

**SPECIAL DEVICES IN PCI**

HKCC/HKPHCA PCI FELLOWSHIP COURSE: THE BASICS

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25 AUG 2019

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- Microcatheter Family
- Mother and Child Guiding Support
- Thrombectomy and Distal Protection Device
- Atherectomy/Calcium Modifying Devices

2

TERUMO

### Microcatheter: **Finexcross MG**

The diagram illustrates the Finexcross MG microcatheter with the following specifications:

- 1.8Fr.**: Dimension of the proximal handle.
- 2.6Fr.**: Dimension of the proximal shaft.
- No M-coat at proximal 60cm**: A section of the shaft without micro-coating.
- Outer & Inner Taper**: The tapered section of the shaft.
- Flexible length 13cm**: The length of the flexible portion of the catheter.

**0.7mm**  
**0.7mm**  
Gold marker length 0.7mm

**135 or 150 cm**

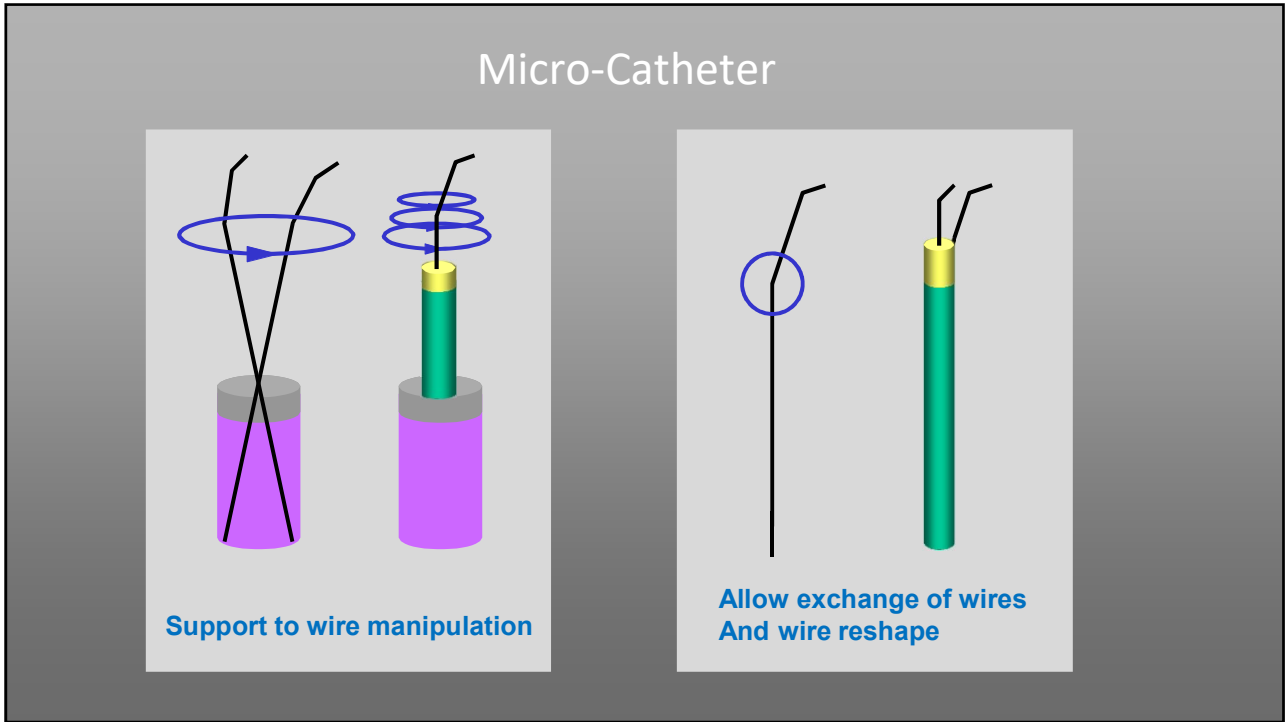
3

### Micro-Catheter

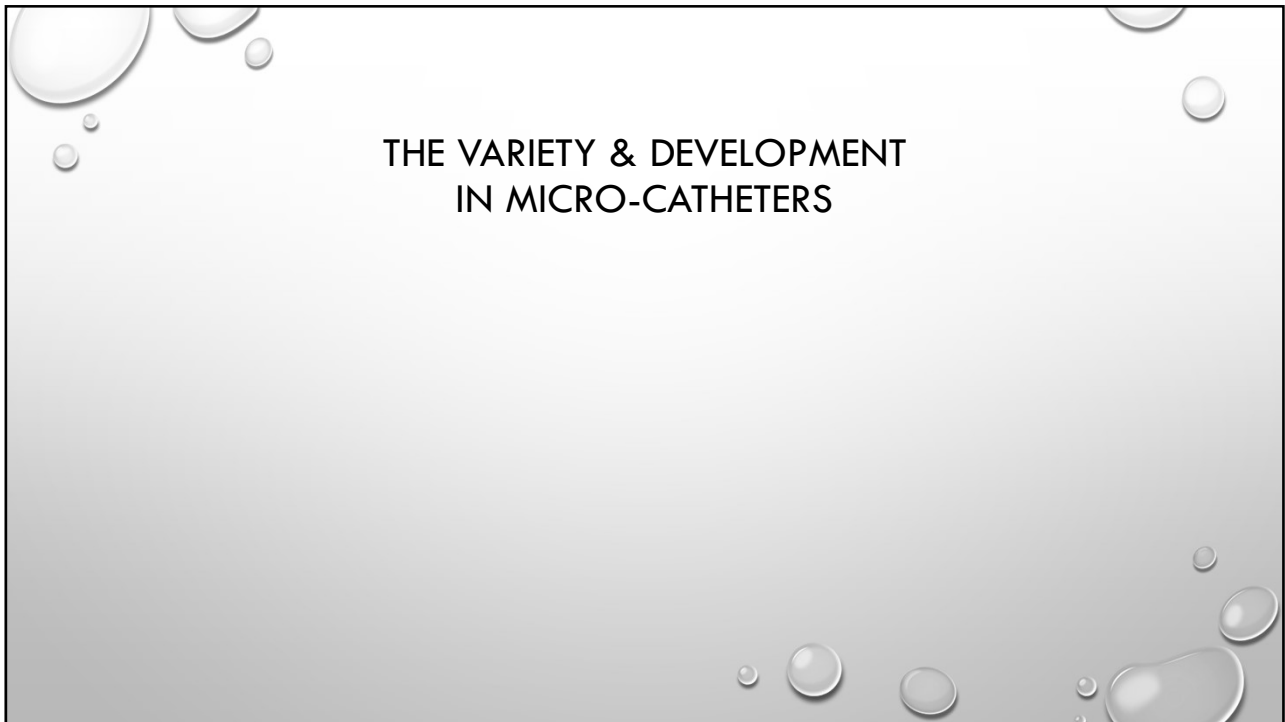
The slide contains three main visual elements:

- Support to wire manipulation**: A diagram showing two catheters in purple containers. The left one has two wires crossing, while the right one has a single wire supported by a green sleeve. Blue circles with arrows indicate the direction of wire manipulation.
- Flexibility comparison**: Two grayscale images of catheters. The top image shows a smooth, curved catheter. The bottom image shows a more rigid catheter with a sharp bend, labeled "Lossy compression - not intended for diagnosis".

4



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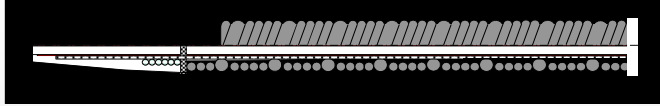


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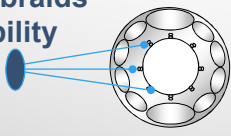
**ASAHI Corsair**  
Microcatheter

## CORSAIR MICRO-CATHETER

**For crossing & dilating micro-channels or lesions**



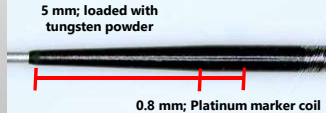
**Tungsten braids for visibility**



$\Phi 0.12 \text{ mm} \times 2\text{pcs}$   
 $\Phi 0.07 \text{ mm} \times 8\text{pcs}$

**8 thin wires wound with 2 larger ones = pushability, trackability and support**

Kink resistant tapered tip (.016")  
Hydrophilic coating in distal 60cm



5 mm; loaded with tungsten powder  
0.8 mm; Platinum marker coil

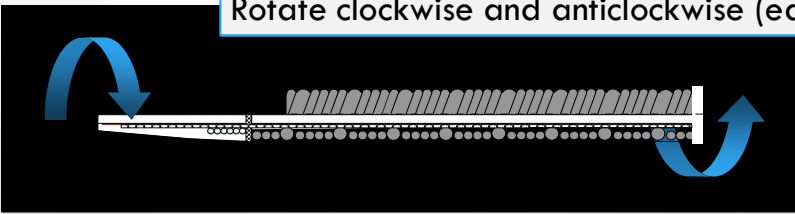
7

**ASAHI Corsair**  
Microcatheter

## CORSAIR MICRO-CATHETER

### Rotation Resistance Reduction

Rotate clockwise and anticlockwise (each < 10 turns)

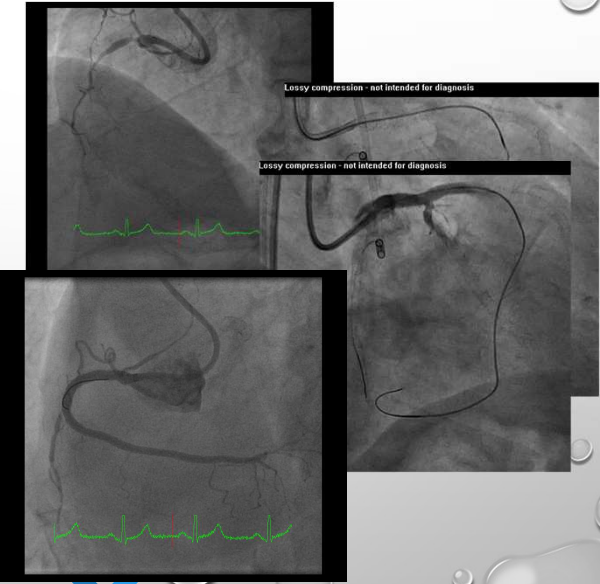
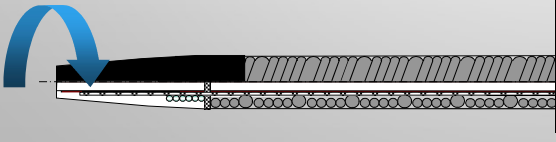


**SHINKA-Shaft's spiral structure transmits rotation to the distal tip. This rotation gives CORSAIR its crossing performance through tortuous channels.**

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## CORSAIR MICRO-CATHETER

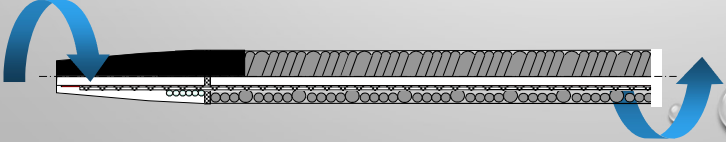

- For antegrade crossing as support catheter
- For collateral channel crossing in retrograde approach for CTO



