Benefit and risk of lower follow-up blood pressure after intracerebral haemorrhage

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Introduction

Intracerebral haemorrhage (ICH) survivors are prone to recurrent ICH, and blood pressure (BP) control is the sole modifiable risk for ICH recurrence. The risk of recurrent ICH will be significantly reduced with lower follow-up (FU) BP. However, in cohorts of hypertensive patients, intensive BP lowering is associated with fatal and nonfatal ischemic vascular events and overall mortality. The association of cardiovascular events and mortality with intensive BP control in ICH survivors remained unstudied. Hence, we aimed to investigate the benefit and risks of lower FU BP in ICH survivors.

Methods

We studied the FU data of primary ICH survivors from the University of Hong Kong's prospective stroke registry. Consecutive ICH survivors aged ≥18 years, who were admitted from January 2011 to March 2019 and survived for more than 90 days were included in this analysis. FU data, including FU BP, were retrieved from the electronic patient record system or written medical notes. Only BP measurements taken in a medical setting were recorded and we excluded patients with white-coat effect. Our primary end-points were recurrent ICH, cardiovascular mortality, and all-cause mortality. The adjusted hazard ratios (HR) for each BP categories during FU were derived using multivariate Cox regression.

Results

There was a total of 501 ICH survivors. The mean age was 66.4 ± 14.1 years, and 62.3% (312/501) of patients were female. During a median FU of 4.2 years (interquartile range, 2.2-6.1 years), there were 39 recurrent ICHs.

When compared with systolic BP (SBP) of <120 mmHg, higher SBP categories were associated with an increasing risk of recurrent ICH (Table 1). Similarly, the recurrent ICH risk was lowest with diastolic BP (DBP) of <70mmHg, and there were increasing risk with higher DBP categories.

Table 1. Adjusted HR for Recurrent ICH

Variables	Adjusted HR	95% CI	*p* value
SBP category			
<120 mmHg	1 (Reference)		
120-139 mmHg	4.5	1.1-19.1	0.041
140-159 mmHg	10.4	2.1-50.8	0.004
≥160 mmHg	46.6	7.7-283.1	<0.001
Every SD increase in age	1.0	0.7-1.4	0.867
History of ICH	4.2	1.8-9.5	0.001
Lobar located index ICH	3.8	2.0-7.3	<0.001

There was a J-shape relationship between SBP and all-cause mortality (Table 2), but not for cardiovascular mortality (Table 3). 75.8% (22/29) of patients with all-cause mortality for SBP category <120 mmHg were aged >70 years. No J-shape relationship was observed between DBP and all-cause or cardiovascular mortality.

Table 2. Adjusted HR for All-cause Mortality

Variables	Adjusted HR#	95% CI	*p* value
SBP category			
<120 mmHg	1.7	1.1-2.6	0.016
120-139 mmHg	1 (Reference)		
140-159 mmHg	2.0	1.1-3.3	0.005
≥160 mmHg	4.3	1.6-12.0	0.005
Every SD increase in age	2.4	1.9-2.9	<0.001
Diabetes Mellitus	1.7	1.2-2.6	0.005

Table 3. Adjusted HR for Cardiovascular Mortality

Variables	Adjusted HR#	95% CI	*p* value
SBP category			
<120 mmHg	1.2	0.5-2.7	0.731
120-139 mmHg	1 (Reference)		
140-159 mmHg	1.0	0.3-3.2	0.959
≥160 mmHg	9.0	2.6-30.4	<0.001
Every SD increase in age	1.7	1.2-2.4	0.002
Diabetes Mellitus	2.7	1.4-5.3	0.003

In the subgroup analysis of patients aged ≤70 years, lower BP did not heighten all-cause mortality risk.

Discussion

FU BP <120/70 mmHg was associated with the lowest recurrent ICH risk. The all-cause mortality risk was higher for SBP <120 mmHg than SBP 120-139 mmHg, but the risk for cardiovascular mortality was not increased.

Age is one of the most important factors for all-cause mortality. Most of the patients with all-cause mortality for SBP category <120 mmHg were aged >70 years and were likely frail. The age factor was likely the main driver for the J-shape relationship between FU SBP and all-cause mortality. In patients aged ≤70 years, lower BP did not heighten all-cause mortality risk.

Conclusion

An intensive BP target of <120/70 mmHg should be considered in ICH survivors, especially in patients aged ≤70 years. This approach should be tested in randomized controlled trials.

References

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