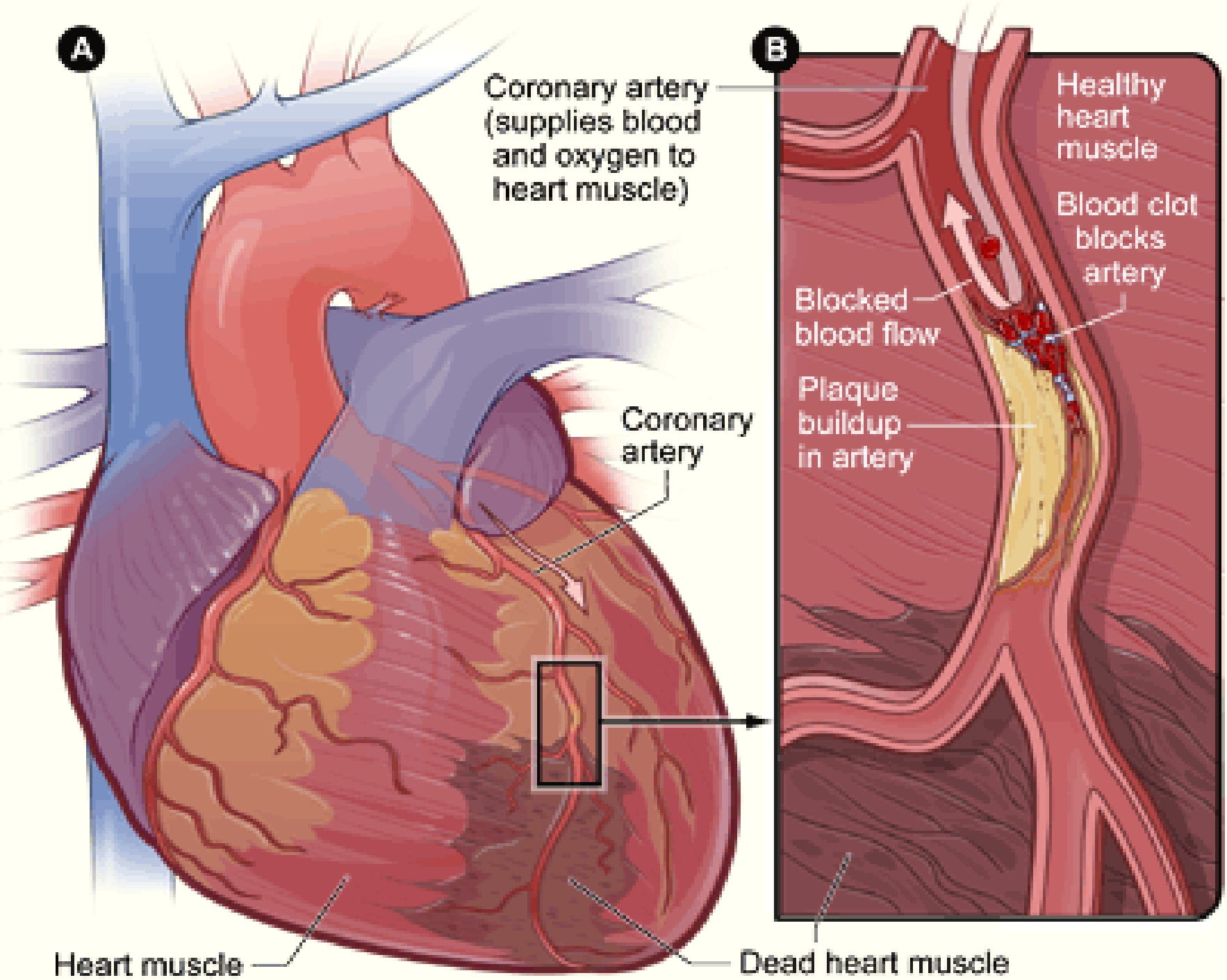


Classification of Coronary Lesions

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Value ??



**prediction of the course of the procedure
and complications**

*Multiple classification was used
to classify different lesions.*

1- The Mayo Clinic Risk Score

2- ACC/AHA lesion classification

3-The Society for Cardiovascular
Angiography and Interventions (SCAI) risk
score

The Mayo Clinic Risk Score used eight morphologic variables

1. Length
2. Total occlusion
3. Ostial lesion
4. Bifurcational lesion
5. SVG lesion
6. Thrombus containing lesion
7. Calcified lesion
8. Angled lesion

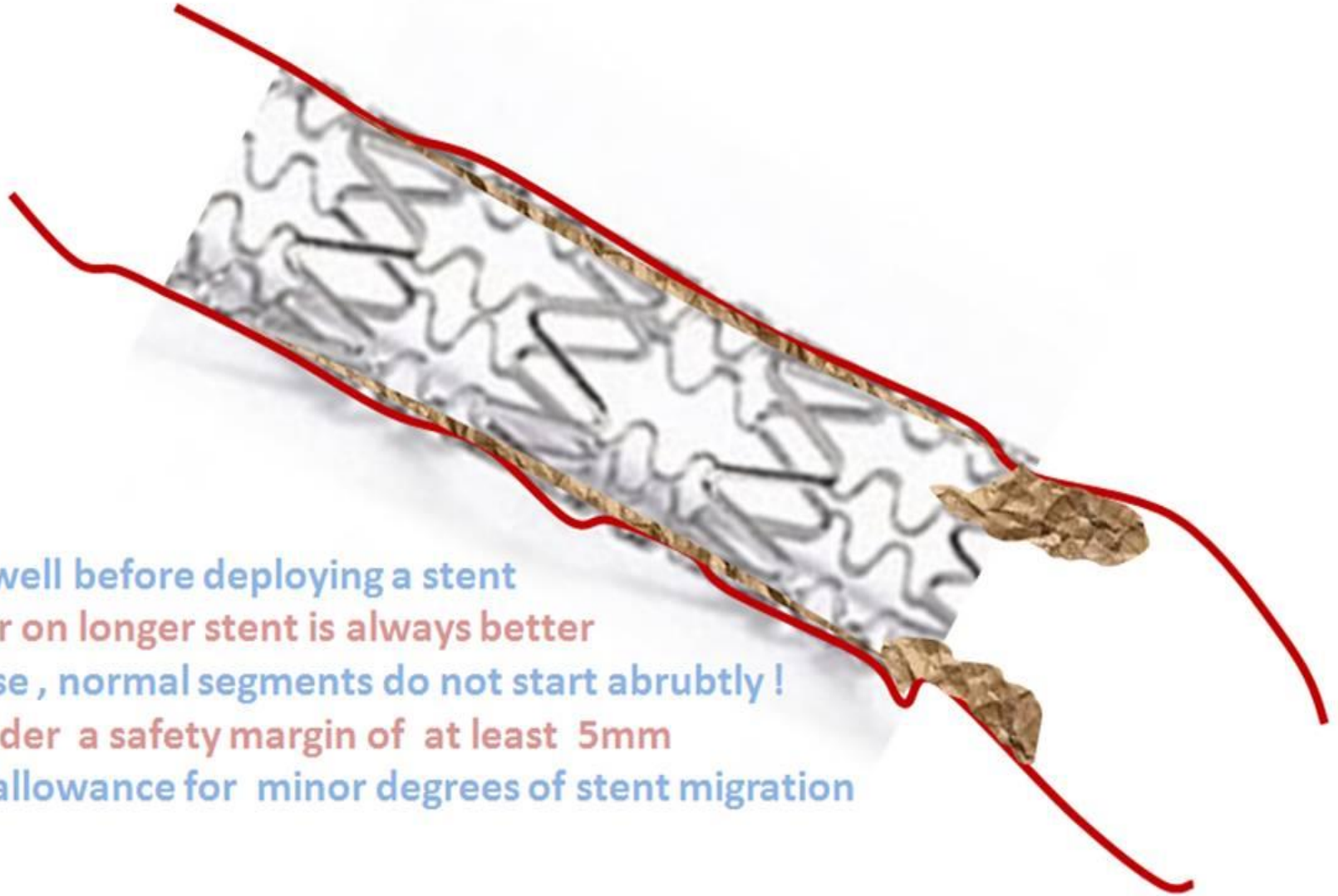
(1) Lesion Length

- *Focal - Discrete:* below (10 mm)
- *Tubular:* from (10- 20 mm)
- *Diffuse – long* (>20 mm)

long lesions increases the procedure and post procedure risk.

