Stroke is the leading cause of disability and second most common cause of death worldwide. Ischemic stroke accounts for 80% of all strokes, and are the result of the blood supply to the brain being interrupted abruptly. Atheroembolism, or a cholesterol embolism, is a major contributor to ischemic strokes. Due to this fact, treatment of carotid artery stenosis has been aimed at preventing atheroembolization by controlling plaque buildup in arteries before they have the chance to break off and cause harm. In an attempt to prevent future stroke (O) in adult patients with asymptomatic carotid artery disease (P), will performing a carotid endarterectomy (I) compared to carotid stent placement (C) have lower associated risks (O)?

### Methods

A literature search was conducted through PubMed, Clinical Key, and Academic Search Premier in November of 2019. Six articles were selected based on patient population, publication date, study design and interventions compared.

### Results

The literature review and critique showed there currently is no real statistical difference in the outcomes related to carotid endarterectomy versus carotid artery stenosis in the treatment prevention of stroke in patients with asymptomatic carotid stenosis. Two randomized controlled trials, the ACT-1 and 10-year follow-up to CREST-1, both showed no significant difference between the two interventions. All retrospective cohort studies came to the same conclusion as the RCTs, with the exception of one that found CAS to be significantly higher risk than CEA in the prevention of periprocedural stroke and death. Overall, every patient is different and as of now it is up to the patient and clinical team to decide which is best for the individual based on their health and risks they are willing to take.

<table>
<thead>
<tr>
<th>Study</th>
<th>Periprocedural Stroke</th>
<th>Periprocedural MI</th>
<th>In-Hospital Death</th>
<th>1-Yr Stroke-Free</th>
<th>1-Yr Survival</th>
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</tbody>
</table>

Table 1: Comparison of Results

### Discussion

Most of the studies focused on periprocedural outcomes in the form of ipsilateral stroke, myocardial infarction, and in-hospital death, as well as later outcomes. One study broke down outcomes further into secondary outcomes including: cranial/peripheral nerve injury, noncerebral bleeding, wound complications, and other. The definition of "later outcome" varied depending on the study (30-days, 1 month, every 6 months, 4 years, 7 years, 10 years). There were some differences in patient populations studied, which was uncontrollable due to the nature of the retrospective cohort studies being the majority of studies available. There was also some difference in the medical treatment provided before and after procedures. Overall, the studies found that neither CEA or CAS are inferior to the other.

Thankfully, there are currently three randomized controlled trials that are ongoing and will hopefully give us more clarity in the future:

- Carotid Artery Stenting (CAS)
  - Follow-up to ACST-1 (1993-2003)
  - International RCT coordinated by The ACST-2 office at The University of Oxford
  - Jan 2008 to Dec 2020
  - CAS vs. OMT for long-term stroke prevention
  - n = 5,638
  - Results expected late 2021

- Carotid Endarterectomy Versus Carotid Stenting in the Prevention of Stroke in Asymptomatic Carotid Artery Disease (ACST-2)
  - Follow-up to CREST (2000-2011)
  - Multi-center RCT sponsored by the National Institute of Neurological Disorders and Stroke of the National Institutes of Health
  - Dec 2014 to est. Dec 2022
  - BMT alone vs. CEA vs. CEA/CAS
  - n = 3,638
  - Ext. = 2,486
  - Study is currently ongoing

- European Carotid Surgery Trial-2 (ECST-2)
  - International RCT initially funded by the National Institute for Health Research, currently funded by the Stroke Association, UK
  - Initiated in March of 2012
  - Comparing optimized medical treatment (OMT) alone vs. OMT/CEA vs. OMT/CAS in both symptomatic and asymptomatic patients
  - n = 2,500
  - Study is currently ongoing

### Conclusion

Carotid artery stenting and carotid endarterectomy are not superior to one another, and choice should be based individually per patient. Both have low morbidity and low mortality rates. Given the lack of randomized controlled trials for this specific patient population, there needs to be more research done before a definitive answer can be given to this research question. Currently there are at least three ongoing trials that aim to determine a more definitive answer. These trials are set to end in the next 2 years.