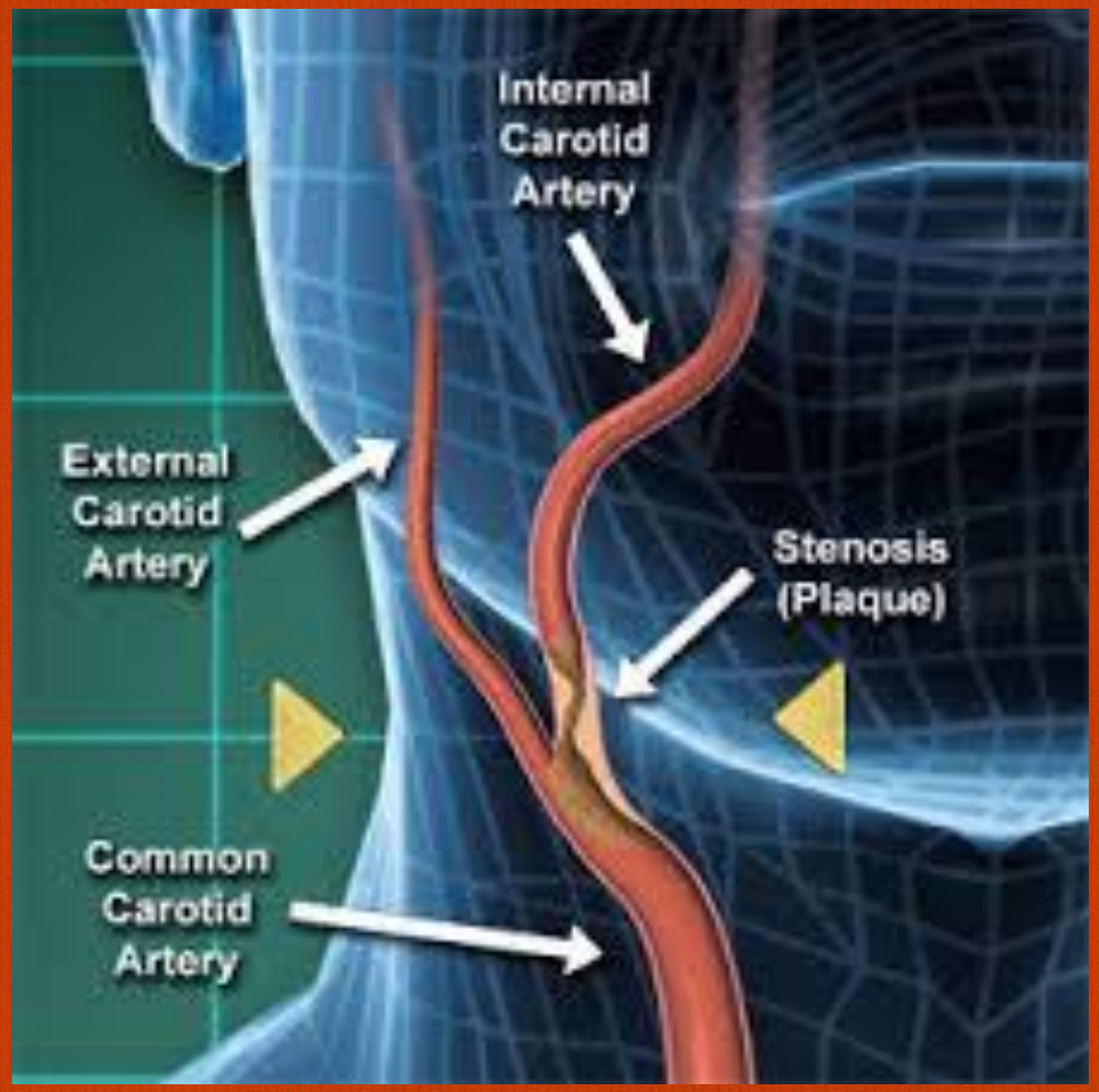

Treatment Considerations for Carotid Artery Stenosis

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4.29.2016

There is no actual or potential conflict of interest in regards to this presentation

I have no relevant financial relationships to disclose. This presentation was created without any commercial support.