- (More metal = higher risk of instent restenosis)
- (More like hood to have overlapped stents)(not only metal but overlapped metal)
- (More like hood to miss lesion segment)
- (more likelihood for stent mal-deployment)
- Long lesion indicates large atherosclerotic burden and so more cardiac events

Incomplete plaque coverage : Prone for edge lesion and stent exit block



- Plan well before deploying a stent
- To err on longer stent is always better
- Realise , normal segments do not start abruptly !
- Consider a safety margin of at least 5mm
- Give allowance for minor degrees of stent migration

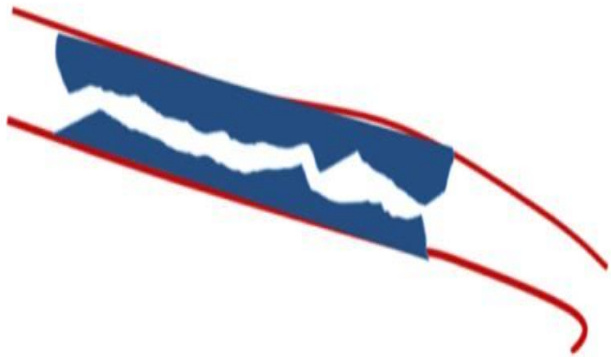
** Please remember current technology does not allow stent repositioning !*

- **A tandem lesion:** is two lesions close to each others with a normal segment in between. (*Like the bullets loaded in a tandem fashion in a gun*)... متتابع

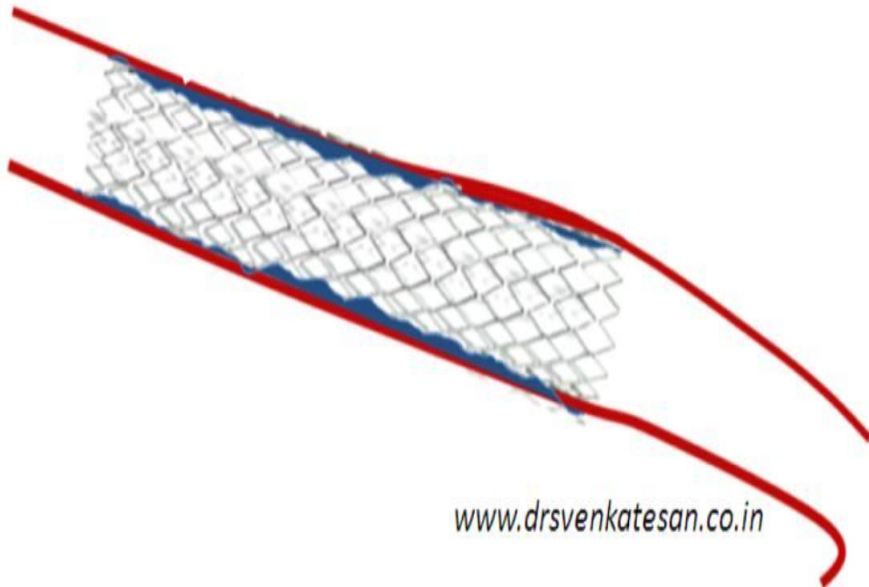
Multiple tandem lesions with ectasia



Tandem vs Long lesion

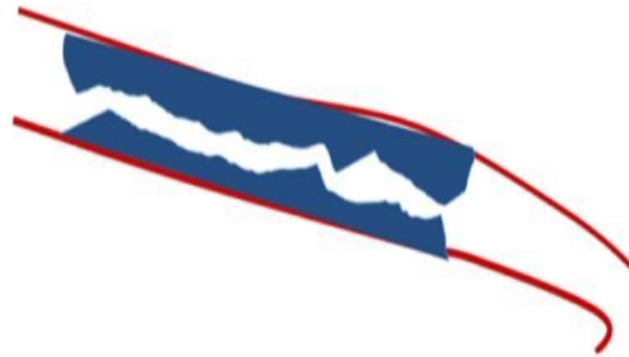


Long, diffuse lesions often well covered by stent than lesions in tandem!

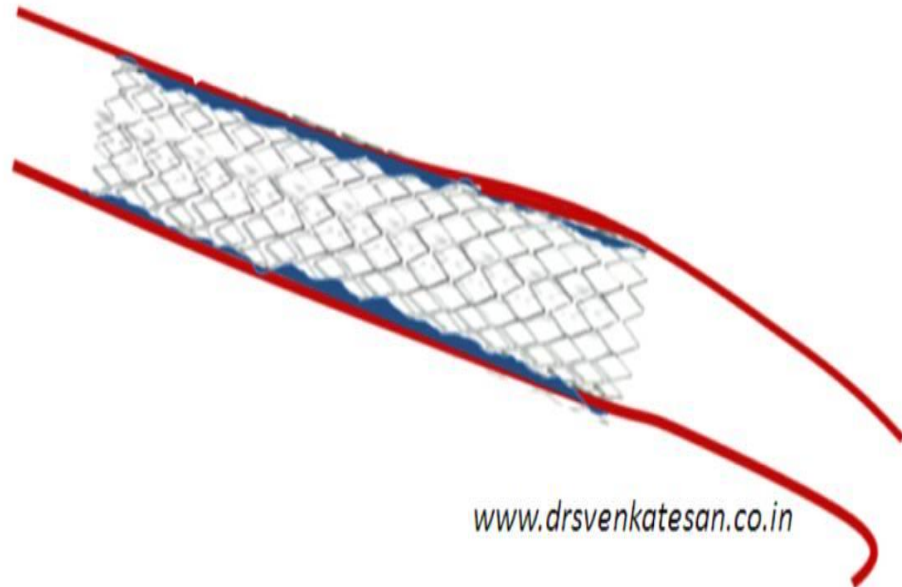


www.drsvenkatesan.co.in

Tandem vs Long lesion



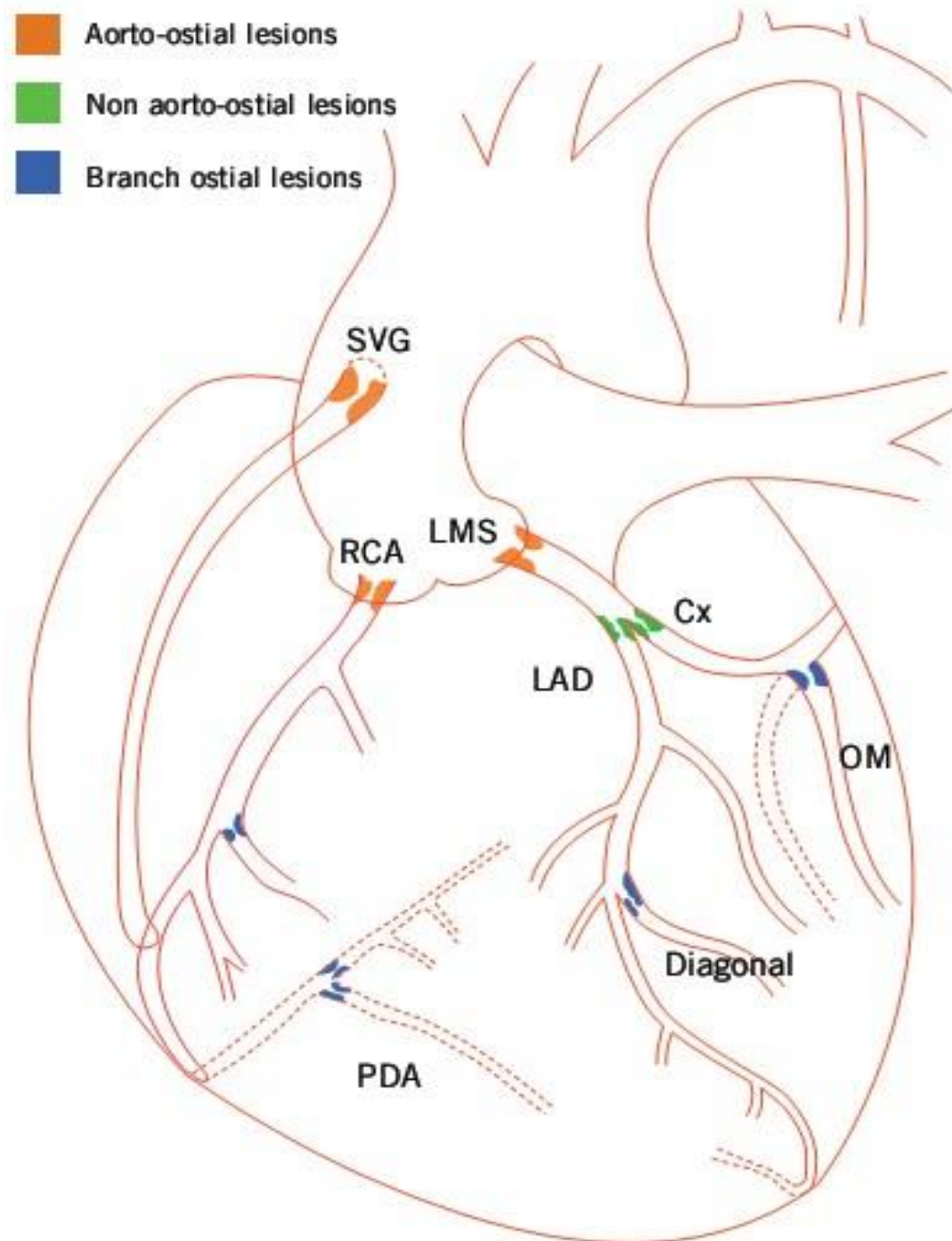
Long, diffuse lesions often well covered by stent than lesions in tandem!



