

A 3D medical reconstruction of a carotid artery. The artery is shown in a golden-yellow color, branching into smaller vessels. A stent, a mesh-like structure, is visible within the artery, likely used for treatment of stenosis or aneurysms. The background is dark and textured, possibly representing the surrounding tissue or a scan artifact.

# Carotid Artery Stenting: Tailored Approach to the Patient and Carotid Anatomy

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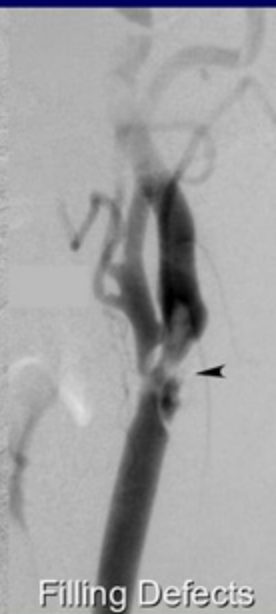
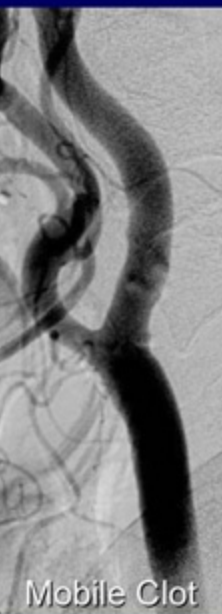
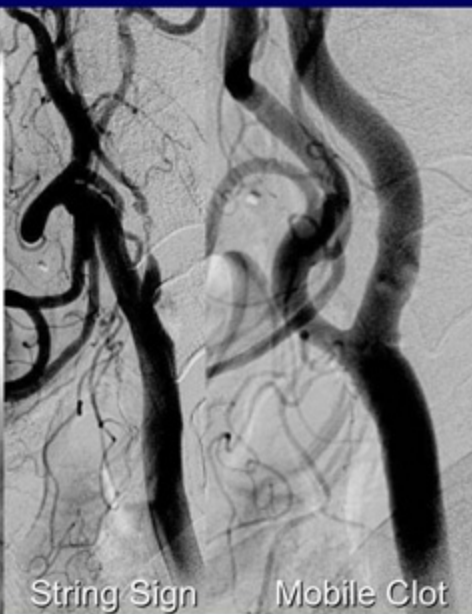
## The “Tailored Approach”

Definition: One approach does not fit all cases. Modification of the approach to “best fit” the clinical situation or patient anatomy

## High Risk Lesions

- Thrombus containing lesion
- “String sign”
- Heavily calcified lesion
- Ulcerated lesion
- Longer lesions ( $> 2\text{cm}$ )
- Echogenicity ( $\text{GSM} < 25$ )
- Extreme carotid tortuosity

# High Risk Lesions

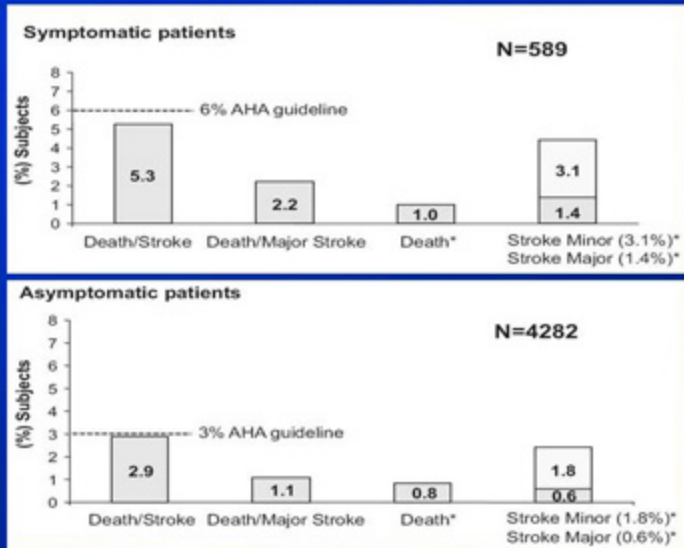


# High Risk Patient

- Elderly (Age > 80)
- Recently symptomatic
- Difficult Arch
- Renal failure
- The “Vasculopath” – severe PAD and CAD