Learning Objectives

- Evaluate asymptomatic v. symptomatic carotid artery disease
- Analyze the degree of carotid stenosis
- Identify the medical and surgical management of carotid artery disease

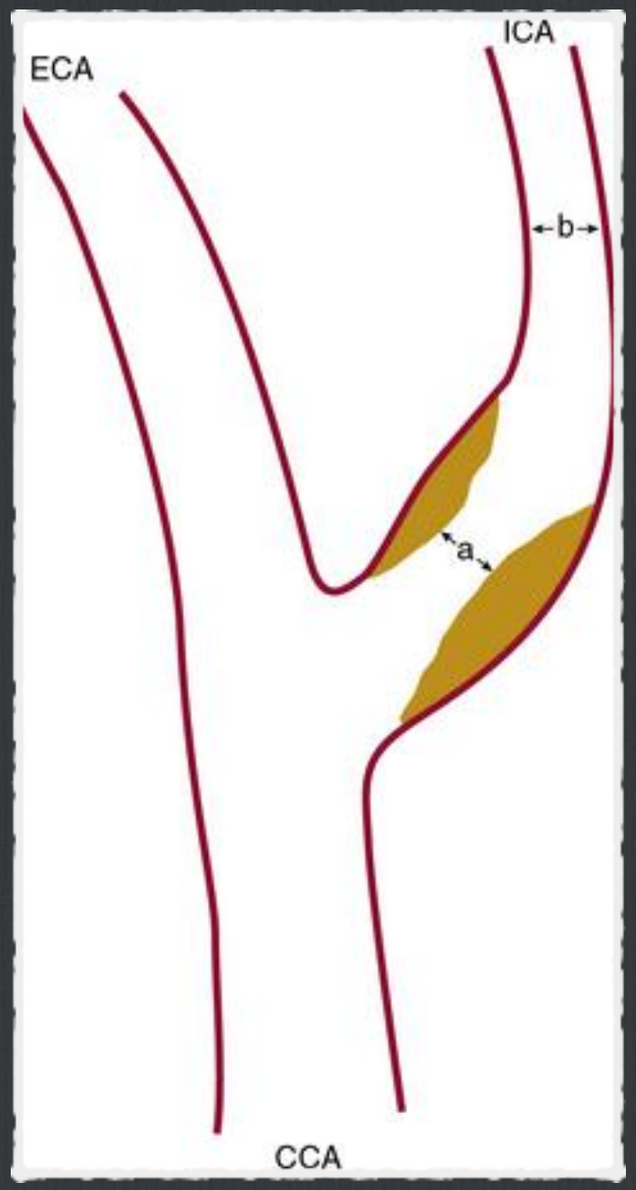
Background

- 80-85% of all stroke is ischemic is nature
- Carotid artery disease has been documented to cause 30-60% of ischemic strokes
- The location most frequently affected is the carotid bifurcation (with extension into the internal carotid artery)
- Atherosclerosis -> stenosis: luminal narrowing often accompanied by ulceration

Atherosclerosis in Carotid Artery Stenosis

- Build up of plaque inside the arteries.
- Plaque is made of cholesterol, fatty substances, calcium, fibrin and cellular waste.
- Over time, this leads to the narrowing of an artery, a total occlusion of blood flow, thrombus formation on the plaque’s surface, or a piece of plaque/thrombus may break off (embolic stroke)