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(2) Ostial lesion

- ❑ **Defined as** a lesion arising within 3 mm
- ❑ **classified by location**
- ✓ aorto-ostial (more RCA)
(more with radio link but actually atherosclerotic)
- ✓ non aorto-ostial,
- ✓ or branch-ostial



What's the challenge of Ostial location??

1. Usually fibrotic or calcified and prone to recoil due to the greater thickness of muscular and elastic tissue in the aortic wall. (usually dilatation is advisable).
2. Misinterpreted with Ostial spasm (IC nitrates- small cath-cusp gram- IVUS –CT)
3. More liable to in-stent restenosis.
4. Retrograde dissection is a life threatening condition and requires immediate surgical consultation.
5. Difficult visualization of the coronary ostium on cath removal and cuspopogram.

Aorta free-floating wire technique

(for aorta-ostial lesion only)

“Sepal Wire Technique” – A Novel Technique for Aorto-ostial
Left Main Stenting

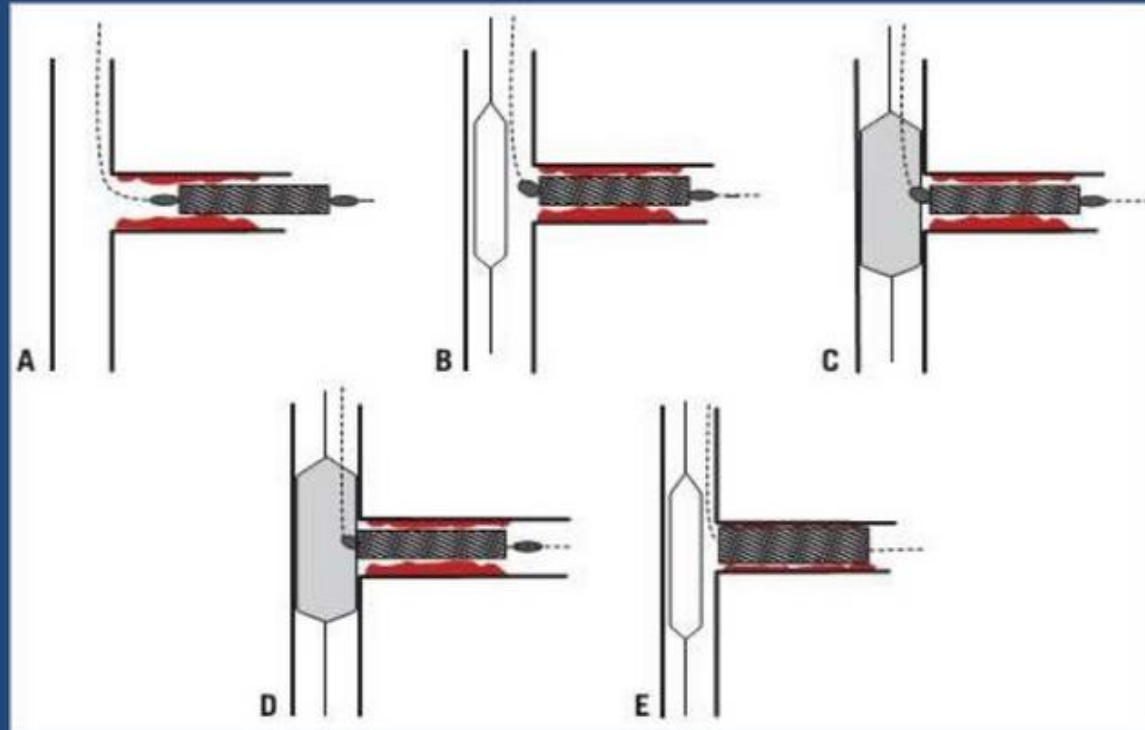
Chan et al. J INVASIVE CARDIOL 2011;23:211–212



The guide catheter is backed out of the ostium and the second wire is advanced into the aorta. This second wire acts as a marker for the ostium and prevents the guide from deeply engaging the vessel



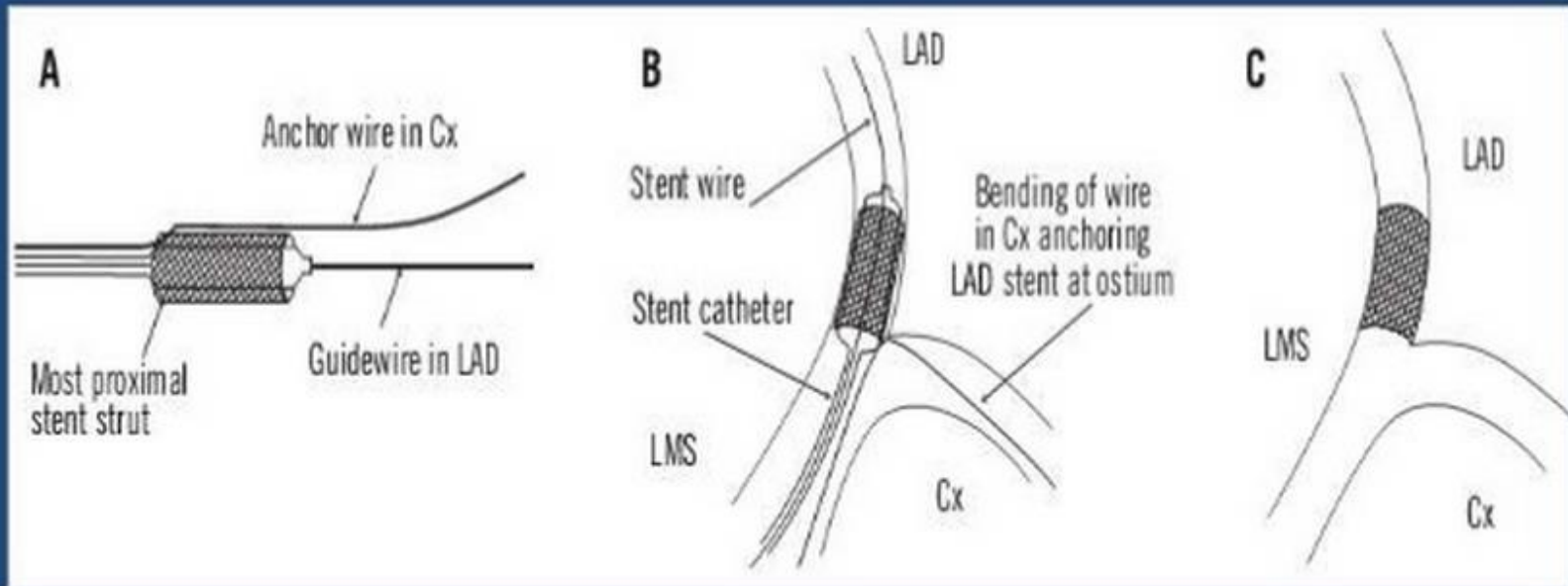
Stent draw-back technique



(a) The stent is advanced on the target vessel wire beyond the lesion; (b) a balloon is advanced over the second wire opposite the ostium of the target vessel; (c) the balloon is then inflated at low pressure (6-8 atm); (d) the undeployed stent catheter is pulled back against the inflated balloon until a dent is seen; (e) both balloons are deflated.

