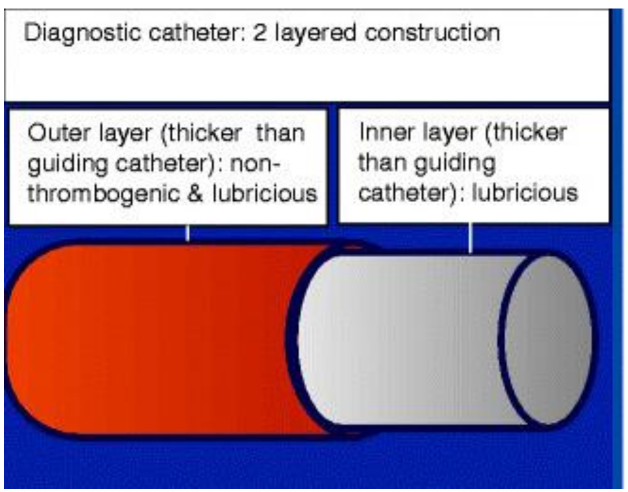
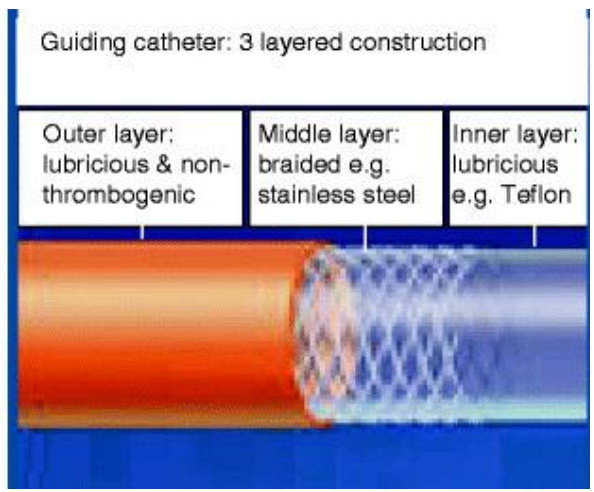
GUIDE CATHETERS FOR CORONARY INTERVENTION

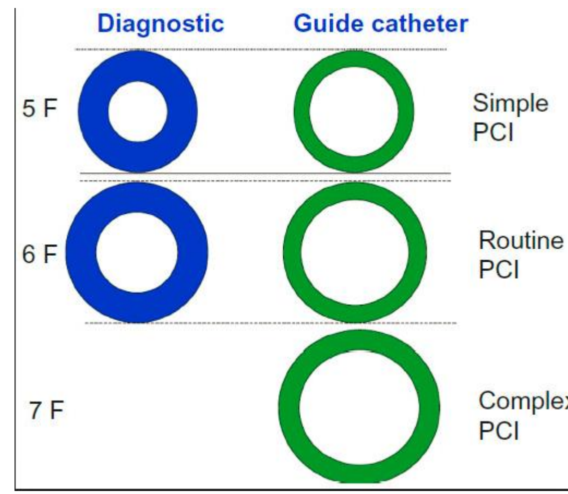
Sreeyam Srikanth

Diagnostic vs Guide catheters

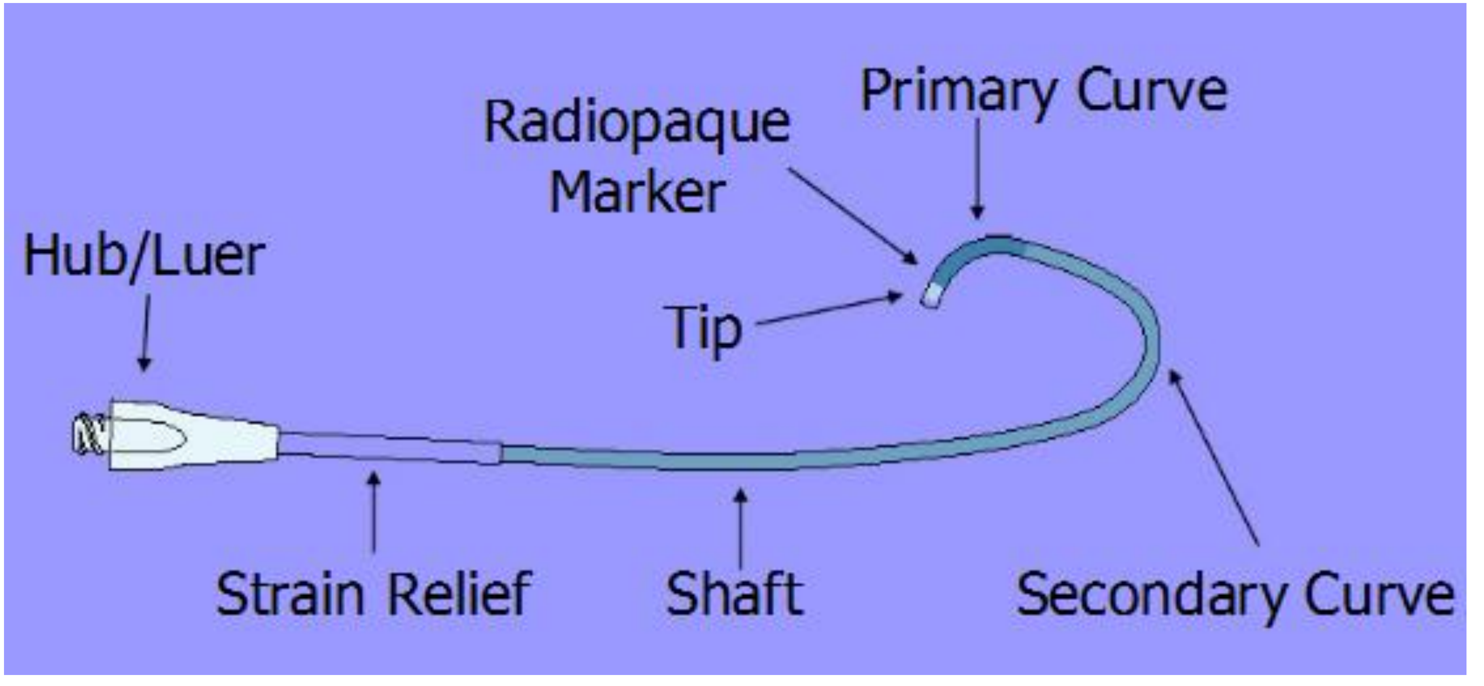
- Stiffer shaft
- Larger internal diameter (ID)
- Shorter & more angulated tip (110º vs. 90º), non tapering a traumatic tip
- Re-enforced construction (3 vs. 2 layers).







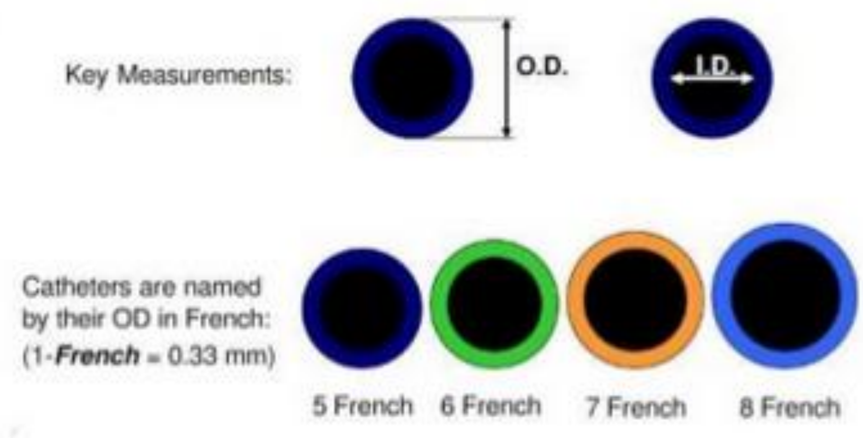
Parts of a Catheter



- Usual length= 100 cm

Catheter size

- Outer diameter = French size (5-10F)
- Inner diameter = Inches
- Length in cm (usually 100 cm)



Cross section of catheter

Outer jacket	Stainless Steel braid	Inner Liner
Strength Support/Flexibility Kink resistance **Polyurethane or Polyethylene**	1:1 Torque Kink resistance **Stainless steel/ Kevlar**	Internal lumen Smooth or lubricious material Device compatibility **PTFE (Polytetrafluoroethylene) like Teflon**

Important features of a guide catheter

- Preformed curves & configurations, optimum support
- Adequate lumen & device compatibility
- Easy to handle, torque control, kink resistance
- A traumatic tip

Side hole vs no side hole

Side holes are useful where the pressure gets frequently damped as in RCA interventions, CTO interventions or sole surviving artery or left main interventions

Advantages

- Prevent catheter damping (occlusion of the coronary ostium)
- Allow additional blood flow out of tip, to perfuse the artery.
- Avoid catastrophic dissections in the ostium of the artery

Disadvantages

- False sense of security because now, aortic pressure, and not the coronary pressure is being monitored.
- Suboptimal opacification
- Reduction in back up support provided because of weakness of catheter shaft and the kinking at side holes

Guide catheters

- ADROIT® Guiding Catheter-
- VISTA BRITE TIP® Guiding Catheter

Cordis

- Wiseguide™ Guide Catheter
- RunWay™ Guide Catheter
- Mach 1™ Guide Catheter
- Convey Guiding Catheter

Boston scientific

- Launcher Coronary Guide Catheter
- Sherpa NX Active Coronary Guide Catheter
- Sherpa NX Balanced Coronary Guide Catheter

Medtronic

Guide catheters sizes

Guide/Manufacturer		*Outer lumen size (French)*			
		5	*6*	*7*	*8*
Launcher / Medtronic	*Inner Lumen (in)*	0.058	0.071	0.081	0.090
Vista Brite Tip/Cordis		0.056	0.070	0.078	0.088
Mach1/Boston Scientific		NA	0.070	0.081	0.091
Viking/Guidant Abbott		NA	0.068	0.078	0.091
Wiseguide/Boston Scientific		NA	0.066	0.076	0.086

Guide catheters are available as standard, large and giant catheters based on the internal diameter

Table 7.2 Internal diameters of standard, large, and giant lumen guiding catheters

French	Standard (in.)	Large (in.)	Giant (in.)
6	≤0.061	0.062–0.065	≥0.066
7	≤0.071	0.072–0.075	≥0.076
8	≤0.079	0.080–0.085	≥0.086
9	≤0.089	0.090–0.096	≥0.096
10	≤0.099	0.100–0.107	≥0.108

Guide selection

- Diagnostic curve selection
- Size of the ascending aorta
- Origin and takeoff of the target artery
- Degree of tortuosity and calcification of the coronary artery segment proximal to the target area
- Device to be utilized during intervention

Smaller vs larger catheter

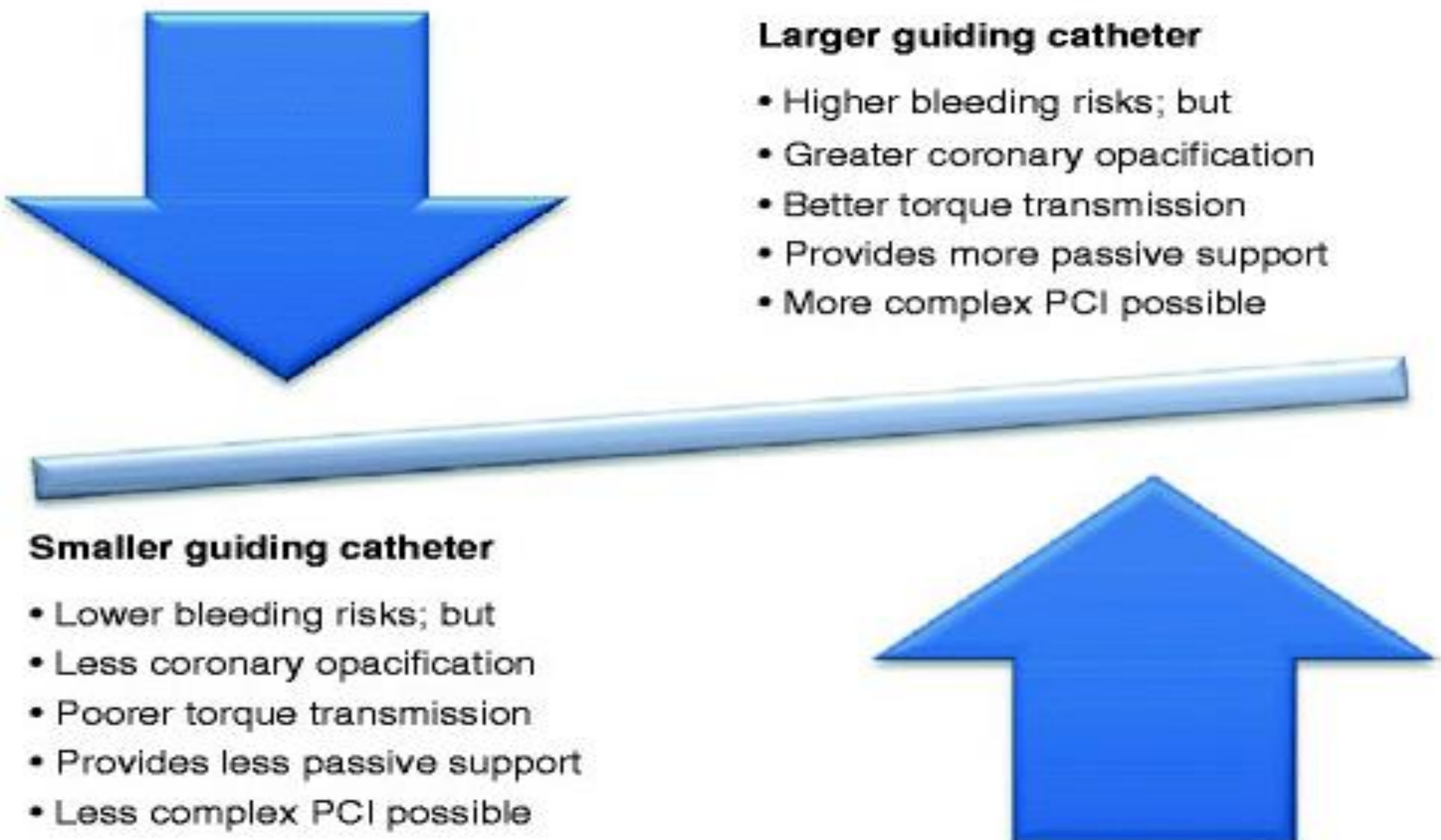


Table 7.1 Advantages and disadvantages associated with the size of the guiding catheter

	≤5 Fr	6 Fr	≥7 Fr
Advantages	Smaller puncture	Smaller puncture	Increased support
	Small vessel access	Small vessel access	Improved visualization
	Radial access	Radial access	Increased torque
	Deeper engagement possible for active support	Deeper engagement	Facilitate the use of 2 balloons (kissing)
	Smaller quantity of contrast		Allows the use of any covered stent
	Improved patient comfort		
Disadvantages	↓ passive support	↓ support	Larger puncture site/recovery time
	↓ visualization	↓ visualization	Less radial access possible
	↓ torque	↓ torque	Pressure dampening
	Device limiting (no thrombectomy, no simultaneous balloon inflation (kissing) technique possible, no Rotablator)	Device limiting	Increased contrast usage
			Increased risk of ostial dissection

Selection of guiding catheter

- Size
- Shape/curve
- Length

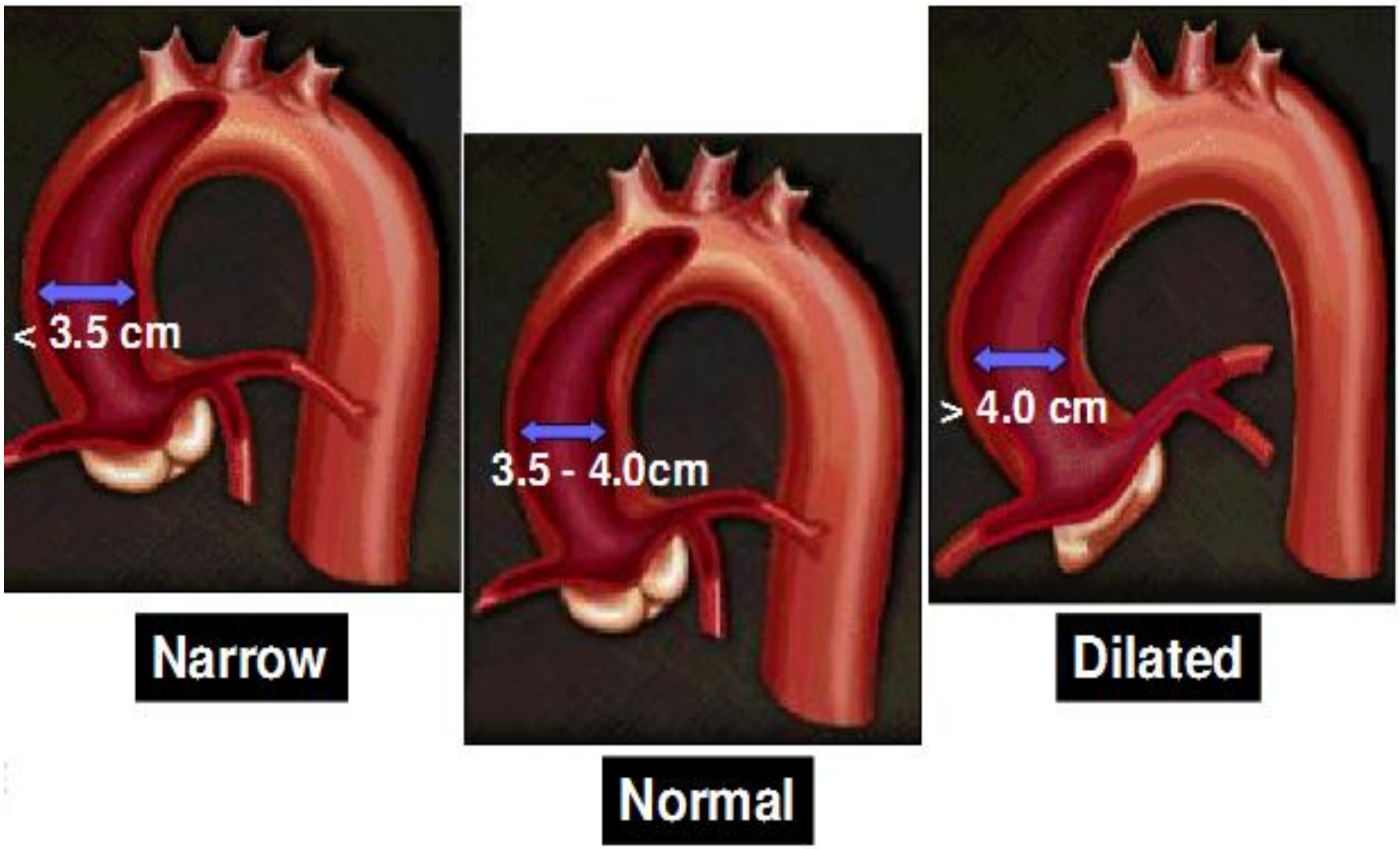
Size of the catheter

Catheter Size	**Devices**	**Techniques**
5Fr	**Balloons<5 mm** **Stents<4.5 mm** **IVUS** **Rotablator1.25 mm burr**	No Kissing Balloon
6 Fr	**All Coronary balloons** **All Coronary stents** **Cuttinng Balloon** **Rotablator <1.5 mm** **CSI orbital atherectomy 1.25 mm** **Protection device** **Guideliner**	Kissing Balloon
7Fr	**Rotablator1.75 mm** **Guideliner** **Trapping balloons**	Simultaneous Kissing Stent
8Fr	**Rotablator 2 mm** **Guideliner** **Trapping balloons**	Trifurcation stenting

Curve selection factors

- Aortic Width
- Coronary Anatomy
- French Size
- Active vs. Passive Support
- Native Coronary vs. CABG
- Amount of Calcium in Target Vessel

Aortic width



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Back-Up Support

- Ability of the guiding catheter to remain in position and provide a stable platform for the advancement of interventional equipment
- There are 3 main types of back up support
  - Passive
  - Active
  - Balanced