Asymptomatic v. Symptomatic and degree of stenosis

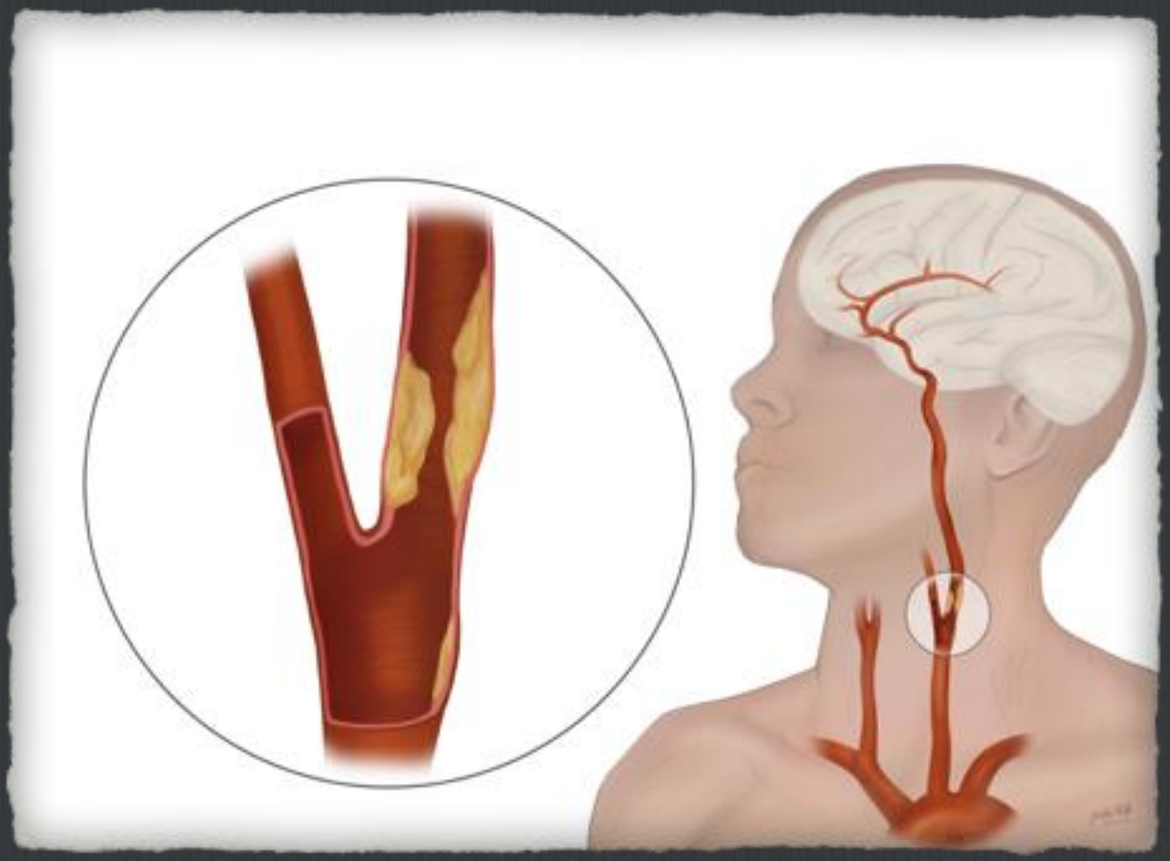


- Asymptomatic: presence of atherosclerotic narrowing without recent stroke or TIA (6 months)
- Symptomatic: with Stroke/TIA - not vertigo, lightheadedness or syncope
- Degree of stenosis:
  - Mild < 50%
  - Moderate 50-69%
  - Severe 70-99%
- Severe carotid stenosis is a strong predictor for stroke

Asymptomatic Management

- Intensive medical management: statins, anti-platelet agents (Aspirin), HTN/DM management, lifestyle modification (AHA/ASA guidelines)
- (Consider CEA if stenosis > 70% and surgical risk is low (<3%))
- Aspirin pre- and post-operatively
- (Prophylactic CAS is considered in selected patients (not recommended by the Society of Vascular Surgery) - and only if in a trial)

CEA and CAS for Asymptomatic disease



- CEA trials, in patient with high-grade, asymptomatic stenosis: VA trial, ACAS, and ACST.
- Delay to benefit, Preoperative complications, gender role (male benefit)
- CAS trials: SAPPHIRE and CREST (asymptomatic and symptomatic patients enrolled), ACT I (CEA v. CAS)
- CAS - consider when poor candidates for surgery (conflicting date)