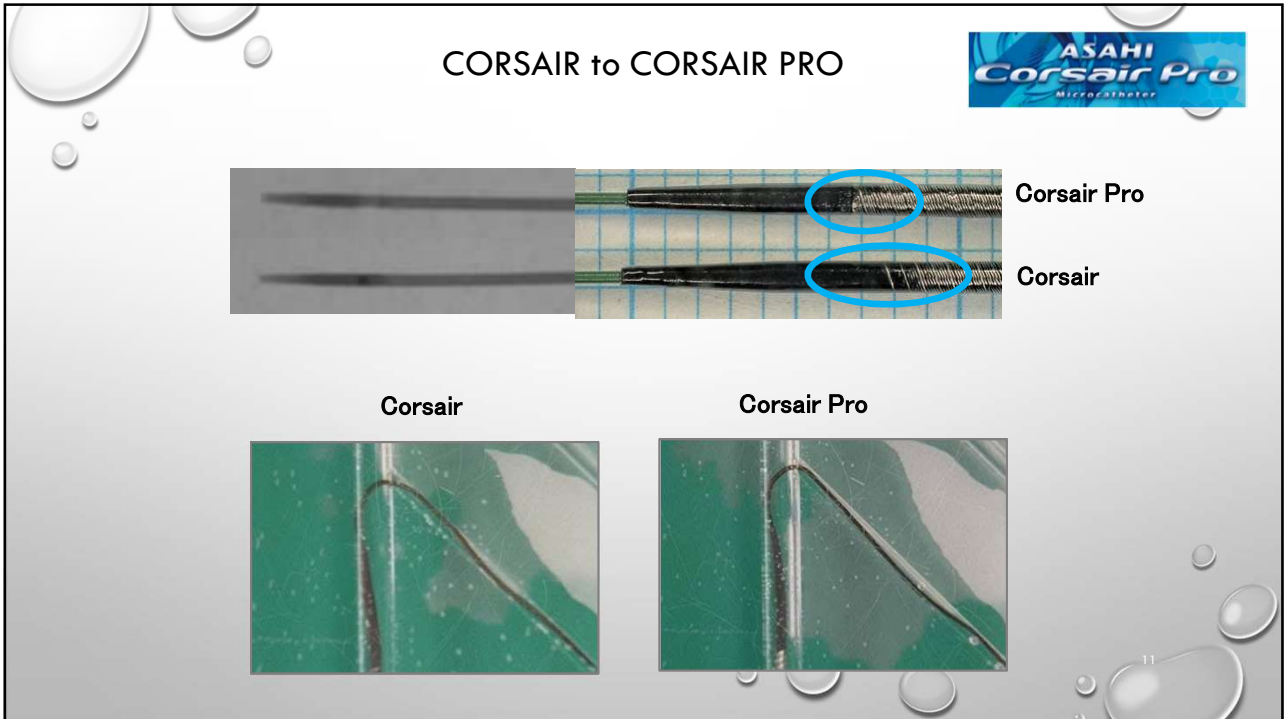
9

## CORSAIR MICRO-CATHETER

Caution in “drilling” through calcific lesion, especially in tortuous vessel



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### Product structure

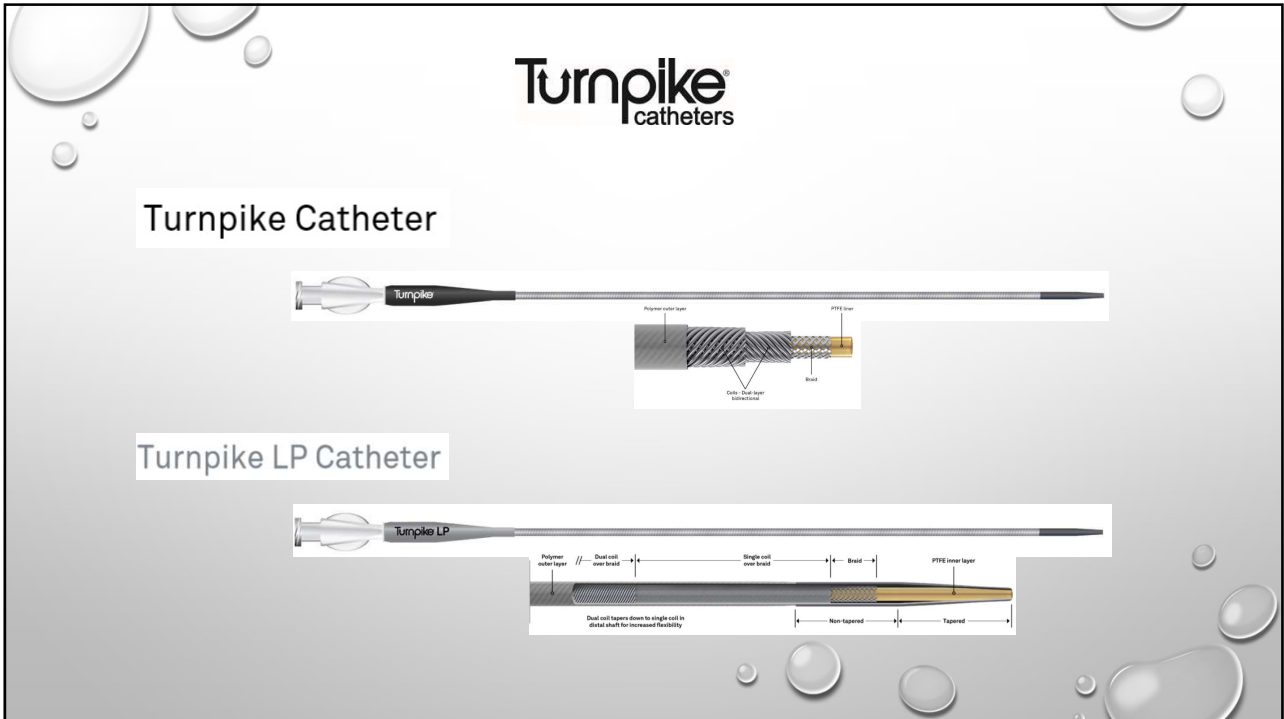
**ASAHI™ Caravel™** (#)

Hydrophilic coating : 70/85cm

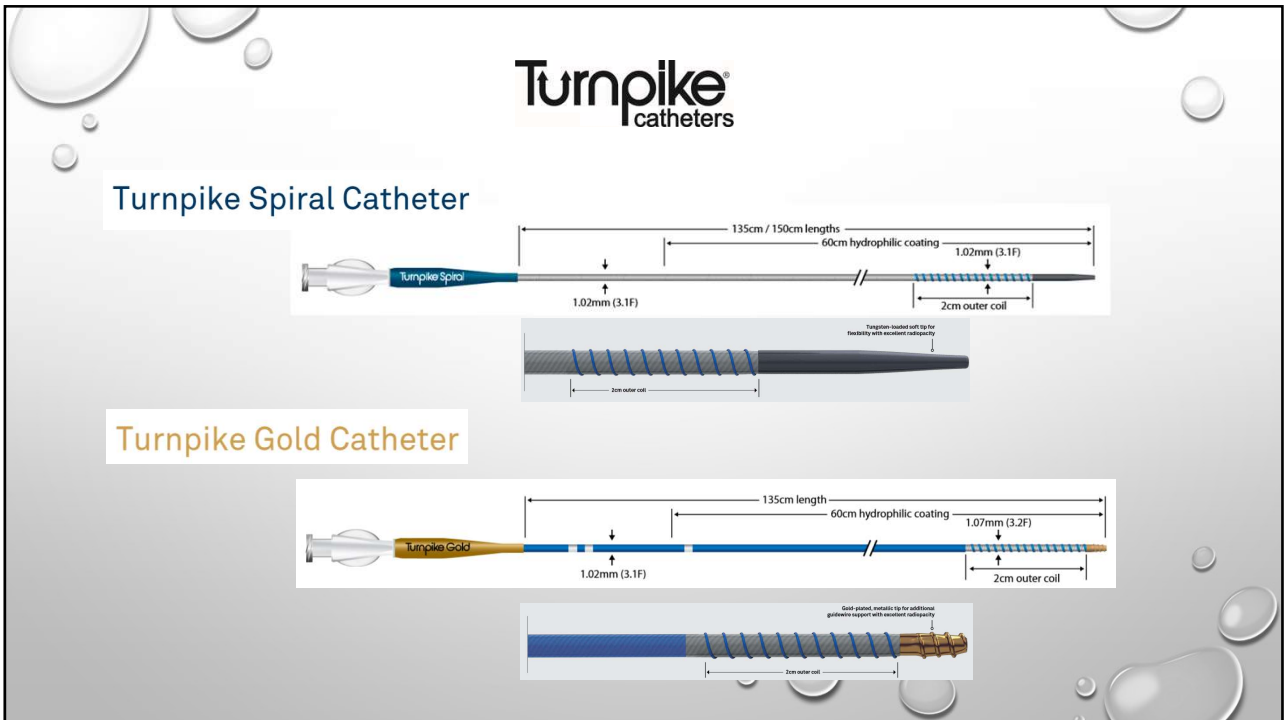
Caravel™ Dis.                      Caravel™ Prox.

Products	O.D.			I.D.			Length	Coating Length
	Entry	Distal	Proximal	Entry	Distal	Proximal		
ASAHI™ Caravel™ 135cm	0.48 mm (1.4Fr)	0.62 mm (1.9 Fr)	0.85 mm (2.6 Fr)	0.40 mm (0.016inch)	0.43 mm (0.017inch)	0.55 mm (0.022inch)	135cm	70cm
ASAHI™ Caravel™ 150cm	0.48 mm (1.4 Fr)	0.62 mm (1.9 Fr)	0.85 mm (2.6 Fr)	0.40 mm (0.016inch)	0.43 mm (0.017inch)	0.55 mm (0.022inch)	150cm	85cm


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**Tornus 2.1Fr – more flexible**





**Tornus 2.6Fr – more support**



Eight (8) individual stainless steel wires (0.007” diameter) stranded together to form a tapered catheter

- Silicone coating on inner/outer surfaces
- OTW system, 135cm length, compatible w/ 0.014” guidewire
- 2 uses: 1) secures proximal support; 2) crosses resistant lesions

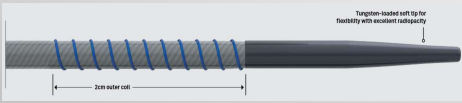
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ANTICLOCKWISE up to 20 turns  
Then release the torque before repeating

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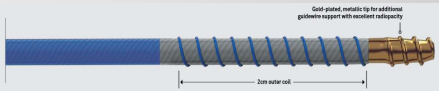
**Turnpike Spiral Catheter**



Tungsten-loaded soft tip for flexibility with excellent radiopacity

2cm outer coil

**Turnpike Gold Catheter**



















Gold plated metallic tip for additional guidewire support with excellent radiopacity

2cm outer coil

















CLOCKWISE Turn

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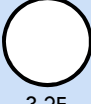
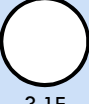
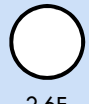

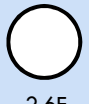

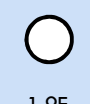


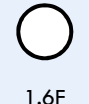

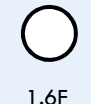

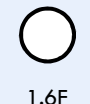

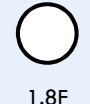


	Turnpike Gold	Turnpike Spiral	Tornus 88Flex	Turnpike	Corsair Pro	Turnpike LP	Caravel	Finecross
Distal Shaft OD	 3.2F <small>* w/outer coil</small>	 3.1F <small>* w/outer coil</small>	 2.6F	 2.6F	 2.6F	 2.2F	 1.9F	 1.8F
Tip OD	 2.1F	 1.6F	 2.1F	 1.6F	 1.3F	 1.6F	 1.4F	 1.8F
Clockwise Torque	✓	✓		✓	✓	✓		
Anti-Clockwise Torque			✓	✓	✓	✓		
Push	-	-	-	✓	✓	✓	✓	✓
Calcified lesion	✓	✓	✓	-	-	-	-	-

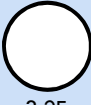
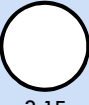






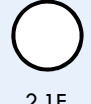
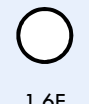

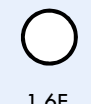

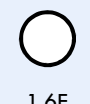


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	Turnpike Gold	Turnpike Spiral	Tornus 88Flex	Turnpike	Corsair Pro	Turnpike LP	Caravel	Finecross
Distal Shaft OD	 3.2F <small>* w/outer coil</small>	 3.1F <small>* w/outer coil</small>	 2.6F	 2.6F	 2.6F	 2.2F	 1.9F	 1.8F
Tip OD	 2.1F	 1.6F	 2.1F	 1.6F	 1.3F	 1.6F	 1.4F	 1.8F
Clockwise Torque	✓	✓		✓	✓	✓		
Anti-Clockwise Torque			✓	✓	✓	✓		
Push	-	-	-	✓	✓	✓	✓	✓
Calcified lesion	✓	✓	✓	-	-	-	-	-

















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	Turnpike Gold	Turnpike Spiral	Tornus 88Flex	Turnpike	Corsair Pro	Turnpike LP	Caravel	Finecross
Distal Shaft OD	 3.2F <i>* w/outer coil</i>	 3.1F <i>* w/outer coil</i>	 2.6F	 2.6F	 2.6F	 2.2F	 1.9F	 1.8F
Tip OD	 2.1F	 1.6F	 2.1F	 1.6F	 1.3F	 1.6F	 1.4F	 1.8F
Clockwise Torque	✓	✓		✓	✓	✓		
Anti-Clockwise Torque			✓	✓	✓	✓		
Push	-	-	-	✓	✓	✓	✓	✓
Calcified lesion	✓	✓	✓	-	-	-	-	-

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	Turnpike Gold	Turnpike Spiral	Tornus 88Flex	Turnpike	Corsair Pro	Turnpike LP	Caravel	Finecross
Distal Shaft OD	 3.2F <i>* w/outer coil</i>	 3.1F <i>* w/outer coil</i>	 2.6F	 2.6F	 2.6F	 2.2F	 1.9F	 1.8F
Tip OD	 2.1F	 1.6F	 2.1F	 1.6F	 1.3F	 1.6F	 1.4F	 1.8F
Clockwise Torque	✓	✓		✓	✓	✓		
Anti-Clockwise Torque			✓	✓	✓	✓		
Push	-	-	-	✓	✓	✓	✓	✓
Calcified lesion	✓	✓	✓	-	-	-	-	-

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	Turnpike Gold	Turnpike Spiral	Tornus 88Flex	Turnpike	Corsair Pro	Turnpike LP	Caravel	Finecross
<b>Distal Shaft OD</b>	 3.2F <small>* w/outer coil</small>	 3.1F <small>* w/outer coil</small>	 2.6F	 2.6F	 2.6F	 2.2F	 1.9F	 1.8F
<b>Tip OD</b>	 2.1F	 1.6F	 2.1F	 1.6F	 1.3F	 1.6F	 1.4F	 1.8F
<b>Clockwise Torque</b>	✓	✓		✓	✓	✓		
<b>Anti-Clockwise Torque</b>			✓	✓	✓	✓		
<b>Push</b>	-	-	-	✓	✓	✓	✓	✓
<b>Calcified lesion</b>	✓	✓	✓	-	-	-	-	-

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## MICROCATHETERS TO DEAL WITH ANGULATION...