# Symptomatic versus Asymptomatic Patients *CAPTURE 2 and EXACT Registries*

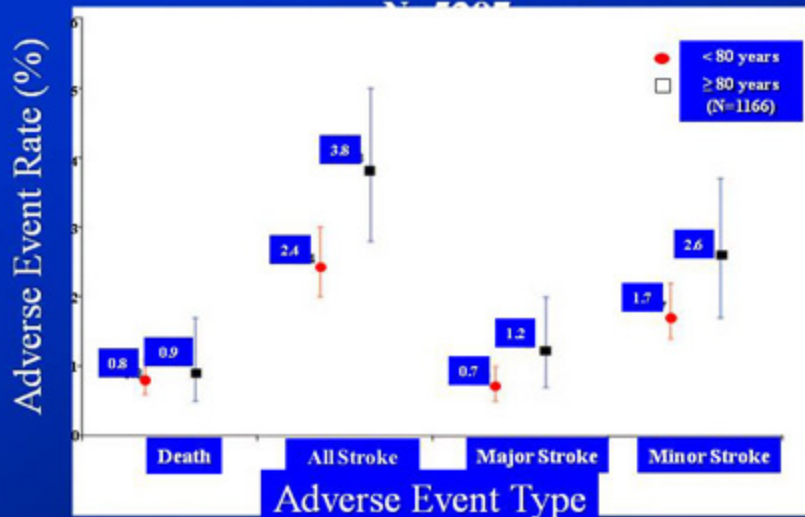
CAPTURE 2 and EXACT (N=6320)  
Pooled Results for Patients < 80 Years of Age



# Carotid Artery Stenting in Octogenarians < 80 years versus $\geq 80$ years in CAPTURE 2

## CAPTURE 2 Results Through 30-Days

N = 507



# The Tailored Approach

## *Choice of.....*

- Proximal versus distal embolic protection
- Open versus closed cell stent (or hybrid)
- Standard sheath/guide position versus guiding catheter from the arch
- Radial/brachial approach versus femoral

**The above considerations are not mutually exclusive**

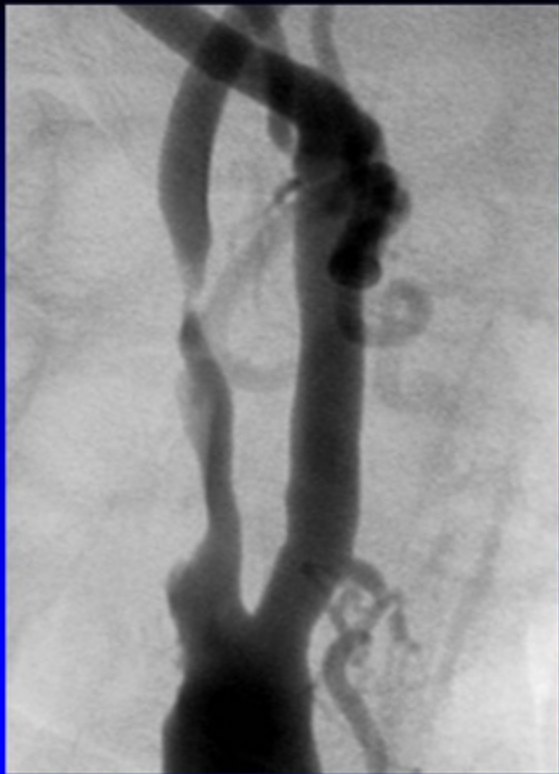
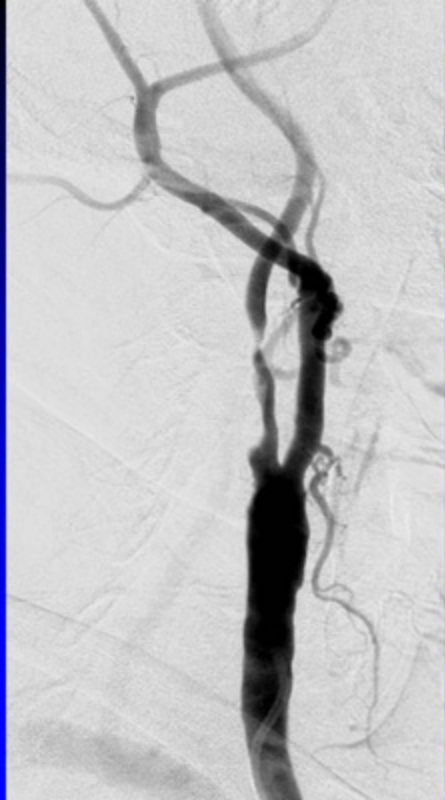


