Original Article

Prevalence of Hypertension in Deep and Lobar Intracerebral Hemorrhage in a Group of Iraqi Patients

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Summary:

Background: Non-traumatic Intracerebral Hemorrhage (ICH) results from rupture of blood vessels in the brain. ICH categories can also be considered as being either lobar in location or within the deep white matter. Although hypertension is a major risk factor for ICH in general[11], it is commonly considered to be associated more with patients having deep than with those having lobar haemorrhage.

Objectives: We investigate the relationship between hypertension and deep versus lobar intracerebral hemorrhage (ICH).

Methods: a retrospective review of records of 163 patients aged 18-89 years admitted to Al-Kadhimiya Teaching Hospital (January 2008 - October 2010) and diagnosed with ICH.

Results: There was no significant relationship between hypertension in deep versus lobar intracerebral hemorrhage (p=0.814)

Conclusions: Although the relation between hypertension and ICH was not found to be significant, our study suggests and recommends age-appropriate investigations for patients with ICH, as well as the need to promote patients' education with regards to this disease and the importance of adherence to treatment of risk factors.

Key words: Hypertension, Intracerebral and Hemorrhage.

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Introduction:

Spontaneous intracranial hemorrhage accounts for about 20% of all strokes. There are two types of hemorrhagic stroke. Bleeding within the brain itself and subarachnoid hemorrhage (SAH)[1].

The occurrence of SAH and intracerebral haemorrhage (ICH) was noticed to have a circadian occurrence pattern from 8AM to 4PM[2]. Non-traumatic ICH results from rupture of blood vessels in the brain. It is a major public health problem[3] with an annual incidence of 10–30 per 100 000 population,[3,4] accounting for 2 million (10–15%)[5] of about 15 million strokes worldwide each year[6]. Hospital admissions for ICH have increased by 18% in the past 10 years,[7] probably because of increases in the number of elderly people[8].

ICH categories can also be considered as being either lobar in location or within the deep white matter. From an imaging perspective, etiologies leading to either primary or secondary ICH typically produce a different pattern or combination of patterns on CT and MRI, lending insight into the mechanism responsible for the bleeding[9].

ICH can have several causes. In younger patients (<40 years), intracranial vascular malformations are the most common single cause of ICH, usually lobar in location[10]. Cerebral amyloid angiopathy is thought to underlie about 30% of ICH in those aged >70 years and to cause mainly lobar haemorrhages[10]. Although hypertension is a major risk factor for ICH in general[11], it is commonly considered to be associated more with patients having deep than with those having lobar haemorrhage. Deep haemorrhage has become virtually synonymous with hypertensive haemorrhage[12]. Most bleeding in hypertension-related ICH is at or near the bifurcation of small penetrating arteries that originate from basilar arteries or the anterior, middle, or posterior cerebral arteries.[5] Small artery branches of 50–700 μm in diameter often have multiple sites of rupture; some are associated with layers of platelet and fibrin aggregates. These lesions are characterized by breakage of elastic lamina, atrophy and fragmentation of smooth muscle, dissections, and granular or vesicular cellular degeneration.[5,13] Severe atherosclerosis including lipid deposition can affect elderly patients in particular. Fibrinoid necrosis of the subendothelium with subsequent focal dilatations (micro aneurysms) leads to rupture in a small proportion of patients.[5]

Subjects and Methods

Case Subjects: This is a retrospective study of 163 cases with ICH admitted to Al-Kadhimiya teaching hospital between January 2008 and October 2010 and were identified by reviewing the discharge records. Patients included were adults (ages 18-89 years) ICH was defined as a sudden onset of focal neurological event with confirmation of ICH, by CT scan. Based on the CT findings we further identified the site of the hemorrhage as being deep or lobar and whether it was located

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to the left or right of the midline. Children with ICH were excluded because of the likely different etiologies. Patients with hemorrhagic infarction (transformation) were not included; nor were those in whom the event was secondary to an arteriovenous malformations, tumor, or bleeding diathesis or followed the ingestion of sympathomimetic drugs.

