aspiration pneumonia in supratentorial ischaemic stroke has been established in a few recent studies. No such study has been conducted on Bangladeshi population. So, this study was intended to establish the association of lesion location in the assessment of risk of aspiration pneumonia in supratentorial ischaemic stroke.

Materials & Methods:

This was a hospital-based observational study conducted on acute hemispheric infarct patients admitted in Dhaka Medical College Hospital from July 2013 to December 2013. Total 100 patients with supratentorial ischaemic stroke aged 18 years or more, admitted in the hospital within 48 hours of onset were selected for the study by random sampling from a large pool of stroke patients admitted in the departments of medicine and neurology of the hospital. Combined cortical and subcortical infarctions were excluded. Brainstem and cerebellar infarcts, haemorrhagic infarcts and patients with impaired level of consciousness or pre-existing dysphagia were also excluded from the study. Ethical clearance was taken from hospital authority & informed consent was taken from guardian of patients. Important demographic variables and risk factors were recorded. Thorough neurological examination was conducted on every patient. Features of interest in CT scan were recorded after confirmation by a consultant radiologist.

Risk of aspiration was assessed with two to six scale on admission. On admission, a score of 0-1 were taken as no risk of aspiration and a score 2-6 were taken as risk of aspiration. A second assessment was done on day 7 after the onset of stroke, on patients with risk of aspiration in the first assessment. Patients with a score of 0-1 were considered as 'transient risk of aspiration' and 2-6 as 'extended risk of aspiration'.

Location of infarct: cortical and subcortical, were taken as independent variables. Risk of aspiration: No, transient and extended risks were taken as dependent variables. Association between location of infarct and risk of aspiration was assessed using standard statistical procedure.

Statistical analyses were carried out by using the Statistical Package for Social Sciences version 16.0 for Windows (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as mean, standard deviation, and categorical variables as frequencies and percentages. The differences between groups were analyzed by unpaired t-test, Fisher's exact test or chi-square (X^2) test. A p-value <0.05 were considered as significant.

Results:

Total 100 patients of hemispheric infarcts were included in the study. Fifty six patients were males and 44 were females. Mean age was 64.02 ± 9.90 years, slightly higher in females (65.80 ± 9.82 years) than in males (62.80 ± 9.82 years). The youngest and the oldest patient's age was 42 and 85 years, respectively.

Majority of the cases were cortical infarcts (58 %). Subcortical infarcts were found in 42 % cases. Risk of aspiration on day 1 was observed in 33 patients, 21 of which were subcortical and 11 were cortical. Twenty two (22) percent of subcortical infarcts were associated with risk of aspiration on day 1, of which 7 percent proved to have extended risk on day 7. The percentage of cortical ischaemic strokes having risk of aspiration on day 1 was 7, none with extended risk on day 7. Subcortical infarcts were associated with higher proportion of risk of aspiration on day 1 with relative risk 2.63 which was statistically significant (95 percent CI 1.43 - 4.86, p-value 0.001). Extended risk of aspiration on day 7 was also found more in these patients (relative risk 8.29, 95 percent CI 1.96 - 35.09, p-value 0.0004). There was no statistically significant age and sex difference between the two groups. (Table I)

Table I: Association of cortical versus subcortical locations of infarcts and risk of aspiration (n=100)

Outcome		Location		Relative risk	95 percent CI	p-value
		Subcortical (n_1=42)	Cortical (n_2=58)			
Risk of aspiration on day 1	Yes	21(50.0)	11(19.0)	2.63	1.43–4.86	0.001
	No	21(50.0)	47(91.0)			
Extended risk of aspiration on day 7	Yes	12(28.6)	2(3.6)	8.29	1.96–35.09	0.0004
	No	30(71.4)	56(96.4)			
Age (years)		62.5±10.4	66.1±9.01			0.08
Sex	Male	34	22			0.54
	Female	24	20			

Discussion:

One hundred patients of supratentorial ischaemic stroke were included in this study. Most (55 %) of the patients were of more than 50 years age. Mean age was 64.0_2 ± 9.90 years. The age distribution was similar to that of most of the previous studies conducted in Bangladesh[13-15] and India[16,17]. The youngest and oldest

patients were of 42 and 85 years respectively. Number of males (56 %) was more than that of females (44 %). Similar sex distribution was found in the study on spontaneous supratentorial ischaemic stroke patients in Bern, Switzerland[11].

