

Blood Pressure Profile in Post-Stroke Patients

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Abstract

Blood pressure profile after ischemic stroke in both hypertensive and non-hypertensive patients usually follows a benign course. This prospective study was done among the admitted patients in Bangladesh medical college, starting from November 2006 to August 2007. We observed 80 cases where there was sharp rise of blood pressure in most cases in the early part of ischemic stroke which gradually came down to its previous level within 7-10 days, without any antihypertensive drug. These patients were specially selected as they had only ischemic stroke with or without hypertension. Patients having co-morbidities other than diabetes were excluded.

Introduction

In ischaemic stroke intracranial vessels may be acutely obstructed by many ways leading to tissue damage. Signs and symptoms of neurological deficit depend upon timed restoration of blood supply. If cerebral blood flow is zero, tissue death occurs within 4-10 minute. Values < 16-18 ml/ 100 gram brain tissue per minute cause infarction within an hour and values <20 ml/ minute /100 gram of tissue cause ischemia without infarction unless prolonged. Tissue surrounding the core regions of infarction is called ischemic penumbra. Function of

this area is reversible if blood flow can be re-established before it is too late. This ischemic penumbra is the goal of revascularization therapy. As blood flow in the ischemic penumbra is dependent upon blood pressure, sudden fall of blood pressure may be disastrous, and may lead to increment of size of the original infarction. Although we have to reduce blood pressure in case of malignant hypertension, nephropathy, ischemic heart disease, hypertensive encephalopathy etc. without any controversy, but patients having no such complications, whether to reduce blood pressure acutely or not yet remains controversial.

Materials and Methods:

Inclusion Criteria

Patients with diagnosed ischemic stroke who presented on the 1st day and were conscious was included in this study. No age or sex were exempted. Both hypertensive and non-hypertensive patients were included with or without diabetes.

Exclusion Criteria

Patients with haemorrhagic stroke were excluded. Patients having ischemic stroke but also suffering from IHD, nephropathy, hypertensive encephalopathy were excluded. Patients with clinical or radiological evidence of raised intracranial

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pressure were not included in this study.

Methods Used

It was a prospective study done among the admitted patients in Bangladesh Medical College Hospital starting from November 2006 to August 2007. Patients were carefully selected on the basis of clinical examination and investigation reports who met the inclusion criteria. We took the blood pressure measurements every four hours in first two days then 6 hourly in next two days and finally every 8 hours in last 3 days. Any patient developing any exclusion

criteria during this period were excluded from this study and treated accordingly.

Observation and Results

A total of 82 patients were included in this study but 80 patients completed the whole period. In this study 41 patients were hypertensive and 39 patients were non-hypertensive. Highest systolic blood pressure recorded was 210 and diastolic blood pressure was 110 in hypertensive group and highest systolic blood pressure was 170 and diastolic blood pressure was 100 in non-hypertensive group.

Table-I
Demographic characteristics of the patients (n = 80)

Variables	Number	Percentage
Sex		
Male	50	62.5%
Female	30	37.5%
Age		
>50	48	60%
<50	32	40%
Blood Pressure		
Hypertensive	41	51.25%
Non-hypertensive	39	
Glycemic status		
Non-diabetic	50	
Diabetic	30	37.5%

Table-II
Level of systolic blood pressure in hypertensive patients (n = 41)

Systolic B.P.	D-1 n (%)	D-2 n (%)	D-3 n(%)	D-4 n (%)	D-5 n (%)	D-6 n (%)	D-7 n (%)
201-210	2(5.13)	1(2.56)					
191-200	3(7.69)	4(10.26)	3(7.69)	3(7.69)			
181-190	3(7.69)	3(7.69)	3(7.69)	3(7.69)	4(10.26)	2(5.13)	3(7.69)
171-180	10(25.64)	3(7.69)	3(7.69)	6(15.38)	3(7.69)	3(7.69)	3(7.69)
161-170	12(30.77)	15(38.46)	9(23.08)	4(10.26)	6(15.38)	10(25.64)	15(38.46)
151-160	11(28.21)	15(38.46)	23(58.97)	25(64.1)	28(71.79)	26(66.67)	20(51.28)

Table-III*Level of diastolic blood pressure in hypertensive patients (n = 41)*

Diastolic BP	D-1 n (%)	D-2 n (%)	D-3 n (%)	D-4 n (%)	D-5 n (%)	D-6 n (%)	D-7 n (%)
90- 100	36(87.8)	35(85.37)	35(85.37)	37(90.24)	38(92.68)	41(100)	37(90.24)
101 -110	5(12.2)	6(14.63)	6(14.63)	4(9.75)	3(7.32)	0	4(9.75)

Table-III*Level of systolic blood pressure in non-hypertensive patients (n=39)*

Systolic BP	D-1 n(%)	D-2 n (%)	D-3 n(%)	D-4 n (%)	D-5 n(%)	D-6 n (%)	D-7 n (%)
121-130	12(30.77)	19 (48.72)	19(48.72)	25(64.1)	18(46.15)	22(56.4)	32(82.05)
131-140	1(2.56)	1(2.56)	1(2.56)	2(5.13)	3(7.69)		
141-150	16(41.03)	13(33.33)	14(35.9)	10(25.64)	18(46.15)	17(43.59)	7(17.95)
151-160	7(17.95)	6(15.38)	5(12.82)	2(5.13)			
161-170	3(7.69)						

