

Challenges in Management of Symptomatic Carotid Artery Disease in Cancer Patients

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Making Cancer History™

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Carotid Artery Disease Management

Objectives

- Describe the pathophysiology of carotid artery disease (CAD) and how to interpret common diagnostic studies to identify CAD.
- Differentiate treatment guidelines for symptomatic CAD and the optimal medical management of symptomatic CAD
- Recognize specific concerns of cancer patients with CAD

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Worry About Carotid Artery Disease?

- Carotids - provide 80% blood flow to brain
- Carotid atherosclerosis - 10-20% of ischemic strokes
- Carotid atherosclerosis can start as early as 20 years
- Carotid screening is not recommended for asymptomatic patients

(USPTF, 2021)

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Current Statistics

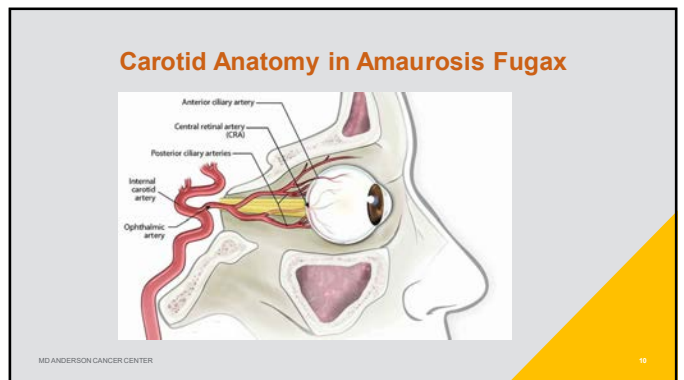
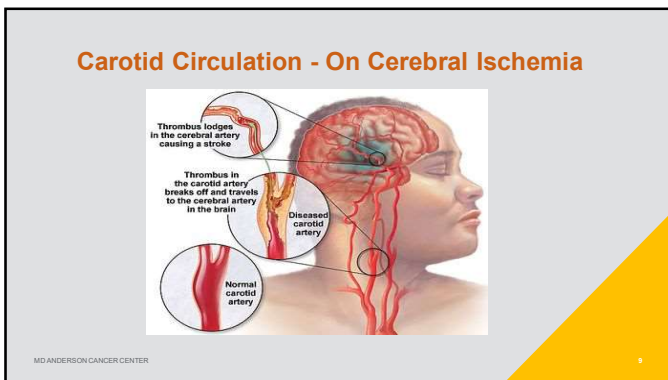
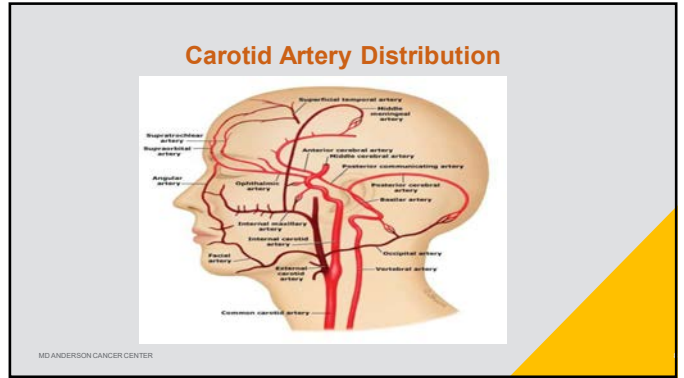
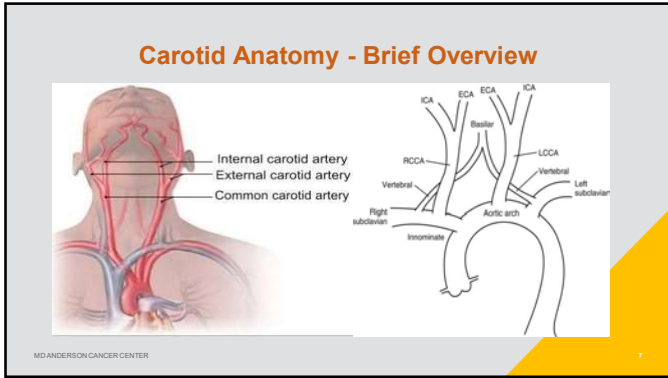
- Aging population - increasing stroke risks
- Stroke genetic loci - share genetic association with BP
- Women consuming >2 artificially sweetened beverage daily - increased risk of stroke (AHA-2020)
- Globally in 30-79 years old, carotid artery thickening - 27.6%