Regarding overall outcome, risk of aspiration was found in 32 % patients, of which 14 % were proved to have extended risk at day 7. Middle cerebral artery (MCA) was the most favoured territory (75 %) in this study, like described by Rovira[18]. Most of the infarcts were cortical (58 %). Subcortical infarcts comprised 42 percent patients, most of which in MCA territory (93 %). Subcortical infarcts were associated with higher proportion of risk of aspiration, both transient and extended than cortical infarcts. This finding was consistent with the study by Gonzalez-Fernandez[13].

Conclusion:

Subcortical infarction is associated with higher risk of aspiration pneumonia in supratentorial ischaemic stroke. The study has its limitations also, it was based on calculation of the risk of aspiration, not the number of patients who developed aspiration. Dysphagia was assessed clinically, flouroscopic study of swallowing would have given more accurate results. Further research on this topic with a larger sample is recommended.

References :

1. WHO MONICA Project Investigators. Monitoring trends and determinants in cardiovascular disease. Journal of Clinical Epidemiology. 1988; 41(2):105-14.

2. Islam MN, Moniruzzaman M, Khalil MI, Basri R, Alam MK, Loo KW. Burden of stroke in Bangladesh. International Journal of Stroke. 2013; 8(3):211-13.

3. Siddique MAN, Nur Z, Mahbub MS, Alam MB, Miah MT. Clinical presentation and epidemiology of stroke - a study of 100 cases. Journal of Medicine. 2009; 10(2):86-89.

4. Mohammad QD, Habib M, Hoque A, Alam B, Haque B, Hossain S, et. al. Prevalance of stroke above forty years. Mymensingh Med J. 2011; 20(4):641-44.

5. Martino R, Foley N, Bhogal S, Diamant N, Speechley M, Tesall R. Dysphagia after stroke: incidence, diagnosis and pulmonary complications'. Stroke. 2005; 36(12):2756-63.

6. Picaroni M, Mazzotta G, Corea F, Caso V, Venti M, Milia P, et al. Dysphagia following stroke. European Neurology. 2004; 51(3):162-67.

7. Smithard DG, O'Neill PA, England RE, Park CL, Wyatt R, Martin DF, et al. The natural history of dysphagia following a stroke. Dysphagia. 1997; 12(4)188-93.

8. Flowers HL, Skoretz SA, Streiner DL, Silver FL, Martino R. MRI-based neuroanatomical predictors of dysphagia after acute ischemic stroke: a systematic review and meta-analysis. Cerebrovascular Disease. 2011; 32(1): 1-10.

9. Brodley S, Croser D, Cottrell J, Creevy M, Teo E, Yiu D, et al. Predictors of prolonged dysphagia after acute stroke. Journal of Clinical neurosciences. 2003; 10(3):300-05.

10. Dennis MS, Lewis SC, Warlow C. FOOD trial collaboration. Effect of timing and method of enteral tube feeding for dysphagic stroke patients (FOOD): a multicenter randomized control trial. Lancet. 2005; 365(9461):764-72.

11. Galovic M, Leisi N, Müller M, Weber J, Abela E, Kägi G, et. al. Lesion location predicts transient and extended risk of aspiration after supratentorial ischemic stroke. Stroke. 2013; 44(10):2760-67.

12. Gonzalez-Fernandez M, Kleinman JT, Ky PKS, Palmer JB, Hillis AE. Neuroanatomical Basis of Swallowing disorders after Stroke: A Pilot Study. Stroke. 2008; 39(11):3022-28.

13. Daniels SK, Foundas AL. Lesion localization in acute stroke patients with risk of aspiration. J Neuroimaging. 1999; 9(2):91-98.

14. Uddin MJ, Mondol BA, Ahmed S, Ullah AKMA, Jabbar MA, Mohammad QD. Smoking and ischaemic stroke. Bangladesh J Neurosc. 2008; 24 (1):50-54.

15. Mollah AS, Rahman SW, Das KK, Hasanuzzaman M. Characteristics of patients admitted with stroke. Mymensingh Med J. 2007; 16(1):20-24.

16. Pandian JD, Sudhan P. Stroke epidemiology and stroke care services in India. Journal of Stroke. 2013; 15(3):128-34.

17. Barucha NE, Kuruvulla, T. Epidemiology of stroke in India. Neuro J southeast asia 1988; 3:5-8.

18. Rovira A, Grive E, Rovira A, Alvarez-Sabin J. Distribution of territories and causative mechanisms of ischemic stroke. Eur Radiol. 2005; 15(3):416-26.