Passive support

- Strong support given by
  - inherent design of a guide with good back-up against opposite aortic wall
  - stiffness from manufactured material

- Additional manipulation is generally not required
- Mainly passive
  - Amplatz

Active support

- Active support is typically achieved by

1. Manipulation of the guide - into a configuration conforming the aortic root
2. Deep-Seating - Intubation with deep engagement of the guide into the coronary vessels

Balanced Support

- Rely on the inherent property of shaft and shape for coaxiallity, but can be manipulated in cases requiring extra support
    - Judkins
    - EBU

	Requires precise curve selection and sizing	Requires large ostia	Requires disease free ostia	Take-off orienttion must match curve	Width of aorta must match curve
Active Support	No	Yes, unless sideholes used	Yes	No	No
Passive Support	Yes	Indeterminate	Indeterminate	Yes	Yes

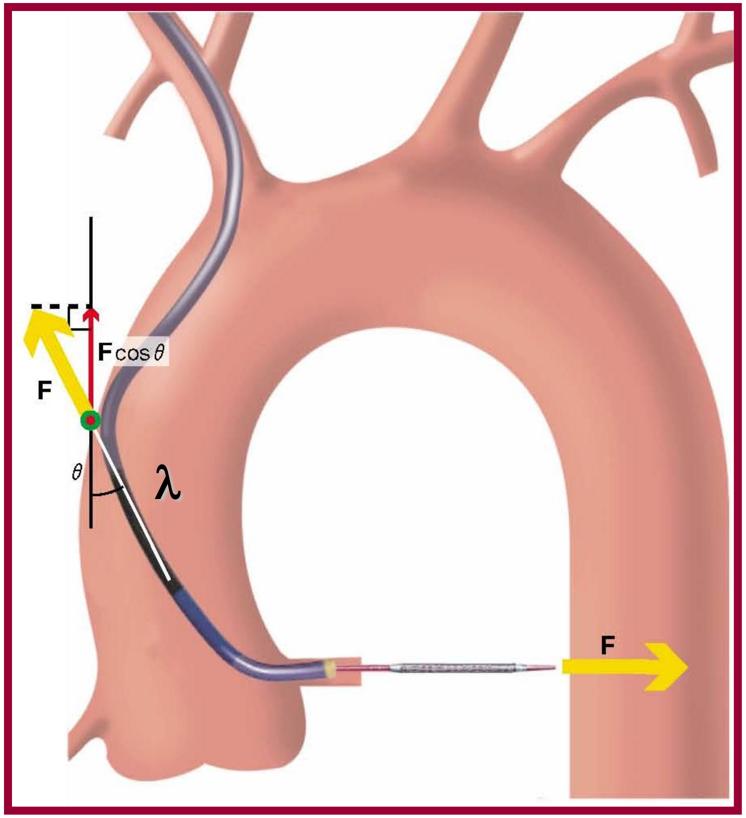
Determinants of back up support

- 3 factors
- Catheter size
- Angle theta of the catheter on the reverse side of aorta
- Contact area

Determinants of back up support

- Role of θ – If θ is larger and close to 90°

the backup force is greater

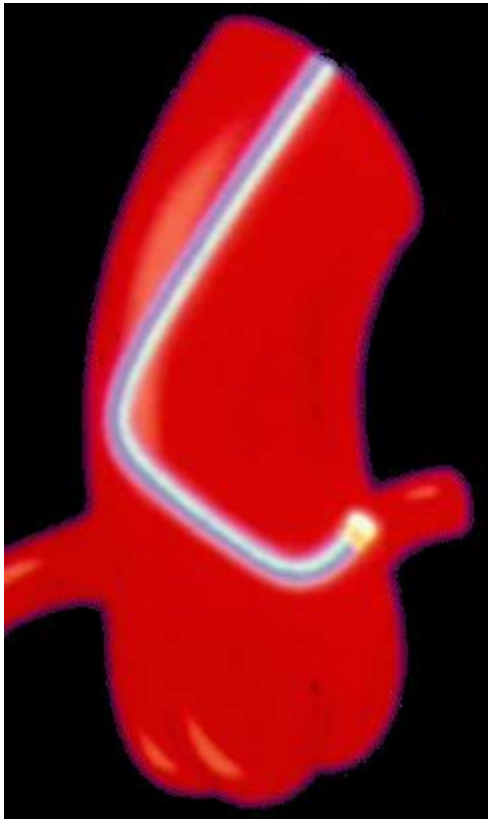


- If $F\cos\theta \le \lambda$ (static friction), the guiding catheter works.
- If $F\cos\theta > \lambda$, system collapses.

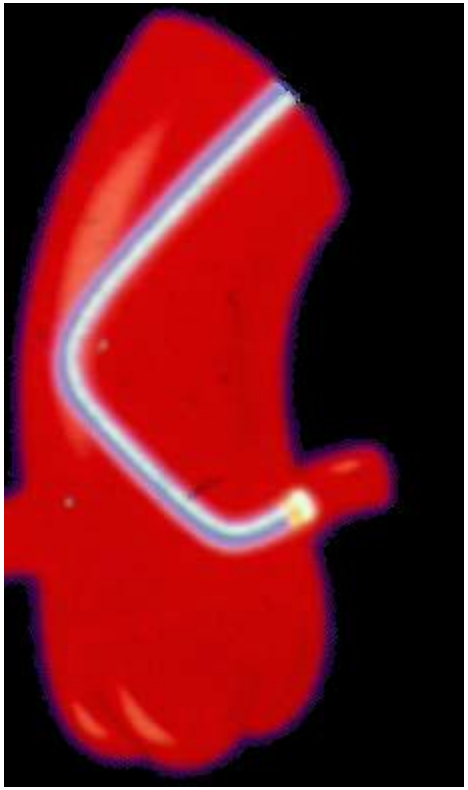
$$F_{max} = \frac{\lambda}{\cos\theta}$$

Guide Catheter Selection

- * MOST IMPORTANT REQUIREMENT: CO-AXIAL ALIGNMENT



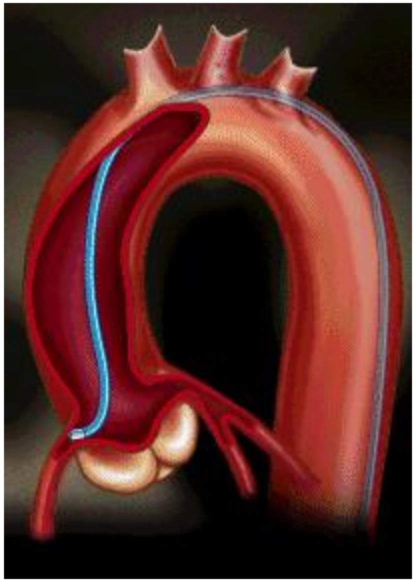
Non-Coaxial



Coaxial

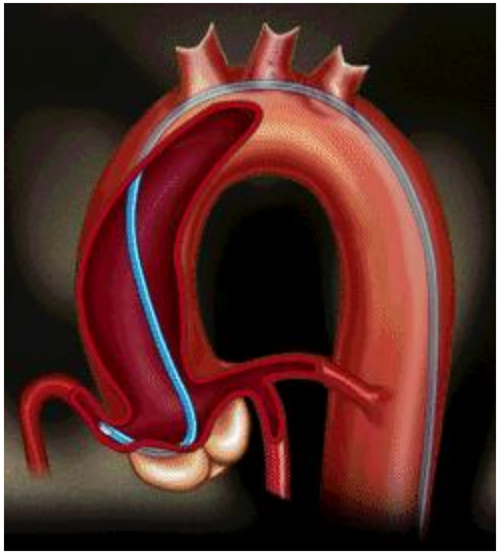
Guiding Catheter Support

JR4



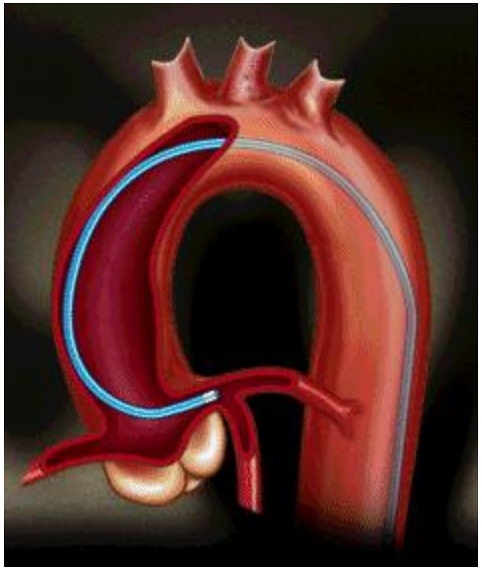
Simple coaxial alignment, without support

Hockey Stick



Coaxial alignment, with extra support from Sinus of Valsalva

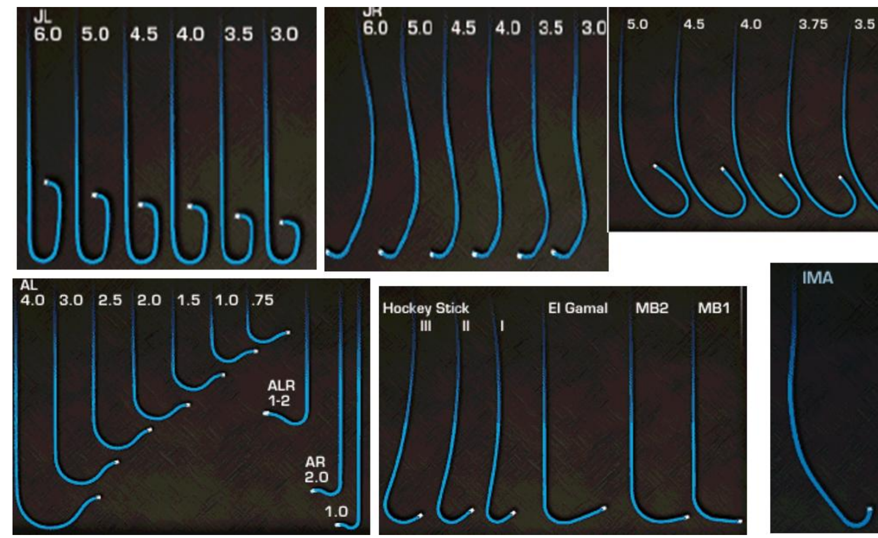
EBU



Coaxial alignment, with power support from opposite wall of aorta

Most commonly used guides

- Judkins, Amplatz, and Extra-back-up guides
- Others include - Multipurpose for RCA bypass or a high left main (LM) takeoff
- LIMA catheter for - right and left coronary bypass graft



Guiding Catheter Selection - LCA

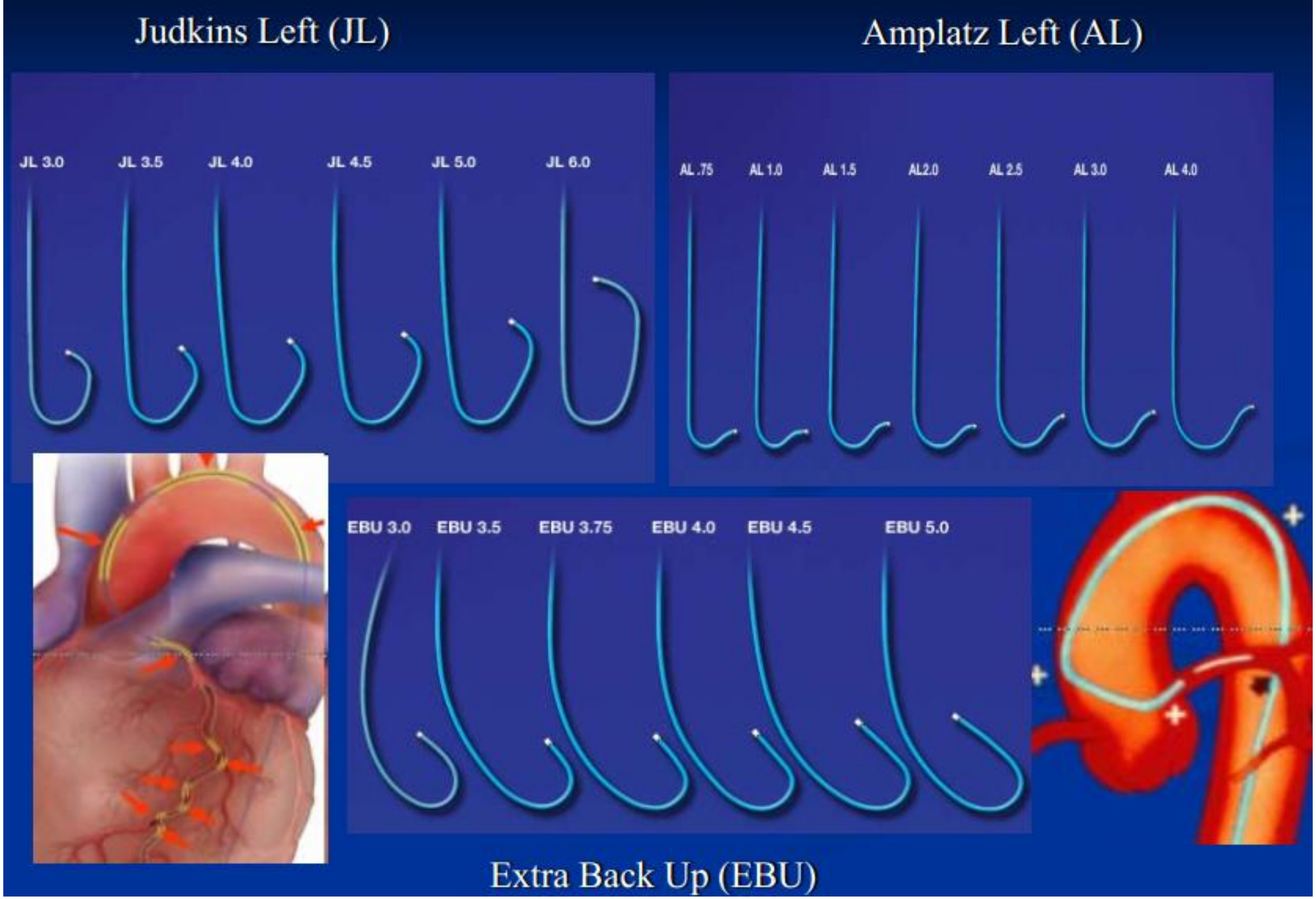
Aortic root

•Normal	•JL4	
•Dilated	•JL ≥ 5, AL ≥ 2,	VL ≥ 4, , XB ≥ 4, EBU ≥ 4
•Narrow	•JL3.5,	VL3.5, XB3.0, EBU3.5

Orientation*

•Normal, Anterior	•JL, AL, VL, XB, EBU
•Posterior	•AL, VL, XB, EBU
•Superior	•JL, VL, XB, EBU

Selection of Guiding Catheter: Left

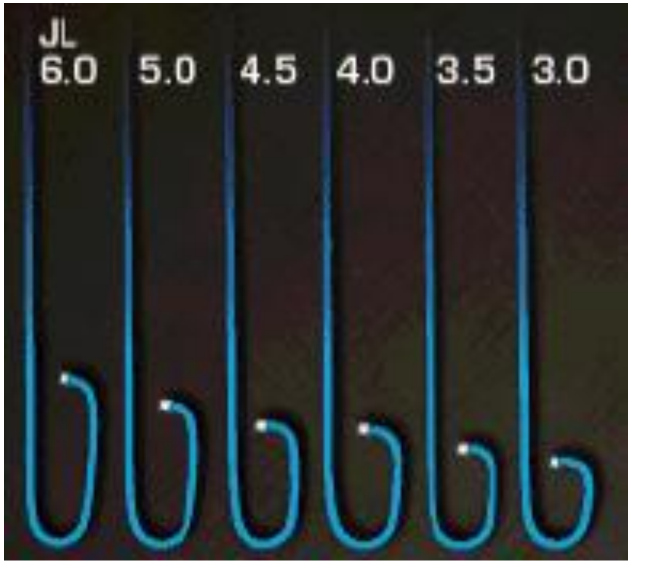


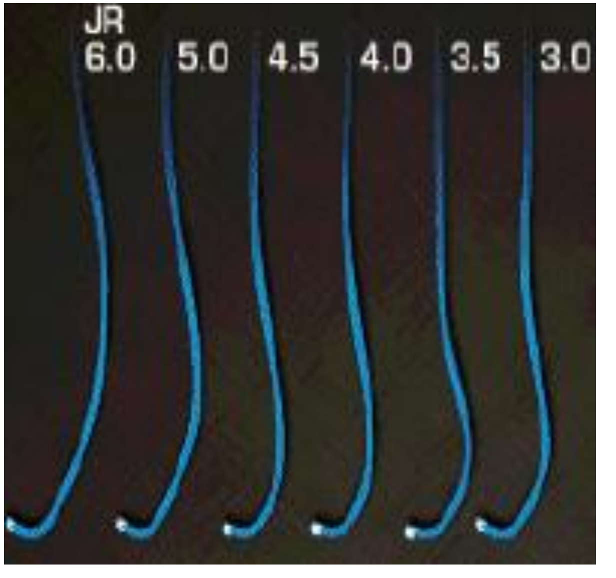
The Judkins Guide

- Primary (90º), secondary (180º), and tertiary (35º) curves fit aortic root anatomy
- As 1^{o} curve fixed Intubates small

  segment of ostium - ↓risk of trauma
- Engage the LM ostium without much manipulation
- knows where to go unless thwarted

  by the operator





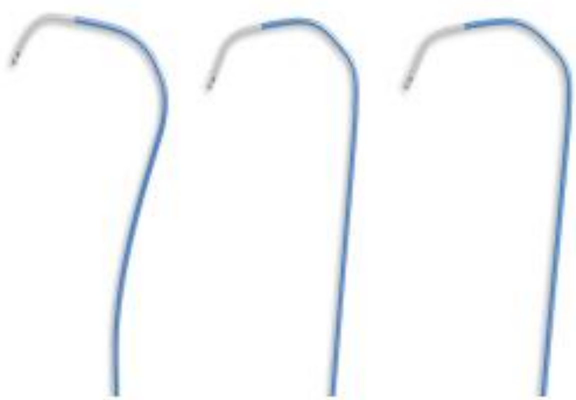
Universal vs. Judkins catheters?

