

RENAL ARTERY STENTING :TIPS & TRICKS

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MD DM FSCAI

METAANALYSES : 2006

Effectiveness of Management Strategies for Renal Artery Stenosis: A Systematic Review

Ethan Balk, MD, MPH; Govert Raman, MD; Mei Chung, MPH; Stanley Ip, MD; Athina Tziouli, MD; Alvaro Alonso, MD; Priscilla Chew, MPH; Scott J. Gilbert, MD; and Joseph Lau, MD

Background: Atherosclerotic renal artery stenosis is increasingly common in an aging population. Therapeutic options include medical treatment only or revascularization procedures.

Purpose: To compare the effects of medical treatment and revascularization on clinically important outcomes in adults with atherosclerotic renal artery stenosis.

Study Selection: The authors selected prospective studies of renal artery revascularization or medical treatment of patients with atherosclerotic renal artery stenosis that reported mortality rates, kidney function, blood pressure, cardiovascular events, or adverse events at 6 months or later after study entry.

Data Extraction: A standardized protocol with predefined criteria was used to extract details on study design, interventions, outcomes, study quality, and applicability. The overall body of evidence was then graded as robust, acceptable, or weak.

Eight other comparative studies and 46 cohort studies met criteria for analysis. Studies generally had poor methodologic quality and limited applicability to current practice. Overall, there was no robust evidence. Weak evidence suggested no large differences in mortality rates or cardiovascular events between medical and revascularization treatments. Acceptable evidence suggested similar kidney-related outcomes, but better blood pressure outcomes with

among some patients only in cohort studies of angioplasty. Available evidence did not adequately assess adverse events or baseline characteristics that could predict which intervention would result in better outcomes.

Limitations: The evidence from direct comparisons of interventions is sparse and inadequate to draw robust conclusions.

Conclusions: Available evidence does not clearly support one treatment approach over another for atherosclerotic renal artery stenosis.

NO SIGNIFICANT DIFFERENCE BETWEEN ANGIPLASTY VS MEDICAL TREATMENT

IMPACT OF RENAL ARTERY REVASCULARISATION

<u>Study</u>	<u>Device</u>	<u>N</u>	<u>Cure</u>	<u>Improved</u>
• <u>Klinge</u>	stent	134	10%	68%
• <u>Lossino</u>	stent	153	12%	51%
• <u>DRASTIC</u>	balloon	106	7%	68%
• <u>Rocha</u>	stent	150	6%	50%
• <u>Dorros</u>	stent	145	1%	52%

ASTRAL TRIAL RAS :STENTING VS MEDICAL

	Revasc.	Medical	P-value
Any Anti-hypertensives	97%	99%	0.03
Diuretic	64%	69%	
Ca² antagonist	63%	71%	
Beta-blocker	46%	55%	0.02
ACE-I, A-II antagonist	50%	43%	0.05
Alpha-blocker	39%	38%	
Mean # drugs	2.77 (1 - 6)	2.99 (1 - 6)	0.03

ASTRAL TRIAL :BLOOD PRESSURE ,CHOLESTEROL & STENOSES

Related laboratory measures			
Mean blood pressure (range) — mm Hg			
Systolic	149 (87–270)	152 (90–241)	0.07
Diastolic	76 (45–120)	76 (46–130)	0.63
Mean total cholesterol (range) — mmol/liter [†]	4.7 (0.1–14.8)	4.7 (1.9–9.6)	0.79
Renal physiology			
Stenosis [‡]			
Mean (range) — %	76 (40–100)	75 (20–99)	0.29
Severity — no. (%)			
<50%	2 (<1)	4 (1)	0.68
50–70%	159 (39)	164 (41)	
>70%	242 (60)	235 (58)	
Mean length of kidney (range) — cm	9.7 (6–14)	9.8 (6–20) ^{**}	0.44