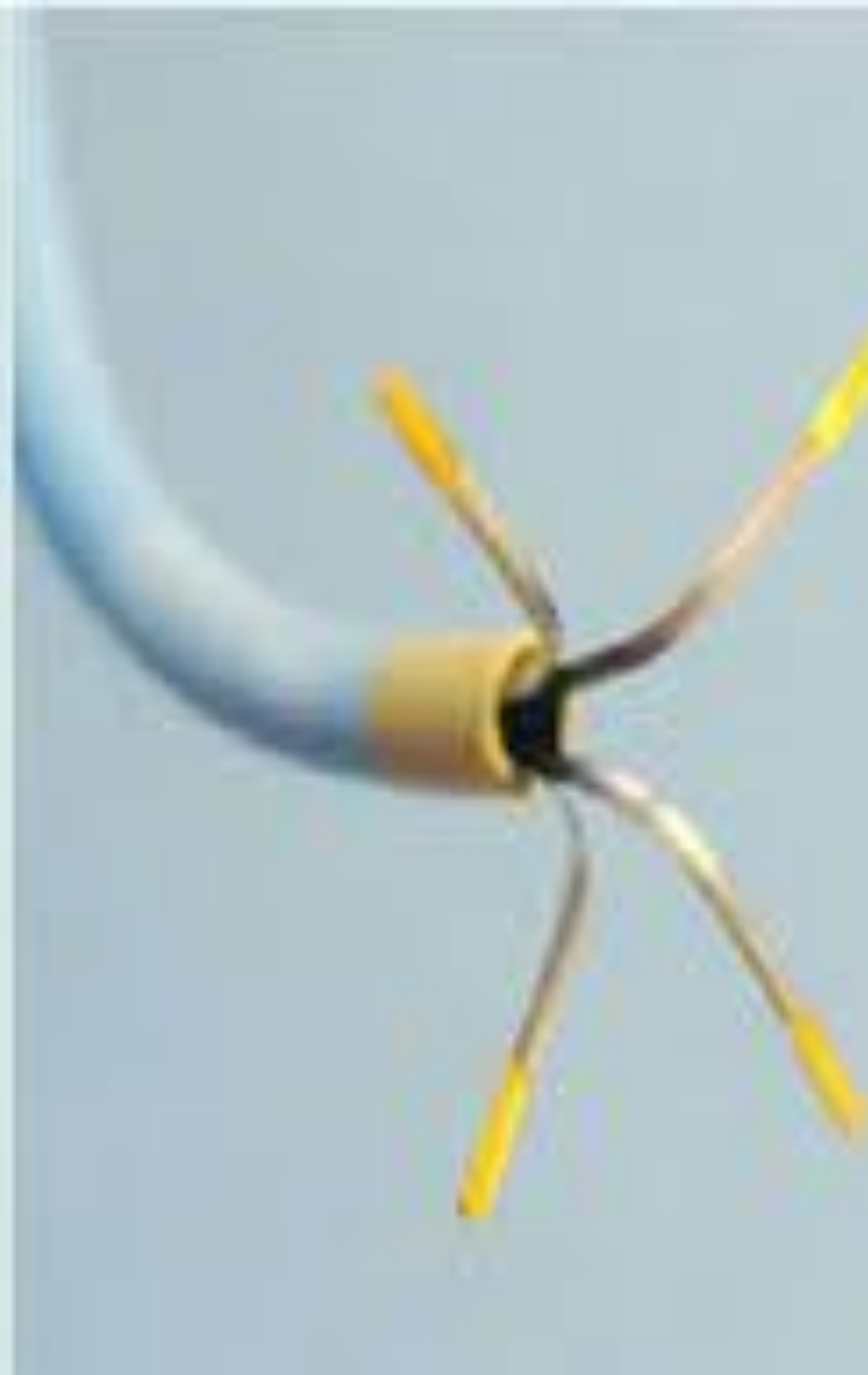
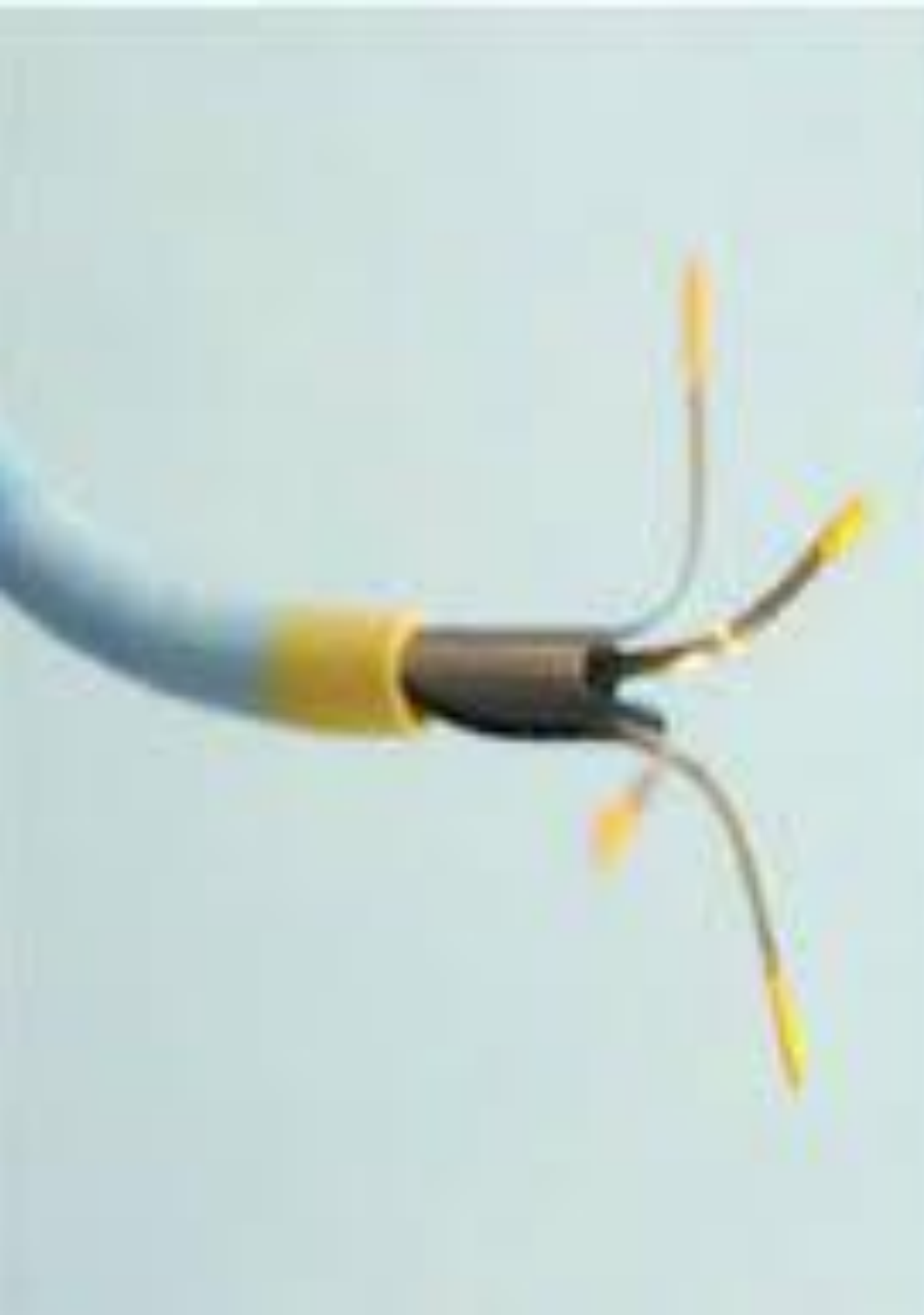
Schwartz L, Morsi A. J Invasive Cardiol 2002;14:66-71.