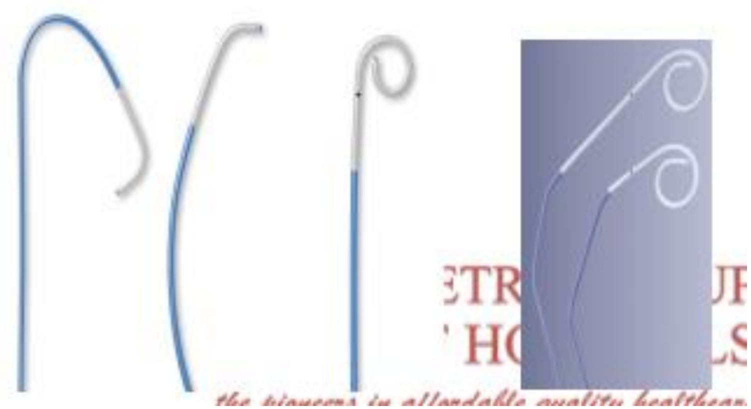
Advantages
- Single pass through radial artery = potentially less time and less spasm

Disadvantages
- Cost
- Learning curve
- Potentially more catheter manipulation

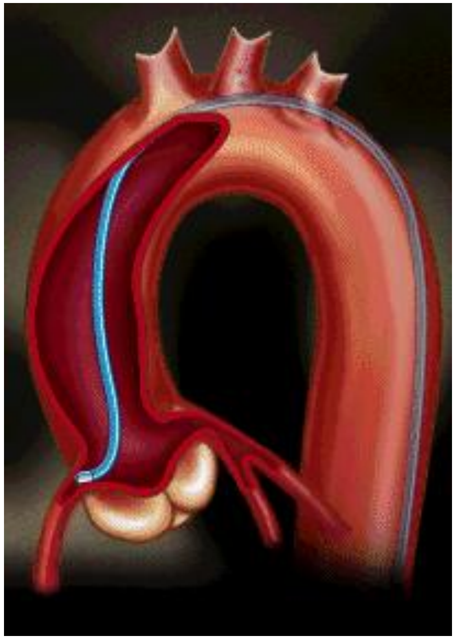
Advantages
- Cost
- Familiarity / availability

Disadvantages
- More time
- More passes through radial artery potentially = more spasm





JUDKINS GUIDE

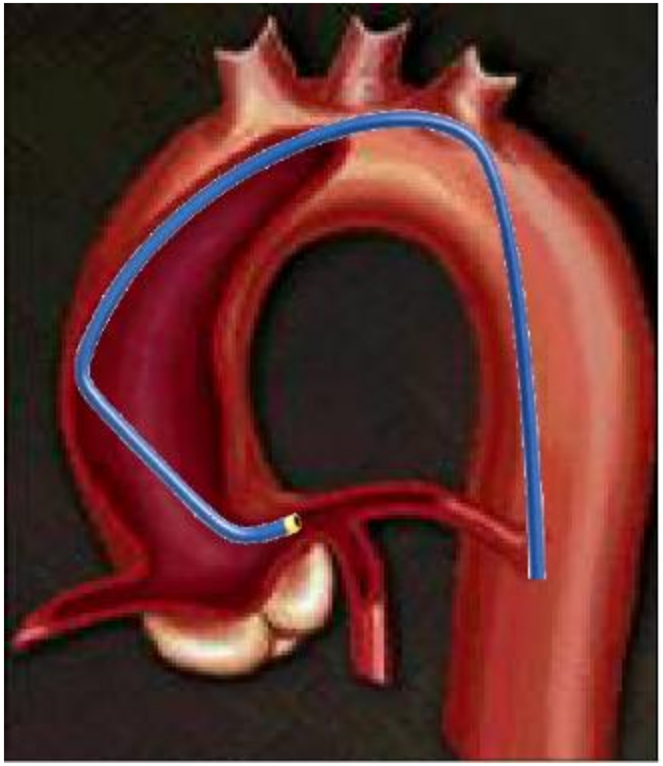


- Selected according to
  - width of the ascending aorta
  - location of the ostia to be cannulated
  - orientation of the coronary artery
  - segment proximal to the target lesion

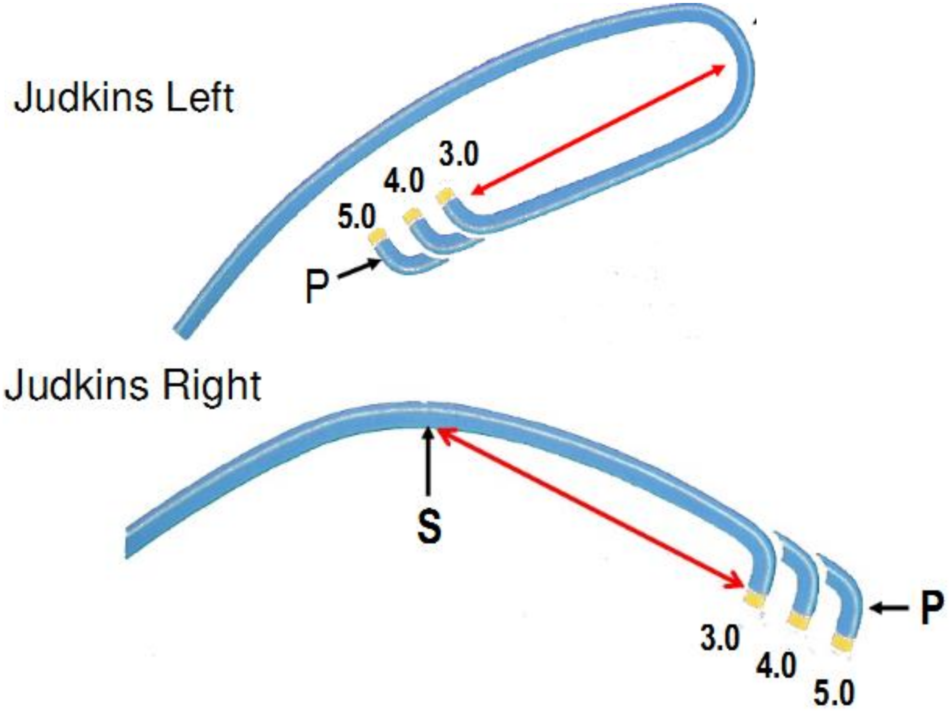
- Segment between the primary and secondary curve of the Judkins left guide should fit width of ascending aorta

  ex:3.5 cm,4 cm, 4.5 cm

Aortic width

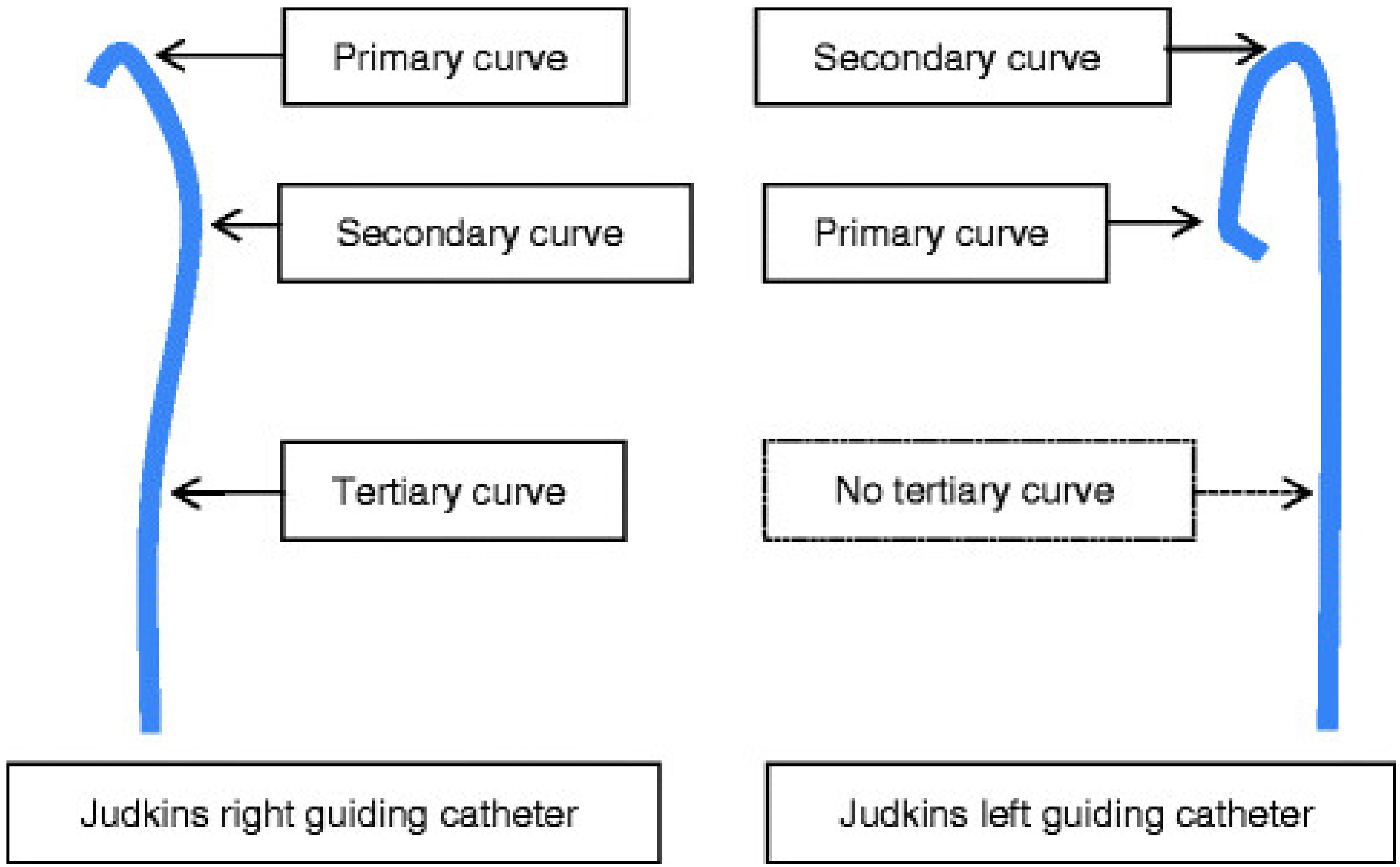


Co-axial alignment with 45^0 at the primary curve and the secondary curve buttressing at the C/L wall



Curve length = distance between P (primary curve) & S (secondary curve)

•Aortic diameter determines the curve length



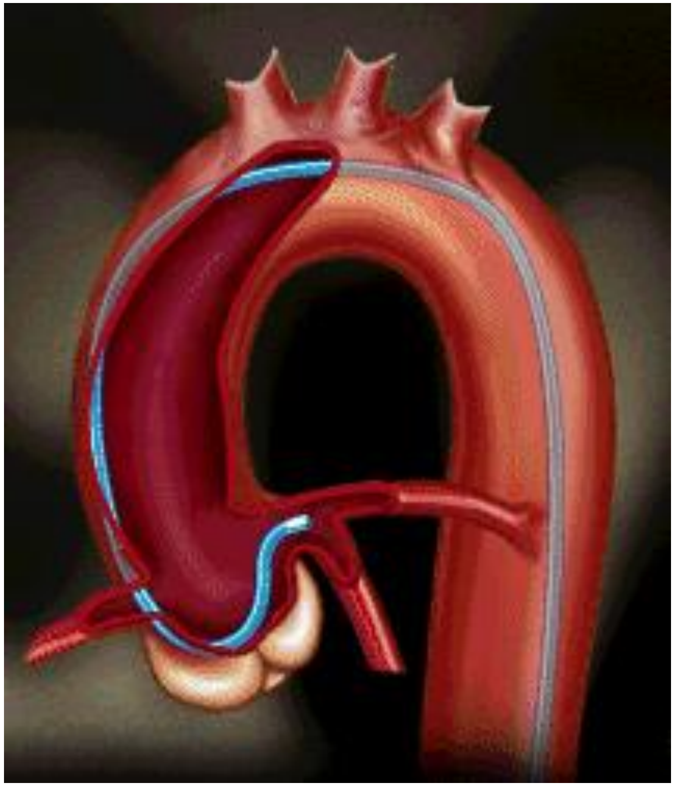
Primary curve
Secondary curve
Tertiary curve
Judkins right guiding catheter
Secondary curve
Primary curve
No tertiary curve
Judkins left guiding catheter

Limitations of Judkins Guide

- As 1^o curve is fixed - may not be co-axial with the artery
- may be difficult to pass balloons - as catheter makes an angle of 90º with ostium
- JL- point of contact on ascending aorta - very high & narrow- ↑ chance of prolapse & dislodgement
- JR- no point of contact on asc Aorta - extremely poor support

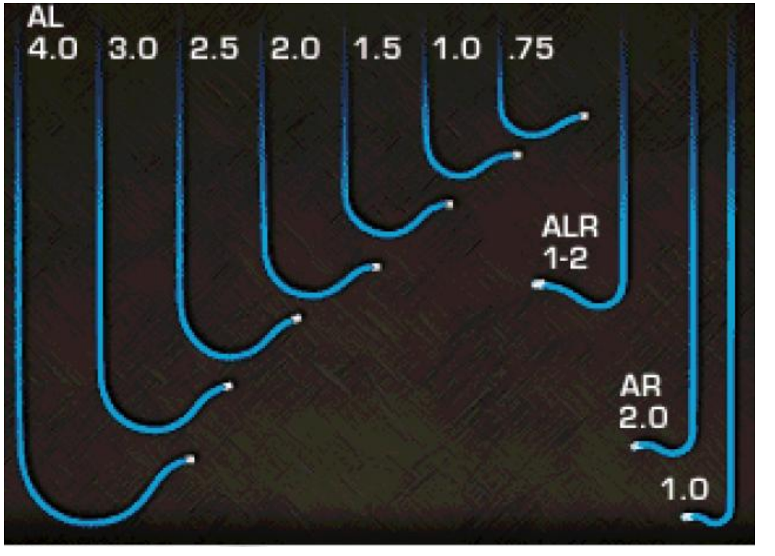
The Amplatz Guide

- Secondary curve rest against the noncoronary posterior aortic cusp
- Offers firm platform for advancement of device
- Best in the case of a short LM, with down going left circumfl ex artery (LCX)
- Tip points slightly downward - higher danger of ostial injury causing dissection



Amplatz Guide

- Selection of the proper size for an Amplatz guide is essential
  - Size 1 is for the smallest aortic root
  - size 2 for normal
  - size 3 for large roots
- Attempts to force engagement of a preformed Amplatz guide that does not conform to a particular aortic root increase risk of complication



Withdrawal of an Amplatz Guide

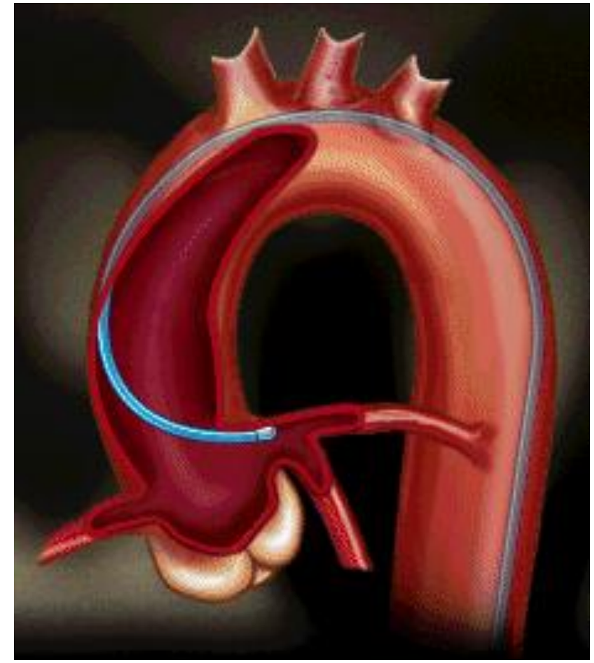
- Must be carefully disengaged from the coronary artery
- A simple withdrawal from the vessel can cause the tip to advance farther into the vessel and cause dissection
- To disengage - first advance guide slightly to prolapse the tip out of the ostium
- Then rotate the guide so that tip is totally out of the ostium before withdrawing it

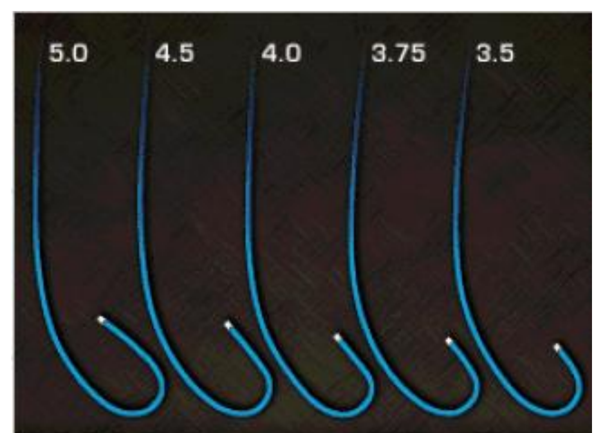
Withdrawal of an Amplatz Guide After Balloon Inflation

- After deflation if balloon is pulled out, the tip of the Amplatz (or any) guide would have the tendency to be sucked in deeper
- To avoid this - pull the balloon out while simultaneously pushing the guide in - to prolapse the guide out

Extra-Back-Up Guide

- Long tip forms a fairly straight line with the LM axis or the proximal ostial RCA
- Long secondary curve - abut the opposite aortic wall
- So tip in the coronary artery is not easily displaced
- Provide a very stable platform

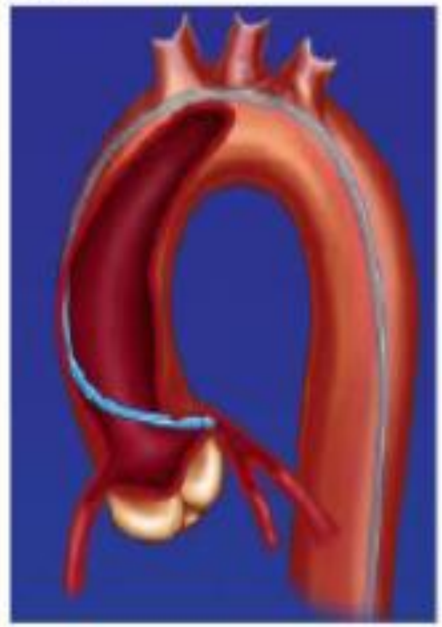




EBU 3.75
Normal Root, left Coronary, lateral takeoff

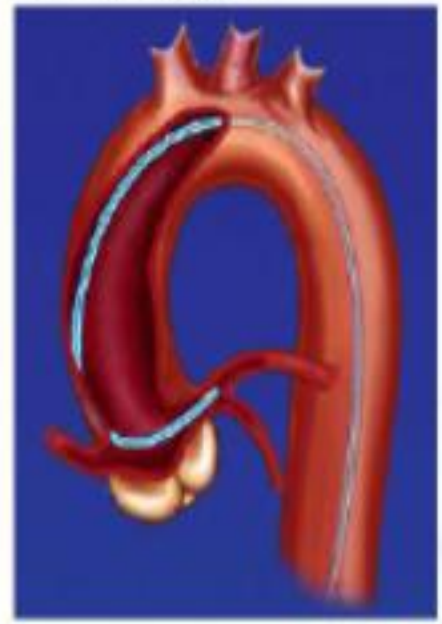
Will engage 2-3mm into ostium

EBU 4.0
Normal Root, left Coronary, inferior



Withdraw catheter for inferior orientation

EBU 3.5
Normal Root, left Coronary, superior takeoff



Advance catheter for superior orientation

How to select the curve?

