



Risk factors for perioperative ischemic stroke/TIA in patients with atherosclerotic extracranial cerebrovascular stenosis undergoing angioplasty and stenting

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ABSTRACT

TITLE:

Risk factors for perioperative ischemic stroke/TIA in patients with atherosclerotic extracranial cerebrovascular stenosis undergoing angioplasty and stenting

BACKGROUND:

Angioplasty and stenting are treatments for atherosclerotic cerebrovascular stenosis in patients at high risk of stroke despite maximal medical therapy. Perioperative ischemic stroke is a major complication following cerebral artery stenting. However, the role of intraoperative blood pressure in the occurrence and evolution of perioperative ischemic stroke in this high-risk population is largely unknown^[1].

OBJECTIVE:

To analyze risk factors for perioperative ischemic stroke/ transient ischemic attack (TIA) following extracranial cerebrovascular stenting, emphasizing the importance of perioperative blood pressure on the outcomes.

METHODS:

We retrospectively evaluated the data from 328 extracranial cerebrovascular stenting procedures performed from March 2012 to February 2013 at a single institution. Perioperative stroke/ TIA was defined as a new neurologic deficit caused by stenting during the follow-up period. A logistic regression was used to analyze the role of the clinical, angiographic and hemodynamic variables in perioperative ischemic stroke/TIA.

RESULTS:

Among the 266 male (81.1%) and 62 female (18.9%) patients, perioperative ischemic stroke/TIA occurred in 10 of 328 (3.0%) procedures; no intracerebral hemorrhages or perioperative deaths occurred. The multivariable predictors of perioperative ischemic stroke/TIA were the presence of untreated intracranial artery stenosis (odds ratio [OR], 9.44; 95% confidence interval [CI], 2.36-37.71; p=0.001) and intraoperative systolic blood pressure lower than 90 mmHg for more than 5 minutes (OR, 9.13; 95% CI, 1.35-61.76; p=0.023).

CONCLUSIONS:

Perioperative stroke/TIA is a potential complication following angioplasty and stenting for extracranial cerebrovascular stenosis. Untreated intracranial stenosis is associated with an increased risk of stroke/TIA following angioplasty and stenting for extracranial cerebrovascular stenosis. Intraoperative hypotension might be a potential modifiable risk factor in the development of perioperative ischemic stroke/TIA.

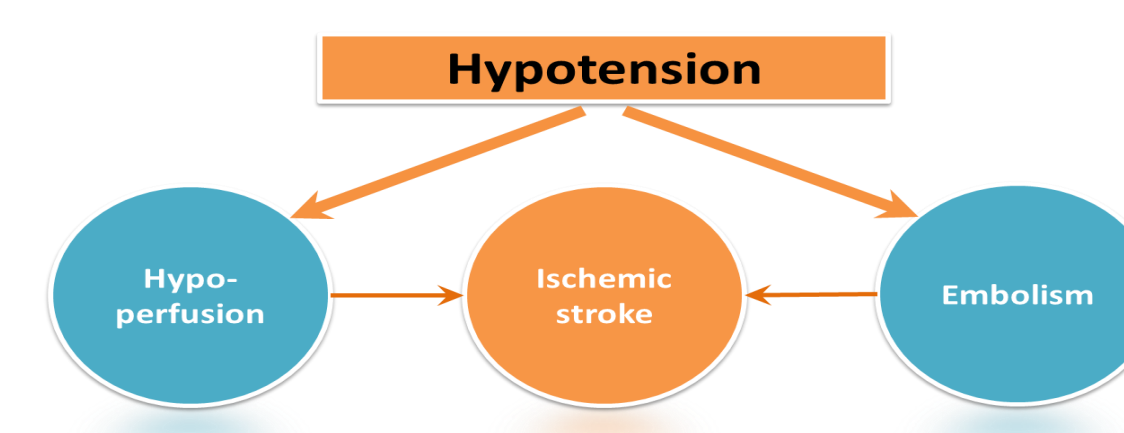
BACKGROUND

Extracranial internal carotid artery stenosis accounts for 15–20% of ischemic strokes, and proximal extracranial vertebral artery stenosis is the second most common area for stenosis next to the carotid bifurcation.