### SuperCross<sup>™</sup> AT Microcatheter



AT Angle	90°	120°
Guidewire Compatibility	0.014"	0.014"
Angled Tip Length	3mm	4mm
Curve Radius	1.5mm	1.25mm



120° SuperCross



120° SuperCross with Workhorse Guidewire

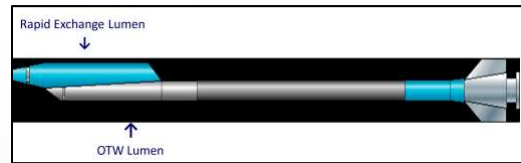


120° SuperCross with 12g CTO Guidewire

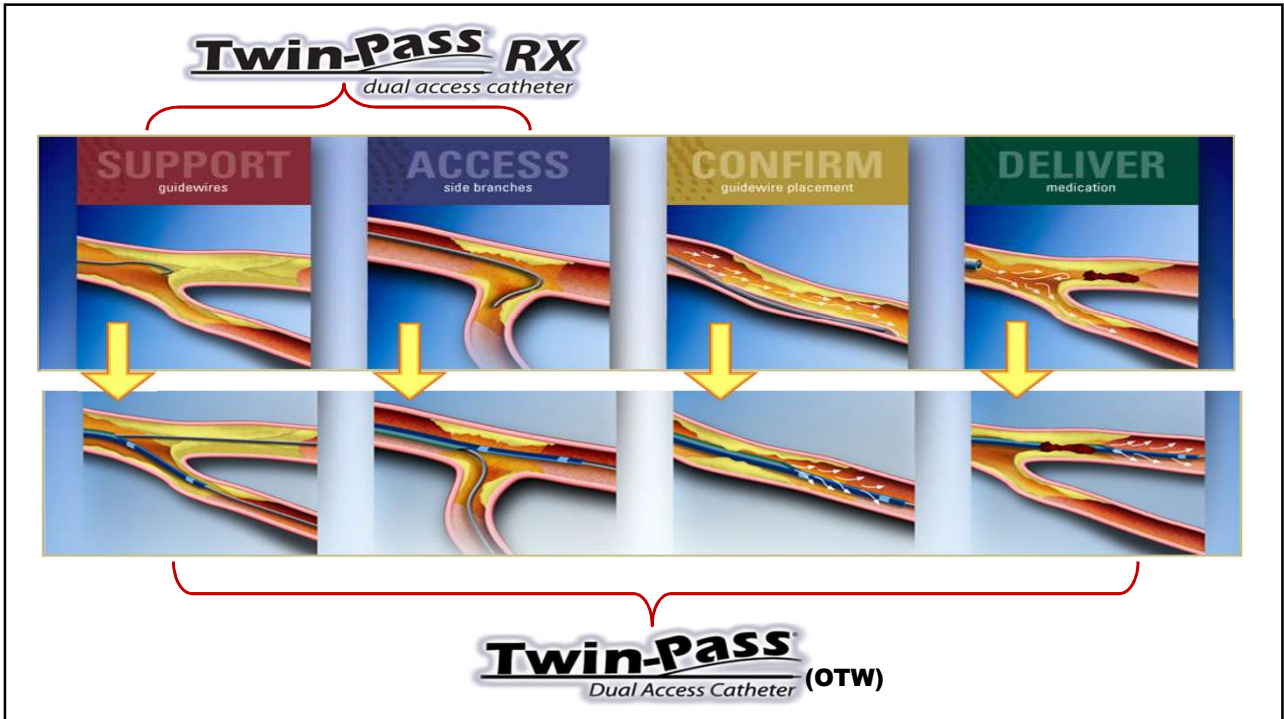


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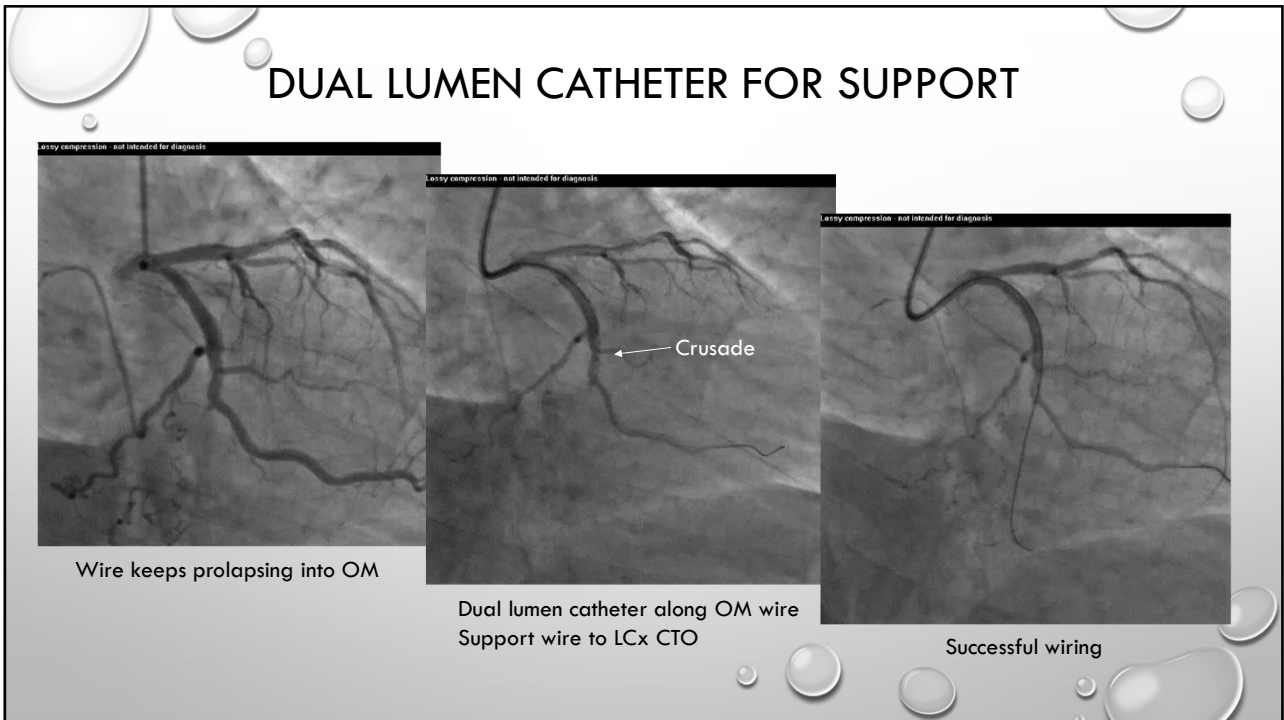
## DUAL LUMEN CATHETERS



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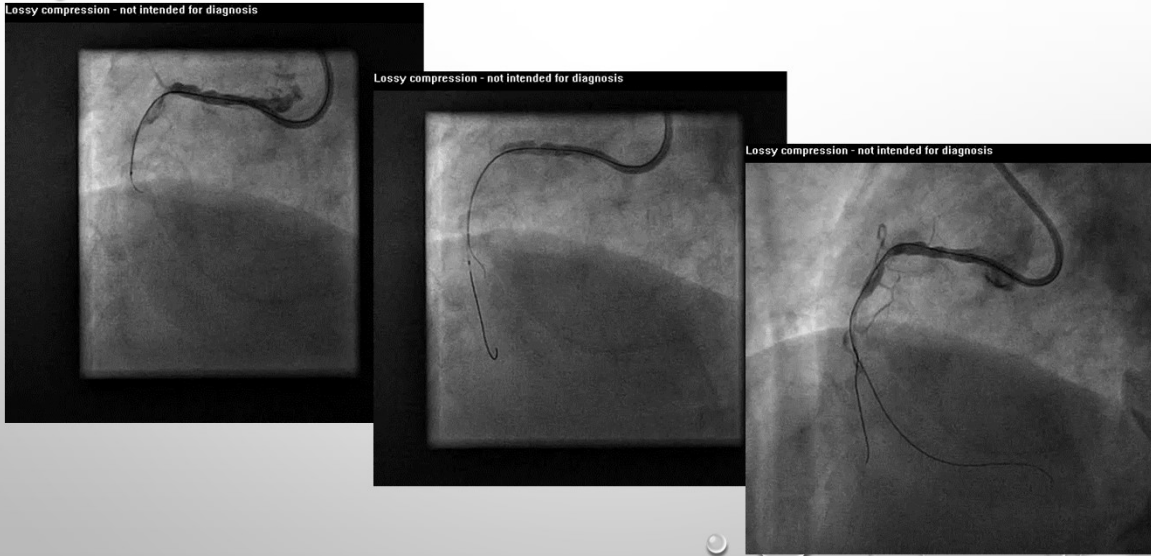


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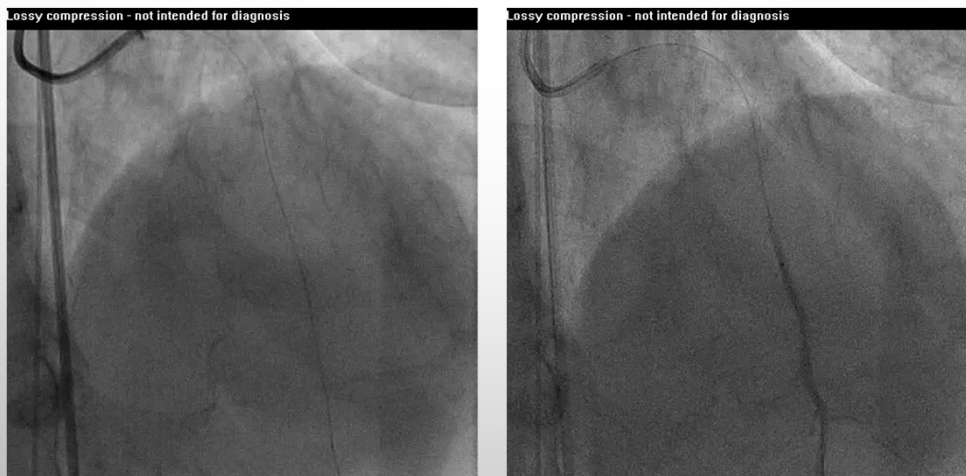
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## DUAL LUMEN CATHETER FOR ACCESS



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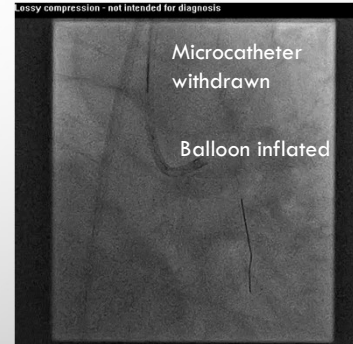
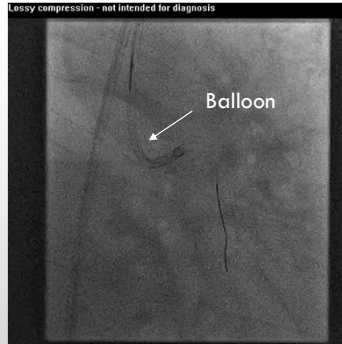
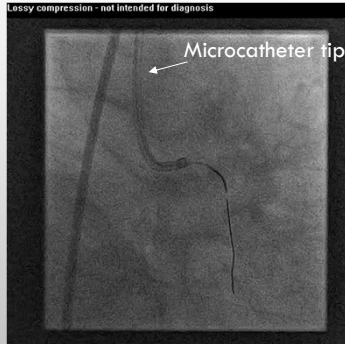
## DUAL LUMEN CATHETER FOR CONTRAST INJECTION



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## REMOVAL OF MICROCATHETER AFTER WIRE CROSSING

### Trapping Balloon



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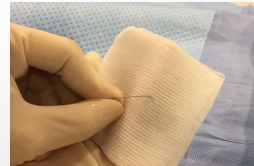
## REMOVAL OF MICROCATHETER AFTER WIRE CROSSING

### Use of extension wire



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## REMOVAL OF MICROCATHETER AFTER WIRE CROSSING By "Injection"



Safety improved by adding a acute curve

Not recommended for:

- Stiff wires
- Tapered wires
- Hydrophilic wires

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Microcatheter Family

**Mother and Child Guiding Support**

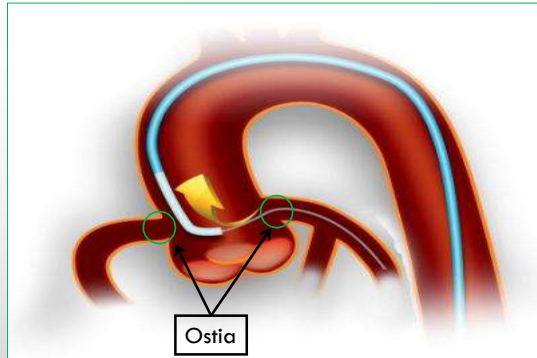
Thrombectomy and Distal Protection Device

Atherectomy/Calcium Modifying Devices

32



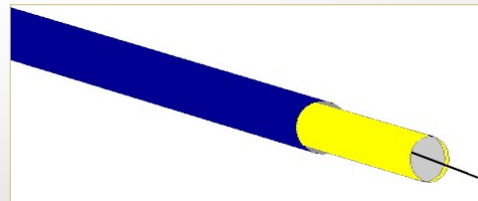
## GUIDE CATHETER BACK-OUT



33

## “MOTHER-AND-CHILD” GUIDE EXTENSION CONCEPT

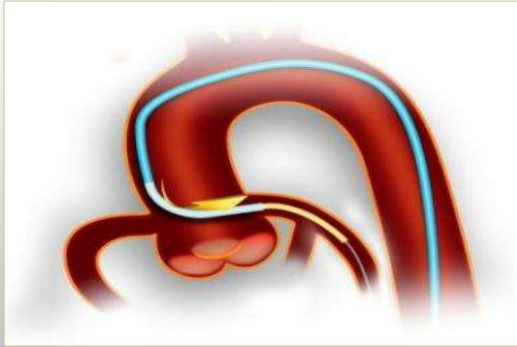
- INSERT ONE SMALL, LONG CATHETER THROUGH A LARGER SHORT CATHETER COAXIALLY  
(MOTHER-AND-CHILD)



34

34

## “MOTHER-AND-CHILD” GUIDE EXTENSION CONCEPT



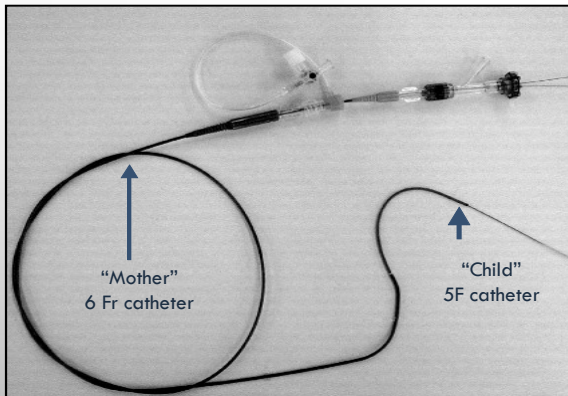
1. PROVIDE SUPPORT TO PREVENT GUIDE CATHETER BACK-OUT
2. ACHIEVE COAXIAL ALIGNMENT IN CHALLENGING TAKE-OFFS
3. DEEP-SEAT WITHIN VESSEL TO PROVIDE EXTENSION FOR DEVICE (STENT) DELIVERY