Table-IV*Level of diastolic blood pressure in non-hypertensive patients (n=39)*

Diastolic BP	D-1 n (%)	D-2 n (%)	D-3 n (%)	D-4 n (%)	D-5 n (%)	D-6 n (%)	D-7 n (%)
70-79	5(12.82)	4(10.26)	6(15.38)	9(23.08)	14(35.9)	19(48.72)	28(71.79)
80-85	18(46.5)	19(48.72)	17(43.59)	15(38.46)	14(35.9)	11(28.4)	8(20.51)
86-90	10(25.64)	10(25.64)	10(25.64)	10(25.64)	8(20.51)	6(15.38)	3(7.69)
91-95	2(5.13)	4(10.26)	4(10.26)	3(7.69)	1(2.56)	3(7.69)	
96-100	4(10.26)	2(5.13)	2(5.13)	2(5.13)	2(5.13)		

Discussion

Management of blood pressure in acute stroke patients varies with the type of stroke and co-morbidities. In ischemic stroke perfusion pressure in vessels distal to the obstruction is low and the vessels become dilated. Blood flow in these dilated vessels is thought to be dependent upon systemic blood pressure.

The mean arterial blood pressure (MAP) is usually elevated in patients with an acute stroke. This may be due to chronic hypertension, which is a major risk factor for ischemic stroke, or to an acute sympathetic response. In many cases, however, the acutely elevated blood pressure is necessary to maintain brain perfusion. A neuroimaging study with CT or

MRI is critical to help guide blood pressure therapy in stroke patients.

The observation is that the blood pressure frequently rises spontaneously following cerebral ischemia is consistent with this protective hypothesis, although a stress response to the acute event and to hospitalization may also contribute. The hypertensive effect is transient, as the blood pressure falls by as much as 20/10 mmHg within 10 days.

An analysis from the International Stroke Trial of 17,398 patients with an ischemic stroke noted a U-shaped relationship between baseline systolic blood pressure and outcome. Elevated systolic blood pressure was associated with an increased risk of recurrent ischemic stroke (50 percent greater risk of recurrence with a systolic blood pressure of >200 mmHg versus 130 mmHg), while low blood pressure (particularly <120 mmHg) was associated with an excess number of deaths from coronary heart disease.

A subsequent analysis of 1004 patients with acute ischemic stroke from Okinawa also found a U-shaped relationship between admission blood pressure and death within 30 days after stroke onset³. The U-shaped relationship was shifted towards higher pressure in patients who had previous hypertension compared with those who did not have previous hypertension. This finding mirrors the shift seen in cerebral autoregulation that occurs in long standing hypertension⁴.

Interventions - Lowering the systemic blood pressure has been associated with clinical deterioration in patients with acute ischemic stroke⁵⁻⁷. Observational studies from three different groups have demonstrated an important adverse effect of reducing blood pressure in the first 24

hours after stroke onset^{6,8,9}. Odds ratios of poor outcome were similar in the first two studies: 1.9 per 10 percent systolic blood pressure reduction (95% CI, 1.02-3.52) in a Brazilian study⁶ and 3.8 for a greater than 25 percent diastolic blood pressure reduction (95% CI, 1.2-12.1) in an Austrian study⁷. In a Spanish study, a fall in systolic blood pressure >20 mmHg in the first day was the most important variable associated with neurologic deterioration and poor outcome.

Recommendations - Most consensus guidelines recommend that blood pressure not be treated in the patient with acute ischemic stroke unless the hypertension is extreme (systolic BP >220 mmHg or diastolic BP >120 mmHg), or the patient has active ischemic coronary heart disease, heart failure, or aortic dissection^{5,10-12}. When treatment is indicated, cautious lowering of blood pressure by approximately 15 percent during the first 24 hours after stroke onset is suggested¹⁰.

Blood pressure management in acute stroke remains controversial. Guidelines from the American Heart Association/ American Stroke Association published in 2007 suggested that antihypertensive medications should be restarted at approximately 24 hours after stroke onset in patients with preexisting hypertension who are neurologically stable, unless a specific contraindication to restarting treatment is known.

However, patients with extracranial or intracranial stenosis may require a slower reduction in blood pressure (e.g., over seven to ten days after ischemic stroke), as some degree of blood pressure elevation may be necessary to maintain cerebral blood flow to ischemic brain regions. Special considerations apply to blood pressure

control in patients with ischemic stroke who are eligible for thrombolytic therapy. Treatment is recommended so that systolic blood pressure is ≤ 185 mmHg and diastolic blood pressure is <110 mmHg before lytic therapy is started¹⁰. The blood pressure should be stabilized and maintained below 180/105 mmHg for at least 24 hours after intravenous rTPA treatment.

Conclusion

Blood pressure management in acute stroke patients is an unresolved issue. Guidelines from the American Heart Association/American Stroke Association published in 2007 suggest that antihypertensive medications should be restarted at approximately 24 hours after stroke onset in patients with preexisting hypertension who are neurologically stable, unless a specific contraindication to restarting treatment is known¹. So it is yet to be decided.

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