LCA Length Variations

- Smaller Guides will Selectively Engage LAD
- Larger Guides will Selectively Engage and give better support LCx
- Amplatz tip selectively engages LCx

Short

Normal-
Long

Separate origin

Guiding catheter's size in practice

Left System

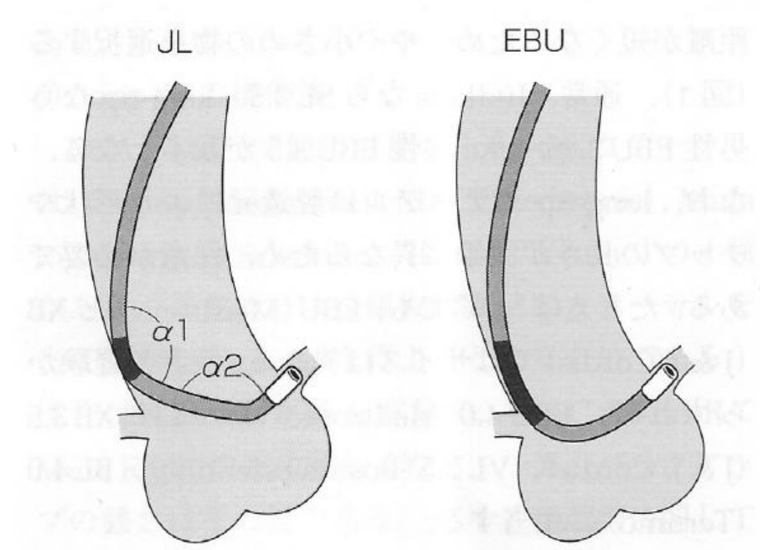
	AL Curve Amplatz curve	XB Curve	JL Curve Judkins left	Q Curve	VL Curve Voda Left
Normal	**AL1**	**XB 4.0 or 3.5**	**JL4**	**Q 4**	**VL 4**
Dilated	**AL2**	**XB 4.0 or 4.5**	**JL 4.5**	**Q 4.5**	**VL 5**
Narrow	**AL 0.75**	**XB 3.0 or 3.5**	**JL 3.5**	**Q 3.5**	**VL 3**

JL and EBU sizing

Judkins Left Catheter Used	EBU Curve Used
JL 3.5	EBU 3.5
JL 4.0	EBU 3.75 will engage 2–3 mm into the ostium EBU 4.0 will engage 3–5 mm into the ostium
JL 4.5	EBU 4.5
JL 5.0	EBU 4.5

Long tip catheters

- Voda, XB, EBU
- Advantages
  - coaxial intubation
  - better support and stability
  - precise control and manipulation
  - lack of bends -improve advancement of devices,decrease the loss of supportive forces
  - safety



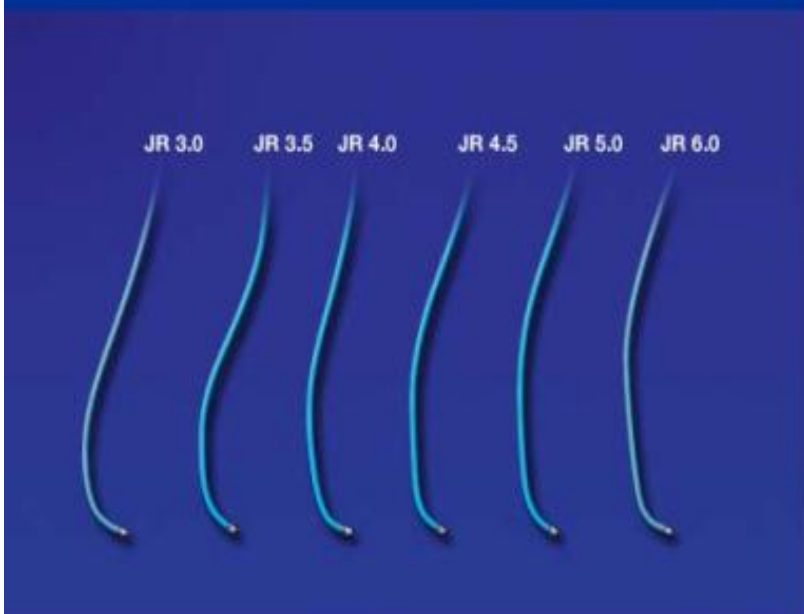
RCA interventions

- Usual - JR or Hockey stick guide
- If extra support - CTO, tortuosity – AL1
- Abnormal take off of RCA from aorta esp info orientations - MP guide
- Tortuous or bent anatomy, posterior and superior take off of RCA - 3DRC

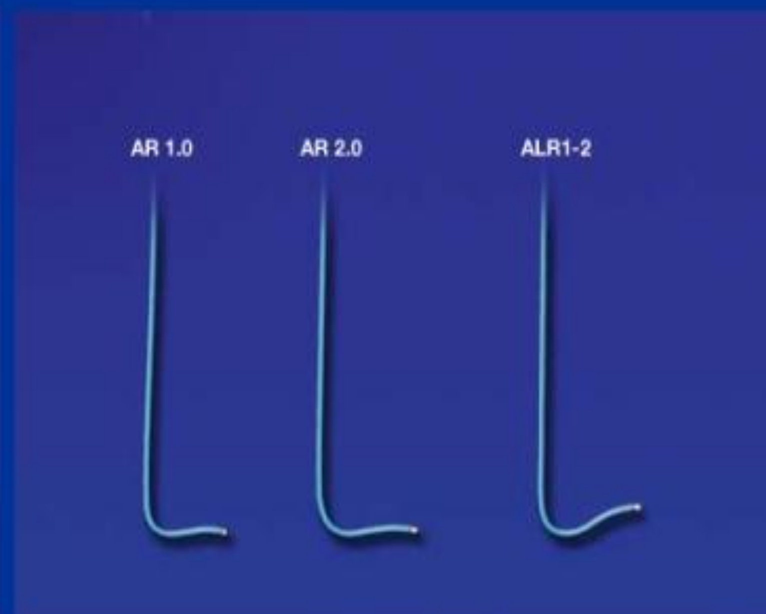
Aortic root	
•Normal	•JR4, AL1, AR1
•Dilated	•JR ≥ 5, AL ≥ 2, AR ≥ 2
•Narrow	•JR 3, AL ≤ 0.75

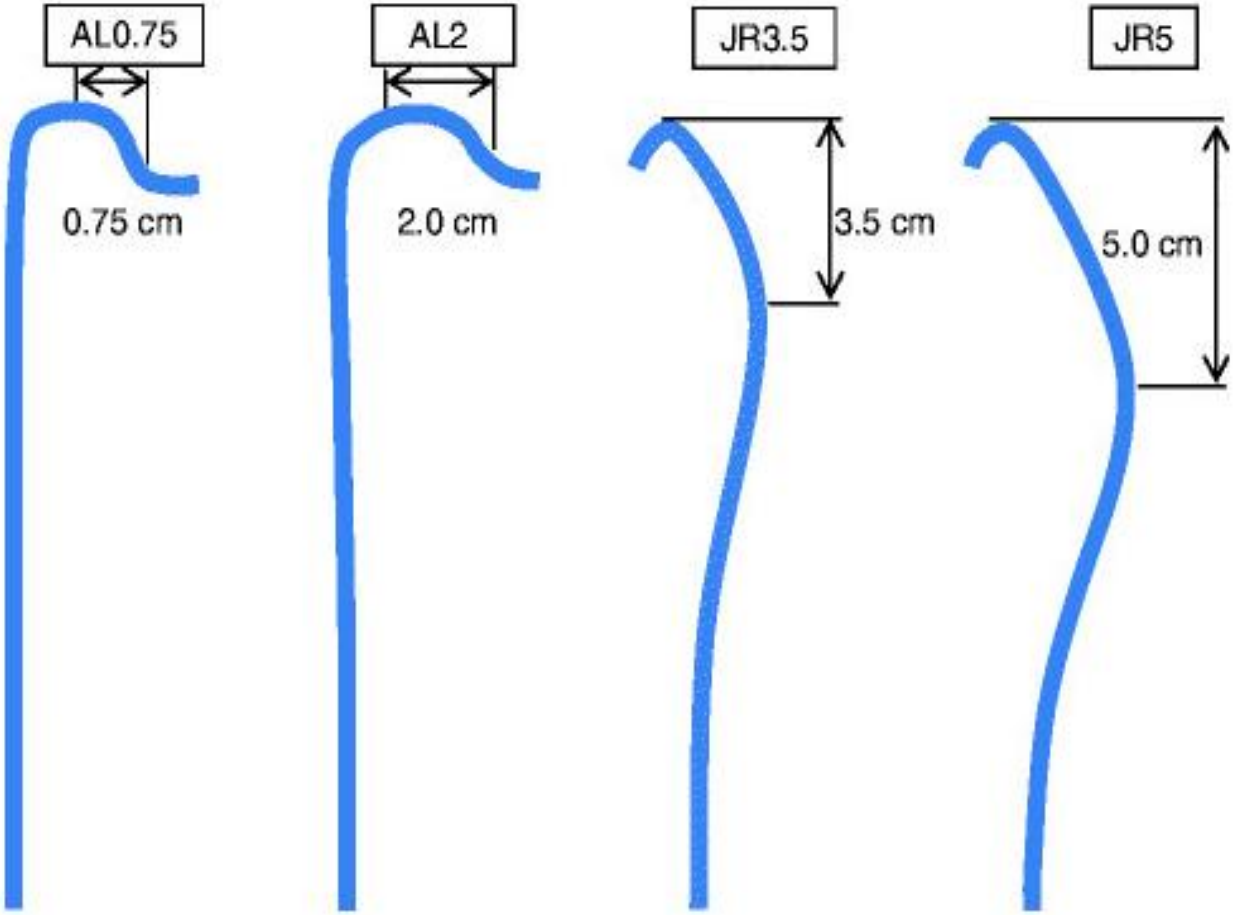
Selection of guiding catheter
Right system

Judkins Right (RL)

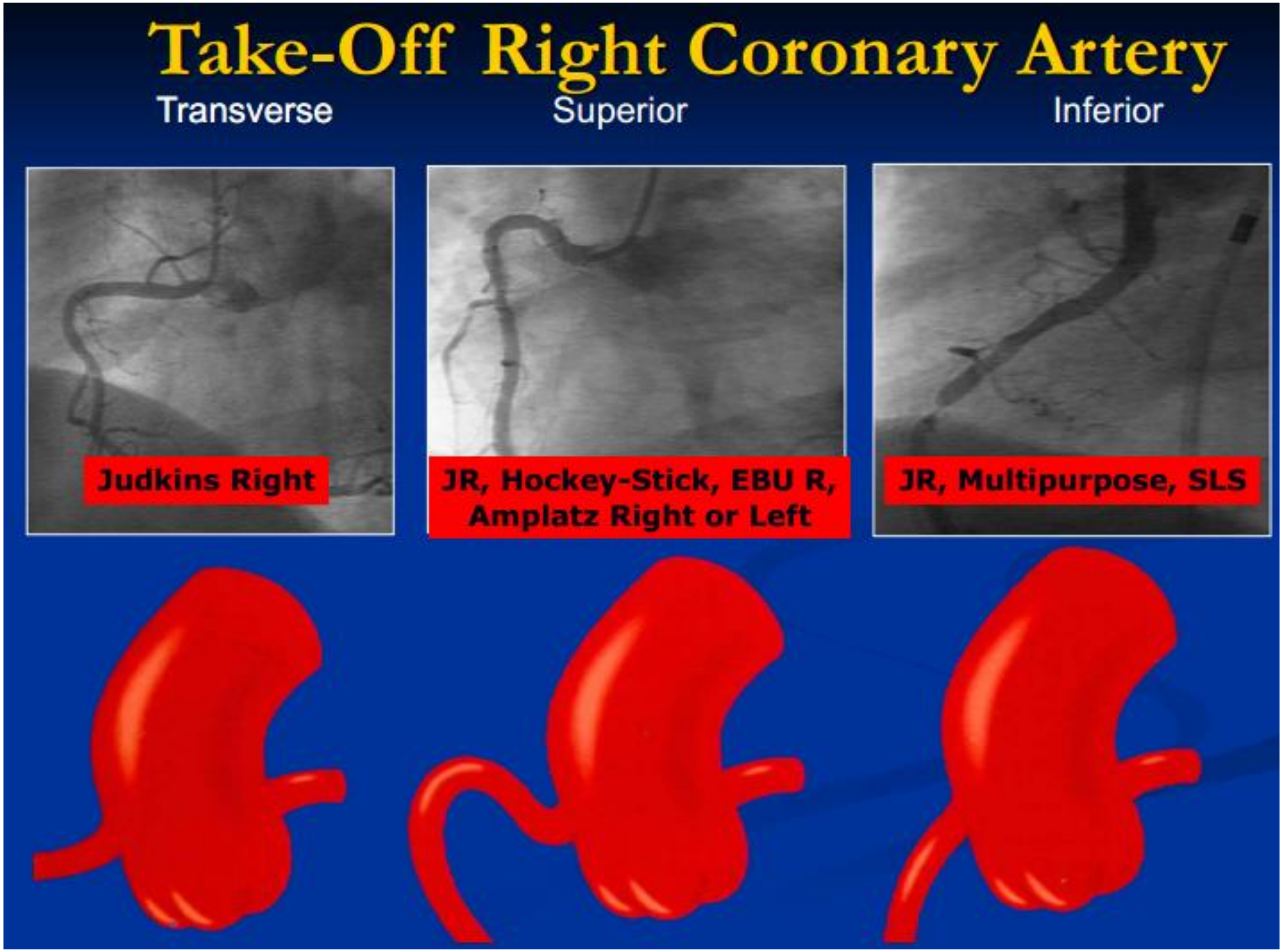


Amplatz Right (AR)



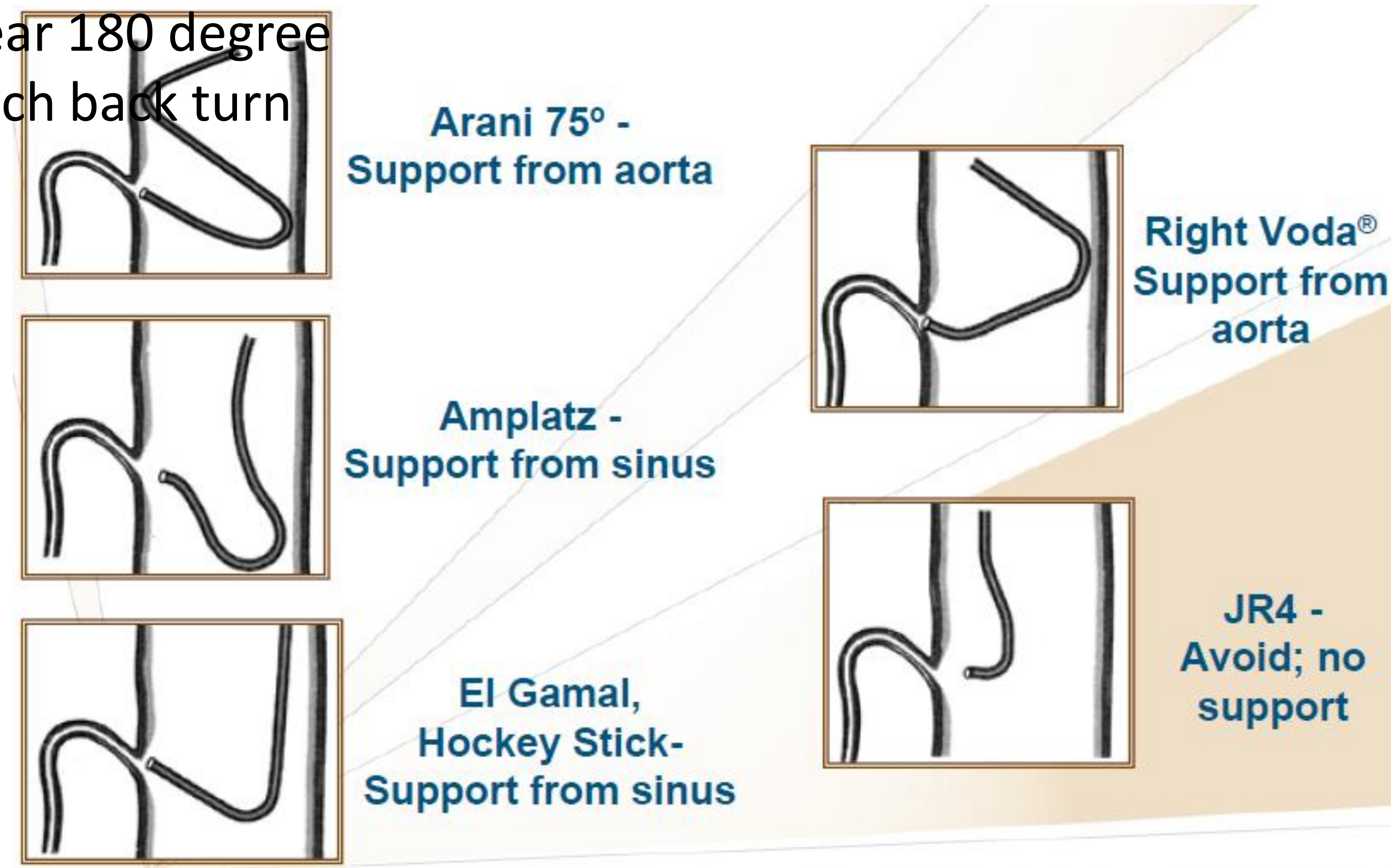


AL0.75
0.75 cm
AL2
2.0 cm
JR3.5
3.5 cm
JR5
5.0 cm


Take-Off Right Coronary Artery
Transverse
Superior
Inferior
Judkins Right
JR, Hockey-Stick, EBU R, Amplatz Right or Left
JR, Multipurpose, SLS

Shepherd's crook deformity of RCA

Dramatic upturn with a near 180 degree switch back turn



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Other catheters

- 3 DRC - Three dimensional right curve - for tortuous, bent anatomy and posterior or superior take off of RCA
- Arani

➢ Double angle 90 º curve sits on ascending aorta in S configuration and is therefore useful for RCA with horizontal take-off & shephered crook RCA

➢ Primary and secondary curve provides two contact points on the opposite side of aorta thus

providing tremendous back-up support

- XBR and XBRCA - new catheters developed specifically for the inferior and superior take off of RCA respectively
- El Gamal (EGB) - pre-shaped catheter with improved distal end-portion for accessing bypass grafts and more precise access of RCA
- LCB - for left coronary venous bypass grafts. Its tip has 90 º bend with 70º secondary bend
- RCB - for right coronary venous bypass grafts, its tip and secondary bends approximate 120º - like a JR catheter with a shallower tip bend

Champ Curves

For superior oriented arteries and saphenous grafts

Right Coronary Artery Champ1.0

Saphenous Grafts Champ2.0

LAD/LCX Champ3.0

Selection of guiding catheter

- Length:
  - Standard length:
    - 100cm.
  - Shorter length for distal lesions (LIMA, sequential SVGs, retrograde approach to CTO):
    - 85 cm, 90 cm
  - Longer length (Tall patients, tortuous aortailiac vessels) :
    - 110-115 cm

- If tip does not reach the ostium and keep lying below it - guide is too small
- If tip lies above the ostium - guide is too large
- When RCA ostium is very high - left Amplatz guide may be used to engage the right ostium

Multipurpose Guide

- Straight with a single minor bend at the tip
- For RCA bypass graft or a high left main (LM) takeoff

GUIDE MANIPULATION

Standard safety techniques

- Basic safety measures should be applied rigorously when manipulating guides
- 1 . Aspirate the guide vigorously after it is inserted into the ascending aorta for any thrombus or atheromatous debris floating
- 2 . Insist on generous bleed back to avoid air embolism
- 3. Flush frequently to avoid stagnation of blood inside the guide
- 4 .Constantly watch the tip when withdraw interventional device especially with ostial or proximal plaques
- 5 .Watch the blood pressure curve for dampening to avoid inadvertent deep engagement of the tip
- 6 .During injection, keep the tip of the syringe pointed down so any air bubbles will float up and are not injected

Advancement Through Tortuous Iliac Artery

- Excessive tortuosity - rotations at the proximal end do not transmit similar motion to the distal tip
- Guide can twist on itself
- Methods to advance -
  - 23 cm sheath may help to overcome the iliac tortuosity
  - Abdominal aortic aneurysm - 40 cm sheath is needed
  - Torquing a guide still cannulated inside by a stiff 0.38 wire

Dampening of Arterial Pressure

- Guide can cause
  - fall of diastolic pressure - ventricularization
  - fall of both systolic and diastolic pressure - dampened pressure
- Can be due to
  - significant lesion in the ostium
  - coronary spasm
  - non-coaxial alignment
  - mismatch between diameter of the guide and of the arterial lumen

Checking Stability and Potential of Backup Capability

- Forward advancement of guide should further intubate the coronary artery rather than prolapse into the aoric root
- If tip slips out - guide does not provide sufficient backup
- Need to be changed for another with better support
- Active intubation of the guide may be tried
  - if its tip is soft
  - if the artery is large enough to accommodate the guide
  - no ostial or proximal lesions
- Active support position is needed temporarily in order to advance the device across the lesion
- Once device is positioned guide is withdrawn to ostium.