35

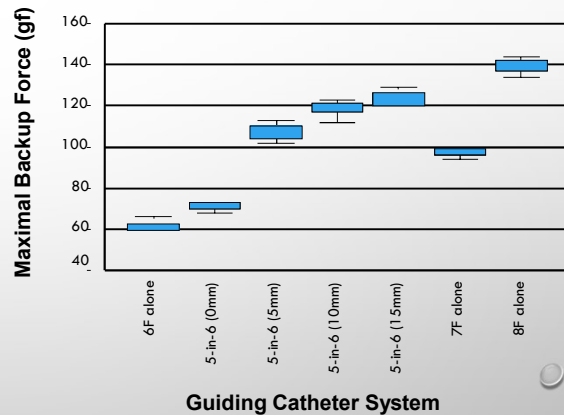
35



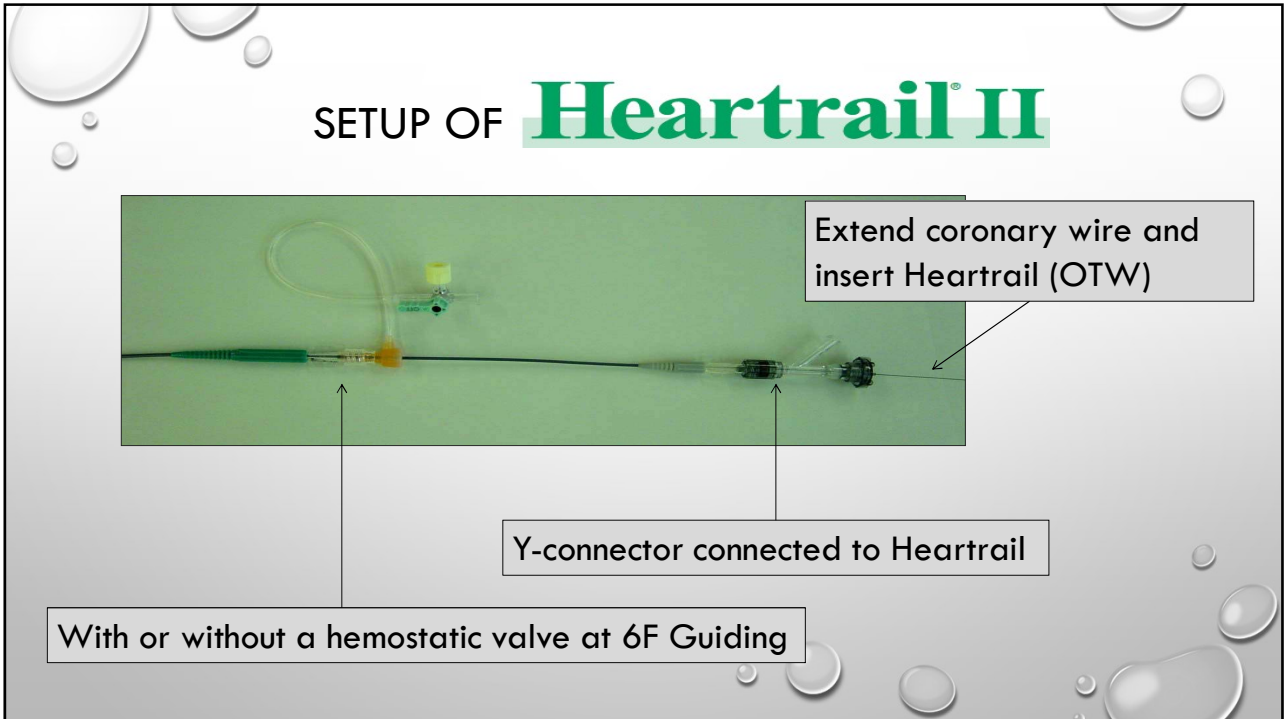
## Heartrail II



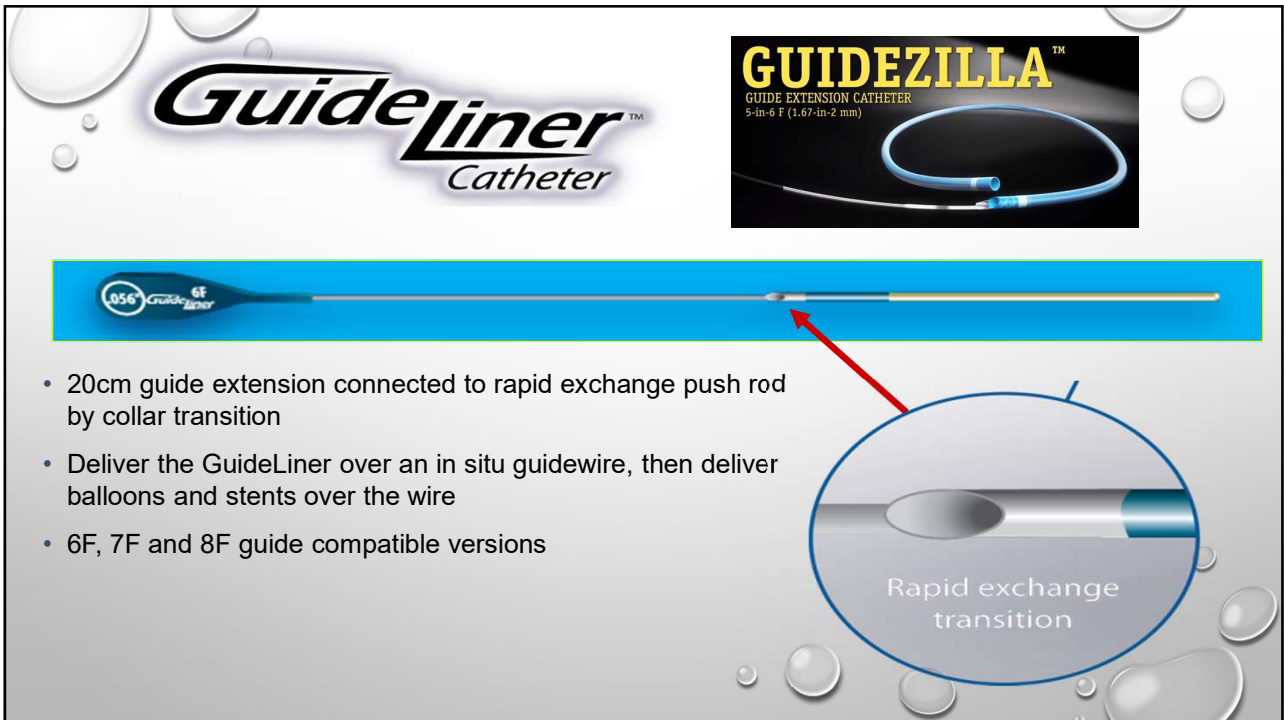
## “Mother & Child” Back-up Support



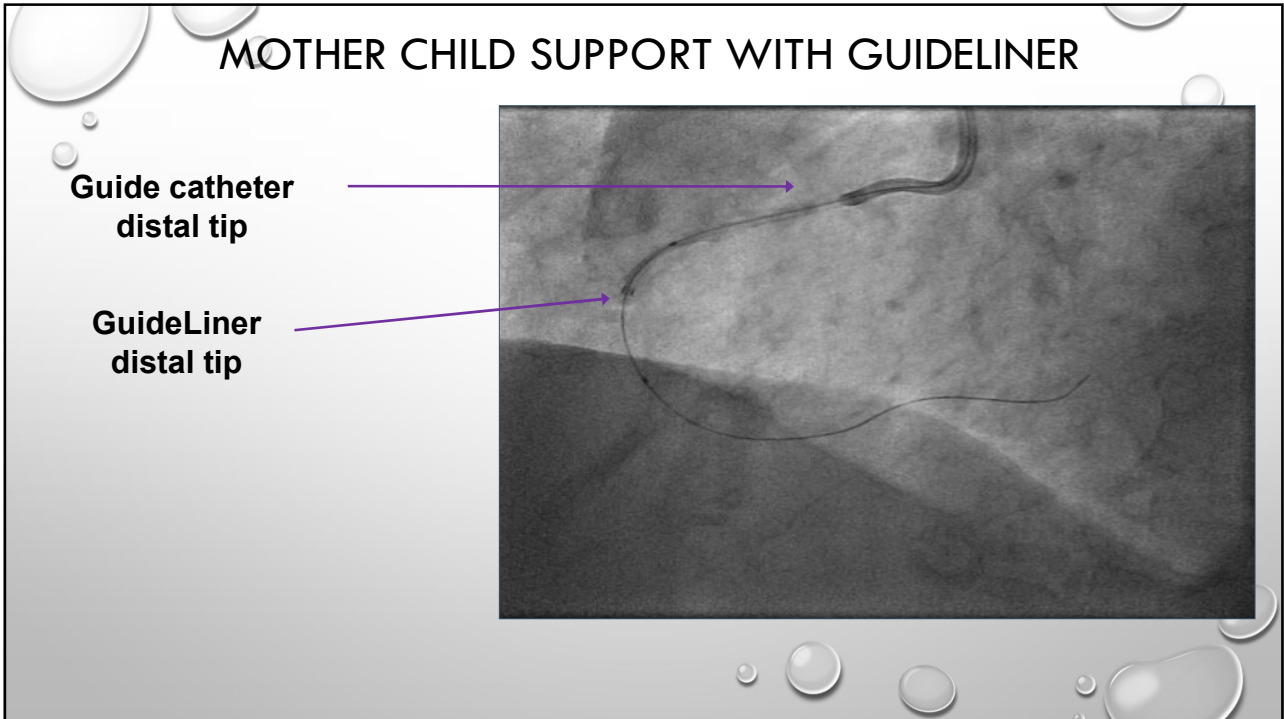
36



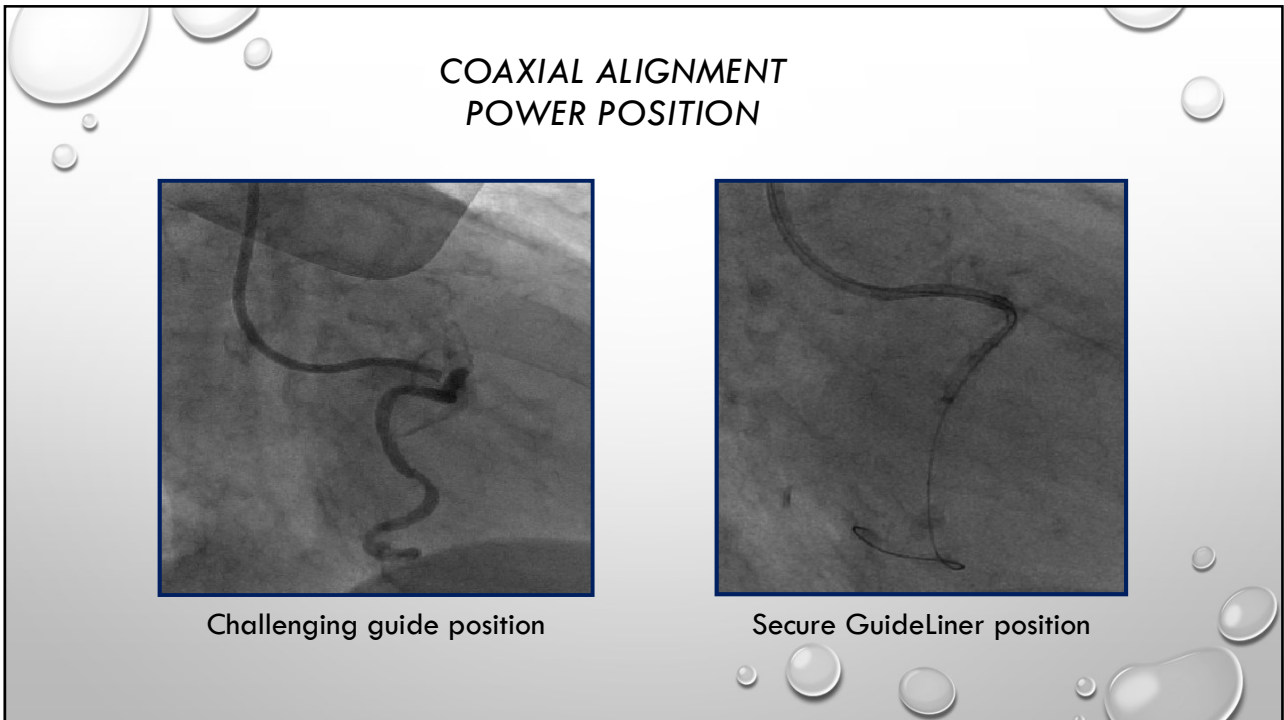
37



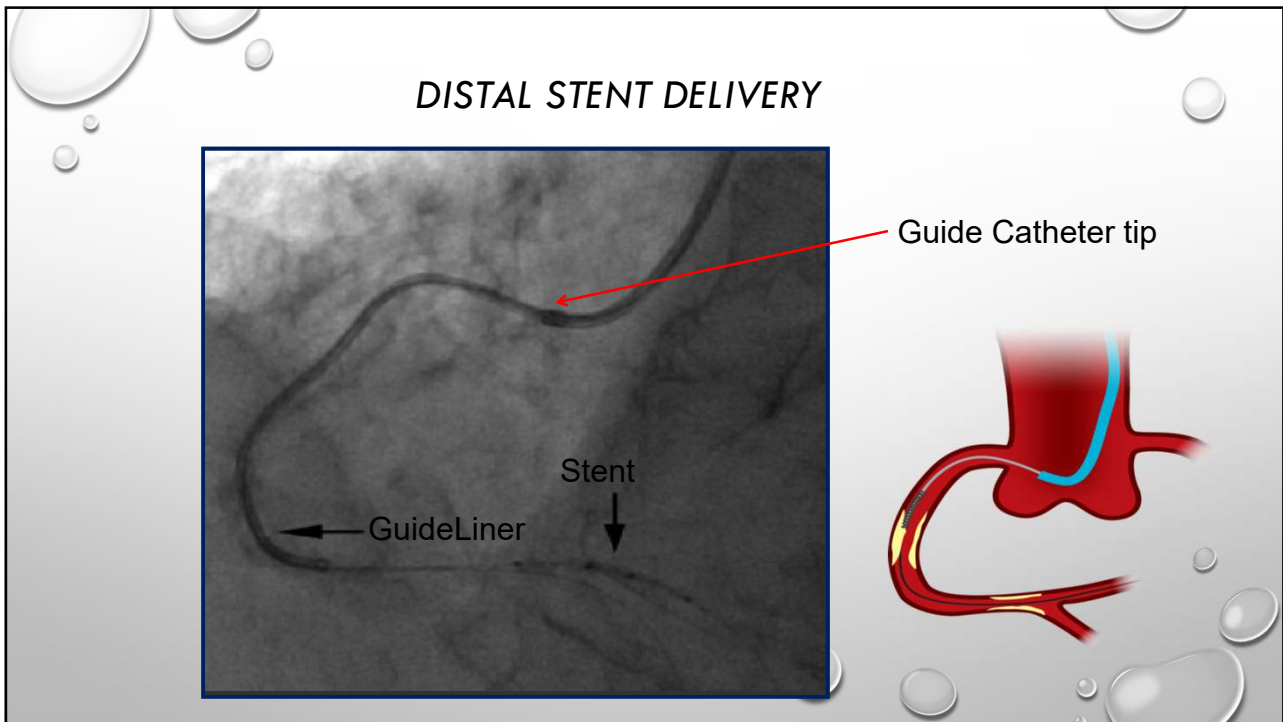
38



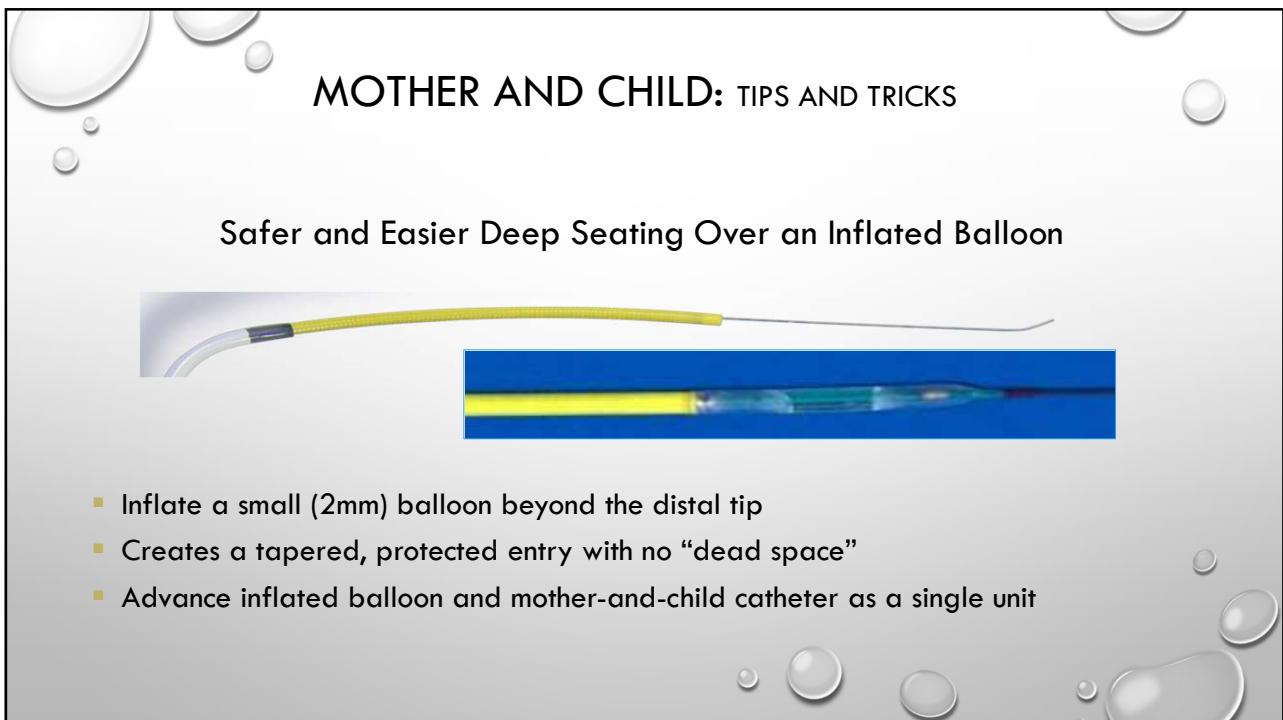
39



40

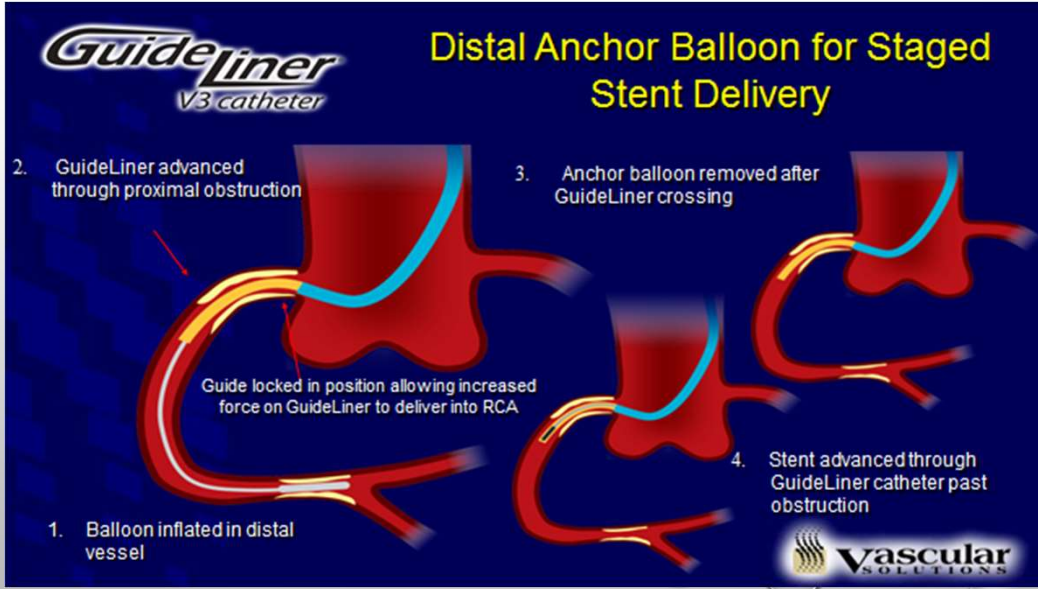


41



42

## MOTHER AND CHILD: TIPS AND TRICKS



43

## MOTHER & CHILD: CASE EXAMPLES



44

## WHAT TO WATCH OUT FOR

- DISSECTION FROM TIP ENTRY
- HYDRAULIC DISSECTION
- WIRE BEHIND LINER
- WIRE WRAP ON PUSH ROD
- KINKING OF CATHETER WHEN "OVEREXTENDED"
- FLOW OBSTRUCTION TO SIDE BRANCH (LAD/LCX)



45

**Guideline<sup>™</sup>**  
Catheter



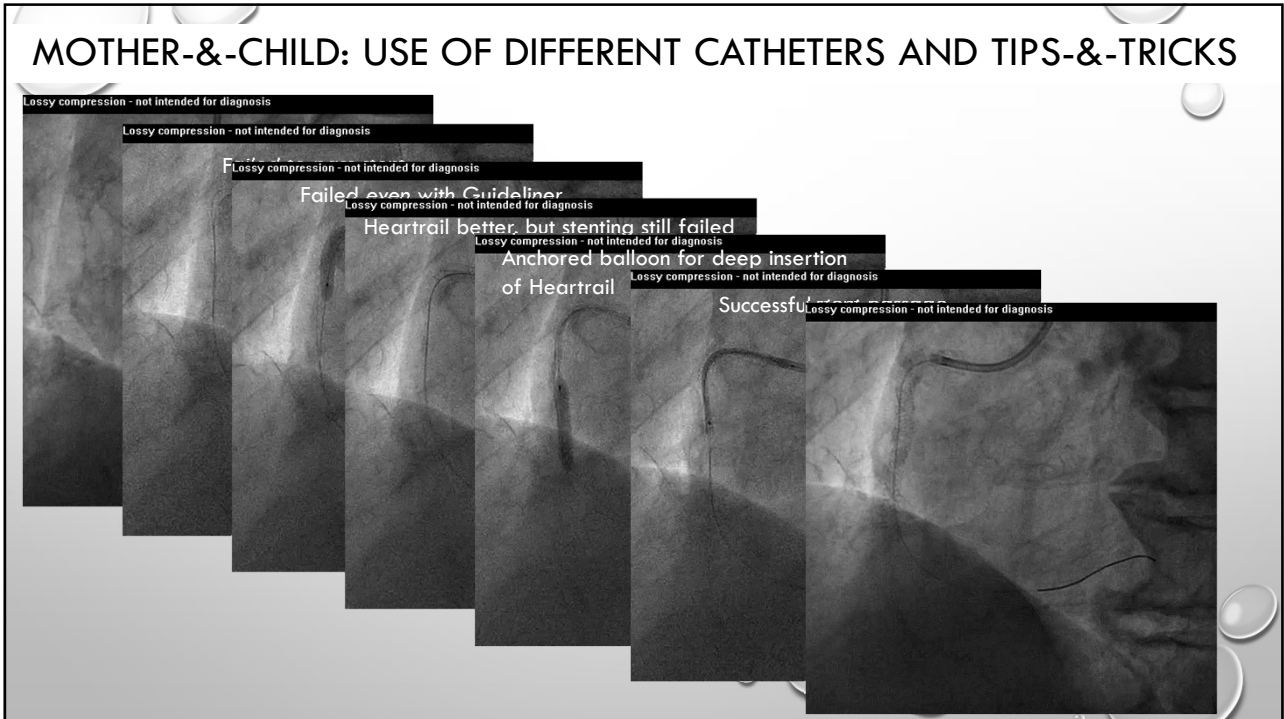
Rapid exchange:  
-more convenient

Vs

**Heartrail<sup>®</sup> II**

Over-the-wire:  
-better trackability

46



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**Microcatheter Family**

**Mother and Child Guiding Support**

**Thrombectomy and Distal Protection Device**

**Rotational Atherectomy**

48



**Microcatheter Family**

**Mother and Child Guiding Support**

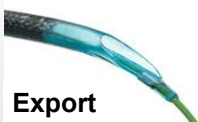
**Thrombectomy and Distal Protection Device**

**Atherectomy/Calcium Modifying Devices**


49

# THROMBECTOMY


**Aspiration**



**Export**  
6Fr – 7 Fr

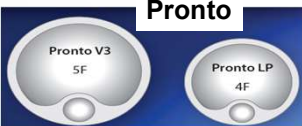


**Fetch® Aspiration Catheter**




**QuickCut**

**Pronto**




**Pronto V3**  
5F

**Pronto LP**  
4F




**Xpress-Way<sup>®</sup> RX**  
6Fr – 7 Fr



**Xtract<sup>™</sup>**  
ASPIRATION CATHETER  