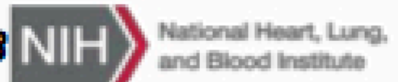
A Randomized Multicenter Clinical Trial of Renal Artery Stenting in Preventing Cardiovascular and Renal Events: Results of the CORAL Study



*Christopher J. Cooper, M.D., Timothy P. Murphy, M.D., Donald E. Cutlip, M.D., Kenneth Jamerson, M.D.,
William Henrich, M.D., Diane M. Reid, M.D., David J. Cohen, M.D., M.Sc., Alan H. Matsumoto, M.D.,
Michael Steffes, M.D., Michael R. Jaff, D.O., Martin R. Prince, M.D., Ph.D., Eldrin F. Lewis, M.D.,
Katherine R. Tuttle, M.D., Joseph I. Shapiro, M.D., M.P.H., John H. Rundback, M.D.,
Joseph M. Massaro, Ph.D., Ralph B. D'Agostino, Sr., Ph.D., and Lance D. Dworkin, M.D.,*



C. Cooper, AHA 2013



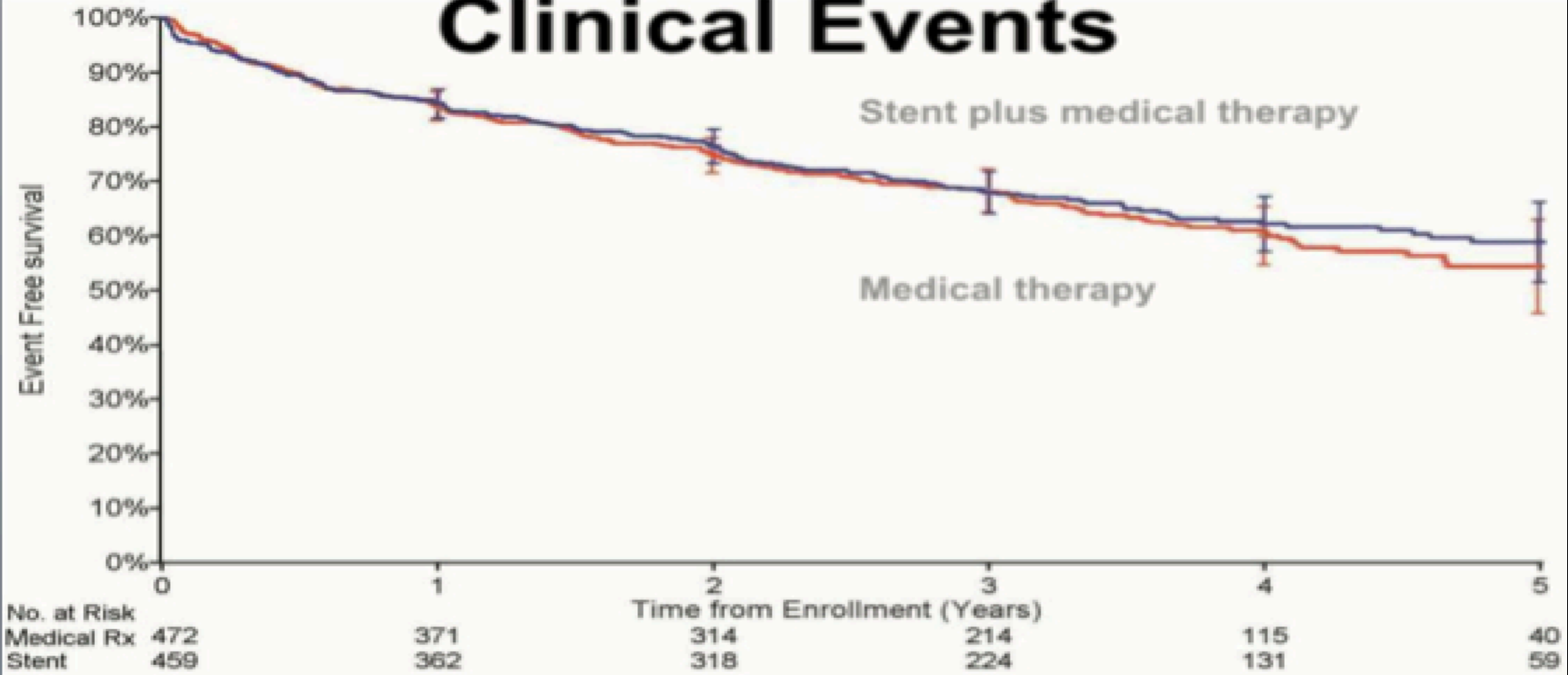
Primary Endpoint

- ***Composite of major cardiovascular or renal events:***
 - ♣ ***Cardiovascular or Renal Death***
 - ♣ ***Stroke***
 - ♣ ***Myocardial Infarction***
 - ♣ ***Heart Failure Hospitalization***
 - ♣ ***Progressive Renal Insufficiency***
 - ♣ ***Permanent Renal Replacement Therapy***