# History

- 87 male with symptomatic carotid artery stenosis.
- Two 15min episodes of difficulty speaking, weakness, unsteady gait.
- Multiple co-morbidities: COPD, PAD, history of Lung CA, CAD, HTN

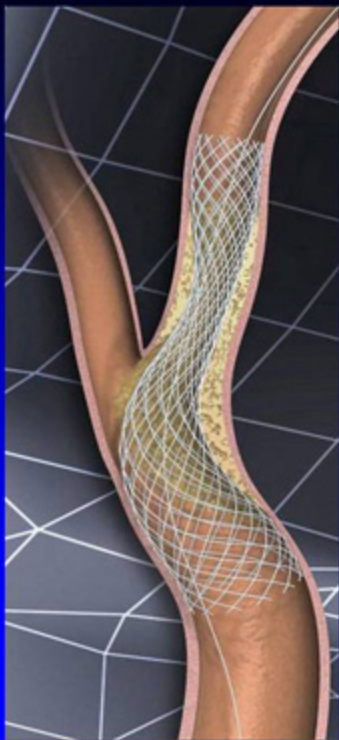
# Carotid Duplex

- Very severe right internal carotid artery stenosis.
  - 80- 99% with a peak systolic velocity in excess of 640 cm/sec, and end-diastolic velocity of 330 cm/sec.
  - Mild left internal carotid artery stenosis
  - Vertebral artery flow is antegrade bilaterally.



# Tailored Approach

- High risk features: Age > 80, recently symptomatic, long, complex, severe stenosis
- Tailored approach:
  - Proximal protection?
  - Closed cell stent design

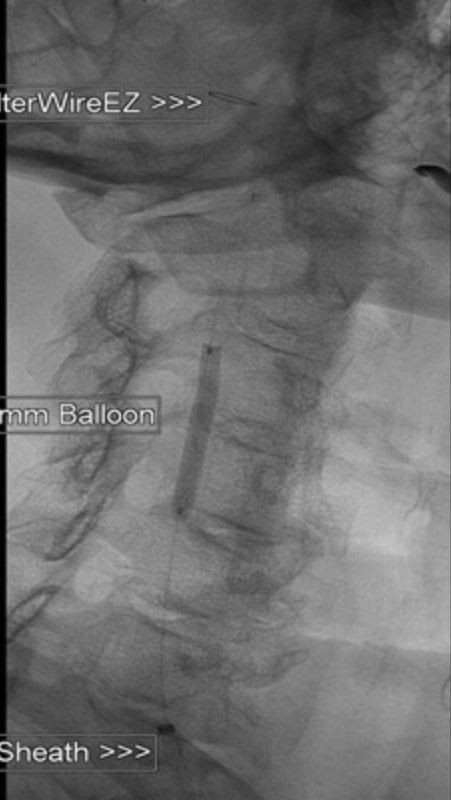


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FilterWireEZ >>>

4mm X 30mm Balloon

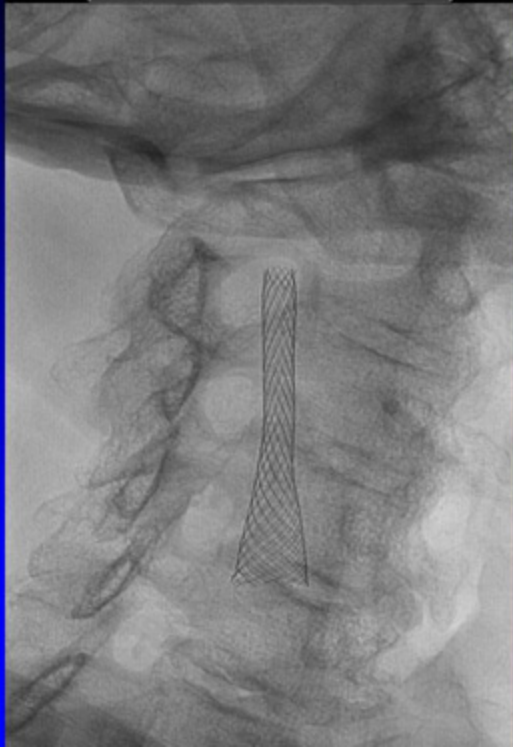
6F Shuttle Sheath >>>



9mm X 30mm WallStent



9mm X 30mm WallStent





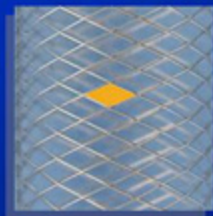
Pre



Post

# Stent Design: Closed and Open

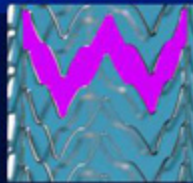
- Closed cell stent design
  - A stent with overlapping or fully connecting struts
    - Examples
      - Carotid WALLSTENT® Endoprosthesis
      - Xact® Carotid Stent
- Open cell stent design
  - A stent with connecting and non-connecting struts
    - Examples
      - Precise® PRO Rx Nitinol Stent System
      - RX Acculink® Carotid Stent