6Fr – 7 Fr

**Mechanical**



**Rheolytic thrombectomy (AngioJet)**

50



51



52

52

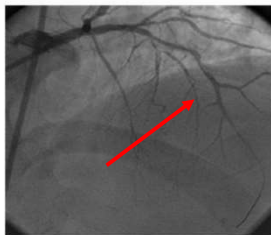
**FOCUSED UPDATE**

**2015 ACC/AHA/SCAI Focused Update on Primary Percutaneous Coronary Intervention for Patients With ST-Elevation Myocardial Infarction**

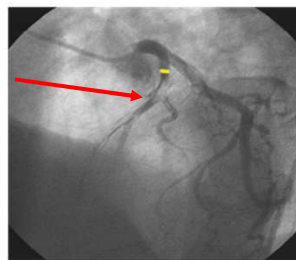
2011/2013 Recommendation	2015 Focused Update Recommendations	Comments
<p><b>Class IIa</b> Manual aspiration thrombectomy is reasonable for patients undergoing primary PCI (29-32). (Level of Evidence: B)</p>	<p><b>Class IIb</b> The usefulness of selective and bailout aspiration thrombectomy in patients undergoing primary PCI is not well established (33-37). (Level of Evidence: C-LD)</p>	<p>Modified recommendation (Class changed from "IIa" to "IIb" for selective and bailout aspiration thrombectomy before PCI).</p>
	<p><b>Class III: No Benefit</b> Routine aspiration thrombectomy before primary PCI is not useful (33-37). (Level of Evidence: A)</p>	<p>New recommendation ("Class III: No Benefit" added for routine aspiration thrombectomy before PCI).</p>

53

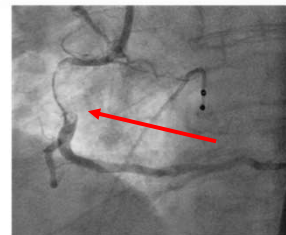
**Assess Thrombus Burden**



Small thrombus burden



Large thrombus burden



Massive thrombus burden

54

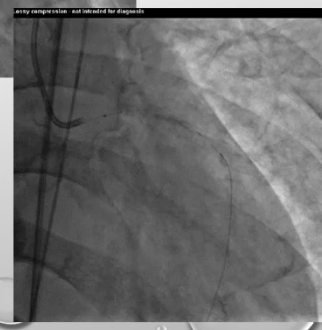
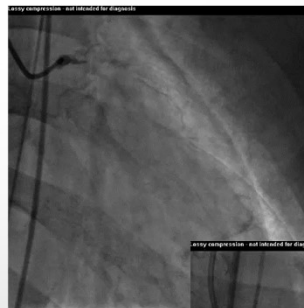
## THROMBUS ASPIRATION FOR LARGE THROMBUS











55

## ASPIRATION: TIPS AND TRICKS

- KEEP STYLET FOR PUSHABILITY
- ASPIRATE FROM PROXIMAL TO LESION TO BEYOND THE LESION, BUT NOT TOO DISTAL
- GO SLOW
- KEEP ASPIRATION WHILE WITHDRAWAL THE CATHETER OUT FROM GUIDING
- BACK BLEED FROM Y-CONNECTION BEFORE INJECT