- CAS tended to have a greater benefit at younger ages, while CEA has a greater benefit at older ages.
- Gender benefit (male>female) or equal by gender
- CAS is not inferior to CEA in high-risk patients (surgical risk, prior neck surgery/radiation, recurrent stenosis after CEA, contralateral laryngeal nerve palsy, age)
- Identifying high-risk patients:
  - Progression in severity of stenosis
  - Asymptomatic carotid embolism
  - High-risk morphologic features of the carotid plaque
  - Reduced cerebral blood flow reserve
  - Ipsilateral silent embolic infarcts on imaging

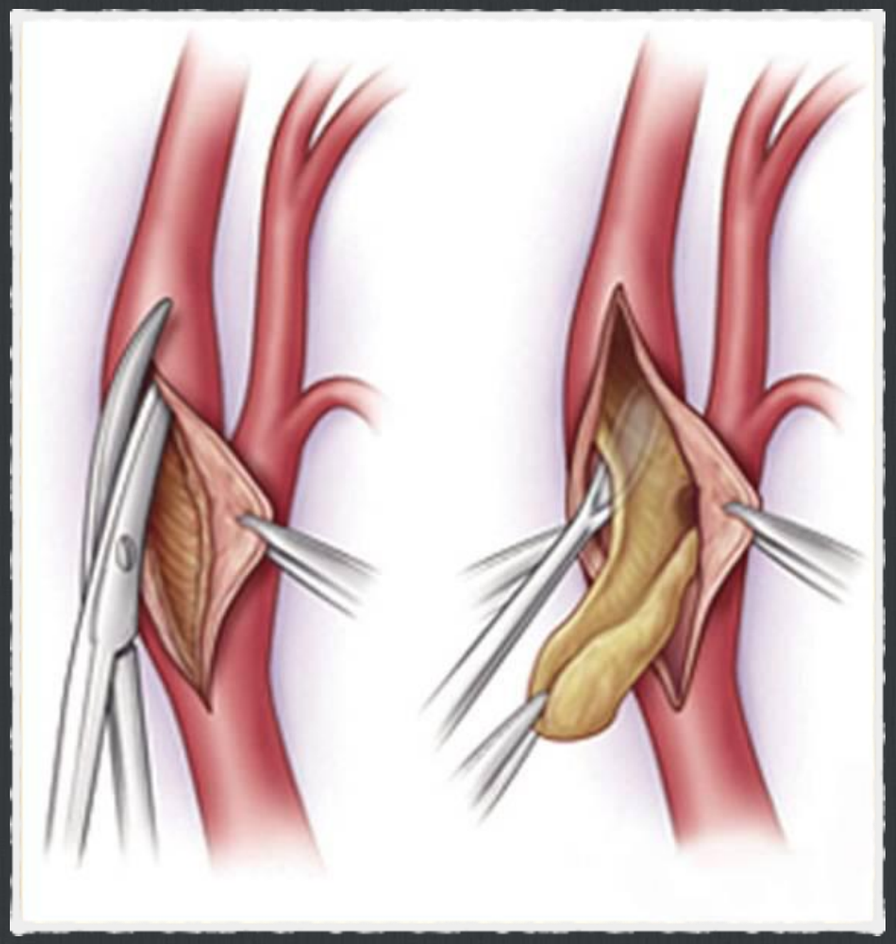
Asymptomatic; Summary

- Estimated risk (stenosis > 50%) is 0.5-1% annually. Also a marker of increased risk for MI and vascular death.
- Intensive medical therapy: Anti-platelet, Statin, HTN/DM control, lifestyle modifications.
- Medically stable, with life expectancy > 5 years, and Severe stenosis - consider CEA (if risk <3% by surgeon and center)
- CAS - clinic trial, high-risk/special population, <3% risk per center