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Cost of Carotid Atherosclerosis

- Direct cost of Stroke - \$35 billion annually
- Alteplase 100 mg - \$6400
- DRG 559 (Ischemic Stroke) CMS hospital reimbursement - \$11578
- Carotid Stenting - \$13539+/- 5590
- Carotid Endarterectomy - \$16422+/-7414
- TCAR - \$23278+/- 7303
- Carotid Duplex - \$220-1500

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Carotid Artery Disease Evaluation

- Carotid Artery Ultrasound Duplex Study (CDUS)
- Computed Tomography Angiography (CTA)
- Magnetic Resonance Angiography (MRA)

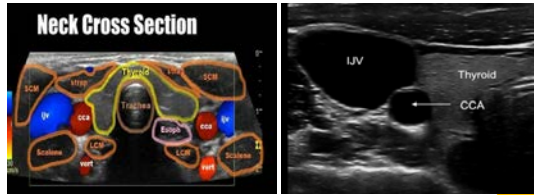
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Carotid Artery Duplex Ultrasound

- Sound waves
- B - mode and Pulse wave
- Low cost, no risks
- High sensitivity and specificity
- Technician and interpreter related

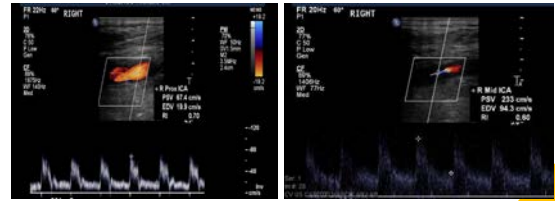
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Duplex Evaluation - Anatomical View



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Duplex Evaluation



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Ultrasound Lab Report

FINDINGS:

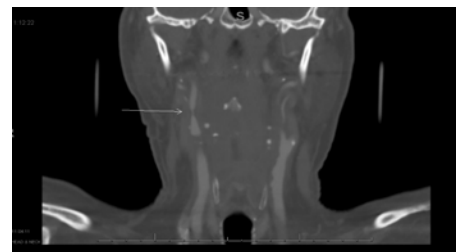
Left And Right Carotid Artery Velocities (cm/sec)

| | PSV | EDV | PSV | EDV |
|------------------|------------|-----|------------|-----|
| CCA, proximal | 107 | 13 | 114 | 27 |
| CCA, mid | 65 | 14 | 82 | 23 |
| CCA, distal | 59 | 14 | 89 | 18 |
| ICA, proximal | 55 | 16 | 94 | 22 |
| ICA, mid | 105 | 30 | 107 | 32 |
| ICA, distal | 248 | 18 | 82 | 27 |
| ECA | 95 | 37 | 90 | 18 |
| Vertebral artery | 64 | 20 | 0 | 0 |
| ICA/CCA ratio | 1.6 | | 1.3 | |

CCA - Common Carotid Artery, ICA - Internal Carotid Artery, ECA - External Carotid Artery, PSV - Peak Systolic Velocity, EDV - End Diastolic Velocity

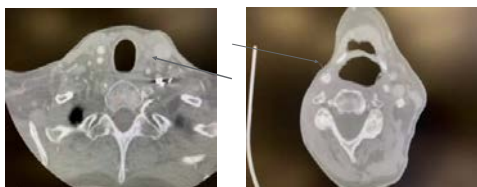
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Computed Tomography Angiography (CTA)



