

High incidence of intracranial atherosclerosis in patients with first-ever acute ischemic stroke

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OBJECTIVE

To report the incidence of intracranial atherosclerosis (ICAD) as a causal risk factor in patients presenting with first ever acute ischemic stroke (AIS) to a comprehensive stroke center.

BACKGROUND

Intracranial atherosclerosis (ICAD) is considered as an important risk factor for acute ischemic stroke, particularly among the non-white population¹⁻³. Patients with symptomatic ICAD are at a very high-risk for recurrent stroke despite maximal medical management^{4,5} and hence endovascular therapy is being evaluated as a potential treatment for this condition⁶. Among patients presenting with first ever stroke, ICAD is currently estimated to account for approximately 8% of ischemic strokes². However, some recent studies⁷ report a very high prevalence of ICAD in patients with fatal ischemic stroke suggesting the possibility that ICAD might account for a higher proportion of first-ever ischemic stroke than previously reported. Most of the previously reported population-based studies were conducted prior to the widespread availability of intracranial vascular imaging modalities and hence reported a high proportion of cryptogenic strokes². We decided to consistently use intracranial vascular imaging in addition to the standard stroke workup in patients presenting with ischemic stroke, and calculate the incidence of ICAD as a causal risk factor for first ever ischemic stroke.

STUDY DESIGN

Every patient admitted with acute ischemic stroke underwent at least one intracranial vascular imaging study- intracranial magnetic resonance angiography (MRA), intracranial computed tomographic angiography (CTA), digital subtraction angiography (DSA) and at least one extracranial vascular imaging study – extracranial MRA, extracranial CTA, DSA, extracranial ultrasound, in addition to electrocardiography, echocardiography and workup for primary stroke risk factors.

Patients eligible for this cohort were prospectively enrolled if they met the following criteria: 1) Diagnosis of acute ischemic stroke 2) No prior history of ischemic stroke. Patients with intracranial hemorrhages (ICH), transient ischemic attacks (TIA) and recurrent strokes were not included in this cohort.

Over a three- month prospective study period, a total of 193 patients were admitted with stroke and 127 patients were found to be eligible for this cohort; 31 had intra-cerebral hemorrhage, 19 had recurrent stroke and 16 had Transient Ischemic Attacks.

Each patient was examined by a stroke neurologist, and their medical history including stroke risk factors, and physical examination was documented. Ischemic stroke subtyping was performed in each case according to the modified NINDS scheme used in similar studies^{1,2,8}. Patients were considered to have symptomatic ICAD if they had an acute cortical or subcortical infarction in the territory of an intracranial vessel with greater than 50% stenosis.

RESULTS

- **Study population:** 127; Mean-age 72 years; (M:F=63:64)
- **Ethnicity:** 77 white, 43 black, 5 hispanic, 3 asian
- **NIH Stroke Scale** on admission: 10 (Range1-32).

- Interpretable intracranial images were obtained in 121 patients (95%); and extracranial in 126 patients (99%)
- Imaging studies performed were as follows:
Intracranial: MRA in 79 patients (65%), CTA in 31 (25.6%), DSA in 28 patients (23%) out of 121 total patients
Extracranial MRA in 54 patients (43%), CTA in 9 (7%), Ultrasound in 68 (54%) out of 126 total patients.

Stroke sub-typing: Cardioembolic 31 (24%), Lacunar 26 (20%), ICAD 23 (18%), Extracranial carotid, vertebral in 19 (15%). In 16 patients (13%), more than one etiology was identified. No etiology could be identified (cryptogenic) in 6 patients (5%).

CONCLUSION

Consistent application of intracranial vascular imaging methods increases the detection rate of symptomatic ICAD by nearly 200% and causes a dramatic reduction in the proportion of cryptogenic strokes.

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