Techniques to Stabilize a Guide

1. Second angioplasty wire/ Buddy Wire - advanced parallel to the first one

- Straightens tortuous vessel and provides better support for device tracking

2. Second wire in a side branch - useful in anchoring the guide (second wire in LCX when dilating LAD lesion)

- Provides for better backup and allows retraction of the guide when necessary, without loss of position
- Also prevents the guide from being sucked in beyond the LM when pulling back balloon catheters
- Cause unnecessary denudation of endothelium in that vessel

Techniques to Stabilize a Guide

3.Change to stronger guide

4. Anchoring Balloon

- Second small balloon (1.5–2 mm diameter) inserted in a small proximal branch
- Inflated at 2 ATM - anchor the guide

5 . Change the current sheath to a very long sheath

6 . Double guide technique

  - insert a smaller guide in current guide

How to Untwist a Twisted Guide

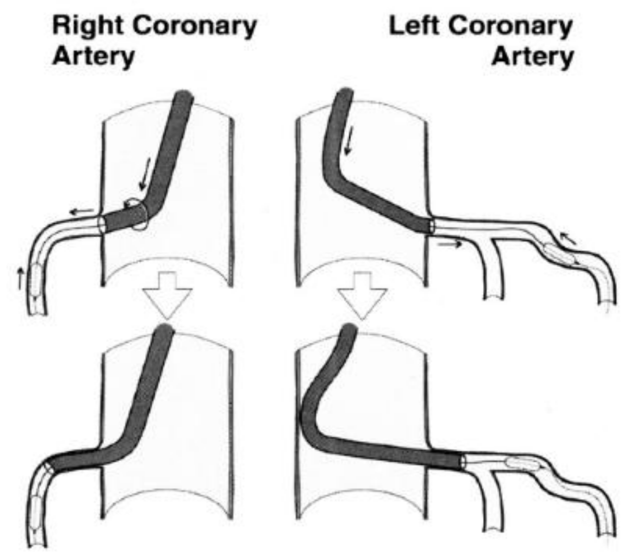
- Move the twisted segment to a large area by advancing it into to the aorta
- Cannulate the guide with a 0.035 wire
- Move its tip to the twisted area
- Next try to untwist the guide by torquing in the opposite direction
- Slowly advance the wire to secure the segment just untwisted

Avoiding Selective Entry of the Conus Branch

- o If the guide keeps entering the conus artery
- change the guide for a larger one
- approach the RCA from a posterior direction - position the guide above the sinus, rotate the guide counterclockwise to enter the main RCA first

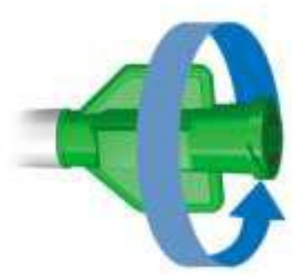
Deep-Seating

- If the guide needs to be deep-seated then it is advanced over an interventional device
- Apply clockwise/counter clockwise torque
- Once deep-seated device is advanced and positioned
- After achieving the position guide is withdrawn with gentle rotation



Deep-seating

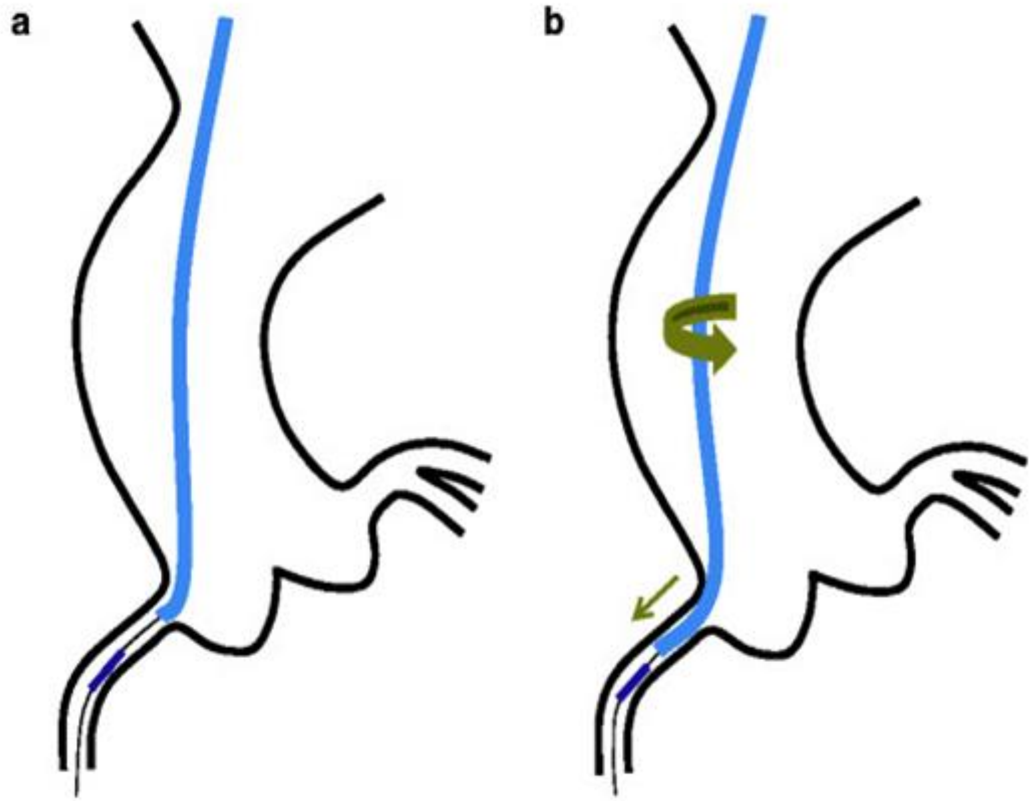
- Attempted only if
  - Artery is large enough to accommodate the guide
  - No ostial or proximal lesion
  - Guide tip is soft
- Direction of torquing



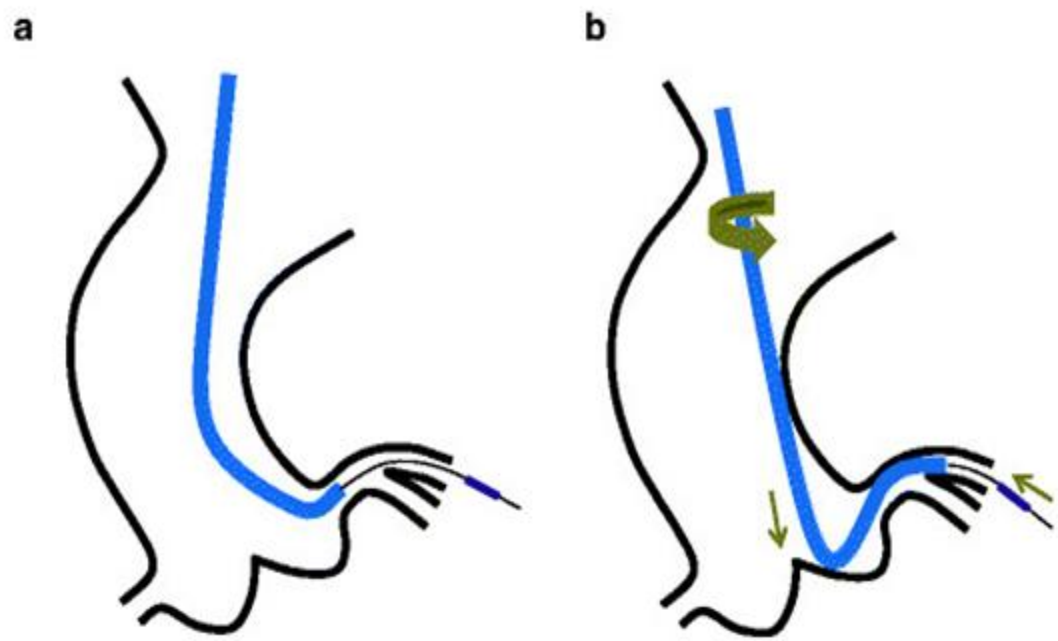
Toward the LAD -
Counter-clockwise rotation

Toward the LCX and RCA -
Clockwise rotation

Deep engagement of the RCA with a Judkins right guiding catheter to achieve active support. (a) Passive engagement of the RCA with a Judkins right guiding catheter, followed by passage of guide-wire and angioplasty balloon into the proximal RCA. (b) Active engagement of the RCA achieved by advancement and rotation of the guiding catheter over the guide-wire, while the angioplasty balloon remains in the proximal RCA



"Amplatzing" a Judkins left guiding catheter to achieve active support. (a) Passive engagement of the left mainstem with a Judkins left guiding catheter, followed by passage of guide-wire and angioplasty balloon into the LAD. (b) Active engagement of the LAD achieved by simultaneous retraction of the angioplasty balloon, and advancement of the Judkins catheter with counterclockwise torque, thus acquiring Amplatz-like shape and active support



Shows how an AL guiding catheter shape (Panel a) conforms to the aortic root curvature, which provides greater backup support/counter-force (F3 > F2 > F1) to push against resistance encountered in the target vessel compared to a Judkins left catheter (Panel b)

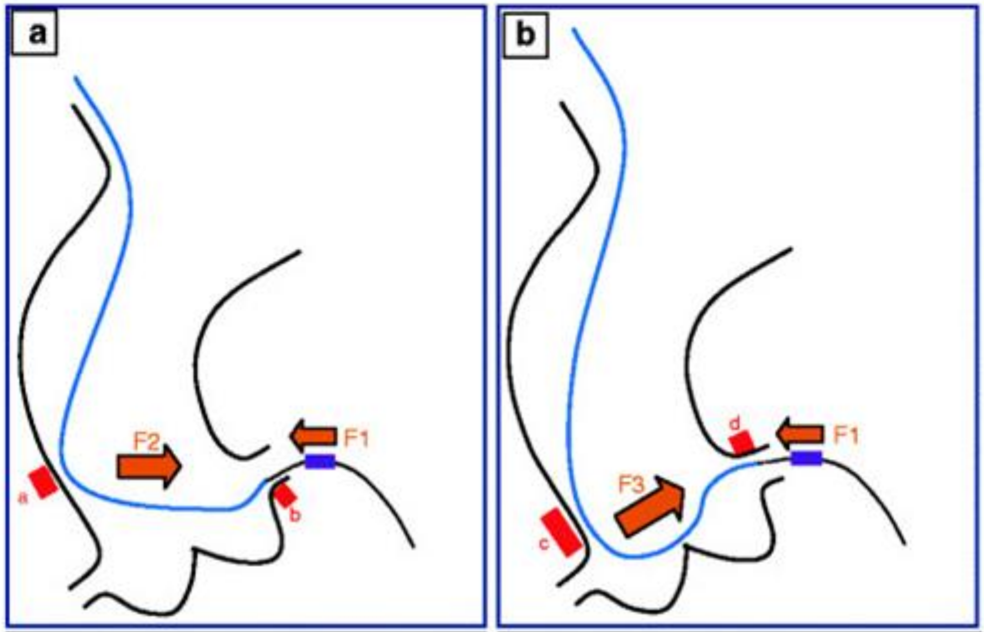


Figure legend

F1: Force/resistance encountered by advancing balloon into target vessel

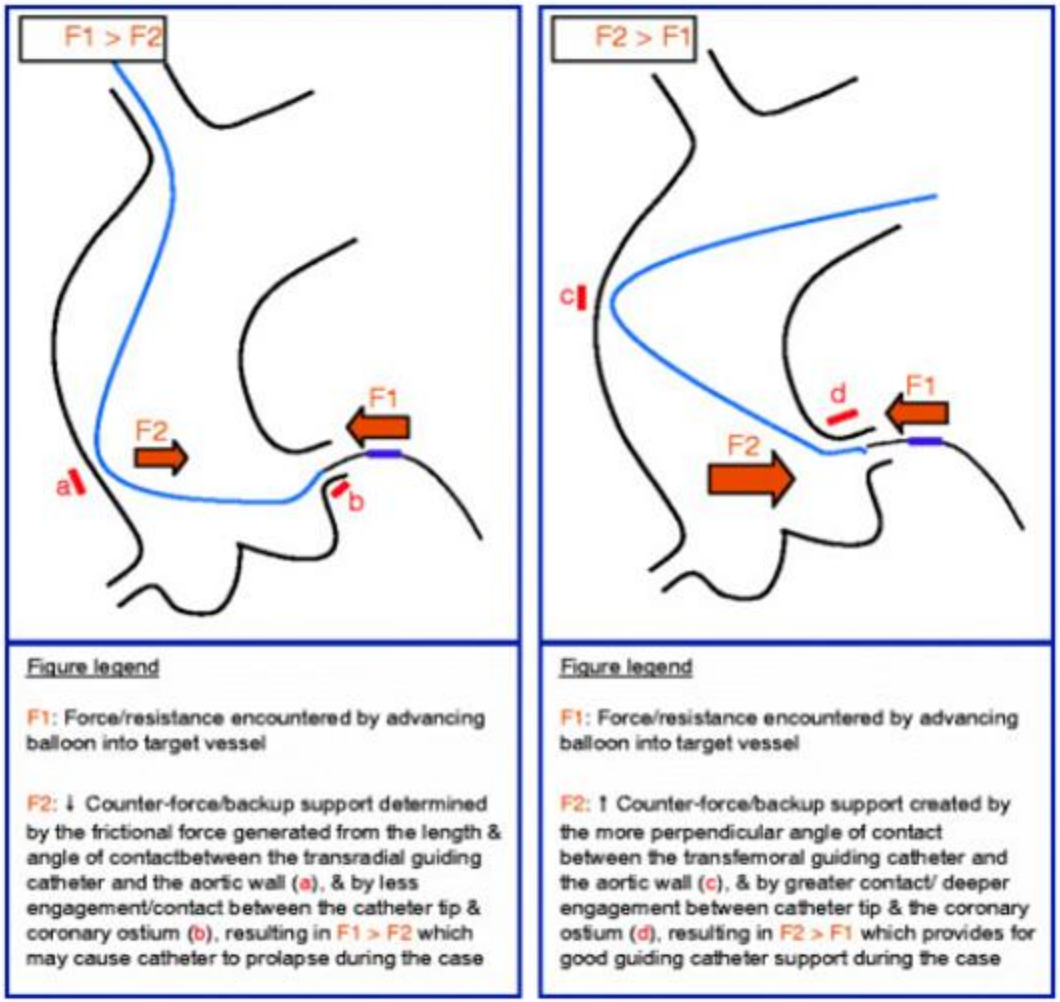
F2: Counter-force/backup support determined by the frictional force generated by the length and angle of contact (a) between a JL catheter and the aortic wall, & by the contact between the catheter tip & coronary ostium (b)

Figure legend

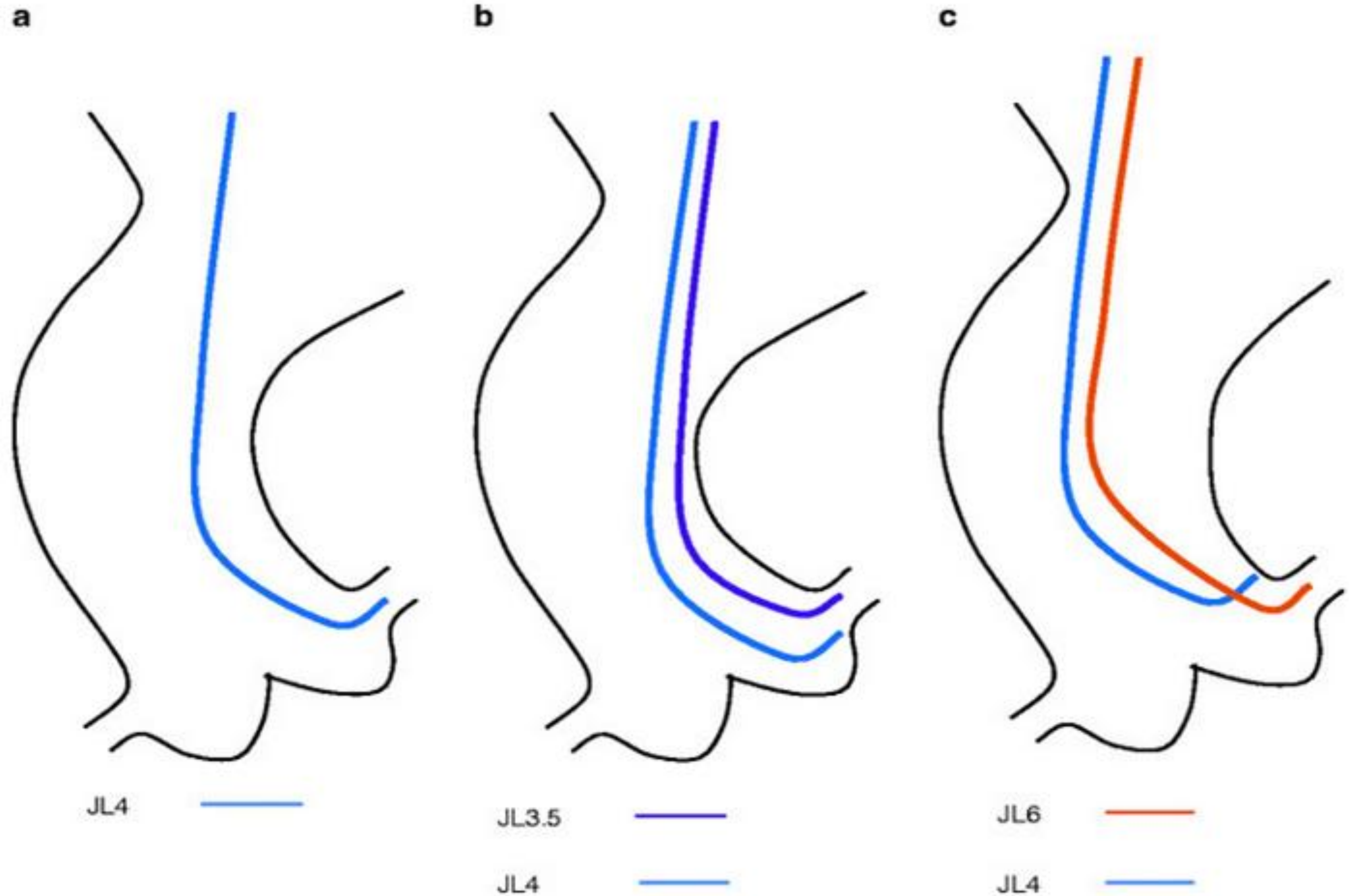
F1: Force/resistance encountered by advancing balloon into target vessel

F3:↑↑ Counter-force/backup support created by the greaterlength of contact (c) & the more perpendicular angle between an AL catheter and the aortic wall, & by the greater contact (d) between a coaxial catheter tip & the coronary ostium

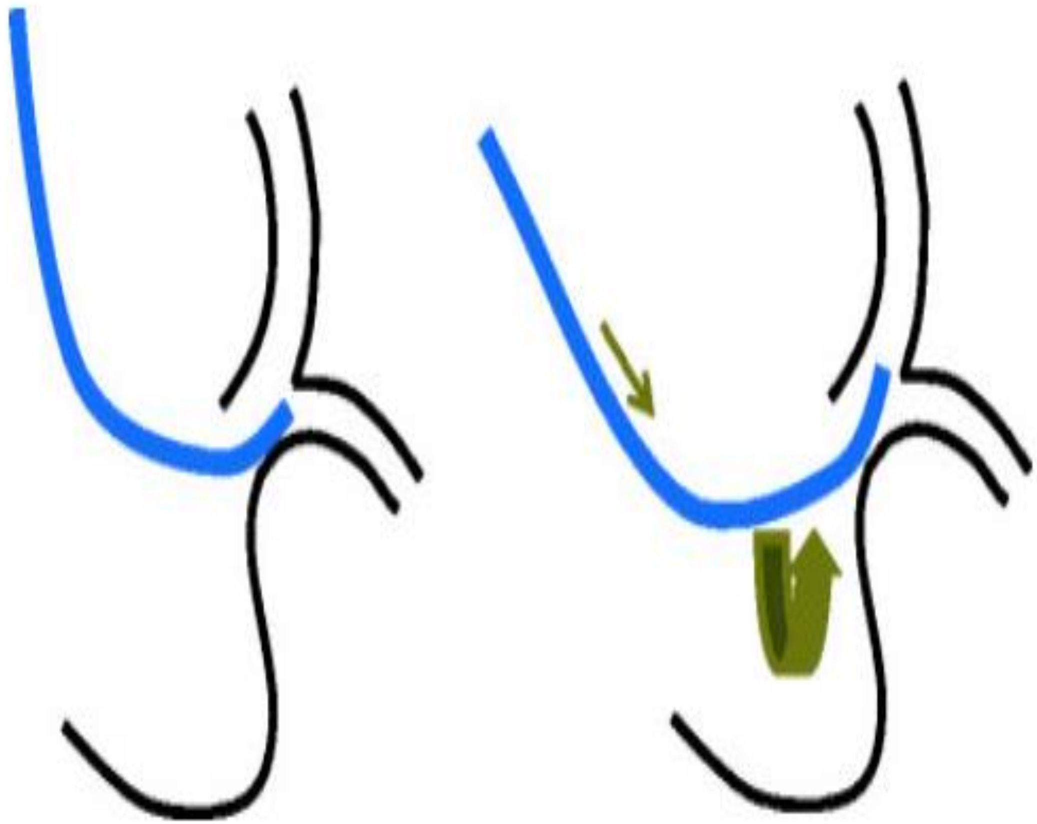
Demonstrates in this patient that a JL 3.5 guiding catheter via transradial access (Panel a) provides less support to undertake PCI compared to converting to transfemoral access (Panel b) and using a larger secondary curve guiding catheter of the same shape (e.g. JL4−4.5), which provides more coaxial engagement and better bracing support against the aortic wall. A more aggressively curved guiding catheter shape or larger Fr gauge catheter would provide greater passive support, if required