Carotid WALLSTENT  
Endoprosthesis



Precise PRO Rx  
Nitinol Stent System

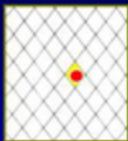
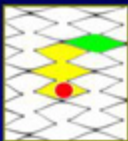


RX Acculink  
Carotid Stent



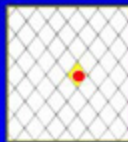
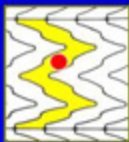
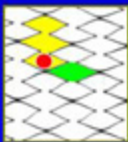
# Does the Stent Design Matter?

Proximal



	PROTEGE® RX (Tapered, 8-6mm)	RX ACCULINK™ (Tapered, 8-6mm)	Xact® (Tapered, 8-6mm)	PRECISE® (Straight, 8mm)	WALLSTENT™ (Straight, 8mm)
Pore Diam. (mm)	1.12	1.10	1.00	1.12	0.92
Pore Size (mm <sup>2</sup> )	2.65	12.50	3.46	2.43	0.948
Cell Area (mm <sup>2</sup> )	7.19	12.50	3.46	7.39	0.948

Distal



	PROTEGE® RX (Tapered, 8-6mm)	RX ACCULINK™ (Tapered, 8-6mm)	Xact® (Tapered, 8-6mm)	PRECISE® (Straight, 8mm)	WALLSTENT™ (Straight, 8mm)
Pore Diam. (mm)	1.08	1.06	0.96	1.12	0.92
Pore Size (mm <sup>2</sup> )	1.80	10.78	2.23	2.43	0.948
Cell Area (mm <sup>2</sup> )	4.48	10.78	2.23	7.39	0.948

# Carotid Stent Design and Outcomes

## Closed Cell vs. Open Cell

### “Stent design” based analysis

ALL EVENTS	Total population		Symptomatic		Asymptomatic	
	n/N	%	n/N	%	n/N	%
Closed	51/2242	2.3%	21/934	2.2%	30/1308	2.3%
Open	39/937	4.2%	27/383	7.0%	12/554	2.2%
<b>TOTAL</b>	<b>90/3179</b>	<b>2.8%</b>	<b>48/1317</b>	<b>3.6%</b>	<b>42/1862</b>	<b>2.3%</b>
	<i>p=0.005</i>		<i>p&lt;0.0001</i>		<i>p=1.00</i>	

# History

- 56 years old female
- Smoker
- Left CEA 7 years ago and right CEA 6 years ago
- New right hemispheric TIA
- Carotid duplex scan showing recurrent stenosis of her distal right CCA with a PSV of 428cm/s and EDV of 154cm/s