Szabo or 'tail-wire' or 'anchor-wire' technique



(a) proximal end of the anchor wire in the Cx is threaded through the most proximal strut of the crimped LAD stent; (b) stent advanced into lesion until the anchor wire prevents further onward motion. Stent balloon is then inflated at 6-8 atm to allow easy removal of anchor wire; (c) after high-pressure inflation showing satisfactory position.

TCT 2005. Szabo S et.al. Am J Cardiol 2005;96:212H.



3- Thrombus burden lesion

More risk of

- No reflow
- Distal embolization.
- Thrombus shift to aside branch.
- Thrombus prolapse and lemon seed effect.
- increase the risk of instent thrombosis.

Although conventional angiography is a relatively insensitive method for detection of coronary thrombus

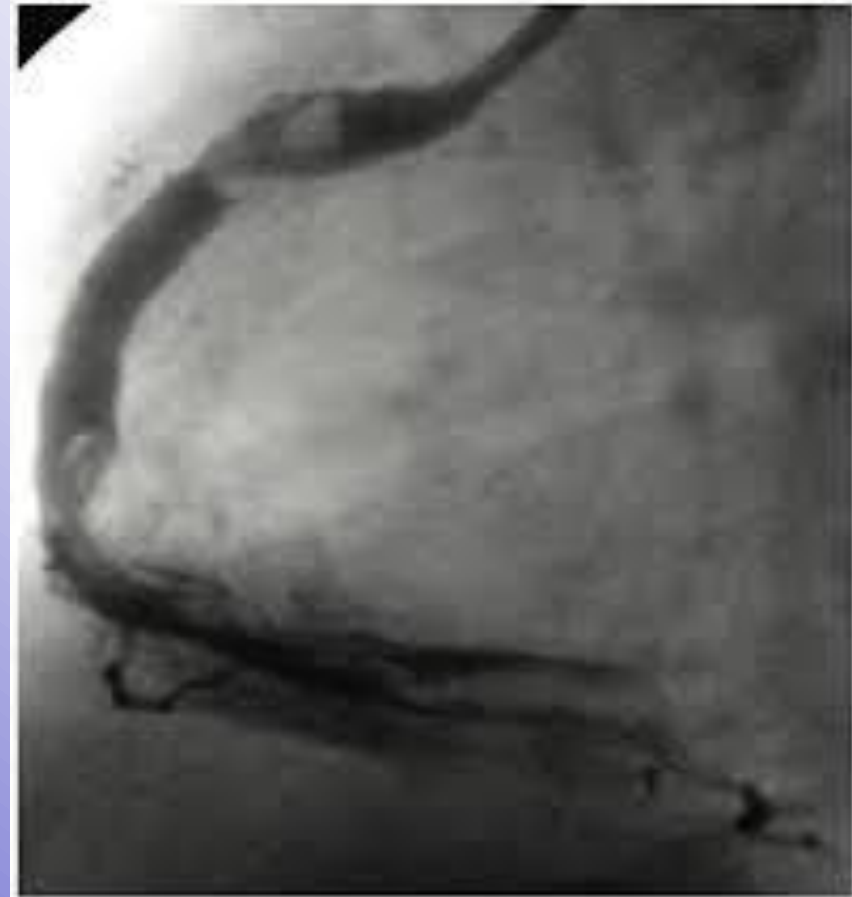


Figure 4. Post guiding catheter aspiration angiogram of the right coronary artery (RCA) showing appreciable reduction of thrombus from the proximal RCA, but persistent thrombus in the distal RCA

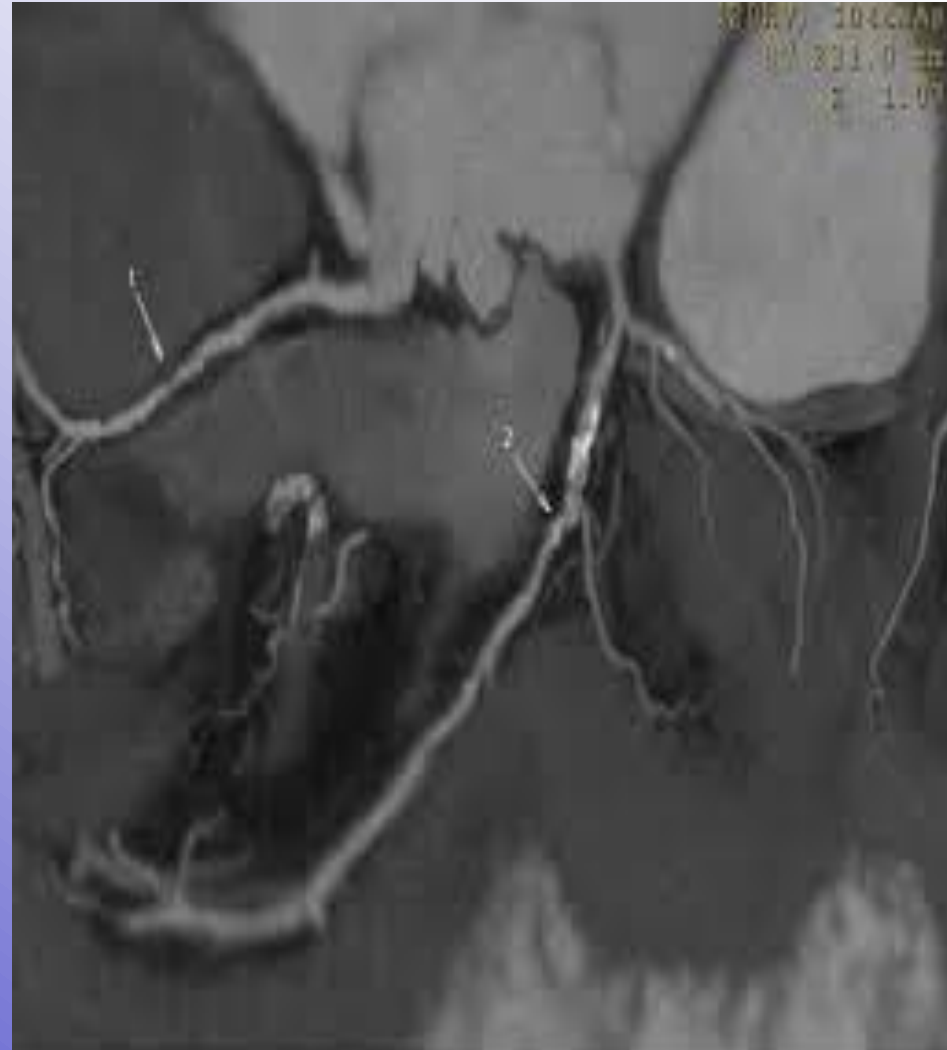
4- calcified lesions

- **More risk of:**

Non dilatatable lesion

Risk of dissection and perforation

Conventional angiography is moderately sensitive for the detection of extensive lesion calcification but is less sensitive for detection of milder degrees of lesion calcification •