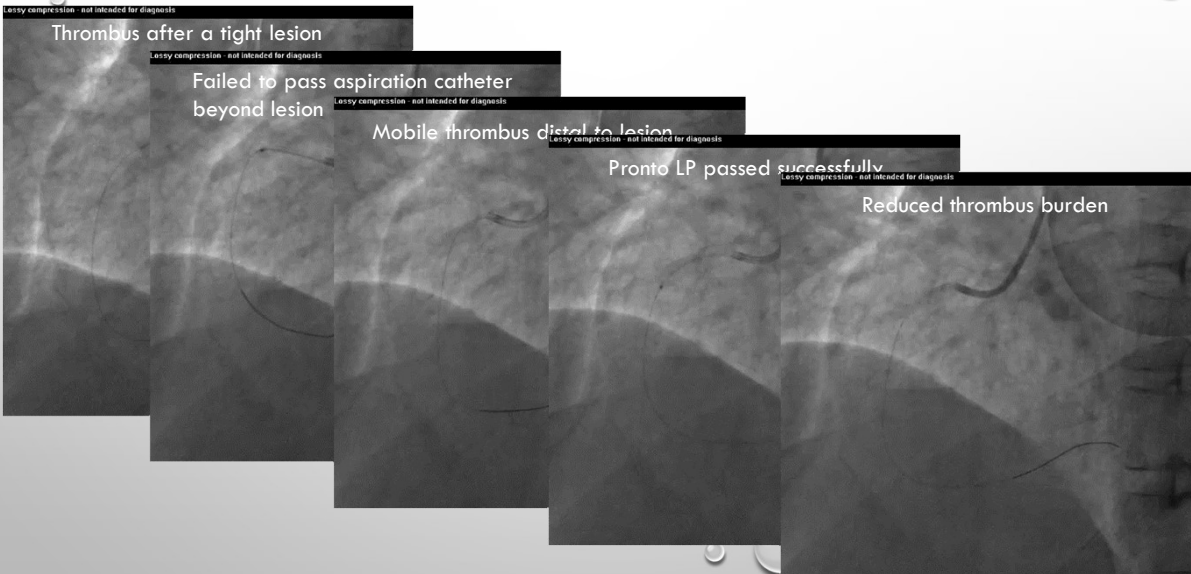


56

	Export Advance	Eliminate	Thrombuster II	Pronto V3	Pronto LP
Tip					
Tip Design	Bevel cut, short, soft	Bevel cut, medium tip	Bevel cut, long tip	Rounded bullnose	Rounded bullnose
Tip Cross Section					
Braiding	Variable, hub-to-tip	Hub-to-tip	No Braiding	Hub-to-tip, nonvariable	Nonvariable, proximal
Proxi. Lumen ID(in)	0.044	0.043	0.042	0.049	0.031
Distal Lumen ID(in)	0.043	0.039	0.039	0.047	0.039
Outer Diameter (in)	0.067	0.066	0.067	0.063	0.053
Length (cm)	140	140	140	140	140
Stylet	Yes	Yes	Yes	No	Yes

57

### ASPIRATION: USE OF PRONTO LP IN SELECTED CASE



Thrombus after a tight lesion

Failed to pass aspiration catheter beyond lesion

Mobile thrombus distal to lesion


Pronto LP passed successfully

Reduced thrombus burden


58

# THROMBECTOMY


## Aspiration




**Export**  
6Fr – 7 Fr




**Pronto**  
Pronto V3 5F    Pronto LP 4F



**Fetch® Aspiration Catheter**




**QuickCut**




**Xpress-Way<sup>®</sup> RX**  
6Fr – 7 Fr

Removable stylet



**Xtract™**  
ASPIRATION CATHETER  
6Fr – 7 Fr

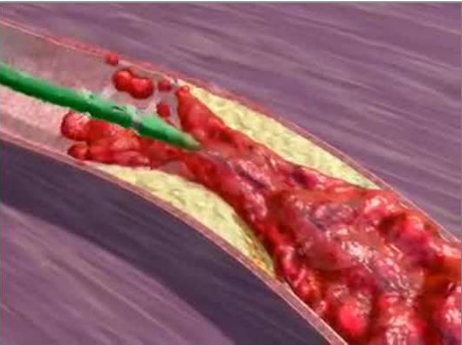
## Mechanical

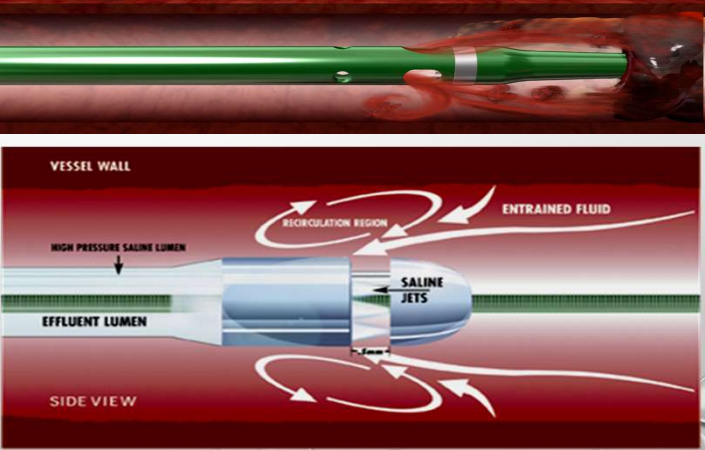


**Rheolytic thrombectomy (AngioJet)**

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## ANGIOJET RHEOLYTIC THROMBECTOMY