Rot -41°  
Ang -0°  
FD 17.0 inch

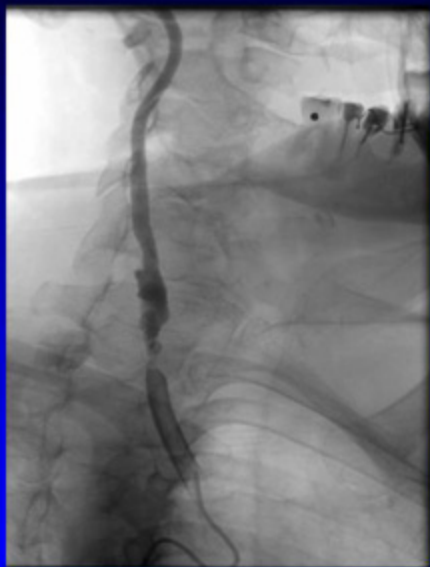


RIGHT

0:00  
3:33  
11:45:53

1-6-11

2



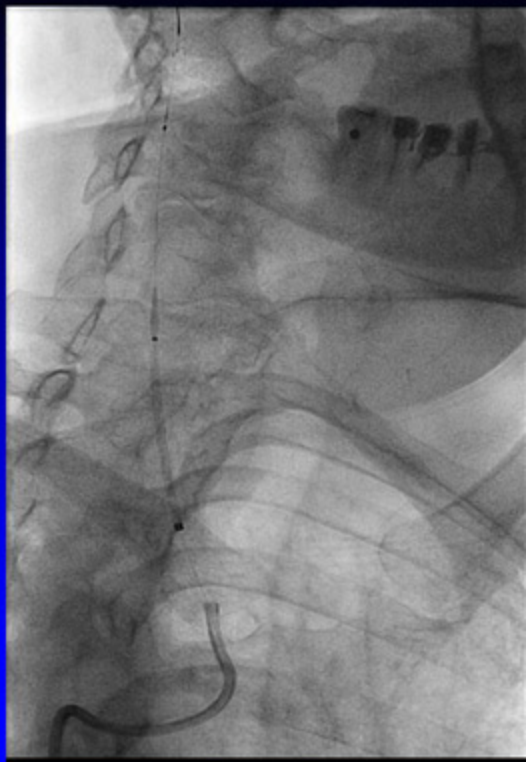
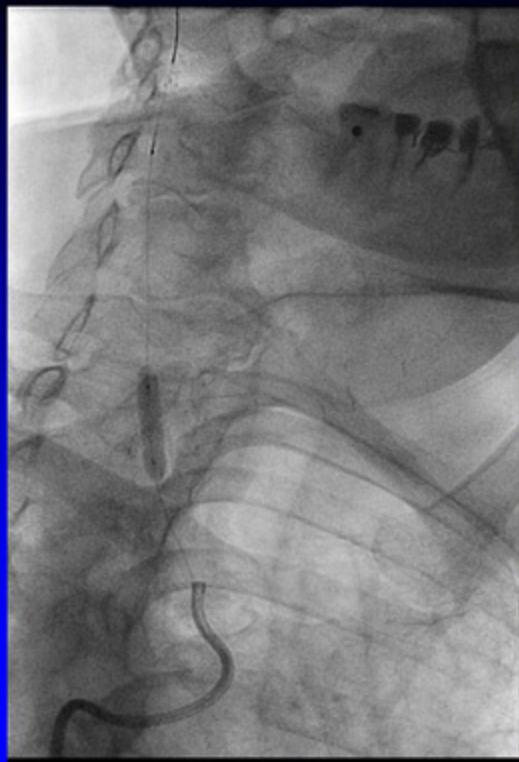
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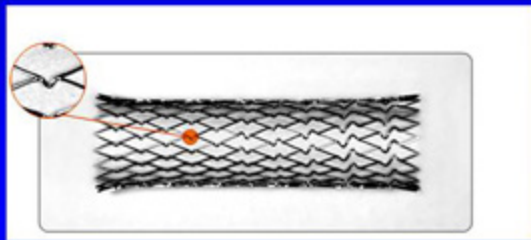
RIGHT



# Tailored Approach

- High risk features: recently symptomatic, bulky CCA plaque, difficult arch, ECA occluded
- Tailored approach: Guiding catheter from arch, closed cell stent design (Xact)







# Case History

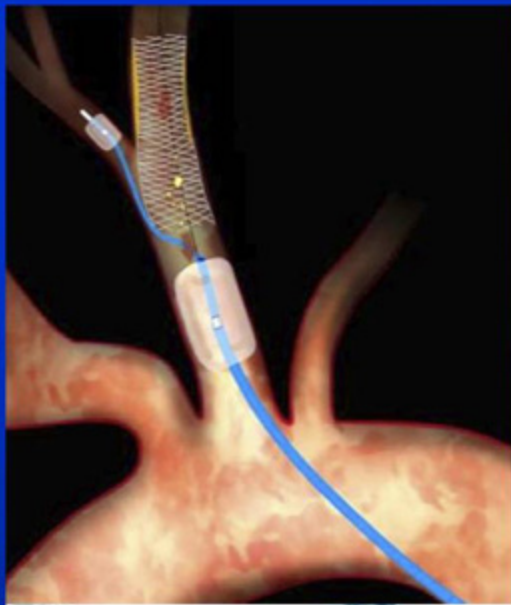
- 81 year old female
- Severe CAD
- Symptomatic right carotid stenosis – small right hemispheric stroke two weeks prior
- Carotid duplex evaluation:
  - 80-99% RICA stenosis
  - 40-59% LICA stenosis