(5) TOTAL OCCLUSION

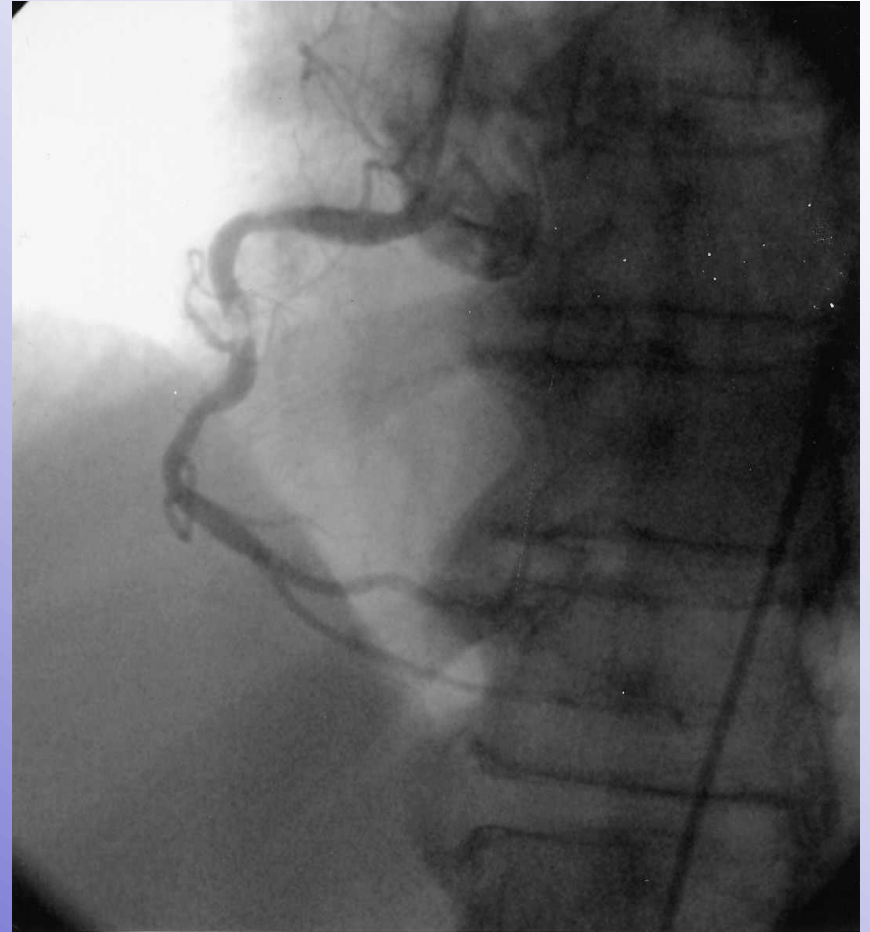
- Difficulty in passage of a guidewire across the occlusion depends on the occlusion duration and on certain lesion morphologic features, such as bridging collaterals, occlusion length of more than 15 mm, and absence of a “nipple” to guide advancement of the guidewire • presence of a total occlusion remains one of the major reasons for referral of patients for coronary bypass surgery

- Higher
Failure
rate



(6) Angulated Lesions

- **Risk for:**
 - ✓ Dissections .
 - ✓ Inability to deliver the stent.
 - ✓ Straightening of the vessel that may predispose to late stent fracture.



↑ complexity

- Angel ≤ 45
- Angel () 45- 90
- Angel ≥ 90



(7) Bifurcation Lesions

- *The optimal strategic approach for bifurcation lesions remains controversial. But In general, placement of one stent is preferable to stent placement in both the parent vessel and side branch*

- Risk for

Side branch occlusion during PCI with plaque shift.

- It is relates to the relative size of the parent and branch vessel, the location of the disease in the parent vessel, and the stenosis severity in the origin of the side branch.

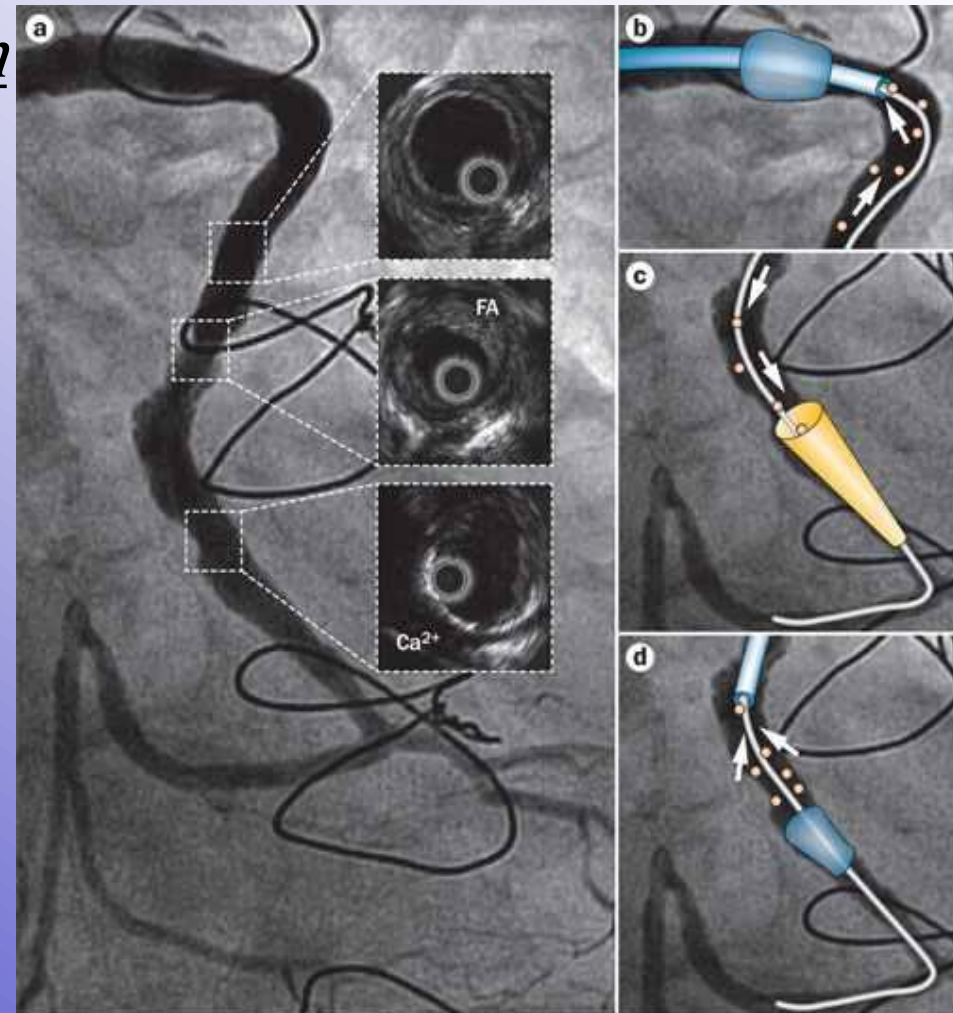
(8) Degenerated Saphenous Vein Grafts

- 25% of SVGs occlude within the 1st year after CABG.

- **Risk of**

- ✓ Restenosis
- ✓ Distal embolization
- ✓ Perforation and rupture

So DES and embolic protection devices are needed



Characteristics of ACC/AHA Type A, B and C lesions

TYPE A LESIONS: (High success, > 85%; low risk)

Discrete (<10 mm length)

Concentric

Readily accessible

Nonangulated segment <45 degrees

Smooth contour

Little or no calcification

Less than totally occlusive

Not stial in location

No major branch involvement

Absence of thrombus

TYPE B LESIONS (Moderate success, 60 to 85%; moderate risk)

Tubular (10-20 mm length)

Eccentric

Moderate tortuosity of prox. segment

Moderately angulated, 45-90°

Irregular contour

Moderate to heavy calcification

Ostial in location

Bifurcation lesions requiring double guidewires

Some thrombus present

Total occlusion < 3 months old

TYPE C LESIONS (low success, < 60%; high risk)

Diffuse (>2 cm length)

Excessive tortuosity of prox. segment

Extremely angulated, >90 degrees

Inability to protect major side branch

Degenerated vein grafts with friable lesions.



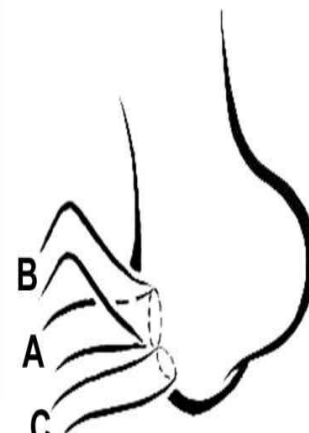





Total occlusion > 3 months old

What ACC/AHA classification added to The Mayo Clinic Risk Score

- *Accessibility*
- *Eccentricity*
- *Proximal lesion tortuosity*

Coronary lesion Accessibility

Starting from iliac vessels to coronary ostia orientation.