**VESSEL WALL**

**HIGH PRESSURE SALINE LUMEN**

**EFFLUENT LUMEN**

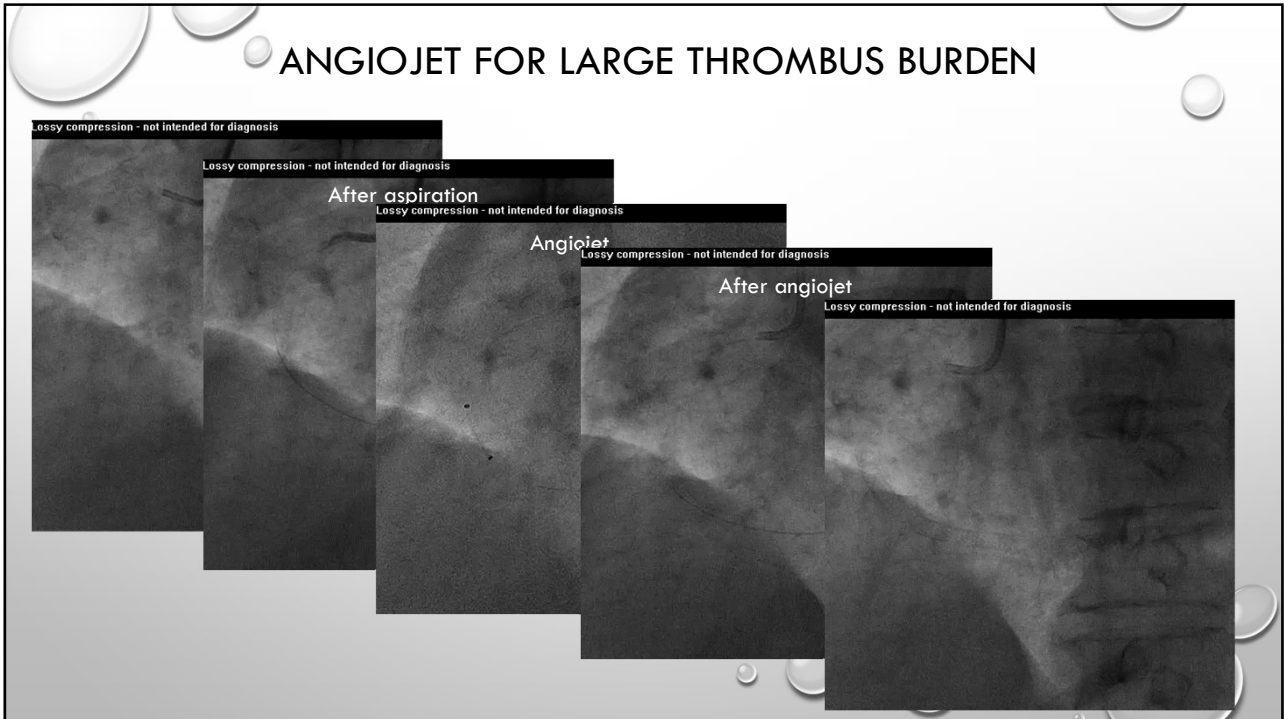
**SALINE JETS**

**RE-CIRCULATION REGION**

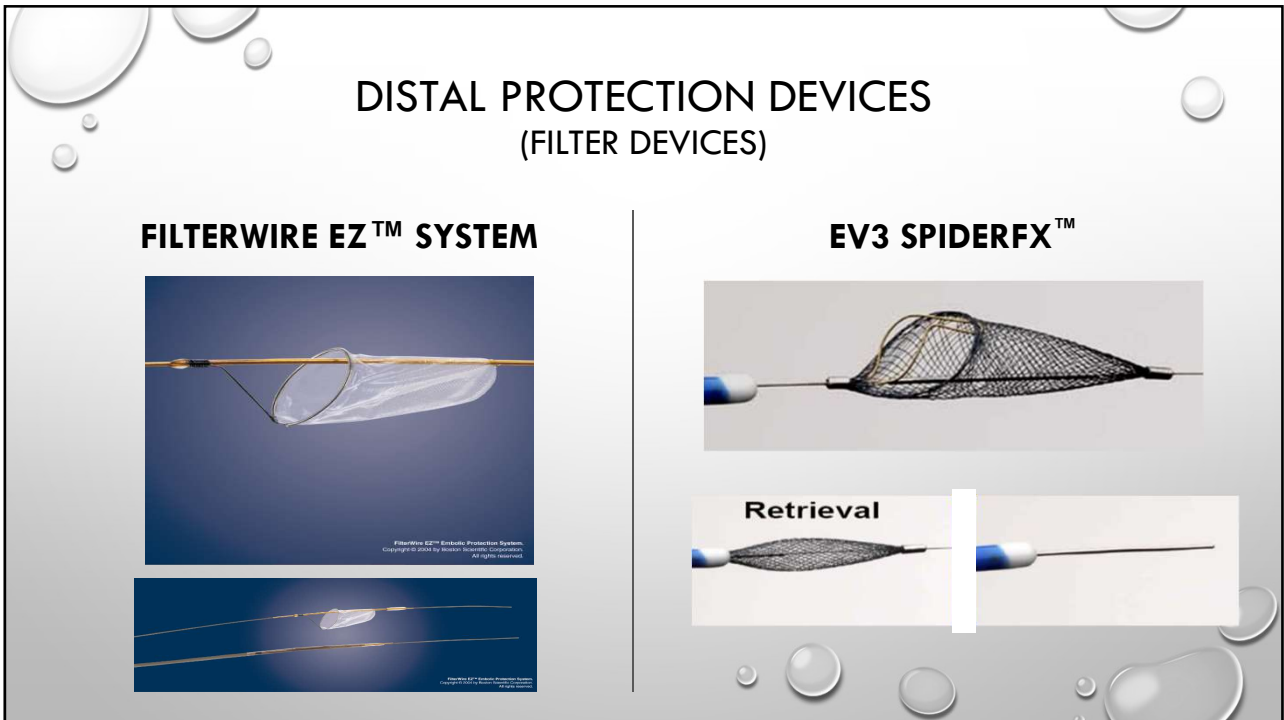
**ENTRAINED FLUID**

**SIDE VIEW**

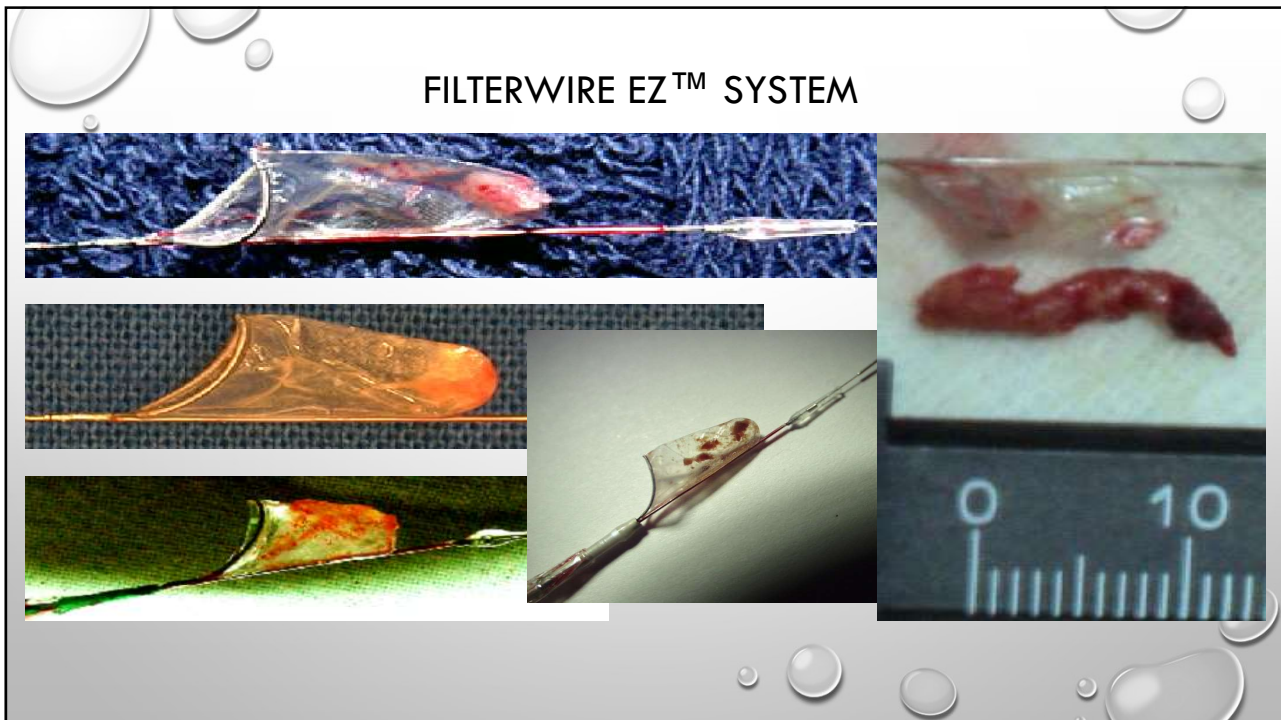
60



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62



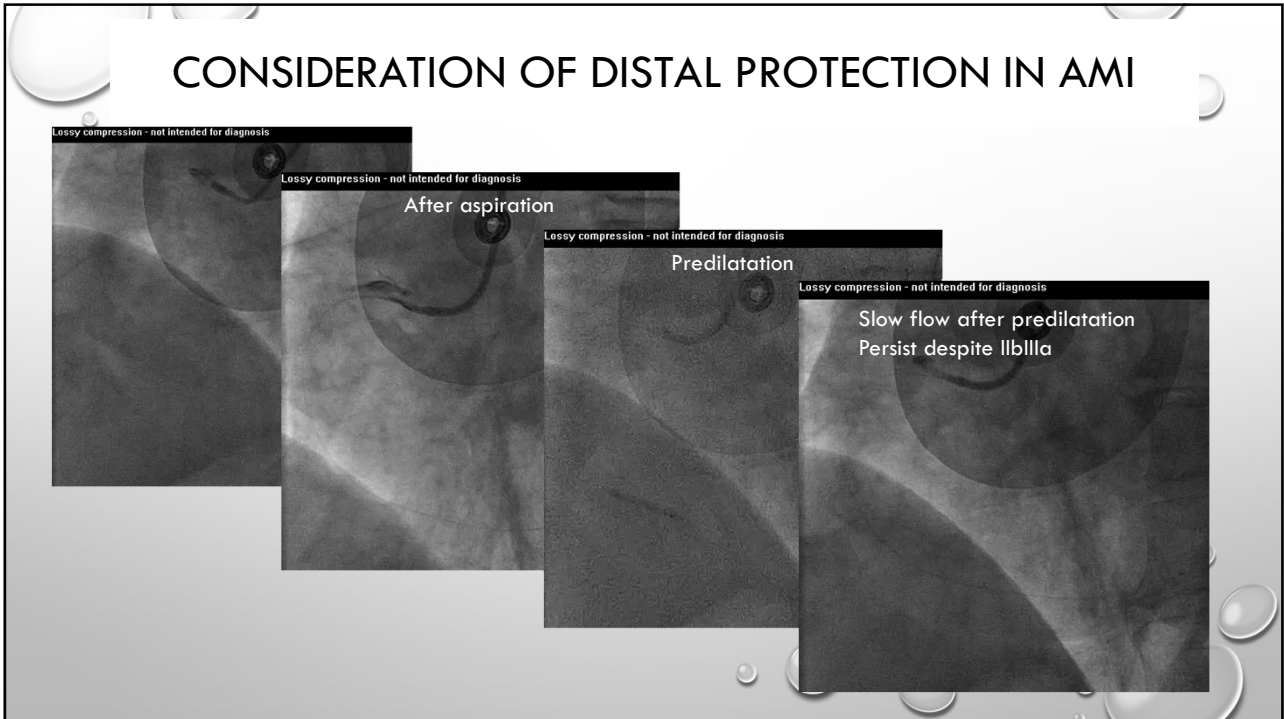
63

## USE OF DISTAL PROTECTION DEVICES

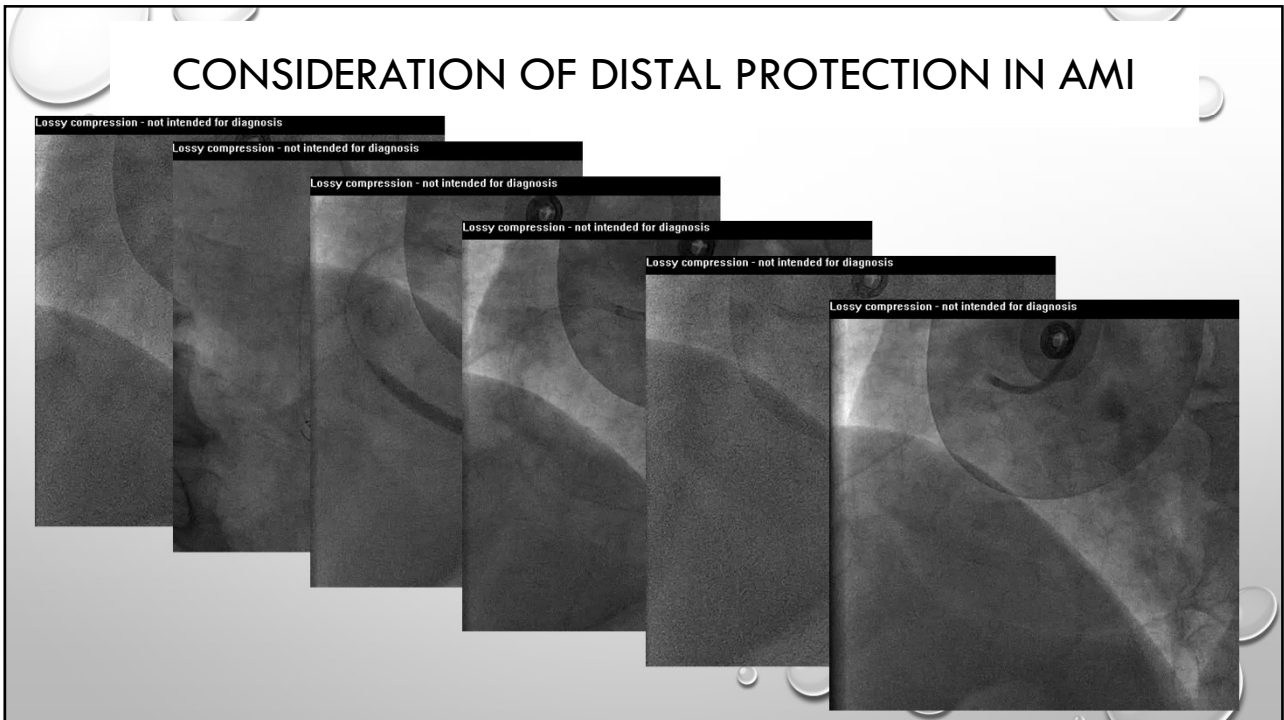
- **AMI SETTING:** FOR INDIVIDUAL PATIENTS, E.G. AFTER ASPIRATION +/- IIBIIIA
  - PERSISTENT HIGH THROMBUS BURDEN
  - HIGH RISK OF DISTAL EMBOLIZATION E.G. SLOW FLOW AFTER PREDILATATION
- **SVG INTERVENTION**

64



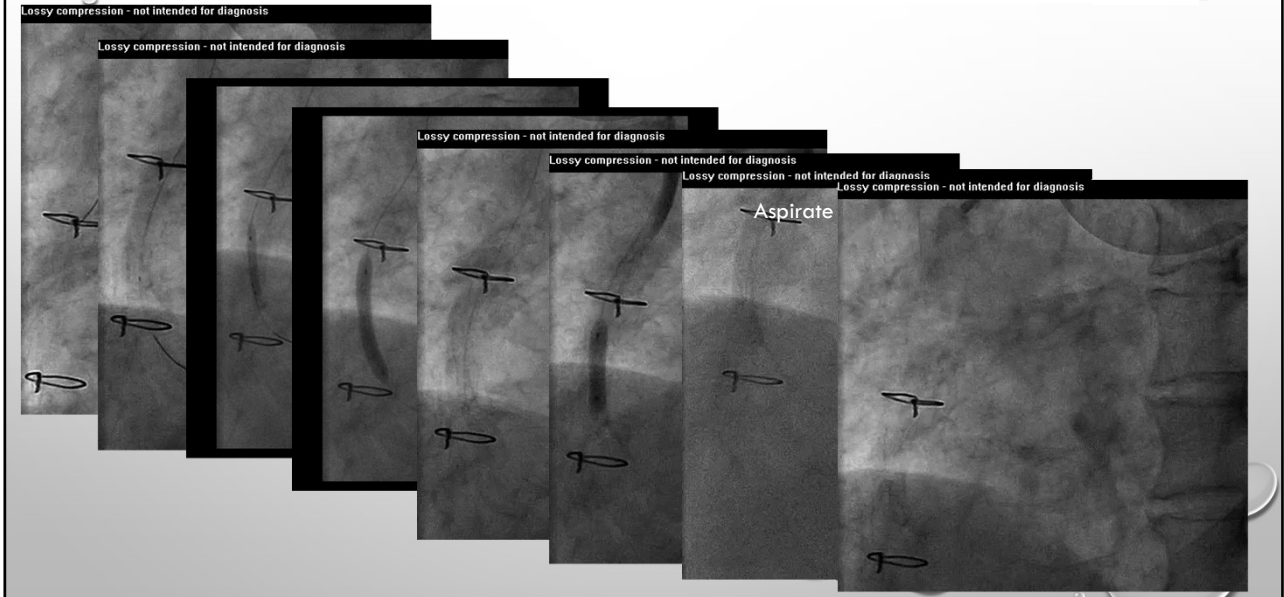


65



66

## DISTAL PROTECTION FOR SVG



67

### Microcatheter Family

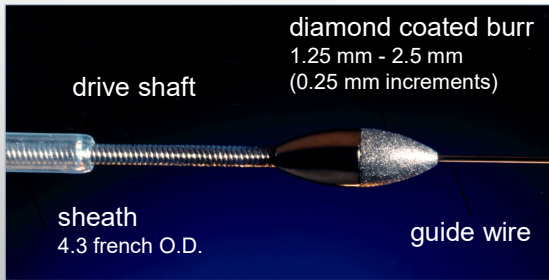
Mother and Child Guiding Support

Thrombectomy and Distal Protection Device

Atherectomy/Calcium Modifying Devices

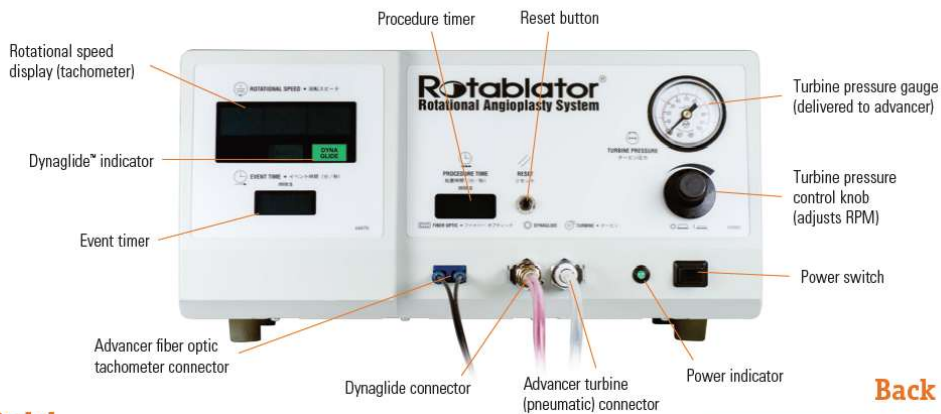
68

# ROTATIONAL ATHERECTOMY



69

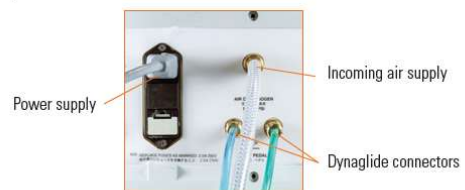
## Console



## Foot Pedal



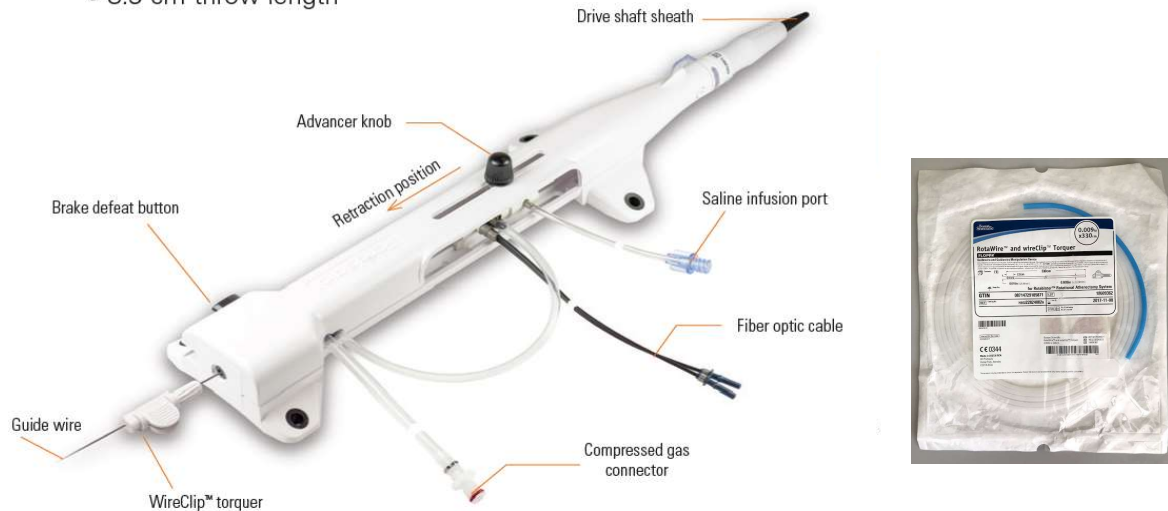
## Back Panel



70

## Peripheral RotaLink™ Plus Burr Catheter (Advancer)

- 135 cm catheter length
- 4.3 F (0.058") protective sheath
- 8.9 cm throw length



71

## INDICATIONS FOR ROTATIONAL ATHERECTOMY

### CALCIFIC LESIONS

- **BALLOON CANNOT BE PASSED**
- **BALLOON CANNOT BE DILATED**  
(DON'T GET BAD DISSECTION BEFORE DECISION TO ROTABLATE)
- **STENT CANNOT BE PASSED**

### OTHERS

- IN STENT RESTENOSIS
- DIFFUSE DISEASE
- OSTIAL DISEASE
- BIFURCATION LESION

72

## PREPARATION

- CONFIRM ADEQUATE ANTICOAGULATION
- PRESSORS / ATROPINE / VASODILATORS AVAILABLE
- CONSIDER TEMP PACING FOR DOMINANT RCA, POOR LV FUNCTION, LARGE BURR
- COAXIAL GUIDING (MORE IMPORTANT THAN SUPPORTIVE)
- APPROPRIATE GUIDING SIZE FOR ANTICIPATED BURR SIZE
- USUALLY START WITH SMALL BURR 1.25/1.5MM  
(LARGER BURR IF LESION UNDILATABLE BUT LUMEN LARGE)

Burr / mm	inches	Guide
1.25	.049	6
1.50	.059	6
1.75	.069	7
2.00	.079	8
2.15	.085	8
2.25	.089	9
2.38	.094	9
2.50	.098	10

73

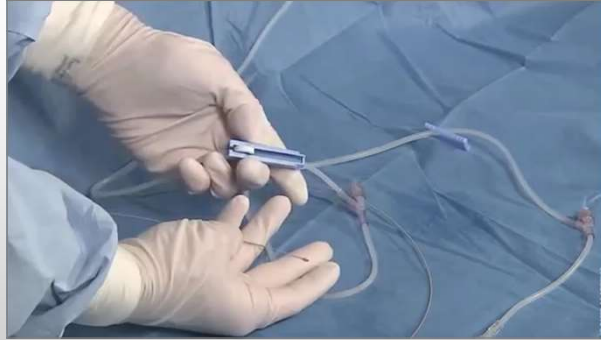
## CONNECT AND LOCK DRIVESHAFT TO ADVANCER