# Tailored Approach

- High risk features: Age > 80, recently symptomatic, severe carotid tortuosity beyond lesion
- Tailored Approach:
  - Proximal protection (MO.MA)
  - Open cell stent
  - Appropriate stent positioning

# MO.MA



- Guiding sheath with 2 anchoring balloons
  - High system stability with good back up support
  - Guidewire of choice
- Lesion crossing under protection
- No need for distal landing zone for EPD
- Any type and size of debris aspiration

23 F

05

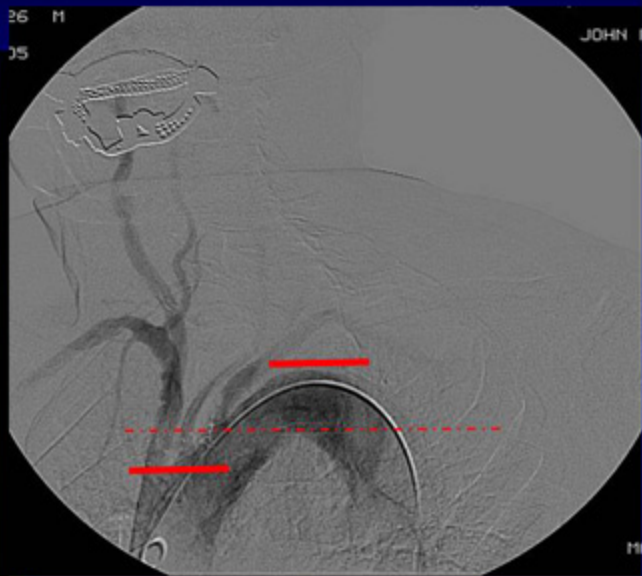


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# Challenging Arch Anatomy

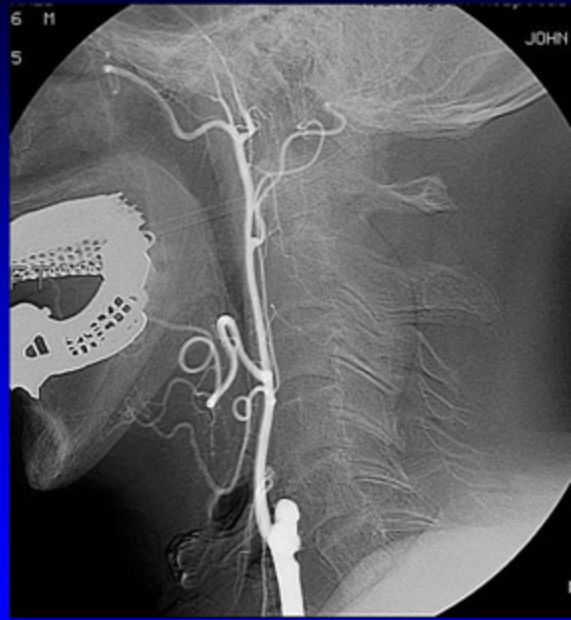
- 72 year old male
- Severe CAD
- Renal insufficiency
- LICA occlusion
- Severe, symptomatic RICA stenosis



# Carotid Angiography



RICA



LICA

## Tailored Approach

- High risk features: difficult arch anatomy, recently symptomatic, complex ulcerated lesion
- Tailored approach:
  - Guiding catheter from the arch
  - Closed cell stent design

# Technique

## Guiding Catheter from a Distance

- 8 Fr Guiding catheter from the aortic arch (**Hockey Stick**, Simmons, Amplatz)
- Abbott carotid stent platform
  - Xact stent
  - NAV 6 embolic protection

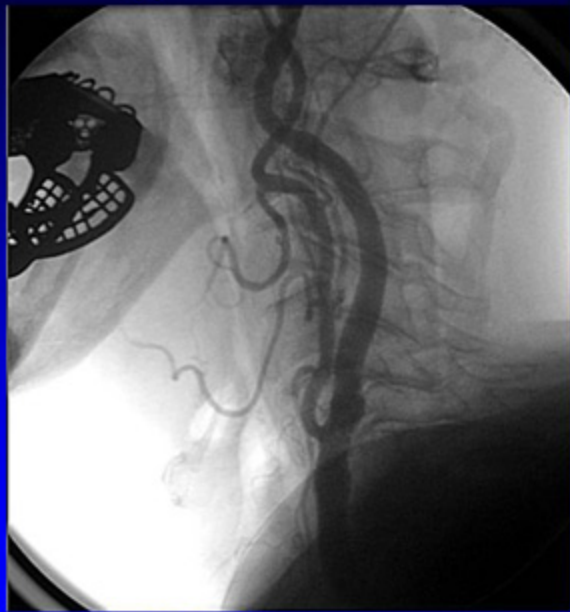


# Technique

## Guiding Catheter from a Distance

- Only attempt if anatomy at carotid bifurcation is straight forward
- Consider use of a buddy wire in the subclavian artery or external carotid artery for extra support