<p>A</p> <p>Normal Left Main Standard Choice</p>  <p>XB, EBU or Amplatz Left</p> 		<p>A Normal origin</p> <p>Standard choice Judking Right</p> <p>Poor back up Amplatz Left 1, 2 or Amplatz Right 1, 2</p> 
<p>B</p> <p>Short Left Main Standard Choice</p>  <p>Judking JL</p> 	<p>B Shepherd's crook origin</p> <p>Standard choice Internal Mammary or Amplatz Left 1, 2</p> 	<p>C Low origin with horizontal course</p> <p>Standard choice Judking Right or Amplatz Right 1, 2</p> 

Eccentricity

- Concentric:

circumferential

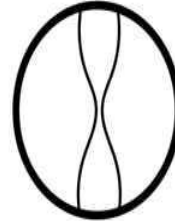
- Eccentric:

- One side

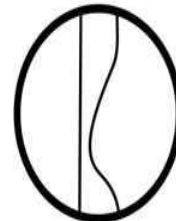
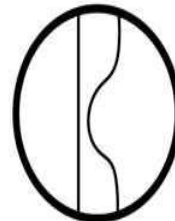
- I: smooth and broad neck.

- II: Irregular surface and/or narrow neck

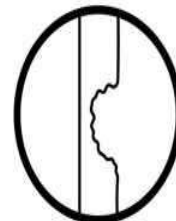
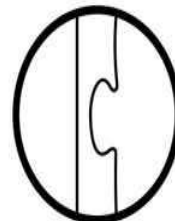
- Complex or irregular



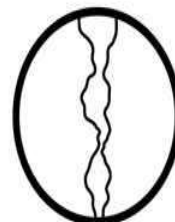
Concentric stenosis



Eccentric stenosis (Type I)



Eccentric stenosis (Type II)

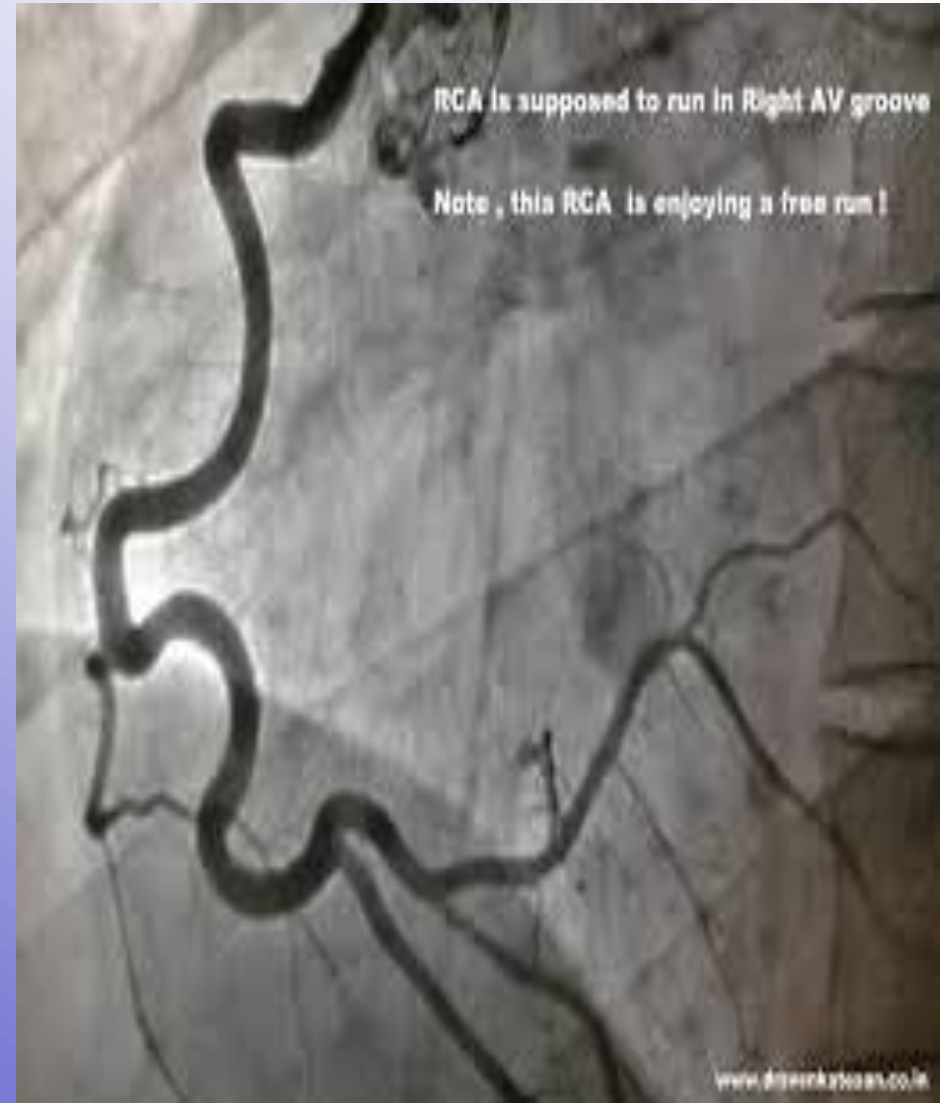


Multiple irregularities

Tortousity

- **Risk for:**

- ✓ Dissections .
- ✓ Inability to deliver the stent.
- ✓
- ✓ Straightening of the vessel that may predispose to late stent fracture.



Characteristics of SCAI Type I-IV lesions

SCAI Type I (Highest success expected, Lowest risk)

Does not meet criteria for ACC/AHA Type "C" Lesion

Patent

SCAI Type II

Diffuse (>2 cm length)

Excessive tortuosity of proximal segment

Extremely angulated segments, >90 degrees

Inability to protect major side branches

Degenerated vein grafts with friable lesions.

Patent

SCAI Type III

Does not meet criteria for ACC/AHA Type "C" Lesion

Occluded

SCAI Type IV

Diffuse (>2 cm length)

Excessive tortuosity of proximal segment

Extremely angulated segments, >90 degrees

Inability to protect major side branches

Degenerated vein grafts with friable lesions.