Ascertainment of Exposure to Risk Factors: structured questionnaires were filled by the researcher after extracting information from the patients' medical records. Questions were related to the time period preceding the stroke. Because case subjects were first seen after the occurrence of their ICH, information on previous medical illness could only be determined by history. Hypertension, previous cardiovascular disease, high cholesterol, and diabetes were considered present when patients reported being diagnosed by their physician. A detailed history of medication use was also recorded.

The information from the interview was matched to that from patients' medical records. Because of the nature of the disease, interviewers could not be blinded to the status of the interviewee. However, subjects were not told of the specific hypotheses involved but were informed that this was a study of lifestyle factors and stroke.

Analysis: Statistical analysis was done using statistical package for social sciences (SPSS version 17 computer software). Data were analyzed using descriptive statistics and analytical (chi-squared test); the level of significance was set to a p value of <0.05.

Results:

The highest frequency of ICH was found in the age group of 60-69 years which was about 50 cases (30.67%), while it was the lowest in the age group 80-90 year being 7 cases (4.29%) as shown in Table 1. The vast majority of ICH was seen in males, being (66.26%) of the cases, while it was 33.74 % for females in this study. About 57.67% of cases had deep ICH, and 42.33% had lobar hemorrhage.

Of the 94 cases with deep hemorrhage, 56.38% were left-sided and 43.62% were right-sided. Of the 69 case with lobar hemorrhages, 59.42% were right-sided and 40.58% were left-sided. One hundred and twenty two patients (74.8%) cases were hypertensive while 41 patients (25.2%) had no such history. Of the 122 hypertensive patients 49.58% were compliant, while 40.34% were not & 10.08 no intake at all (non-compliant & no-intake about 50.42).

Prevalence of Hypertension among Age Groups: The highest frequency of hypertension was noticed in people aged 60-69 years (41 of the 122 hypertensive patients). The lowest frequency of hypertensive was noticed in young age group (18-29 yrs) where (1 of 122 hypertensive patients fell within this age group). There was a significant relationship between age & hypertension ($p=\leq 0.001$)

Location of ICH in hypertensive and non-Hypertensive patients:- hypertension was seen in 71 (75.53%) patients with deep-seated hemorrhage, and in 51 (73.91%) of patients with lobar hemorrhage (table 2). No significant association was seen between hypertension versus location of hemorrhage ($p=0.814$).

Compliance: - Fifty nine (48.36%) of our hypertensive patients were compliant to their antihypertensive regimens, the compliance was defined as having normotensive serial blood pressure measurements and adherence to treatment, whereas non-compliant patients / not taking medication at all collectively was equal to 51.64%. The overall compliance rate was not found to have an effect on the outcome (ICH). The Location of ICH was not related to the patients' compliance with antihypertensive treatment (table 3).

Table 1: Characteristics of the study sample

	Frequency	Percent (%)
Age (years)		
18-29	**9**	**5.52**
30-39	**11**	**6.67**
40-49	**24**	**14.72**
50-59	**36**	**22.09**
60-69	**50**	**30.67**
70-79	**26**	**15.95**
80-90	**7**	**4.29**
total	**163**	**100**
Gender		
Males	**108**	**66.26**
Females	**55**	**33.74**
Type of Hemorrhage		
Deep	**94**	**57.67**
Lobar	**69**	**42.33**
Laterality of Deep Hemorrhage		
Left	**53**	**56.38**
Right	**41**	**43.62**
Laterality of Lobar Hemorrhage		
Left	**28**	**56.38**
Right	**41**	**43.62**
History of Hypertension		
Yes	**122**	**74.80**
No	**41**	**25.20**
Compliance to HTN treatment		
Yes	**59**	**48.36**
No	**51**	**41.80**
No medication intake	**12**	**9.84**

Table 2: Prevalence of hypertension among different subgroups

	Hypertension		Total
	Yes	No	
Age (years)	No.(%)	No.(%)	$\chi 2=31.068$ (df=6) $p\leq 0.001$
18-29	1 (11.10)	8 (88.90)	9
30-39	6 (54.50)	5 (45.40)	11
40-49	15 (62.50)	9 (37.50)	24
50-59	33 (91.70)	3 (8.30)	36
60-69	41 (82.00)	9 (18.00)	50
70-79	21 (80.80)	5 (19.20)	26
80-90	5 (71.40)	2 (28.60)	7
Type of Hemorrhage			$\chi 2=0.055$ (df=1) p=0.814
Deep	71 (75.53)	23 (24.47)	94
Lobar	51 (73.91)	18 (26.09)	69

*Cells include counts of cases, percentages are mentioned in parenthesis. df=degrees of freedom.