# Case History



## *Difficult Access*

- 71 year old male
- Severe CAD, LV dysfunction, chronic renal insufficiency, PAD, severe, symptomatic carotid disease
- Referred for carotid stenting



# Carotid Angiography

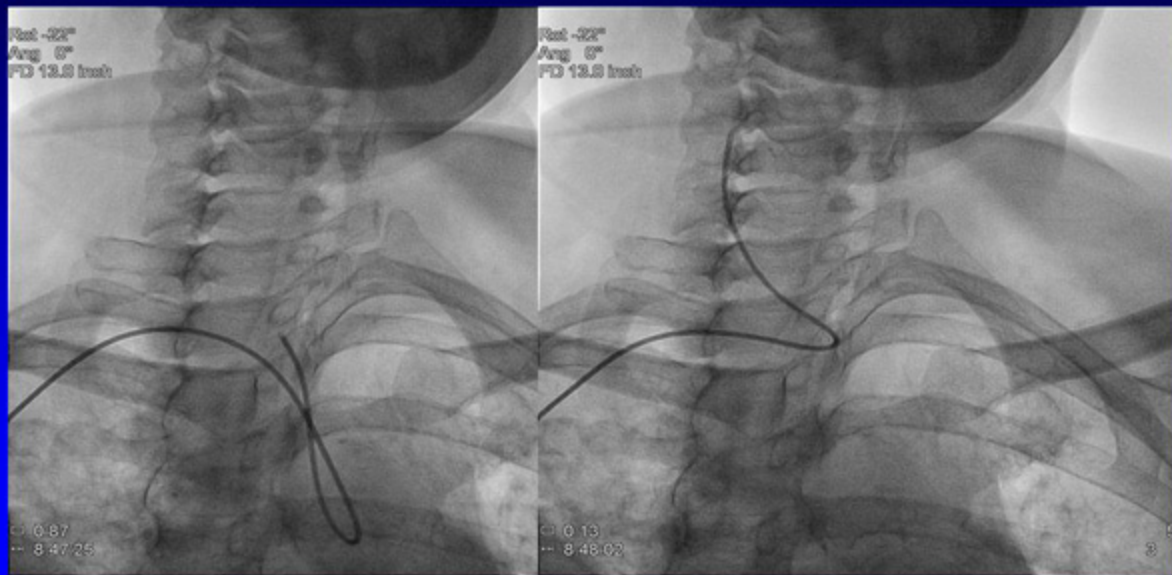


RICA



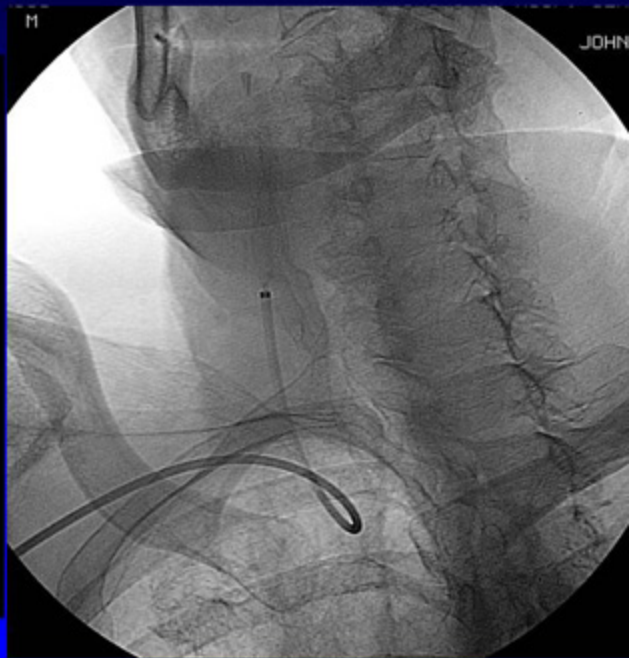
LICA

# Right brachial - Simmons 2

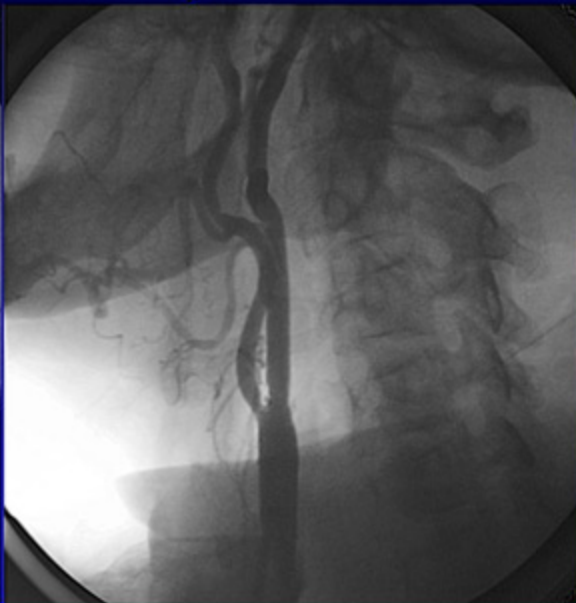
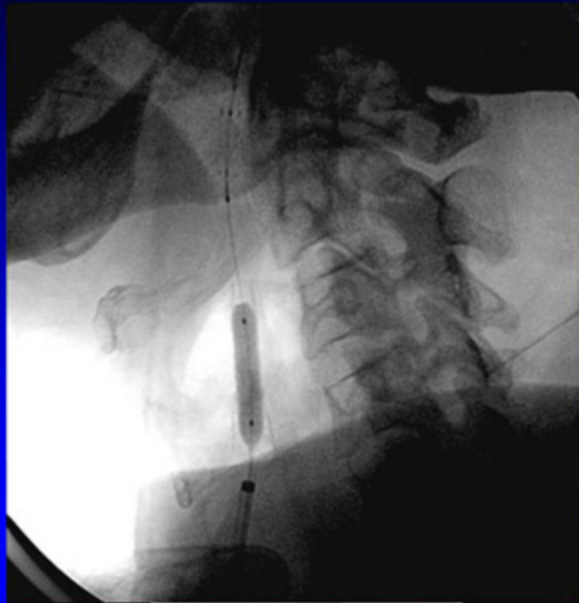


# Case History

- 0.035 inch Supracore guidewire into external carotid artery