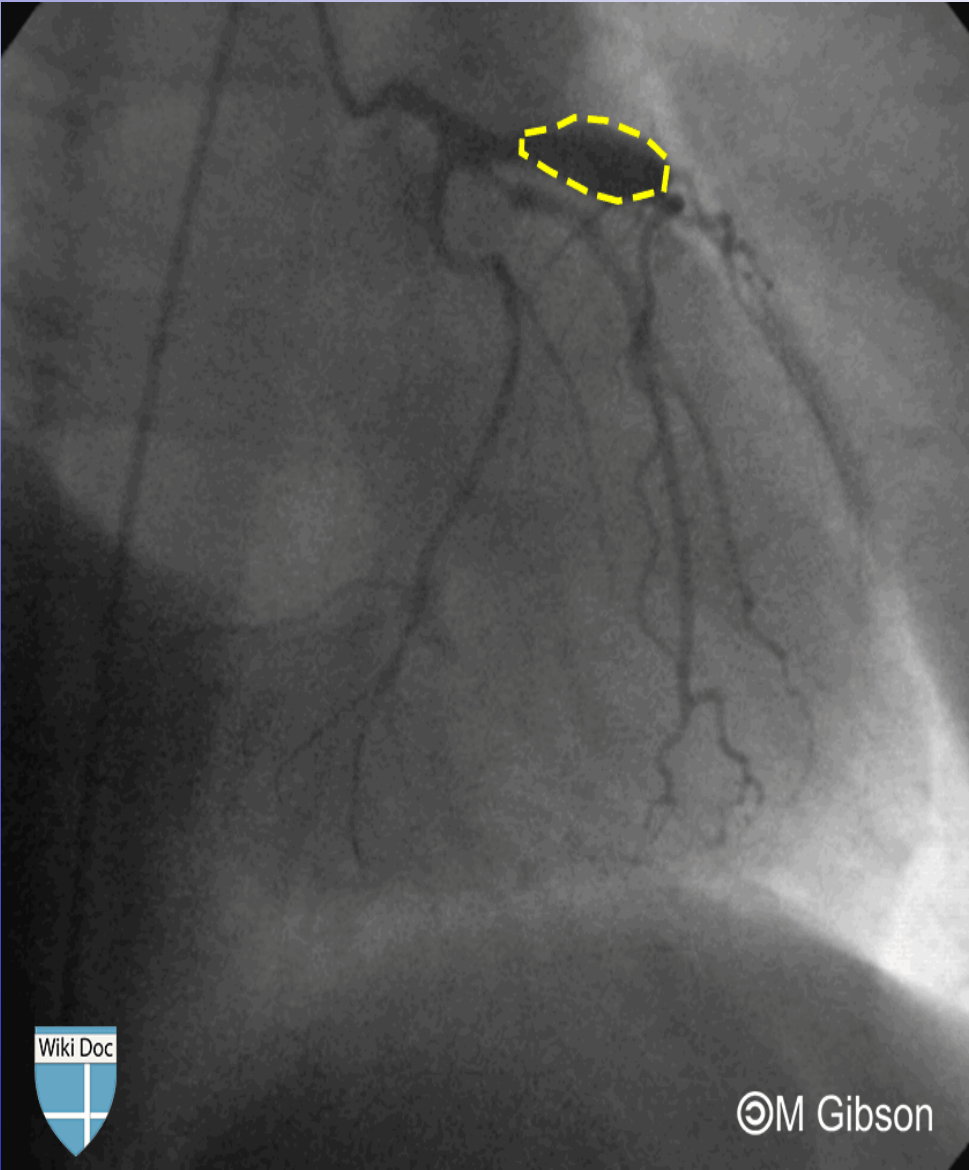
And Occluded

Or "Occluded more than 3 months" alone

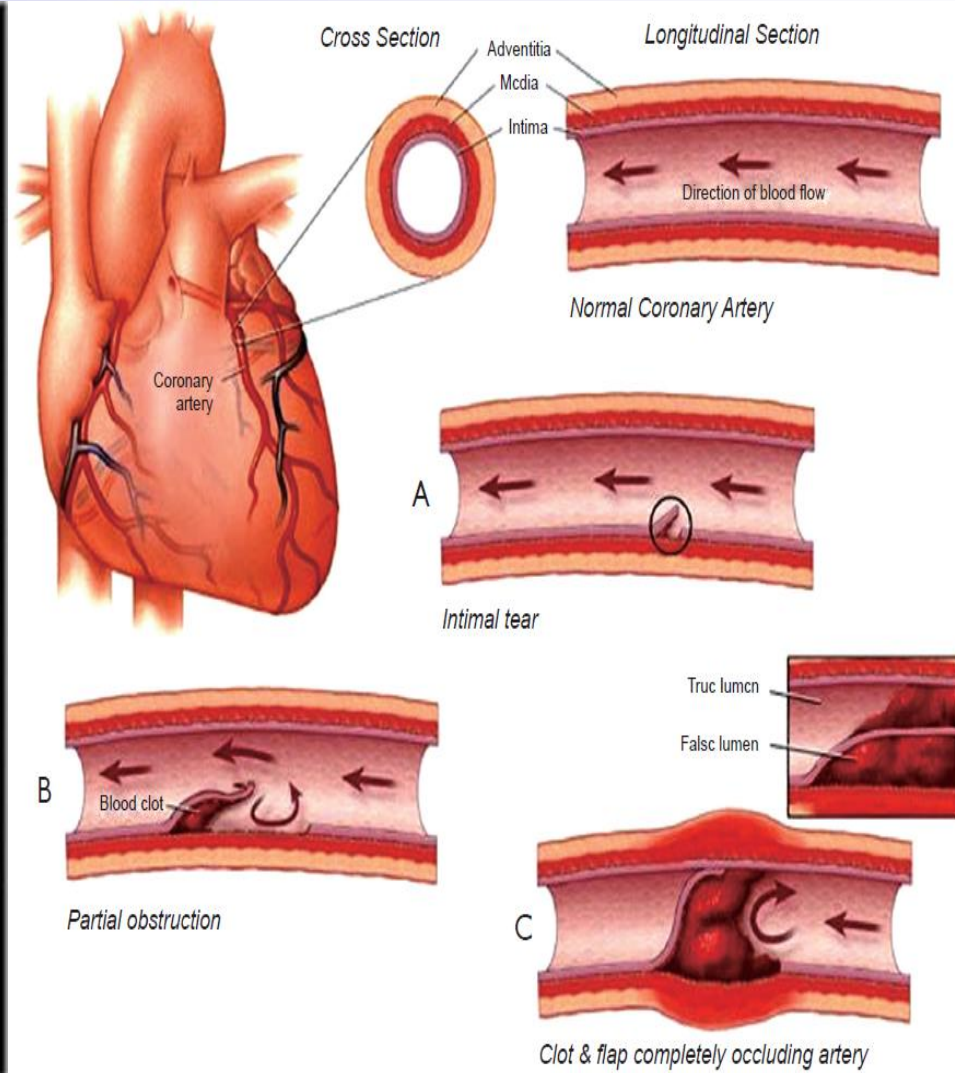
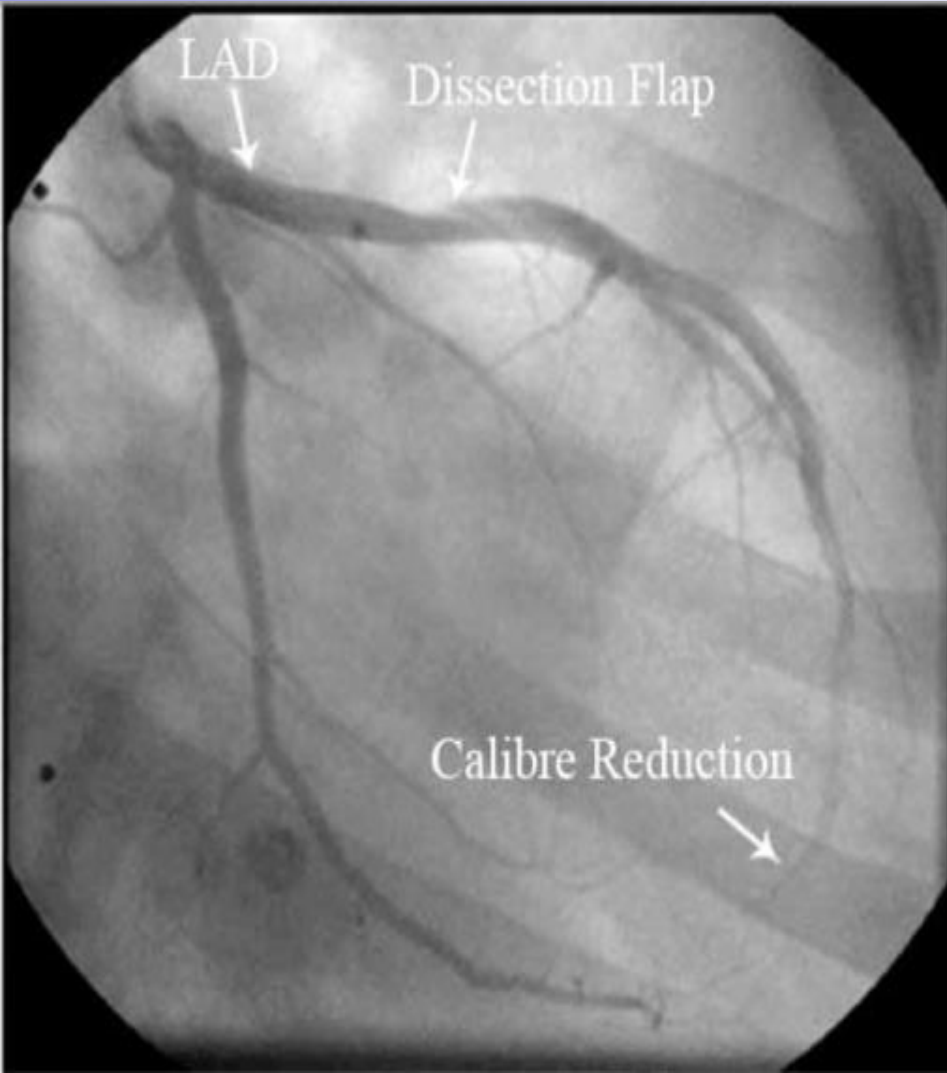
SCAI classification

- *Patent* non c
- *Patent* c
- *CTO* non C
- *CTO* - c

Coronary artery aneurysm



Ulcerated lesion and intimal flap



Summary

- *Assessment of the lesion criteria and so its complexity is an ideal predictor of the procedure course and post procedure outcome.*
- As any pathological description
Size (L&W) – Site (ostial - bifurcational – Graft) – shape (ulcerated, flap, aneurysm) - surface – Cut section (eccentricity) – Content (Thrombus or calcification) – course (accessibility – tortuosity – angulation)