74

## OPERATING THE BLUR

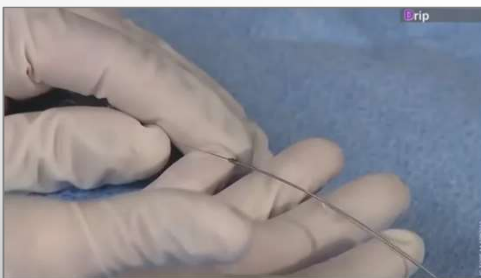
Run Lubricant



75

## OPERATING THE BLUR

Check platform speed outside guiding, and advance burr



76

## OPERATING THE BLUR

### Burr Control



- Retract if significant deceleration ( $>5,000/\text{min}$ ; by listening to the tone)
- Run time 15- 30 seconds



77

## OPERATING THE BLUR

### Removal of Burr

When no more resistance, remove the burr immediately (use dynaglide), and take a shot



78

## OPERATING THE BLUR

- ENSURE FLUSH (LUBRICANT) IS OPENED
- CHECK PLATFORM SPEED OUTSIDE GUIDING; 160,000-180,000 RPM
- START PROXIMAL TO LESION; GENTLE FORWARD AND BACKWARD PECKING MOTION; AVOID FORCEFUL ADVANCEMENT
- RETRACT IF SIGNIFICANT DECELERATION ( $>5,000/\text{MIN}$ ; BY LISTENING TO THE TONE)
- RUN TIME 15- 30 SECONDS
- WHEN NO MORE RESISTANCE, REMOVE THE BLUR IMMEDIATELY (USE DYNAGLIDE), AND TAKE A SHOT

79

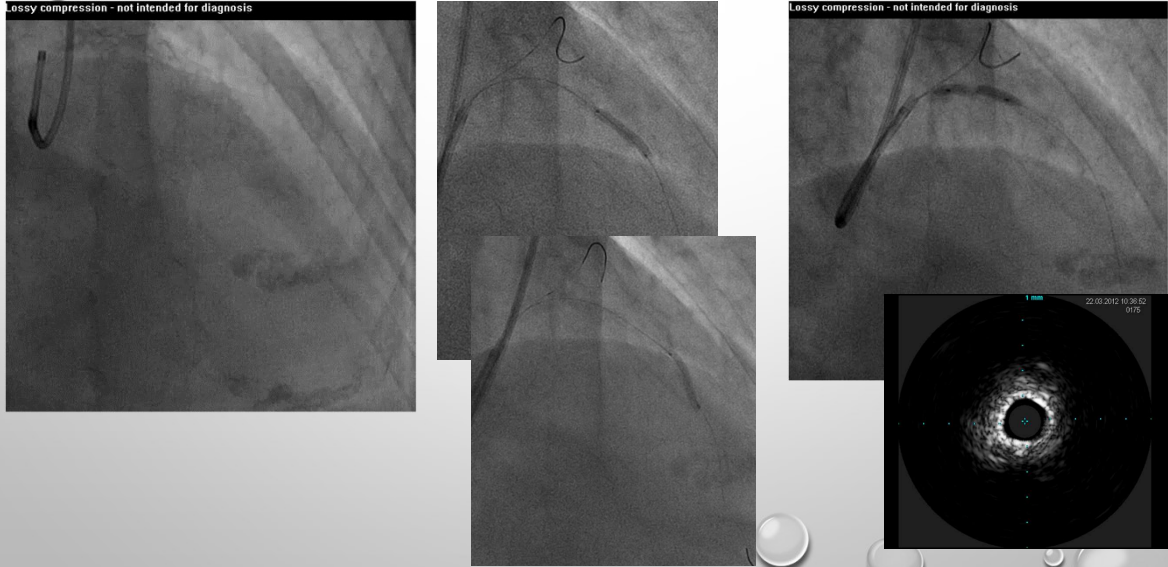
## PREPARE TO DEAL WITH ADVERSE EVENTS

- **SLOW FLOW/NO REFLOW/SPASM/DISSECTION**
  - VASODILATORS
  - LOW PRESSURE BALLOON
- **HYPOTENSION/BRADYCARDIA**
  - PRESSORS/ATROPINE PROMPTLY +/- IABP
- **PERFORATION** AS UNCOMMON COMPLICATION

80



### CASE 1: THE CLASSIC - UNDILATABLE LESION



81

### CASE 1: THE CLASSIC - UNDILATABLE LESION



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## CASE 2: DEALING WITH COMMON COMPLICATION



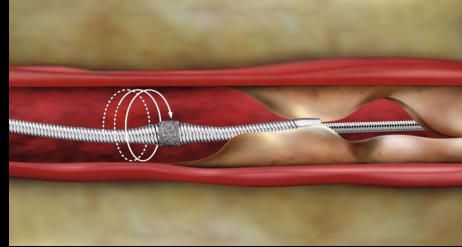
83

## CASE 2: DEALING WITH COMMON COMPLICATION



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## ORBITAL ATHERECTOMY SYSTEM (DIAMONDBACK 360® )



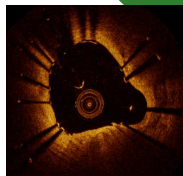
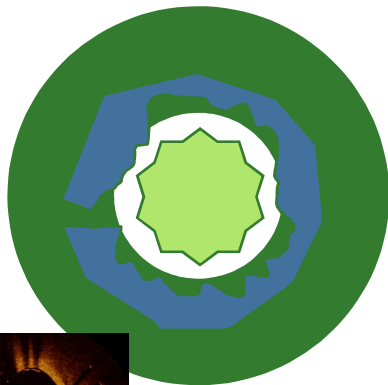
Vessel preparation with OAS reduces severe calcium, enabling successful stent delivery to help optimize stent expansion, apposition and positive long-term outcomes<sup>1</sup>

85 1. COAST Data on File

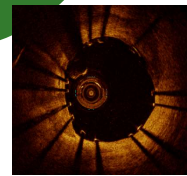
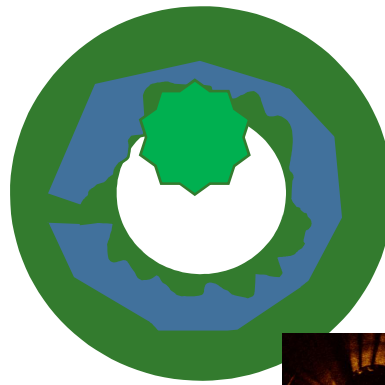
CSI | CARDIOVASCULAR SYSTEMS, INC.

85

## TWO APPROACHES TO ATHERECTOMY



**Rotational Atherectomy**  
Fixed burr



**Orbital Atherectomy**  
360 degree vessel prep

Images courtesy of Dr. Nikolaos Kakouros

CSI | CARDIOVASCULAR SYSTEMS, INC.

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## ORBITAL ATHERECTOMY SYSTEM (DIAMONDBACK 360®)



- An atherectomy device designed to allow bi-directional treatment of vessels 2.5 mm to 4 mm with a **single device**

Vessel preparation with OAS reduces severe calcium, enabling successful stent delivery to help optimize stent expansion, apposition and positive long-term outcomes<sup>1</sup>

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1. COAST Data on File

CSI | CARDIOVASCULAR SYSTEMS, INC.

87

## OAS SYSTEM COMPONENTS



88

CSI | CARDIOVASCULAR SYSTEMS, INC.

88

### DIAMONDBACK 360® CORONARY OAS CLASSIC CROWN FEATURES

Simple OAD setup  
Electric powered handle with millisecond feedback



Images courtesy of Dr. Rohit Bhatheja.

**On-handle Speed Control**  
• Low (80k) and high speed (120k)  
• GlideAssist® (5k)

**Power On/Off Button**  
• 7.5 cm axial travel

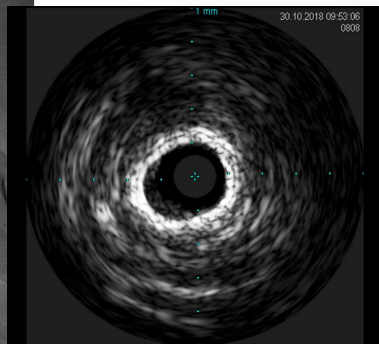
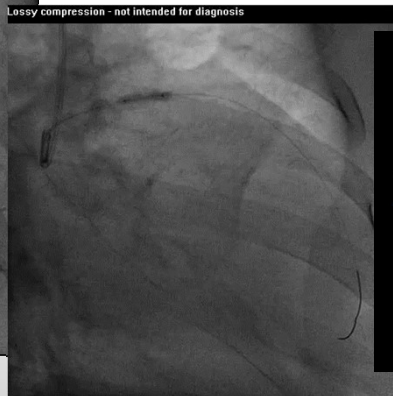
**Guide Wire Brake**

**6 Fr Guide Compatible Saline Sheath**  
• 135 cm usable length

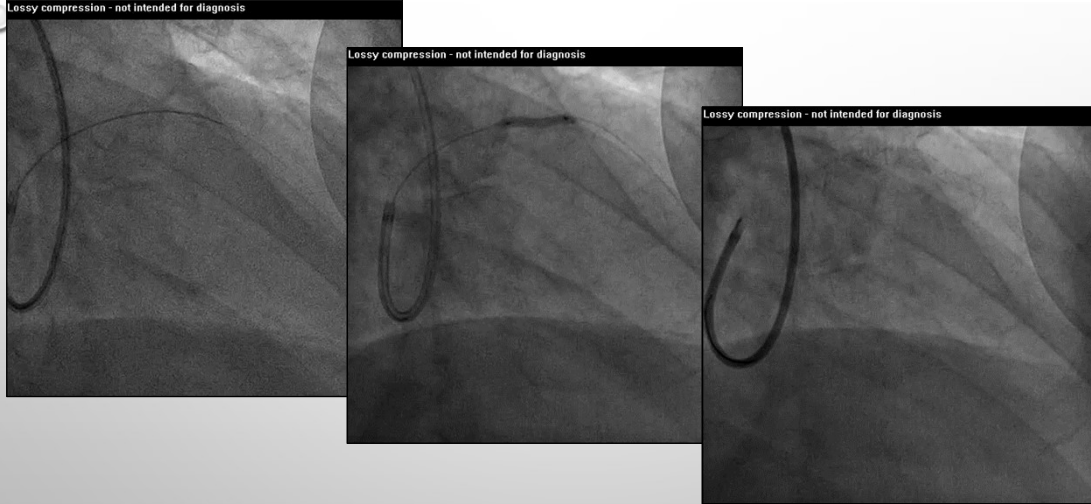
**Traversal Speed**  
• 1 to 3 mm/second



### ORBITAL ATHERECTOMY SYSTEM (DIAMONDBACK 360® )

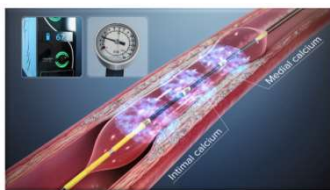


## ORBITAL ATHERECTOMY SYSTEM (DIAMONDBACK 360® )



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## Shockwave Coronary IVL System



*Integrated 12mm SC balloon facilitates energy transfer; IVL=4 atm; Nominal=6atm; RBP=10 atm*

*Distal and proximal marker bands*

*2 emitters that pulse once per second (80 pulses/catheter)*



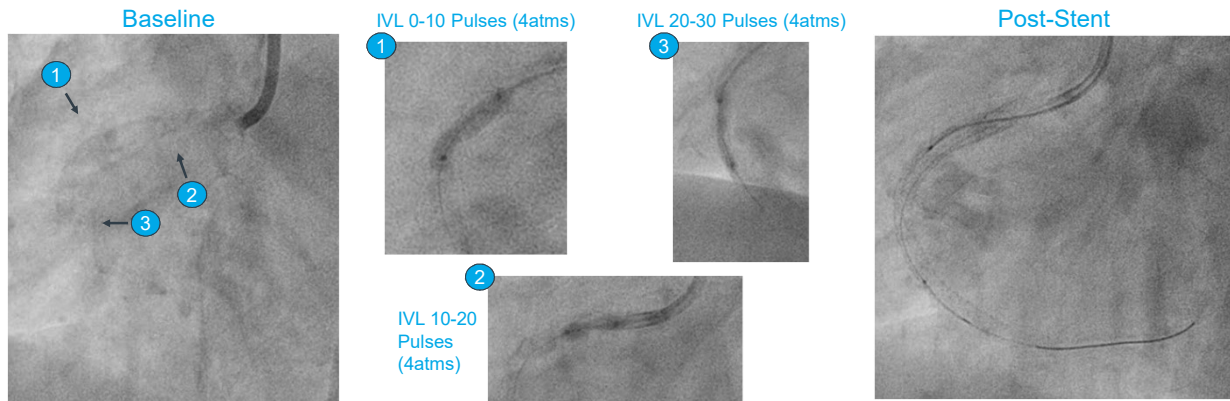
92

## Case: Multi-Lesion RCA

Courtesy of Jonathan Hill,  
King's College London



**Summary:** Multi-lesion RCA; Couldn't advance guideliner to distal lesion despite predilation; advanced 3.5mm IVL catheter as far as possible (1); delivered one cycle (10 pulses) and vessel opened; pulled back to the ostium (2) and vessel opened after one cycle (10 pulses); advanced to distal lesion (3) and vessel opened after one cycle (10 pulses); easily delivered 80mm of DES.



93 | SPL-62111 Rev C – Int'l Coronary IVL Overview. Shockwave Medical, Inc. 2018. Not for use in U.S.

SHOCKWAVE | C<sup>2</sup>

93

## SUMMARY: SPECIAL DEVICES FOR PCI

- MICROCATHETER FAMILY:
  - SINGLE LUMEN: WORKHORSE, RETROGRADE X CTO, PENETRATE CALCIFIC LESIONS, ANGULATE
  - DUAL-LUMEN
- MOTHER AND CHILD GUIDING SUPPORT:
  - HEARTRAIL & GUIDELINER/GUIDEZILLA, PROS & CONS
- THROMBECTOMY AND DISTAL PROTECTION DEVICES
  - ASPIRATION, ANGIOJET, FILTERS
- ATHERECTOMY/CALCIUM MODIFYING DEVICES
  - ROTATIONAL ATHERECTOMY, ORBITAL ATHERECTOMY, SHOCKWAVE

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