- 6 Fr Shuttle sheath over guide wire into common carotid artery



# Case History



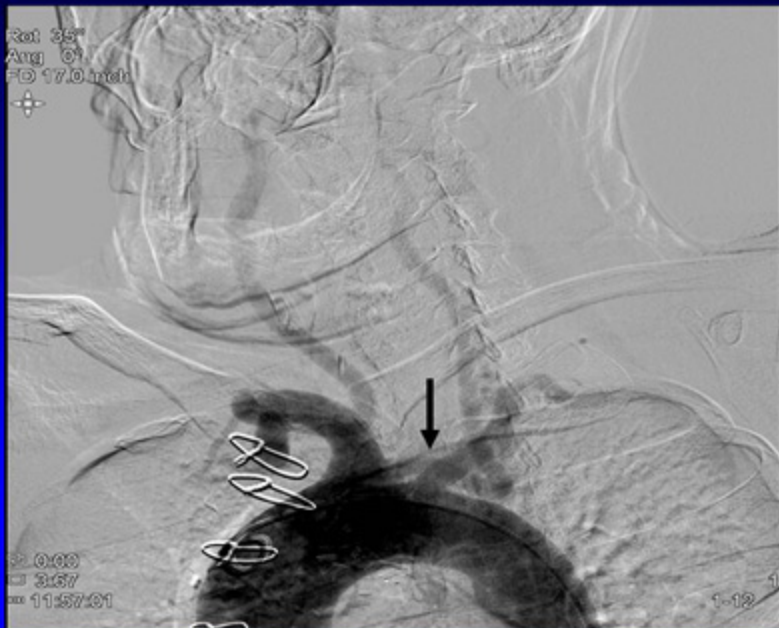
# Tailored Approach

## *Right Brachial/Radial Access*





# *Definitely Right Brachial/radial Access!*



## Final Thoughts

- Although a consistent approach is favored for CAS – one approach does not always fit all cases
- Modifying the approach or equipment to best fit the situation/anatomy will help minimize complications in the most very high risk cases