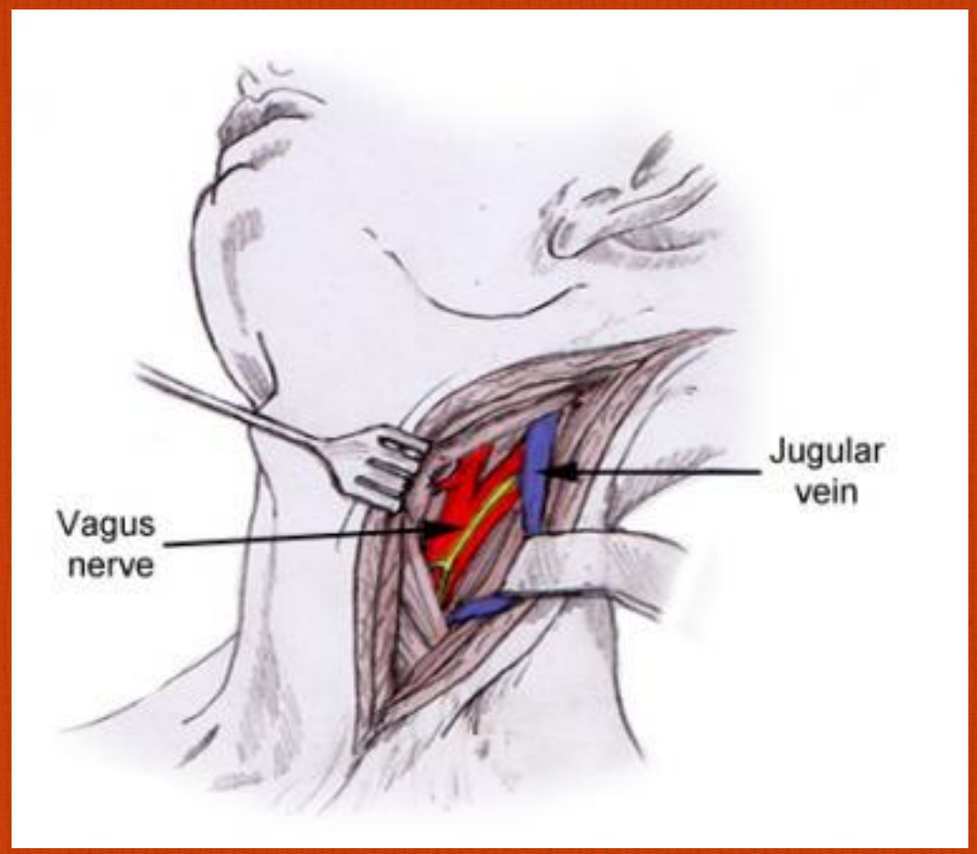
Symptomatic Management

- Defined as focal neurological symptoms, referable to the appropriate carotid artery distribution, including 1+ TIA, transient monocular blindness, or minor stroke (non-disabling) within the last 6 months.
- CEA > medical management alone
- CEA > CAS if:
  - Surgically accessible lesion
  - No significant cardiac, pulmonary, or other diseases that would greatly increase the risk of surgery
  - No prior ipsilateral CEA
  - Preoperative risk < 6%
- Aspirin 81-325mg pre- and post-operatively (at least 3 months)

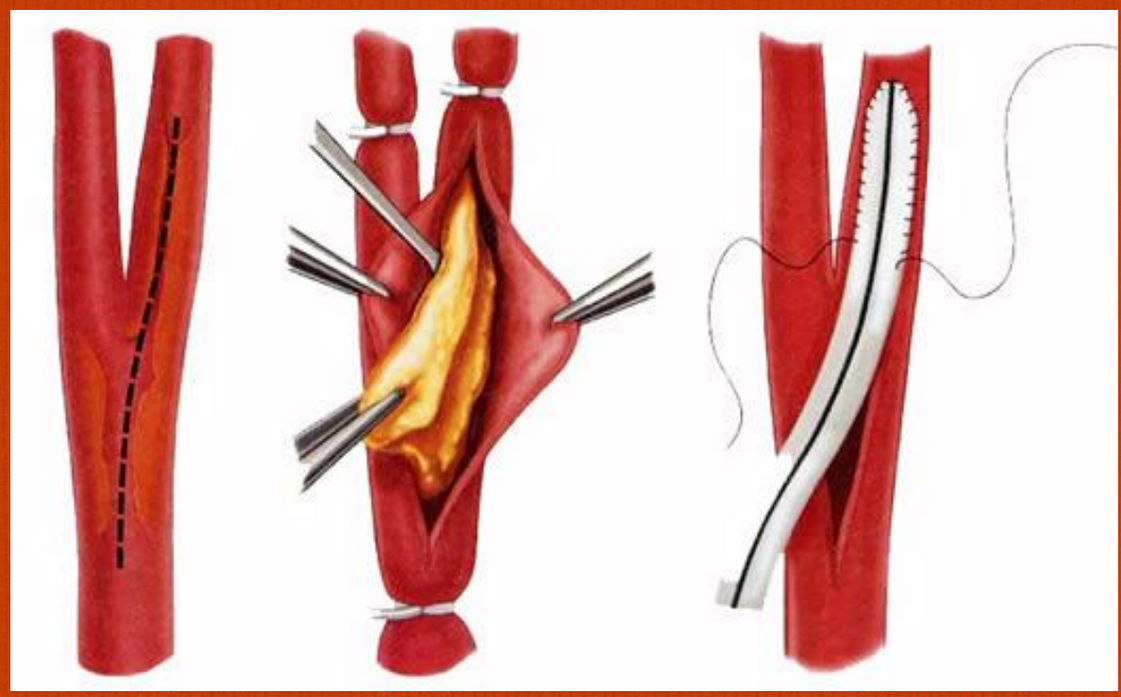
CEA
(Carotid Endarterectomy)