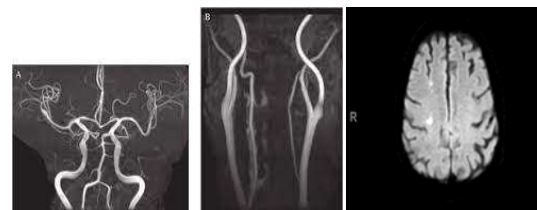
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Computed Tomography Angiography (CTA)



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Magnetic Resonance Angiography (MRA)



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Pop Quiz 1

67 y. o. male patient with colon cancer status post chemotherapy and surgery 3 years ago, now with no evidence of cancer came to your surveillance clinic.

- a) CT Scan Head
- b) MRI Neck and Brain
- c) Carotid Duplex
- d) ECG
- e) ECHO

While discussing about current health he said “when I was working in yard 3 days ago my left arm got weak for 2 minutes, but no issues now”.

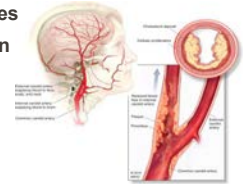
After enquiring a little more about history and his risk factors, which diagnostic test is appropriate to order first to rule out TIA?

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Atherosclerosis of Carotid Artery

- Hardening and thickening of arteries
- First step – endothelial dysfunction
- High level plasma LDL
- Inflammation at every step
- Interaction between genetics, risk factors, & coagulation disorders
- Concurrently seen in other arteries



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Radiation-Induced Carotid Artery Disease



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Atherosclerosis - Medical Management

- Antiplatelets - aspirin, clopidogrel
- HMG - CoA Reductase Inhibitor (Statins)
- Control Risk Factors
 - BP <140/90 mm Hg, keep diastolic <85, if diabetic
 - Smoking Cessation
 - Obesity Management
 - HbA1c < 7

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Medicines And More!

- **Aspirin** - cyclooxygenase (COX) inhibitor
prevent platelets from synthesizing thromboxane A₂
potent vasoconstrictor, promoter of platelet aggregation.
- **Thienopyridines** (Clopidogrel, Prasugrel, Ticlopidine) - block ADP binding to platelet receptors and prevent platelet aggregation.
- **HMG-CoA Reductase Inhibitor** - cholesterol synthesis rate limiter, improve endothelial dysfunction, reduce inflammation and stabilize plaque.

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Case Scenario

Mrs. Garza is 62 y/o female thin built Hispanic female who passed out two weeks ago, after her regular morning walk and regained full consciousness in 2 minutes. She went to the nearest hospital after the incident, found 85% blocked right internal carotid artery, and the cardiovascular surgeon recommended carotid surgery next week.

- She is in the clinic asking a request for a second opinion to another doctor recommended by her friend, who does only stents and no surgery for carotid problems
- Her blood pressure is controlled with metoprolol 25 mg once daily. On atorvastatin 20 mg at bedtime for hyperlipidemia, and levothyroxine 75 mcg once daily for hyperthyroidism.
- Other relevant histories include right breast lumpectomy and chemotherapy for right breast cancer and exposure to second-hand smoking

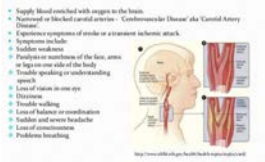
Mrs. Garza is very active, works as a school teacher, and does visit your clinic regularly for annual and required screening visits.

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Case Study in Nutshell

- Symptomatic high grade carotid artery stenosis on one side.
- 10 year ASCD Risk Score - 5.3% (borderline)
- Need for Optimal medical management - start Aspirin
- Clinical decision making guidance



Pop Quiz- 2

Which of these symptoms is specific to carotid artery disease related ischemic stroke or TIA?