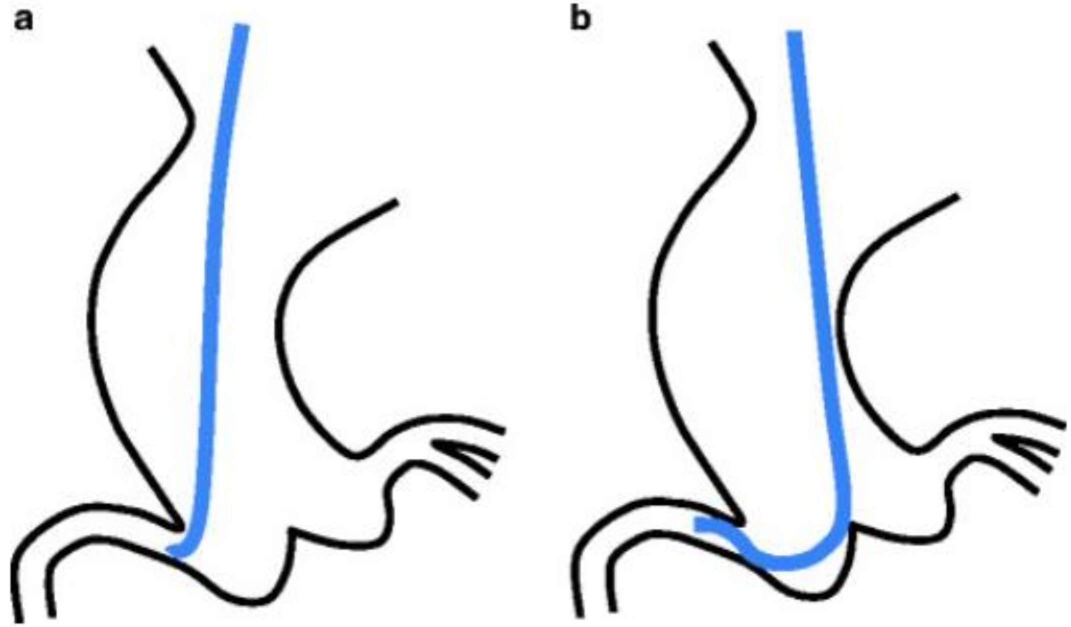
Appropriate sizing of Judkins left catheters depending upon ascending aortic anatomy. (a) Normal ascending aortic size. JL4 guiding catheter will usually be coaxial. (b) Narrow ascending aorta. JL4 will be oversized and the tip may lodge in the left aortic sinus. JL3.5 or JL3 will usually provide a coaxial fit. (c) Dilated ascending aorta. JL4 will be undersized and may not engage or the tip may poorly engage, pointing upwards in the left mainstem. A larger JL catheter (JL4.5–6) would engage more coaxially



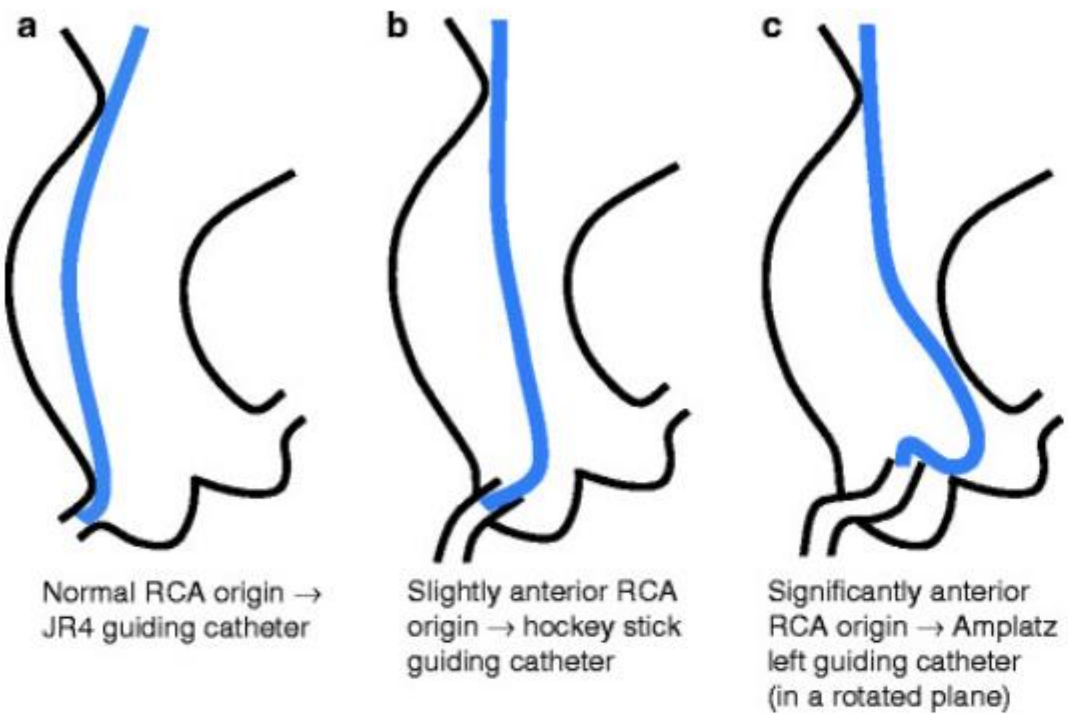
'cumflex



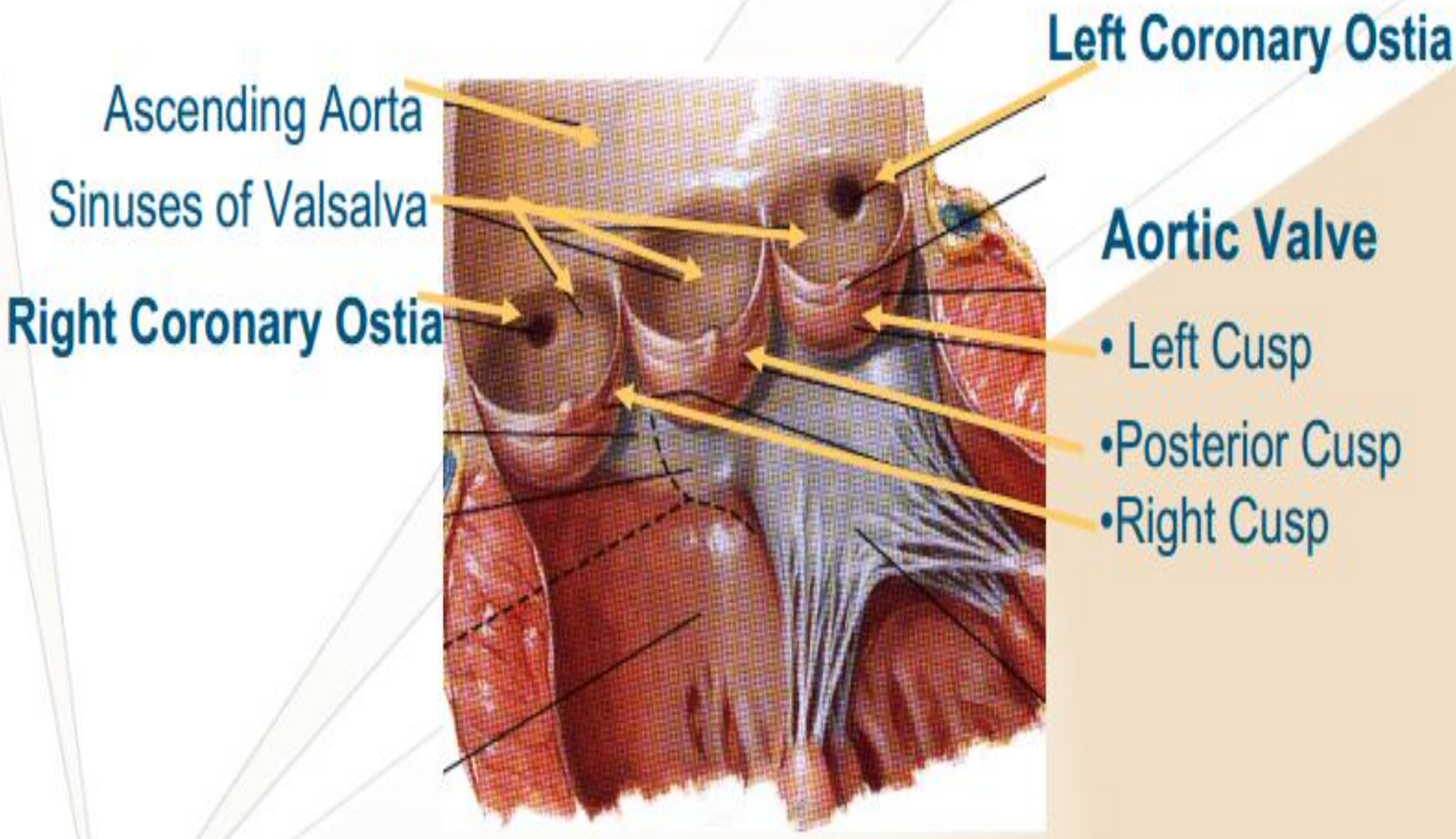
Shows a superiorly orientated “shepherd’s crook” RCA and appropriate catheter engagement. (a) Where using a Judkins right catheter results in non-coaxial engagement of the RCA ostium. (b) Where using a guiding catheter with a superiorly directed tip (e.g. Amplatz left) results in coaxial engagement of the RCA ostium



Showing how RCA may originate from an increasingly anterior position, requiring a different catheter shape to cannulate the ostium successfully. (a) Normal RCA origin – JR catheter engages coaxially. (b) Slightly anterior RCA origin – hockey stick catheter engages better than JR catheter. (c) Significantly anterior RCA origin – JR catheter will not engage, Amplatz left catheter here shown in a rotated plane with appropriate secondary curve length and shape to cannulate the RCA ostium coaxially



- **Coronary Anatomy**
  Ostial Origins
  Left Main - usually arises anterior, inferior and leftward from the left coronary sinus
  LAD - usually arises in an anterior and superior position
  LCX - usually arises posterior and inferior from the left main
  RCA - usually arises anterior from the right aortic cusp
  SVGs - usually arise from the anterior portion of the heart



Ascending Aorta
Sinuses of Valsalva
Right Coronary Ostia
Left Coronary Ostia
Aortic Valve
• Left Cusp
•Posterior Cusp
•Right Cusp

Coronary Anatomy Ostial Variations

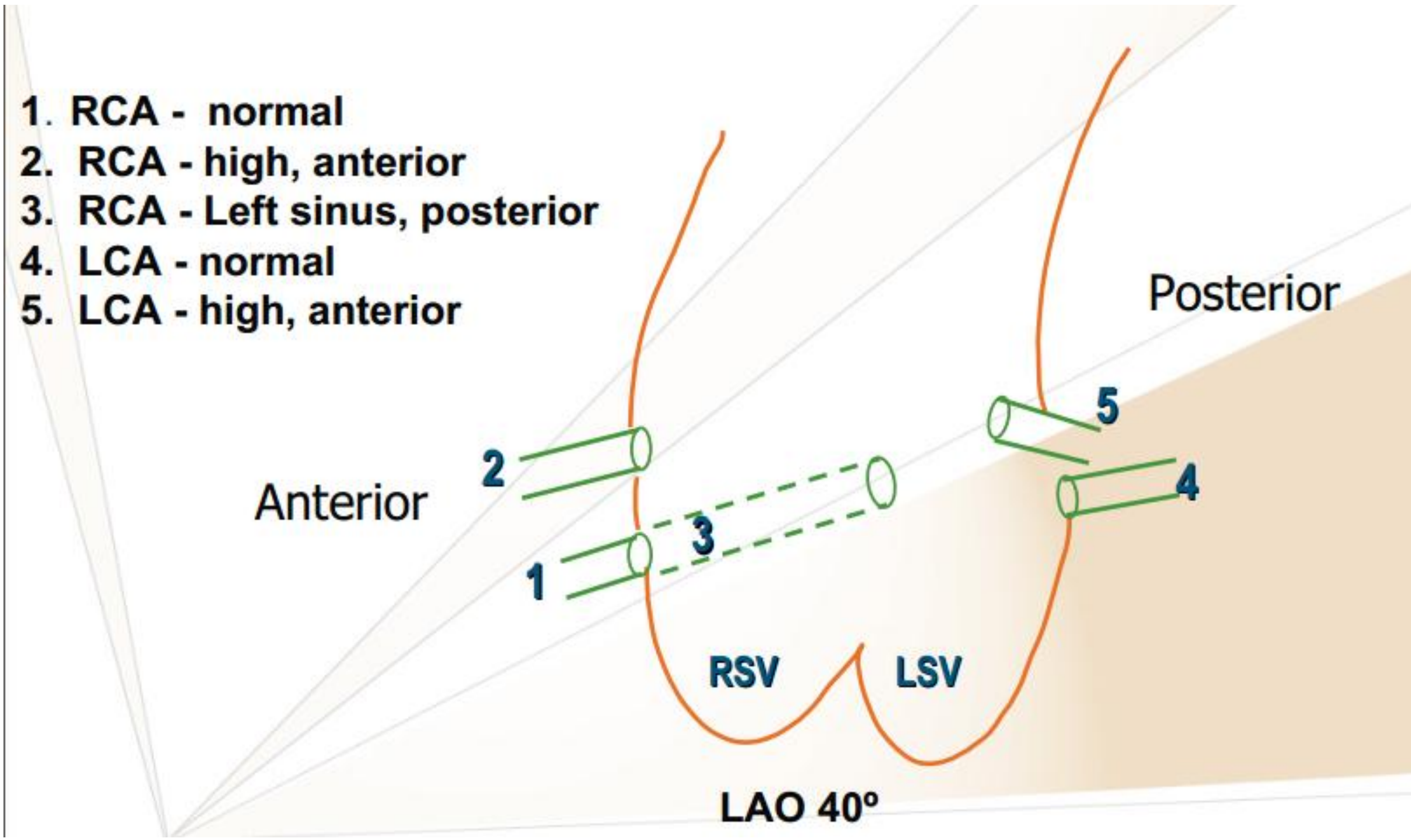
Coronary ostial location:

- high
- low
- anterior
- posterior

Coronary ostial orientation:

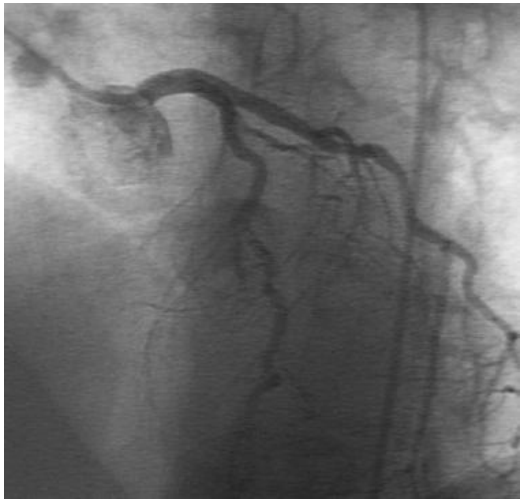
- superior
- horizontal
- inferior
- shepherd’s crook (RCA’s only)

Coronary Artery Variations

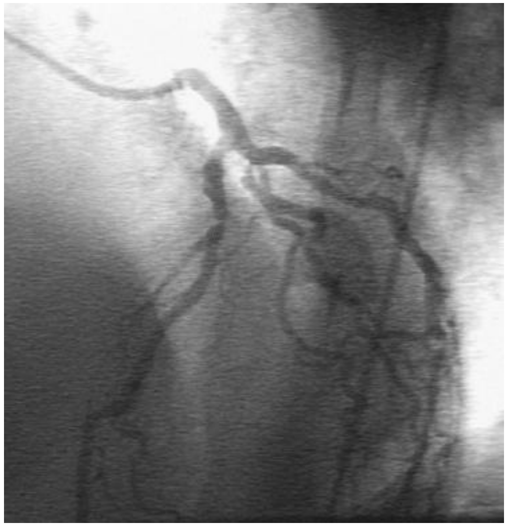


Common Takeoffs- Left Coronary Artery

- Horizontal

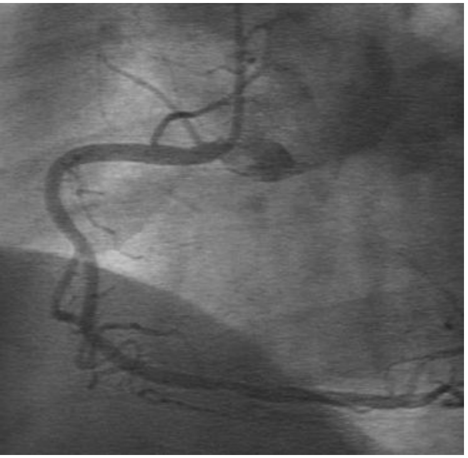


Inferior



Superior

Common Takeoffs Right Coronary Artery

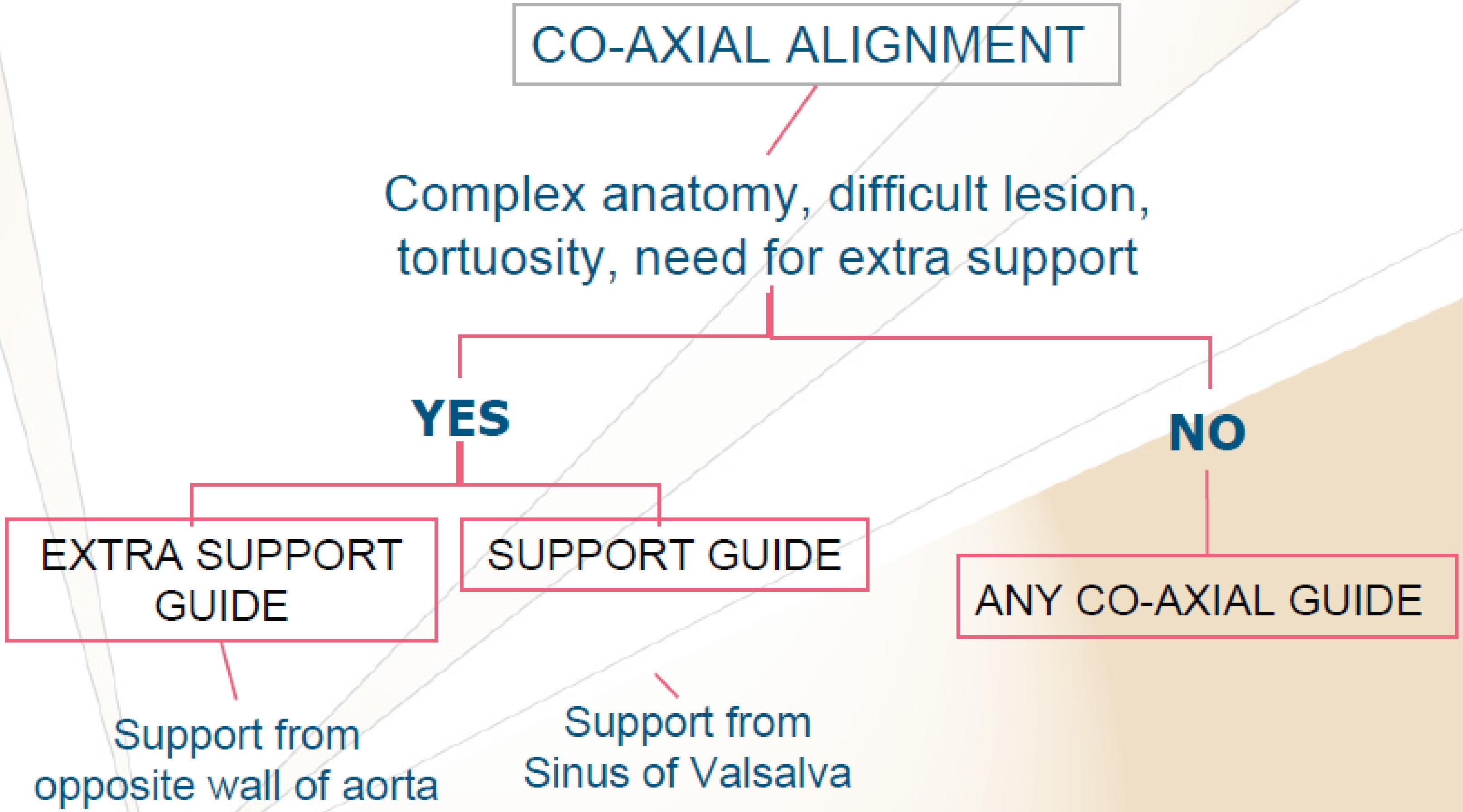


Horizontal

Inferior

Superior

Guiding Catheter Selection



Guiding Catheter Selection and Support

Standard guide for most patients; Minimal support	Support derived from Sinus of Valsalva	Power guides, Extra support
Catheters reside above or barely in Sinus of Valsalva	Catheters reside deep in ipsilateral Sinus of Valsalva	Maximum support derived from opposite wall of aorta
JL, JR, LCB, RCB	AL, AR, Hockey stick, El Gamal, Champ, MP	Voda®, XB, EBU, Arani