- Incision made in neck, plaque removed, artery closed, neck closed. +/- variable closures and bypass techniques
- NASCET Trial - 1980s, CEA vs. Medical Management. Symptomatic patients: TIA, CVA or monocular blindness + 70-99% stenosis. Ended early - surgery beneficial
- ECST Trial - CEA vs Aspirin, Symptomatic, 70-99%. CEA beneficial. Confirmed results of NASCET.
- VA Trials with similar results.
- Pooled analysis added that CEA also beneficial 50-69% stenosis, but higher risk.
- Cranial nerve assessment post-op: 12th: tongue movement and smile, along with incision and drain assessment


Jugular vein
Vagus nerve


Shunt
Clamp
Incision in the artery
Plaque removed



Symptomatic Mangement - CEA

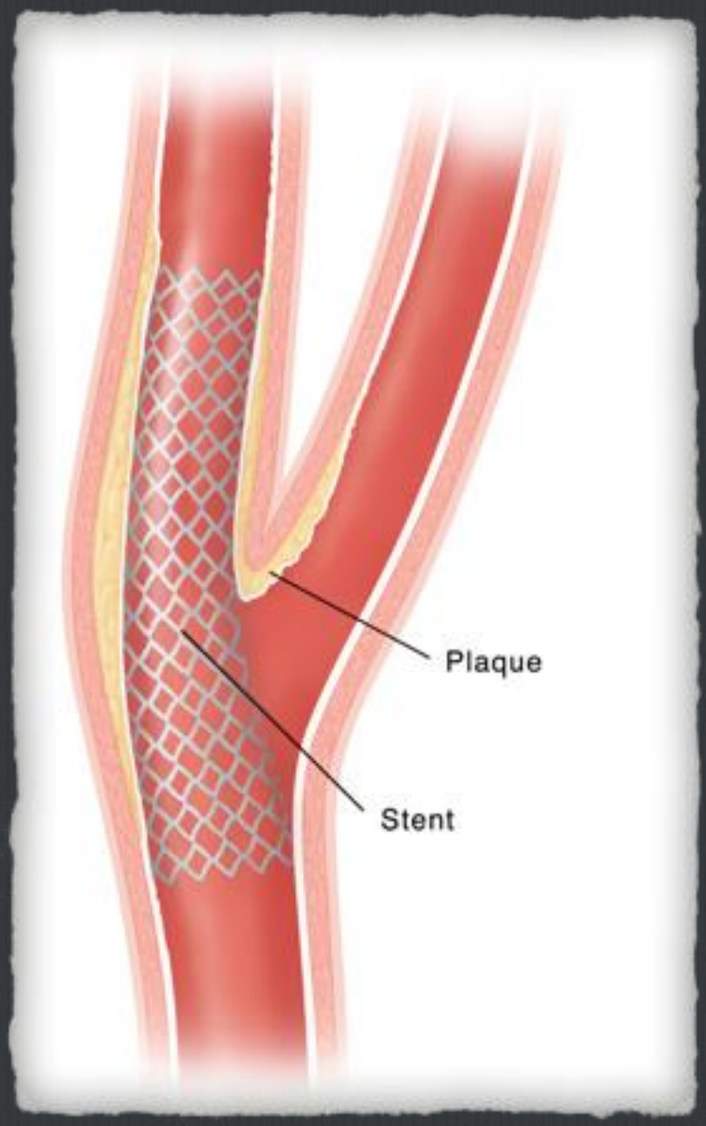
- Timing of Surgery: within 2 weeks of stroke/TIA had higher benefit, but within first 48 hours had a higher risk.