Table 3: ICH location in compliant and non-compliant patients. No significant relationship was seen (p=0.208).*

		Compliance (%)			
		Yes	No	No intake	Total
Site	Deep	32 (45.07)	34 (47.89)	5 (7.04)	71
	Lobar	27 (52.94)	17 (33.33)	7 (13.73)	51
Total		59 (48.36)	51 (41.80)	12 (9.84)	122

Discussion:

Is hypertension really more commonly a risk factor for patients with deep haemorrhage than for those with lobar haemorrhage?

We tried to answer this question in this observational study. This question was raised by Jackson and Sudlow in 2006 with report the findings of a systematic review and meta-analysis of studies that compared the frequency of hypertension as a risk factor for patients with deep haemorrhage versus those with lobar supratentorial haemorrhage, and consider the effects of study methodology on the results. [12]

The majority of cases had deep intracerebral hemorrhage (57.67%), with 42.33% having lobar hemorrhage. The prevalence of hypertension was 75.53% in patients with deep-seated hemorrhage, while 73.91% of patients with lobar hemorrhage were hypertensive (the high prevalence of lobar hemorrhage may be due to the coexistence of cerebral amyloid angiopathy and hypertension). The overall prevalence of hypertension (whether deep &lobar hemorrhage) was 74.85% which is near to result achieved by Ashraf El-Mitwalli (77%) [14]

There was no significant association between hypertension and the location of the ICH (lobar or deep ICH) (p=0.814), which is similar to that of Thrift et al [15] Hypertension was the most important risk factor for ICH but not as high as previously reported, nor was it higher than that reported for ischemic stroke), but differs from what Sandoval et al found[16],which is mainly due to the fact that this study chose the young age group in which hypertension is a significant risk factor for ICH.

Although ICH is believed to be caused by hypertension-induced lipohyalinotic changes in penetrating blood vessels,

history hypertension was not reported in 25.15% of patients. Scrutiny of case subjects medical records showed that some of these "non-hypertensive" cases were diagnosed as hypertensive after their stroke and required ongoing treatment. This finding suggests that the true prevalence of hypertension might be underestimated due to the lack of regular health care and records for the studied population which might have included undiagnosed hypertensive patients classified as being disease-free.

The low compliance rate of 48.36% versus 41.80% incompliant and 9.84% patients not taking antihypertensive treatment at all reflects borderline health education in our population about hypertension. This elicits the need for further education and counseling by health providers.

This study showed that deep hemorrhage should not be considered always as hypertensive hemorrhage because this may exclude some patients with deep hemorrhages from further investigations on potentially treatable non-hypertensive causes (such as coagulopathy, vascular anomalies), especially if they are elderly.

For healthcare providers, we should recommend educating hypertensive patients maximally about the chronicity of their illness and the importance of long-term management and adherence to treatment. We also recommend age appropriate, separate evaluation for individual patients with ICH as the pathology may differ as well as may the effect of the same pathology in different ages.

Our study has some limitations, including recall bias (as some information were collected from the patients), as well as our inability to conduct multivariate analysis (due to small sample size and limited information available through the medical records). Further studies with larger samples are needed to assess the impact of hypertension on cerebral hemorrhage more efficiently. Colleagues conducting future research on this topic might want to include more variables and conduct multivariate analysis.

Author contributions:

Dr. Farah Isaam Al-Saffar: drafting/revising the manuscript, acquisition of data, analysis or interpretation of data, statistical analysis. Dr. Hasan Azeez Al-Hamadani: drafting/revising the manuscript, study concept or design, study supervision. Dr. Mohammad Ghafel Mohammad: drafting/revising the manuscript, study concept or design, analysis or interpretation of data.

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