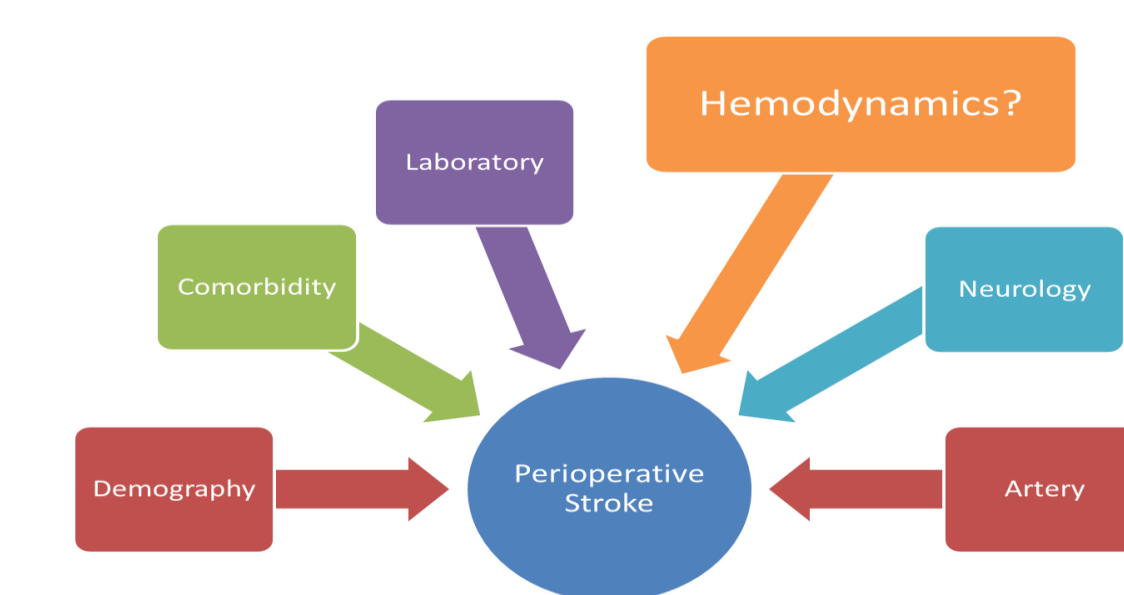
Angioplasty and stenting for extracranial stenosis have generated much controversy because the number of strokes and deaths prevented by the procedure and the number of strokes and deaths following the procedure are unknown.



The mechanism of a perioperative stroke is multifactorial.



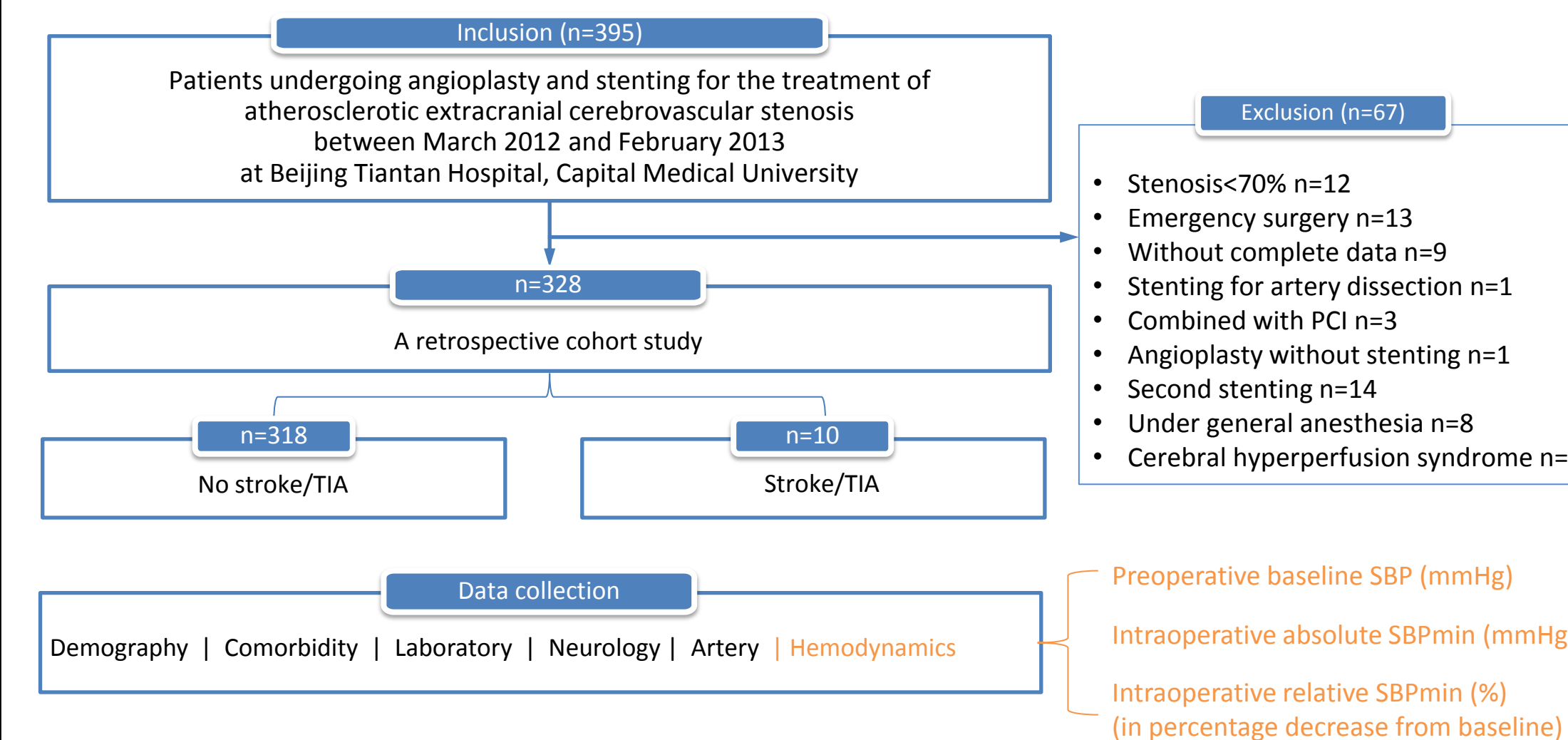
Is perioperative blood pressure, as a modifiable potential risk factor, associated with the occurrence of an ischemic stroke/ transient ischemic attack (TIA) following extracranial cerebrovascular stenting?