- CEA with greater benefit for males > females, especially the lower the stenosis %

- Higher preoperative risk with large cerebral infarct - may delay surgery, but perform within 6 weeks.

- Watch for baroreceptor-related changes in blood pressure post-op, along with post-op hyper-perfusion injury.

CAS
(Carotid angioplasty and stenting)



- Peri-procedural (30 day) stroke or death rate is higher with CAS than CEA
- CAS for patient's with stenosis 70-99% and:
  - Lesion location not suitable for surgery
  - Radiation-Induced stenosis
  - Restenosis after CEA
  - Clinically significant cardiac, pulmonary or other disease that increases risk of surgery/anesthesia
  - Contralateral ICA occlusion
- Post-op assessment: groin site, Neuro checks

Symptomatic Management - CAS

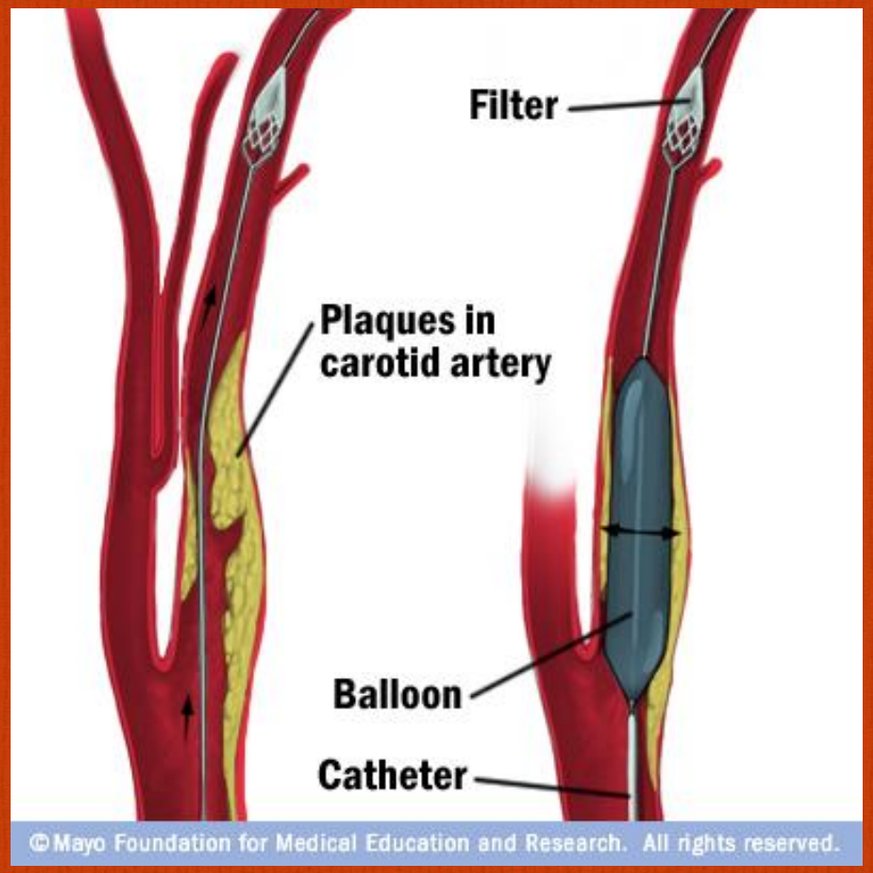
- CREST Trial: CAS vs. CEA - asymptomatic and symptomatic enrolled. Long-term outcomes similar for both. Patients > 70 had increased risk with CAS. CAS had lower rates of MI. Genders equal.

