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Carotid Endarterectomy (CEA) and Carotid Angioplasty and Stenting (CAS) in Asymptomatic Extracranial Carotid Artery Stenosis: A Meta-Analysis

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Introduction

About 11% of all strokes are due to thromboembolism from a previously asymptomatic carotid stenosis of more than 50%, which is also an independent predictor of vascular events in patients with already clinically manifesting arterial disease or type 2 diabetes without a history of cerebrovascular ischemia. Although substantial improvements in medical therapy have attributed to decreased rates of stroke, it might ultimately need revascularization. Recent studies have shown significant benefit in reducing stroke and death in patients treated with CEA and CAS. We aimed to review and analyze the most recent studies comparing short- and long-term complications of CEA and CAS in asymptomatic patients with carotid stenosis.

Methods

Two recent major clinical trials involving asymptomatic carotid stenosis (i.e. ACT I and CREST) were included. Outcome measures included in the analysis were: stroke, myocardial infarction (MI), and death or stroke, both individually and as a composite outcome as defined in the trials. Methodological quality was assessed using the Cochrane Collaboration's tool for assessing risk of bias. A meta-analysis was performed on comparable outcomes at the same time-points using RevMan ver 5.3 software. Risk ratios (RRs) with 95 % confidence interval (CI)s were calculated using the Mantel-Haenszel method with fixed-effect models. Heterogeneity was assessed by I2 and Cochran Q tests.

Results

ACT I showed a lower methodological quality, having a higher risk of attrition bias and failing to report blinding of outcome assessment. There was no significant difference in the composite outcome of death, stroke (ipsilateral or contralateral, major or minor), or MI during the periprocedural period (p=0.70). No heterogeneity was observed in the analyses (I2= 0). During the periprocedural period, CAS had a significantly higher rate of stroke alone than CEA (p=0.05), and trend towards higher stroke or death than CEA (p=0.07). In the postprocedural period, the two treatments did not have different rates for the composite of death, stroke or MI at 5 years.

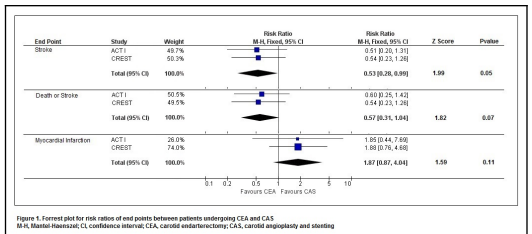

Figure 1. Forrest plot for risk ratios of endpoints in 30 days, between patients undergoing CEA and CAS

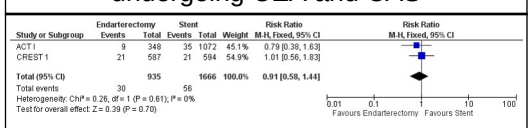

Figure 2. Forrest plot for risk ratios of the composite of death, stroke, or MI in 30 days, between patients undergoing CEA and CAS

Conclusions

Both CREST and ACT I individually failed to show any differences between CEA and CAS in asymptomatic patients (CREST was not powered to determine such a difference in asymptomatic patients a priori). However, their combined meta-analysis demonstrates a higher risk of periprocedural stroke after CAS than CEA in asymptomatic extracranial ICA stenosis. It is unclear whether further evolution in endovascular techniques may change this, and whether any intervention is superior to medical therapy in asymptomatic carotid stenosis.

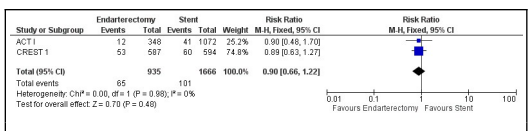

Figure 3. Forrest plot for risk ratios of the composite of death, stroke, or MI in 5 years, between patients undergoing CEA and CAS

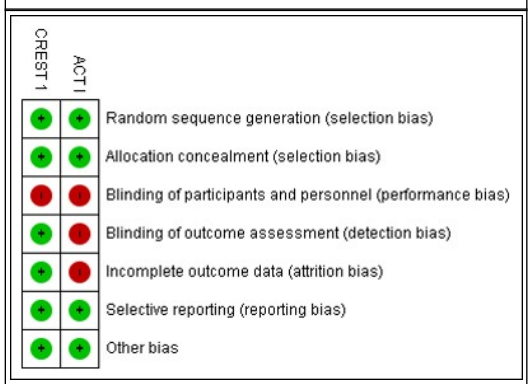

Figure 4. Methodological quality of the studies reviewed

Learning Objectives

Current trials (such as CREST-2) are underway to determine whether any intervention is warranted in asymptomatic carotid stenosis. Until then, patients selected for intervention should preferentially undergo CEA rather than CAS due to a lower risk of periprocedural stroke.

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