CORAL TRIAL OUTCOMES

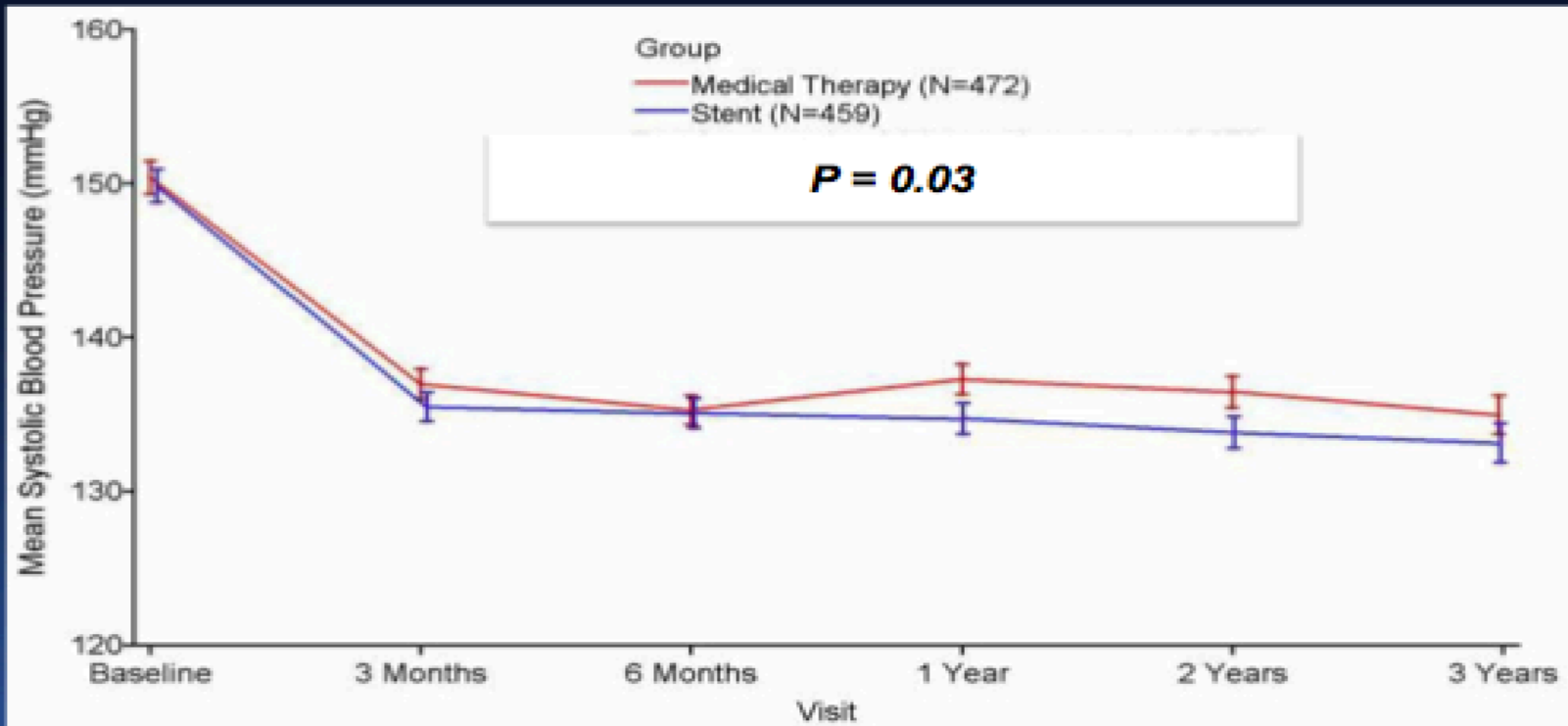
Results: Primary Endpoints

Clinical Events



CORAL TRIAL BP OUTCOMES

Results: Systolic Blood Pressure



Catheterization and Cardiovascular Interventions 84:1163–1171 (2014)

PERIPHERAL VASCULAR DISEASE

Core Curriculum

SCAI Expert Consensus Statement for Renal Artery Stenting Appropriate Use

**Sahil A. Parikh,^{1*} MD, FACC, FSCAI, Mehdi H. Shishehbor,² DO, MPH, FACC, FSCAI,
Bruce H. Gray,³ DO, FSCAI, Christopher J. White,⁴ MD, FACC, FSCAI, and
Michael R. Jaff,⁵ DO, FACC, FSCAI**

SCAI 2014 APPROPRIATE CARE FOR RENAL ARTERY STENOSES

Appropriate Care	<ol style="list-style-type: none">1. Cardiac Disturbance Syndromes (Flash Pulmonary Edema or acute coronary syndrome (ACS)) with severe hypertension2. Resistant HTN (Uncontrolled hypertension with failure of maximally tolerated doses of at least 3 antihypertensive agents, one of which is a diuretic, or intolerance to medications)3. Ischemic nephropathy with chronic kidney disease (CKD) with eGFR < 45cc/min and global renal ischemia (unilateral significant RAS with a solitary kidney or bilateral significant RAS) without other explanation