Short and long LMCA

- If the LM is short and there is no acute angle at the bifurcation with the LCX - left Judkins
- If the LM is long and the angle between the LM and LCX is acute - extra-backup guide
- Tip of the guide is very close to the ostium of the LCX so the acuity of the LM and LCX angle is nullified making smoother the transition between the LM and LCX

GUIDES FOR CORONARY ANOMALIES

- Important to be aware of variations of coronary anomalies
- Systematically search in other aortic sinuses when the vessel in question does not arise

- Anomalous artery from the right sinus -
  - Left, right Amplatz ,Multipurpose
- Anomalous artery from the left sinus
  - Larger left Judkins ,Left Amplatz ,Multipurpose

Guides for Anomalous Coronary Arteries Arising from the Left Sinus

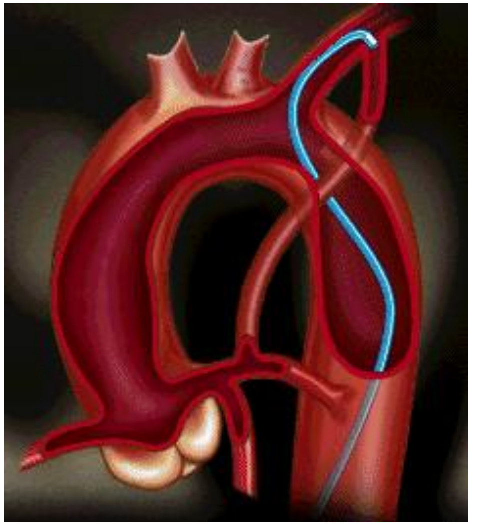
- When RCA arises from the left cusp usually it is anterior and cephalad to LM
- Judkins left with secondary curve one size larger than one used for the patient’s LM
- Pushed deep in the left sinus of Valsava, causing it to make an anterior and cephalad U-turn
- Larger curve will prevent guide to engage LM

Missing arteries Guide selection

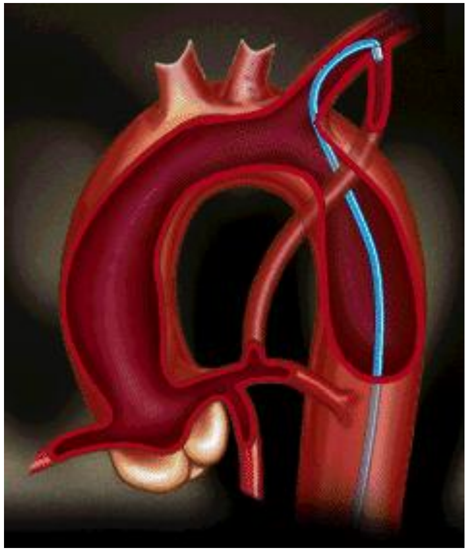
- Missing LCX due to very short LM - Use large guide with short tip and turn clockwise to point the tip more posteriorly
- No RCA In right sinus - Amplatz left pointing antero-superior to the RCA ostium
- No RCA In left sinus - Judkins left one size larger, pointing antero-superior to the LM ostium

SVG and LIMA

- Usual – JR
- Abnormal positions and take offs MP or AL1
- LCB/RCB
- Internal mammary artery - IMA catheter , LCB
  - IMA Catheter is designed for both Rt. And left Internal Mammary arteries
  - shaped like a JR catheter but with a steeply angled tip (80 to 85º).



LCB



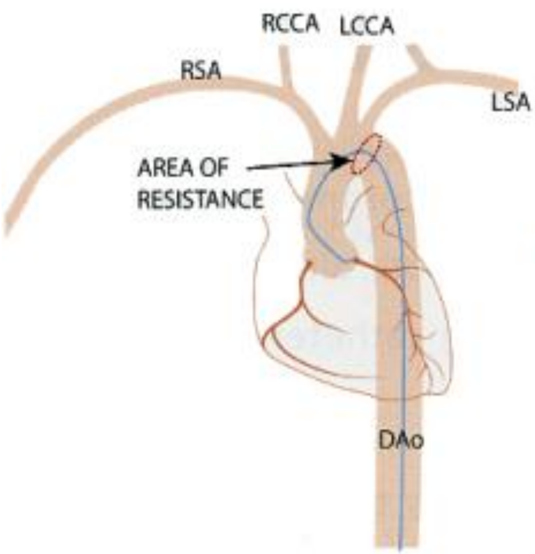
IMA

Choice of Catheters for Interventions via Radial Artery

- Left coronary artery: down size JL by 0.5
  - Judkins left , Amplatz left , Multipurpose , EBU
  - IKARI left , El Gamal
- Right coronary artery
  - Judkins right, Amplatz right, Amplatz left Multipurpose
  - IKARI right, El Gamal

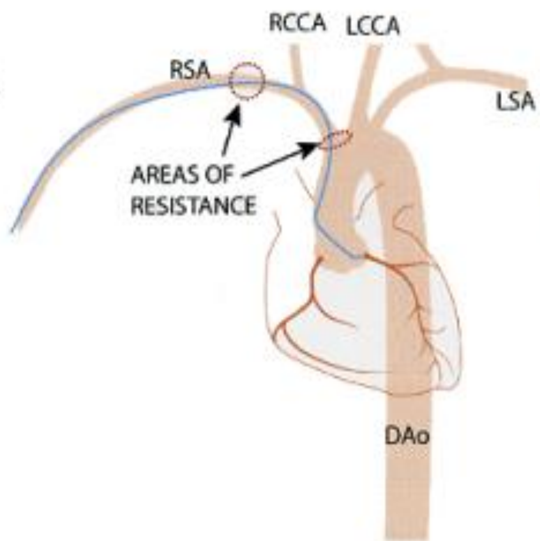
Catheter course: Radial vs. femoral

Femoral



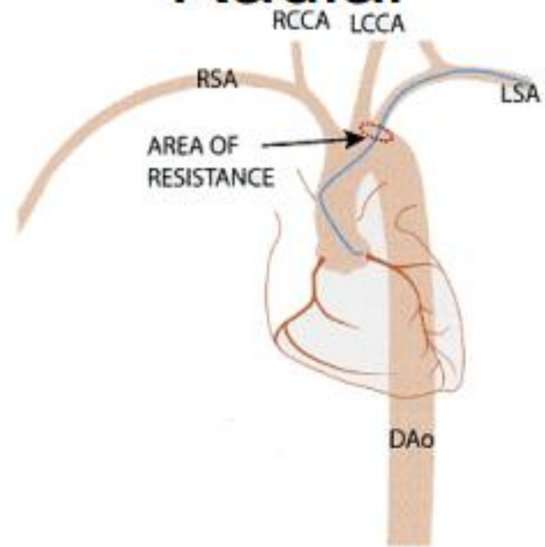
1 point of resistance

Right Radial



2 points of resistance

Left Radial

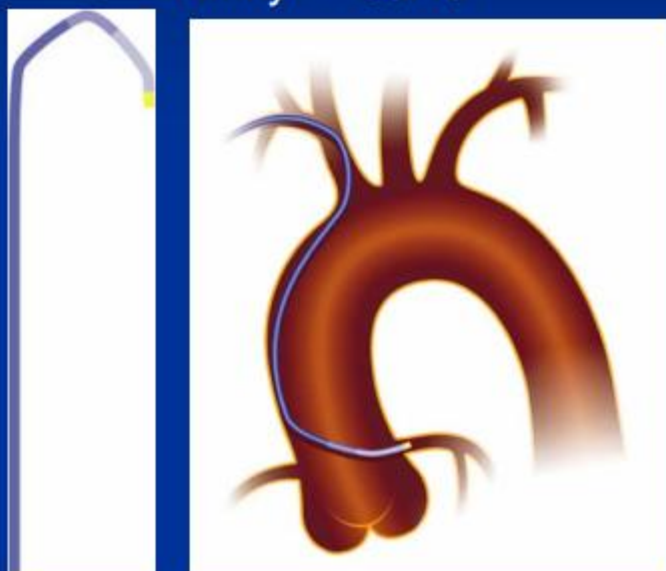


1 point of resistance

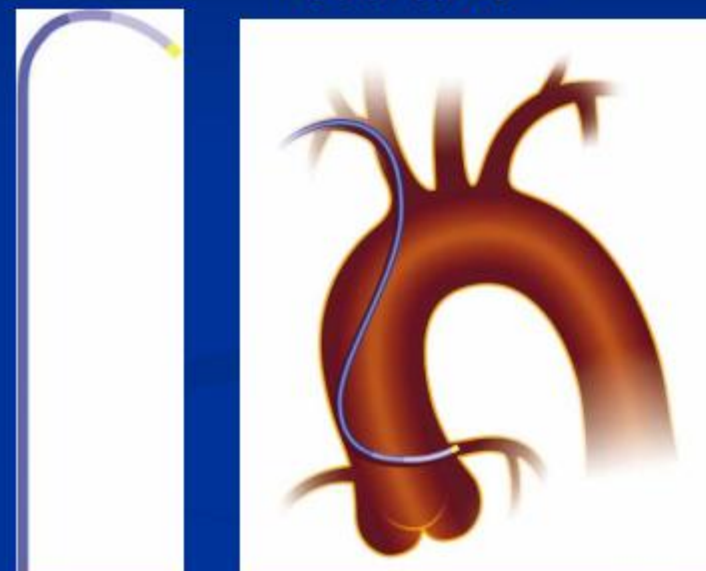
Selection of Radial guiding catheter

Radial Approach

Kimny ™ Curve



Radial curve ™



Kimny Curve
- RCA & LCA Intervention
- Contralateral Support

1 size fits all

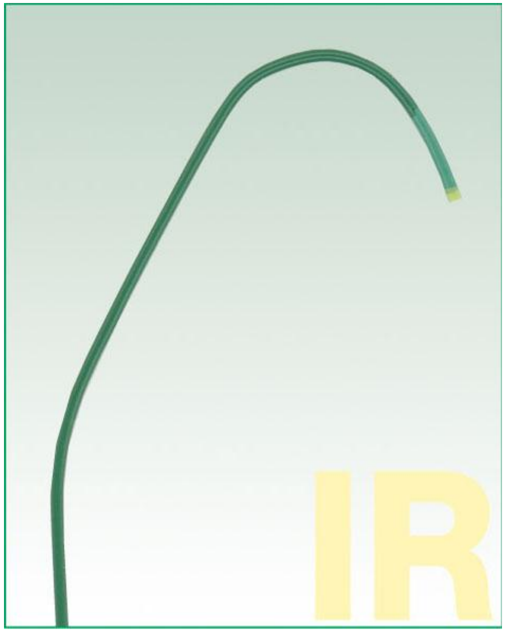
Radial curve
- RCA & LCA Intervention
- Contralateral Support

1 size fits all

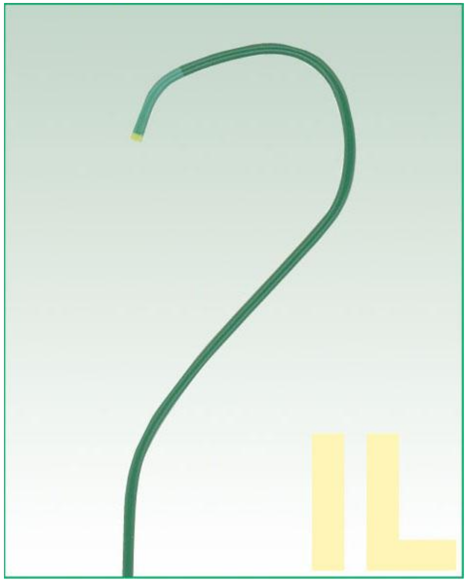
TABLE 1. DEVICES AND TECHNIQUES AVAILABLE FOR TRANSRADIAL PCI		
Catheter Size	**Devices**	**Technique**
5 F	• Balloon ≤ 5 mm • Stent ≤ 4.5 mm • Intravenous ultrasound (Eagle Eye catheter, Volcano Corporation, San Diego, CA; OptiCross coronary imaging catheter, Boston Scientific Corporation, Natick, MA) • Cutting balloon 2.5 mm • Rotablator 1.25 mm (Boston Scientific Corporation)	Two wires allowed for bifurcation but no kissing balloons (only for slender techniques in Japan[a])
6 F	• All balloon sizes • All stent sizes • Intravenous ultrasound (Eagle Eye and Revolution catheters, Volcano Corporation) • Optical coherence tomography • Cutting balloon > 2.5 mm • Rotablator ≤ 1.5 mm • Thrombectomy devices • Saphenous vein graft protection devices • Mother-child • GuideLiner	Kissing balloon
7 F[b]	Rotablator > 1.75 mm	Kissing stents

[a]Note, the "slender technique" is an approach used in Japan to minimize the diameter of guide catheters, guidewires, and puncture sites.
[b]An alternative to 7–8 F outside the United States is to use Asahi sheathless 6.5- or 7.5-F devices (Asahi Intecc USA, Inc., Santa Ana, CA).

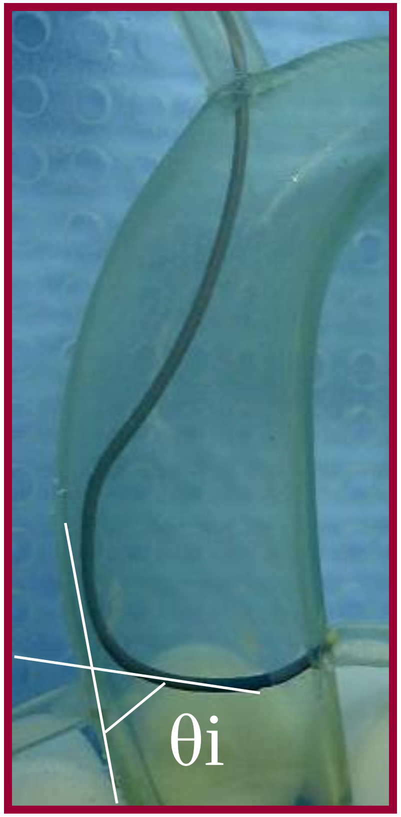
- Ikari catheter – for trans radial intervention



Ikari R (IR) 1.5



Ikari L (IL) 4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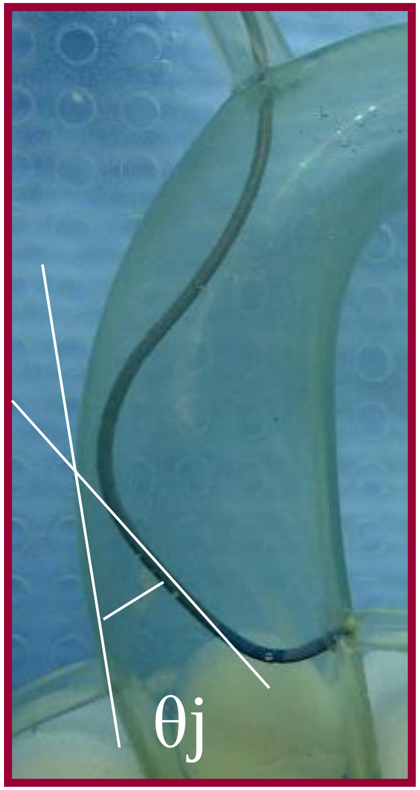
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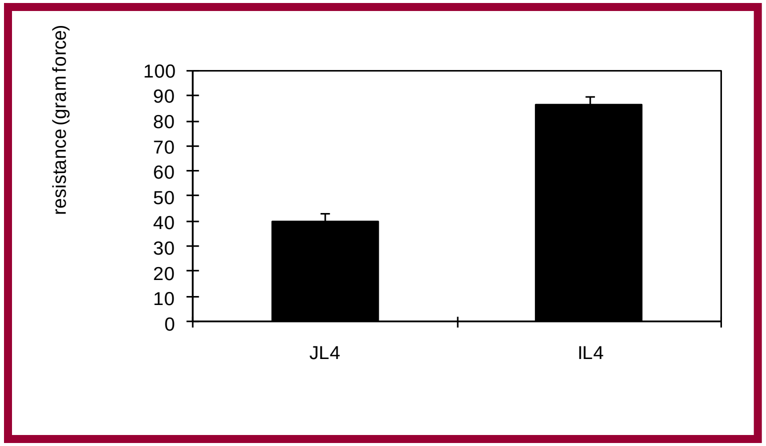
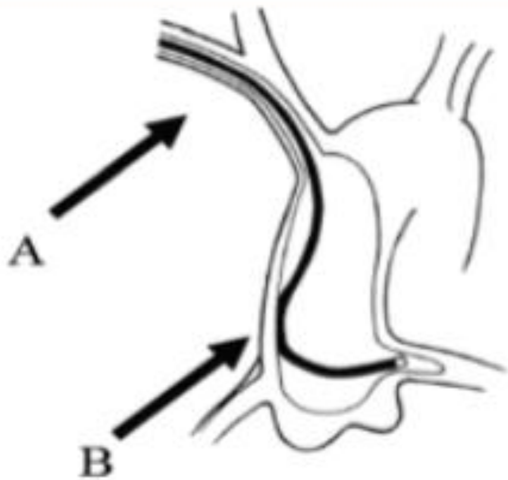
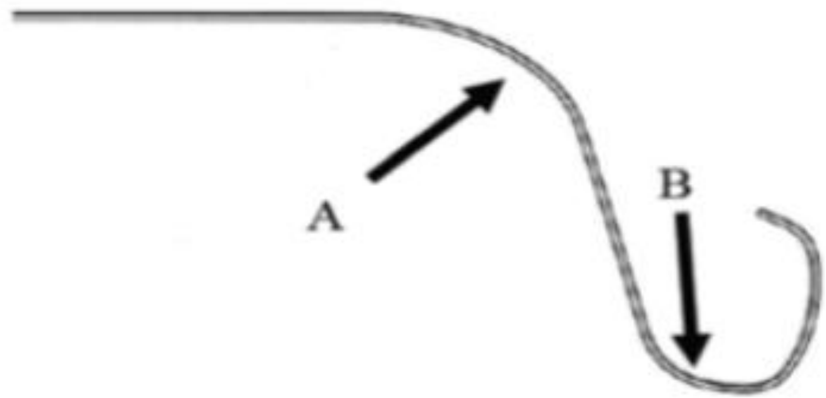

resistance (gram force)
100
90
80
70
60
50
40
30
20
10
0
JL4
IL4

Universal radial guide catheters
Catheter manipulation from right radial approach

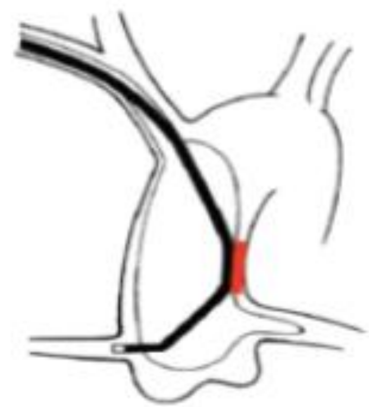


C



Curve A to fit angle of brachiocephalic artery.

Straight portion (20 mm) B to generate strong back-up force supported by opposite side of aortic wall.



