

Carotid Endarterectomy Versus Carotid Stenting in the Prevention of Stroke in Asymptomatic Carotid Artery Disease

Alison Stover, MMS (c)

Faculty Advisor: Kaitlyn Gamber, MHS, MMS, PA-C
Department of Medical Science

Abstract

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)?

Introduction

❖Stroke Overview:

- ❖Result of interruption of blood supply to the brain
- ❖Ischemic (80%) vs. hemorrhagic
- ❖15-20% of ischemic strokes are related to carotid artery stenosis (CAS)

❖Carotid Artery Stenosis:

- ❖Atheroembolization – ruptured atherosclerotic plaque travels to more distal/smaller arteries resulting in blockage
 - ❖Known to be the cause of ischemic strokes related to the carotid artery (rather than carotid occlusion)
- ❖CAS further broken down into:
 - ❖Symptomatic – aphasia, dysphasia, impairment or loss of vision in ipsilateral eye, TIA, or amaurosis fugax in the past 6 months
 - ❖Asymptomatic – stenosis with no symptoms

❖Treatment:

- ❖Aimed at controlling/reducing plaque buildup before it has the chance to rupture
- ❖Three mechanisms:
 - ❖Best Medical Therapy (BMT) – Biological
 - ❖Carotid Endarterectomy (CEA) – Surgical
 - ❖Carotid Artery Stenting (CAS) – Surgical

Based on randomized controlled trials (RCTs) and evidence-based procedures, CEA has been shown to be the treatment of choice for symptomatic patients with 50-99% stenosis. But what about asymptomatic patients?

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.

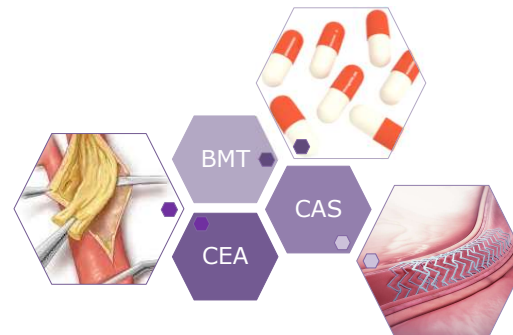
Results

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 1. Comparison of Results

Study	Periprocedural Stroke	Periprocedural MI	In-Hospital Death	1-Yr Stroke-Free	1-Yr Survival
Brott et al (2016)	S	S	S	NS	NS
Choi et al (2015)	S	NS	S	N/A	N/A
Mazzaccaro et al (2019)	NS	S	NS	NS	NS
Rizwan et al (2019)	NS	NS	NS	NS	NS
Rosenfield et al (2016)	NS	NS	NS	NS	NS
Sharma et al (2019)	N/A	N/A	N/A	NS	NS

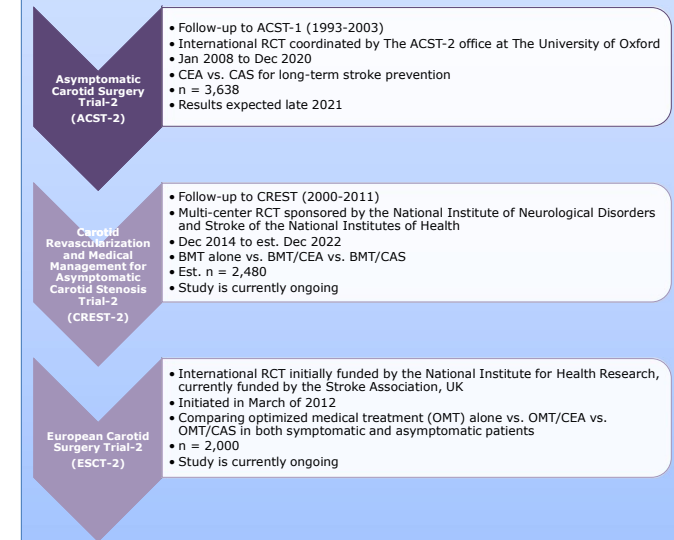
Key: S – significant; NS – not significant; N/A – not applicable



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:



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.