- ICSS Trial: Risk of stroke higher with CAS than CEA. Both beneficial.

- SPACE Trial: Europe, stopped early r/t funding/recruitment. CAS not inferior - could not prove. But, distal embolic protection was not mandatory.

- SAPPHIRE Trial: CAS not inferior to CEA, but 70% enrolled were asymptomatic.


Baseline
Final


Filter
Plaques in carotid artery
Balloon
Catheter
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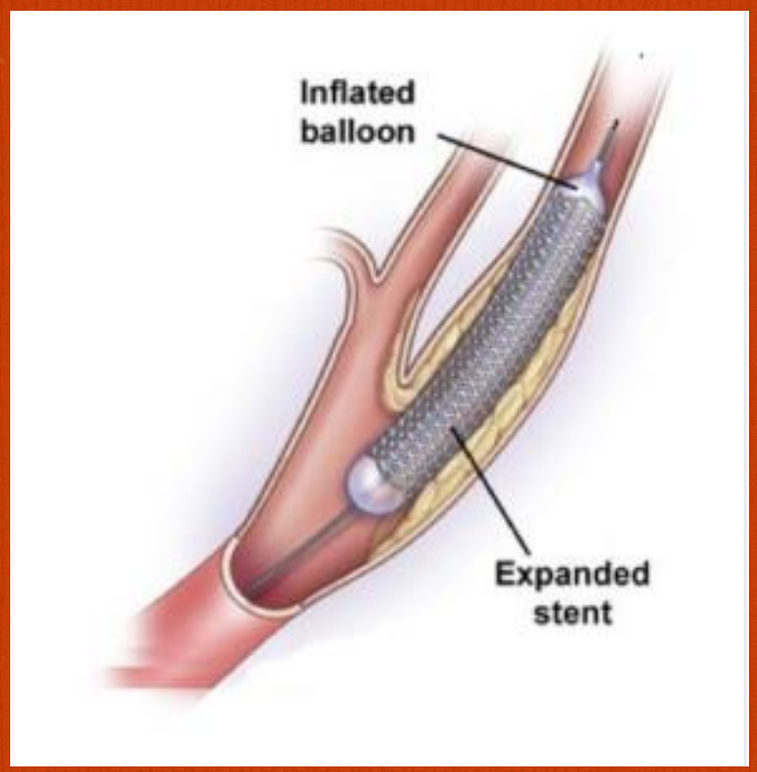
Inflated balloon
Expanded stent

Method of Stenosis Measurement

- Most trials used Catheter Angiography - best accuracy of stenosis %
- Carotid Duplex Ultrasound - Velocity, some accuracy of stenosis
- MRA - Less accurate, no radiation
- CTA - More accurate, with radiation

AHA/ASA Guidelines 2014

- Symptomatic, Severe stenosis - CEA if surgical risk < 6%
- Symptomatic, Moderate stenosis - CEA if surgical risk < 6%
- Stenosis < 50% - no re-vascularization
- CEA - within 2 weeks
- CAS instead of CEA - if average/low risk, diameter of lumen is reduced by 70% by noninvasive imaging or 50% by catheter angiogram, or > 50% noninvasive imaging with corroboration, and risk < 6%. CAS for special circumstances and higher surgical risk
- Consider patient age (>70 better outcomes with CEA
- Optimal medical therapy: Anti-platelet, Statin and lifestyle modifications

Optimal Medical Therapy

- Cause of Carotid Artery Stenosis:
  - Smoking
  - Hyperlipidemia
  - Hypertension
  - Hyperglycemia
- Populations with increased risk:
  - DM, Family history of CAD, HTN Lack of physical activity, Metabolic syndrome, obesity, smoking, poor diet
- Primary/Secondary Prevention!
- Medications: Aspirin/Plavix, Statin, (Fish Oil, CoQ10, Red Yeast Rice)

Questions?

Thank you!