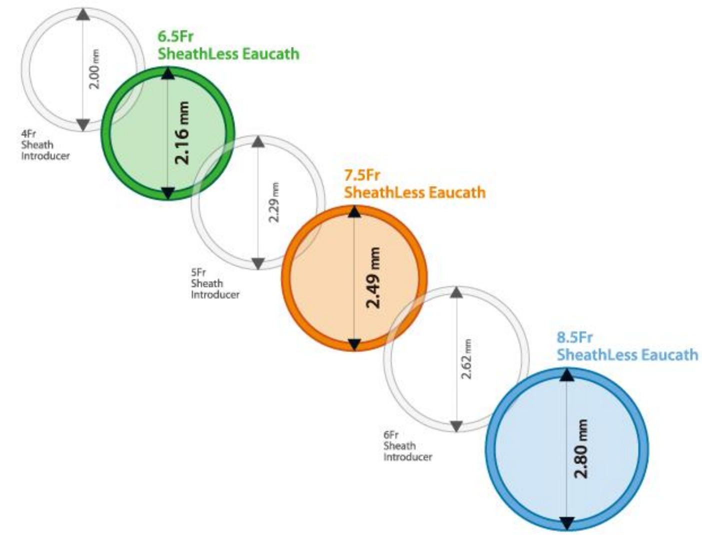
Ikari-L for RCA

Sheath less Guide Catheters During Transradial PCI

The Sheath Less guiding catheter is designed to:

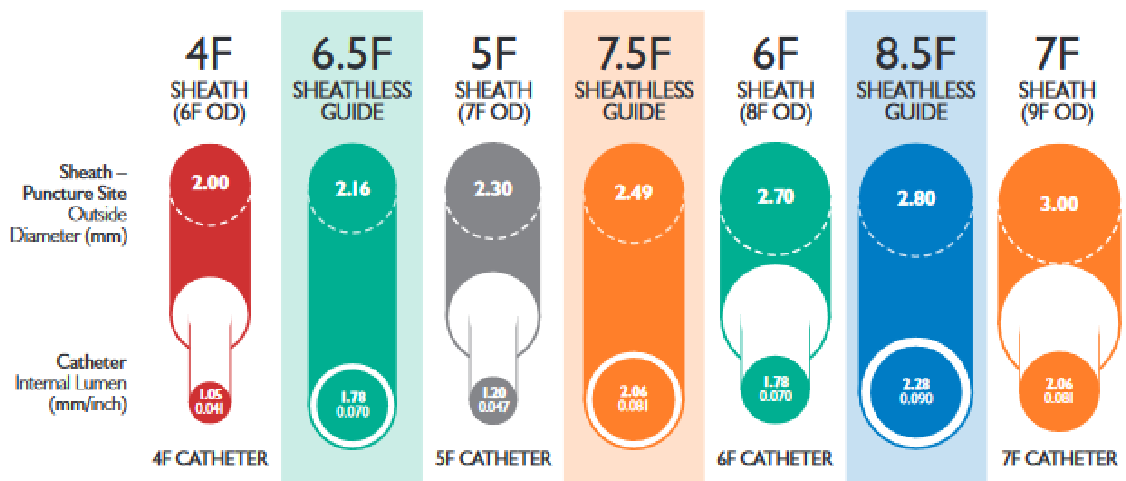
- Minimize the radial puncture site whilst providing a larger inner lumen
- Negates the need for a sheath during PCI
- Hydrophilic coating enhances catheter trackability
- Long dilator provided with each catheter

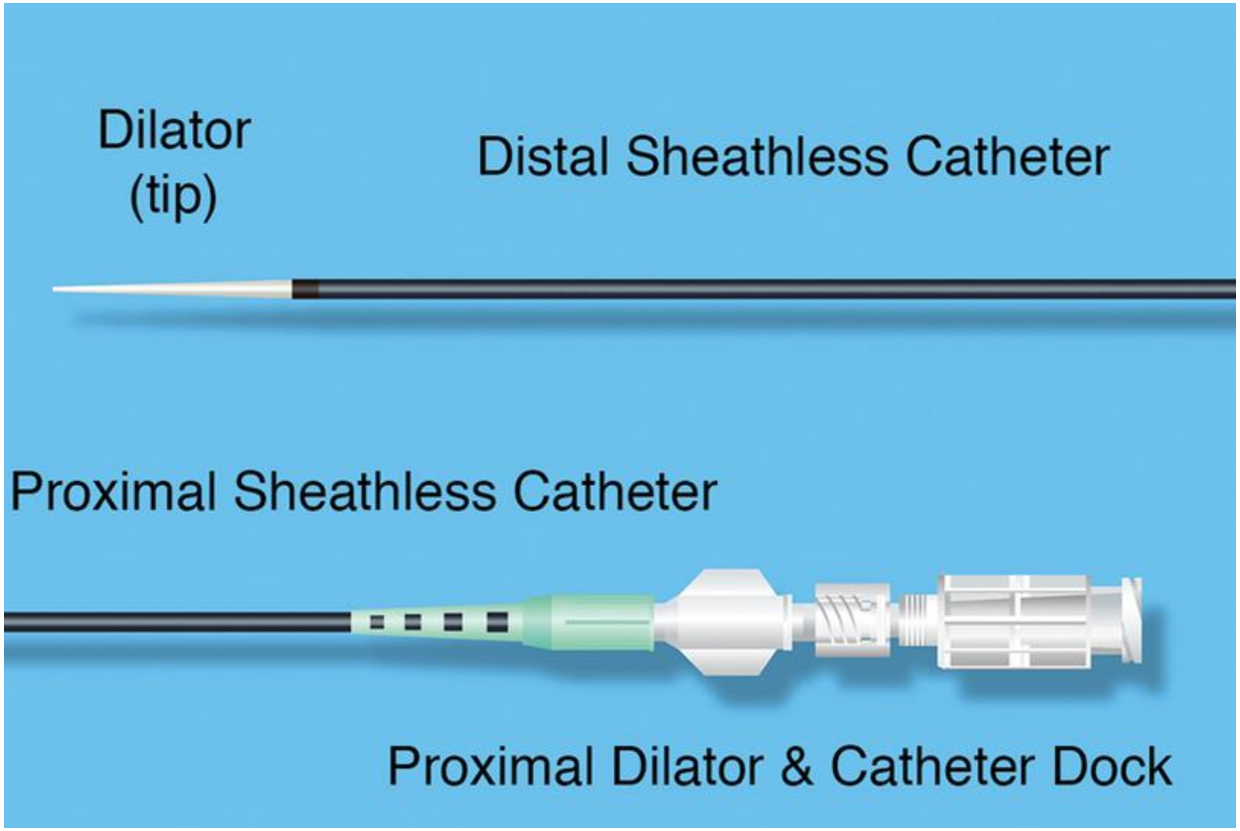
Sheathless Eaucath system (Asahi Intecc Co Ltd.)



Features

- **Substantial outer layer and large inner lumen**
  Enhanced kink resistance and backup support with a large inner lumen for easy device delivery
- **Hydrophilic coating**
  Enhanced catheter trackability even in tortuous vessels, and reduced incidence of spasm
- **ASAHI braiding**
  Two different braiding patterns provide optimal torque and flexibility.



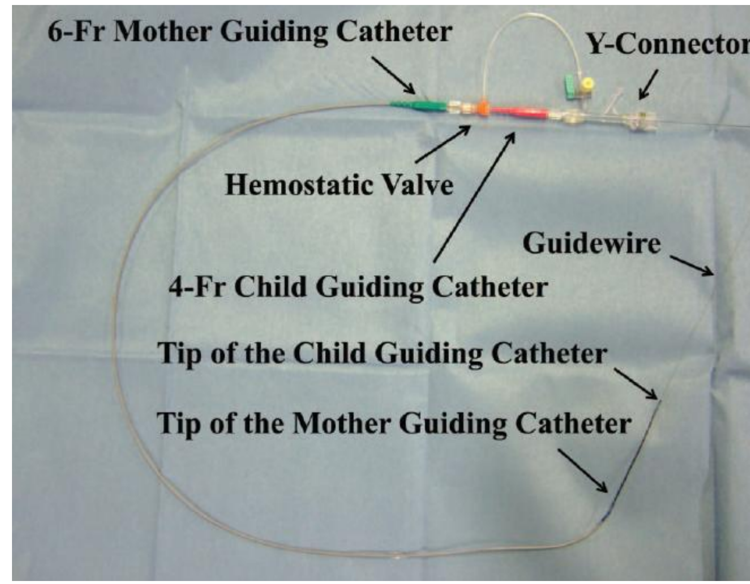


- The Sheath less Eaucath system with integrated central introducer tailored for minimal clearance over a 0.035-inch wire and interface with the inner lumen of the guiding catheter.

- The shape of the guiding catheter becomes apparent after the central dilator and wire are removed in the central aorta.

Guide extension(Mother and child)

- Improve the delivery of coronary stents to complex lesions
- Child catheters 4/5 F 120 cm
- Mother catheter - 6 F guiding catheter 100cm
- Superior trackability of the 4F child catheter
- Increased backup support of the mother-child system



Guide liner catheter

- Guide Liner catheter is a coaxial guiding catheter extension delivered through a standard guiding catheter on a monorail
- Comprises a flexible yellow 20 cm straight extension connected to a stainless-steel push tube
- Permits very deep intubation of the target vessel, thus providing backup support to facilitate stent delivery across heavily calcified lesions in tortuous vessels

Guide liner catheter

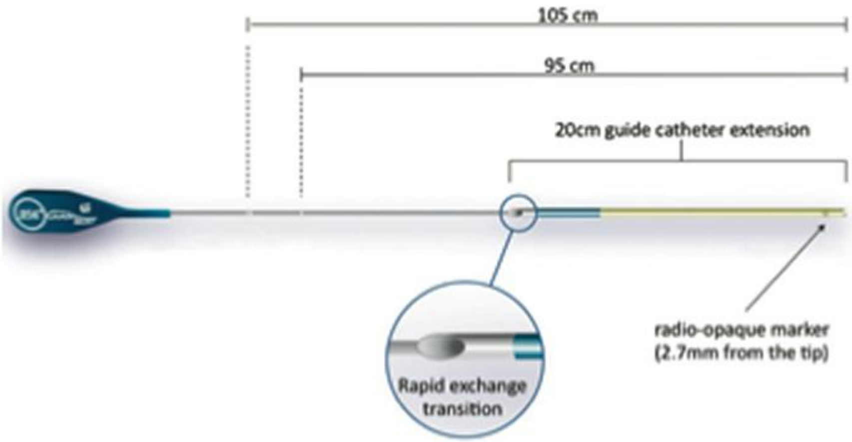


Figure 1. *The GuideLiner catheter. This consists of a flexible 20 cm straight guide extension connected to a stainless-steel push tube.*

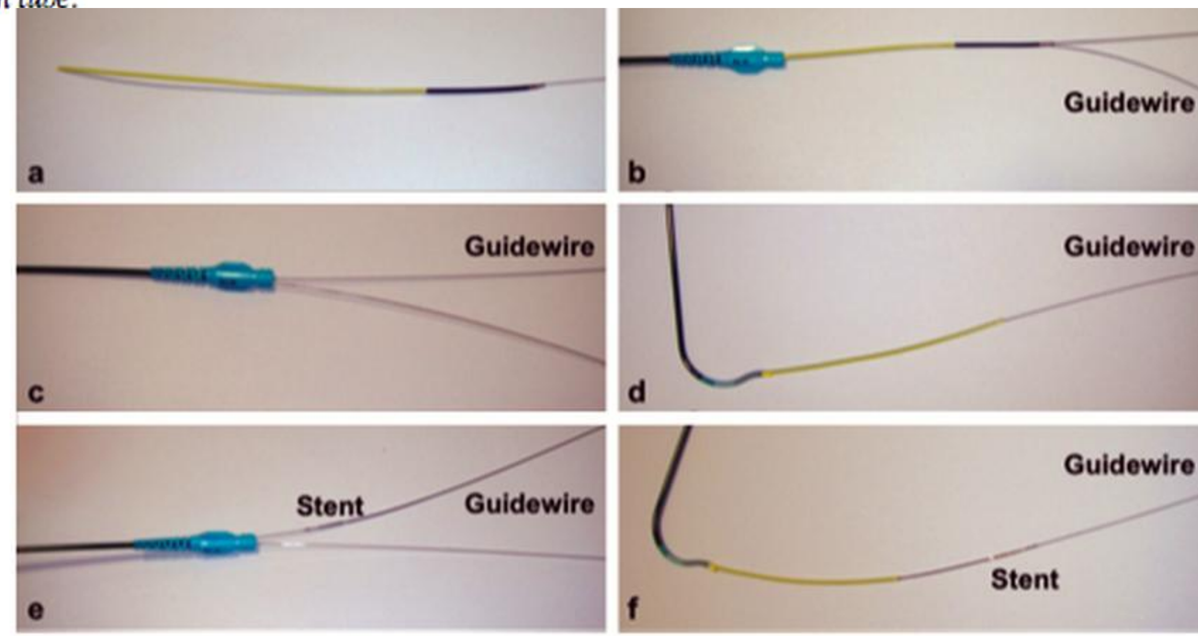
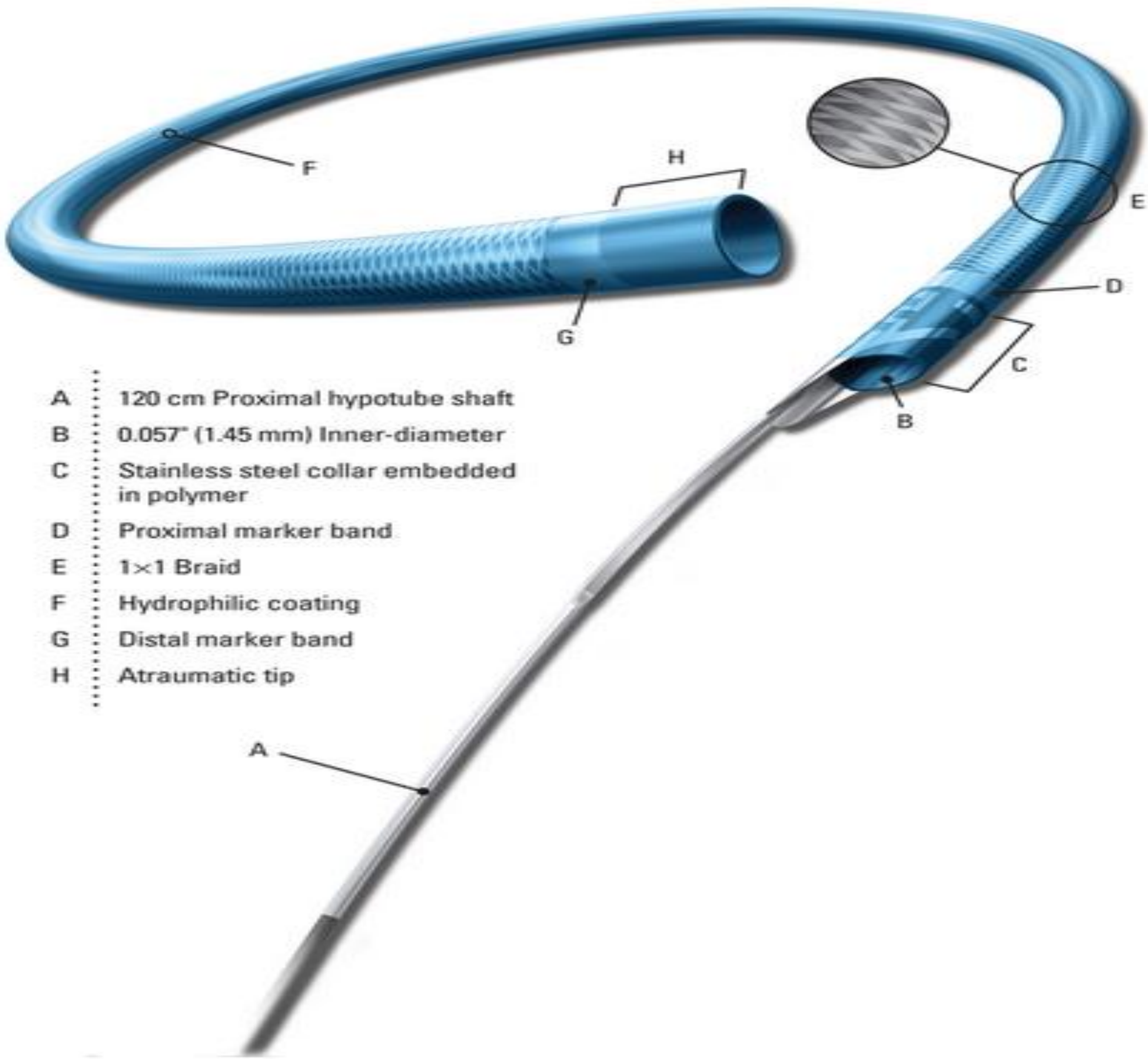


Figure 2. *Insertion of the GuideLiner.* (**a**) *The monorail GuideLiner catheter is inserted into a guiding catheter over a guidewire* (**b**). *Once advanced into the guiding catheter, the GuideLiner push tube can be advanced while holding the guidewire in place* (**c**). *The GuideLiner can be advanced up to 10 cm beyond the guiding catheter tip* (**d**). *Balloons or stents can be advanced along the guidewire* (**e**), *through the GuideLiner to the target lesion* (**f**).

	GUIDEZILLA	GuideLiner® V3*
Size	6 F (1.7 mm)	6 F (1.78 mm)
Proximal Shaft	Stainless steel hypotube	Stainless steel ribbon
Coating	Hydrophilic (Bioslide)	Silicone wipe
I.D.	0.057" (1.45 mm)	0.056" (1.42 mm)
O.D.	0.066" (1.68 mm)	0.067" (1.78 mm)
Distal Guide Length	25 cm	25 cm
Collar Type	Stainless steel collar embedded in polymer	All-polymer half-pipe collar
Marker Band	1 Distal MB at tip 1 MB distal to collar	1 Distal MB at tip 1 MB distal to collar

Heartrail® II - PTCA guiding catheter

- Hear trail II is developed to maximize your back-up force when using right and left Ikari curves during transradial interventions and through its innovative 5-in-6 system.
- By inserting a 5 Fr (120 cm with flexible distal portion) into a 6 Fr guiding catheter:
- Provides the back-up support of a 7 Fr guiding catheter with a 6 Fr system


H
F
E
D
G
C
B
A
A 120 cm Proximal hypotube shaft
B 0.057" (1.45 mm) Inner-diameter
C Stainless steel collar embedded in polymer
D Proximal marker band
E 1×1 Braid
F Hydrophilic coating
G Distal marker band
H Atraumatic tip

NAMES OF GUIDE CATHETERS FROM DIFFERET COMPANIES

BOSTON SCIENTIFIC

CONVEY

GUIDEZELLA GUIDE EXTENTION CATHETER

MACH 1

RUBICON SUPPORT

RUNWAY

WISEGUIDE

MEDTRONIC

- LAUNCHER

CORDIS

- GUIDE CATHETER PORTFOLIO – COMPOSED OF ADROIT GIDE CATHETER AND VIST BRTIE TIP

MERIT MEDICAL

- CONCIERGE

Curve type	Shape type	Shape code
Standard curves	Amplatz Left	AL 1
		AL 2
		AL 3
	Amplatz Right	AR 1
		AR 2
	Judkins Left	JL 3
		JL 3.5
		JL 4
		JL 4.5
		JL 5
		JL 6
	Judkins Right	JR 3
		JR 3.5
		JR 4
		JR 4.5
		JR 5
		JR 6

Stronger backup curves	Back Up for left coronary	BL 2.5
		BL 3
		BL 3.5
		BL 4
		BL 4.5
	Back Up for right coronary	BR 3.5
		BR 4
Other curves	Multipurpose	MPA-Large
Curves for bypass	IMA	IMA 1.0
	Bypass	BP-L
		BP-R
Curves for radial access	Ikari-Curve Left	IL 3
		IL 3.5
		IL 4
		IL 4.5
	Ikari-Curve Right	IR 1
		IR 1.5
		IR 2
	Tiger	TIG 5
	JR Catarina	ER 4
	VD Radial	VDR-L
5 in 6 system		Straight

THE END