OBJECTIVE

To analyze risk factors for perioperative ischemic stroke/ TIA following extracranial cerebrovascular stenting, emphasizing the importance of perioperative blood pressure on the outcomes.

METHODS



Definition of perioperative blood pressure

- Preoperative baseline SBP — the mean of the SBP reading one day before the procedure
- Intraoperative absolute SBPmin — the minimal SBP obtained from the anesthesia notes and spanning a period of at least 5 minutes
 - ✓ Intraoperative hypotension — intraoperative absolute SBPmin < 90 mm Hg for at least 5 minutes
- Intraoperative relative SBPmin = intraoperative absolute SBPmin/ preoperative baseline SBP — three thresholds relative to the baseline SBP (decreases of 30%, 20%, and 10%)

Outcome measures

- Perioperative stroke — any new focal or global neurological deficit caused by stenting lasting more than 24 hours that had a change on the NIH stroke scale with associated radiographic evidence of an acute cerebral infarction
- Perioperative TIA — any new focal or global neurological deficit caused by stenting with a change on the NIH stroke scale that completely resolved or returned to baseline within 24 hours without acute cerebral infarction or hemorrhage on CT scan

Statistical analysis

univariate analysis

↳ factors with P values ≤ 0.20

↳ backwards-stepwise logistic regression

↳ P values ≤ 0.05 were regarded as statistically significant

RESULTS

Among the 266 male (81.1%) and 62 female (18.9%) patients, perioperative ischemic stroke/TIA occurred in 10 of 328 (3.0%) procedures; no intracerebral hemorrhages or perioperative deaths occurred.

The multivariable predictors of perioperative ischemic stroke/TIA were the presence of untreated intracranial artery stenosis (odds ratio [OR], 9.44; 95% confidence interval [CI], 2.36-37.71; p=0.001) and intraoperative systolic blood pressure lower than 90 mmHg for more than 5 minutes (OR, 9.13; 95% CI, 1.35-61.76; p=0.023) (Table 1).

Table 1 Multivariate predictors of perioperative ischemic stroke/TIA

Risk factor	p value	OR	95% CI
Aspirin/ clopidogrel alone on admission	0.066	3.88	0.91-16.52
Untreated intracranial artery stenosis	0.001	9.44	2.36-37.71
Intraoperative SBP < 90 mm Hg for at least 5 minutes	0.023	9.13	1.35-61.76
Female	0.064	3.98	0.92-17.10
CHO	0.315		
LDL	0.122		
Nonuse of antiplatelet drug on admission	0.223		
Intraoperative minimal SBP > 140 mm Hg for at least 5 minutes	0.333		
TG	0.828		
Hyperhomocysteinemia	0.098		
Calcific plaques	0.104		

BP, systolic blood pressure; CHO, total cholesterol; LDL, low density lipoprotein; TG, triglyceride

CONCLUSIONS

Perioperative stroke/TIA is a potential complication following angioplasty and stenting for extracranial cerebrovascular stenosis.

Patients who suffer from untreated intracranial stenosis are associated with an increased risk for this complication. Intraoperative hypotension might be a potential modifiable risk factor in the development of perioperative ischemic stroke/TIA. Particularly for systolic blood pressure lower than 90 mm Hg for at least 5 minutes, an association with perioperative ischemic stroke risks was observed.

REFERENCES

- Reddy U, Smith M: Anesthetic management of endovascular procedures for cerebrovascular atherosclerosis. Current Opinion in Anaesthesiology 2012, 25(4):486-492.

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