1. Confusion
2. Memory loss
3. Dizziness
4. Seeing floaters
5. Vision loss in one eye

Symptomatic CAD – Current Guidelines

- AHA** 50-99% Carotid Artery Stenosis
 - CEA or CAS – If complications higher
- SVS** 50-99% Carotid Artery Stenosis
 - CEA or CAS or both
- ESC** 70-99% or 50-69% Carotid Artery Stenosis
 - CEA or CAS – If complications higher

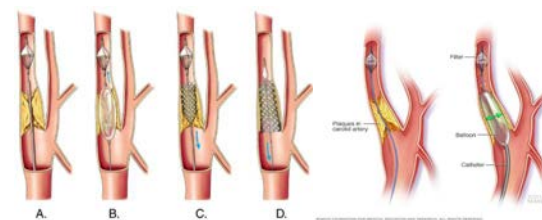
Grey Areas of Management

- CAS vs CEA choice- Unclear boundaries, Provider dependent
- Reimbursement variations based on procedure and setting
- Multiple societies and different range of guidelines
- Many medical specialties can do same procedures

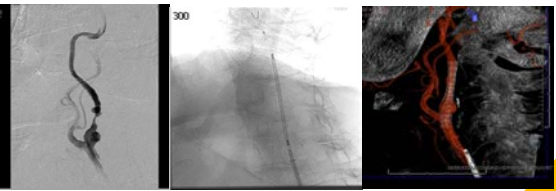
Grey Areas of Management

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Carotid Artery Stenting

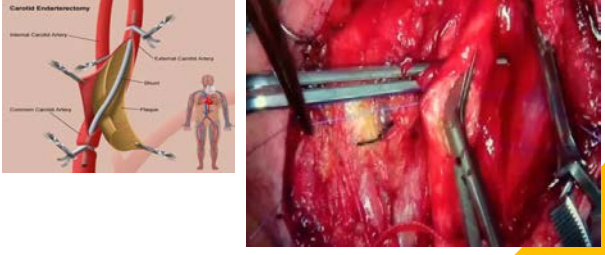


Carotid Artery Stenting



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Carotid Endarterectomy



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Trans Carotid Artery Revascularization

- Newer technique
- Select centers and surgeons

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Case Study - Review

- Clinical decision making guidance

- Will you refer Mrs. Garza for stenting?


Imaging of carotid artery disease by Duplex ultrasound, CTA and/or MRA

| Carotid stenosis <30% | Carotid stenosis 30-69% | Carotid stenosis 70-99% |
|-----------------------|---|--|
| Yes | Yes | Yes |
| | CEA + BMT should be considered [Class IIa, B] | CEA + BMT recommended [Class I, A] |
| | CAS + BMT may be considered [Class IIb, B] | CAS + BMT should be considered if high-risk for CEA; [Class IIa, B] otherwise may be considered [Class IIb, B] |

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Conclusion


- Symptomatic carotid arterial disease with high-grade stenosis of more than 70% needs aggressive medical management with surgical interventions.
- Choice of intervention is based on individual patient and operators average risk rate.



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Cancer and CAD

- CAD incidence is high after head and neck radiotherapy
- No clear dose-response effect between carotid disease and radiation
- Carotid artery screening and preventative strategies recommended for high-risk patient populations



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Chemotherapy and Atherosclerosis

VEGF Inhibitors

- Endothelial dysfunction - ↓ vasodilator factors.
- ↑ vasoconstrictor and microcirculation
- Hypertension & Thrombosis

(Muki, M, 2018)

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CAD - Cancer Specific

- Aggressive risk factor control decrease progression of carotid disease in cancer patients
- No guidelines specific for surveillance and management of carotid artery disease in cancer survivors
- No specific treatment advised for significant radiation-induced carotid artery disease
- Radiation patients are at increased risk for restenosis and should undergo routine surveillance even after revascularization

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Questions?

- Foods For Thoughts on Decision Making
 - Cost effective
 - Tailored to individual patient
 - Evidence - based



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