May Be Appropriate Care	<ol style="list-style-type: none">4. Unilateral RAS with CKD (eGFR ≤ 45 cc/min)5. Unilateral RAS with prior episodes of congestive heart failure (Stage C)6. Anatomically challenging or high risk lesion (early bifurcation, small vessel, severe concentric calcification, and severe aortic atheroma or mural thrombus)
Rarely Appropriate Care	<ol style="list-style-type: none">7. Unilateral, Solitary, or Bilateral RAS with controlled BP and normal renal function.8. Unilateral, solitary, or bilateral RAS with kidney size < 7 cm in pole-to-pole length9. Unilateral, Solitary, or Bilateral RAS with chronic end stage renal disease on hemodialysis > 3 months.10. Unilateral, Solitary, or Bilateral renal artery chronic total occlusion

HOW TO ASSESS HEMODYNAMIC SIGNIFICANCE OF LESION ????

Angiographic Stenosis Severity*	Physiologic Testing	Significance
<50%	None	Mild
50-70%	None	Indeterminate
50-70% with	Resting mean pressure gradient** >10mmHg	Significant
50-70% with	Systolic Hyperemic Pressure Gradient >20mmHg†	Significant
50-70% with	Renal Pd/Pa ≤ 0.8†	Significant
≥70%	None	Significant

GETTING STARTED....

- Set realistic expectations
 - Half dose of anti hypertensives on day of procedure
 - Preload with aspirin 350 mg and clopidodrel
 - UFH 70IU/kg
-

ABDOMINAL AORTOGRAPHY FIRST



Anatomic road map
of RA

Accessory RA 1/3

Abd AO disease

AP VIEW DSA AVOID IN CKD

ON ACCESS

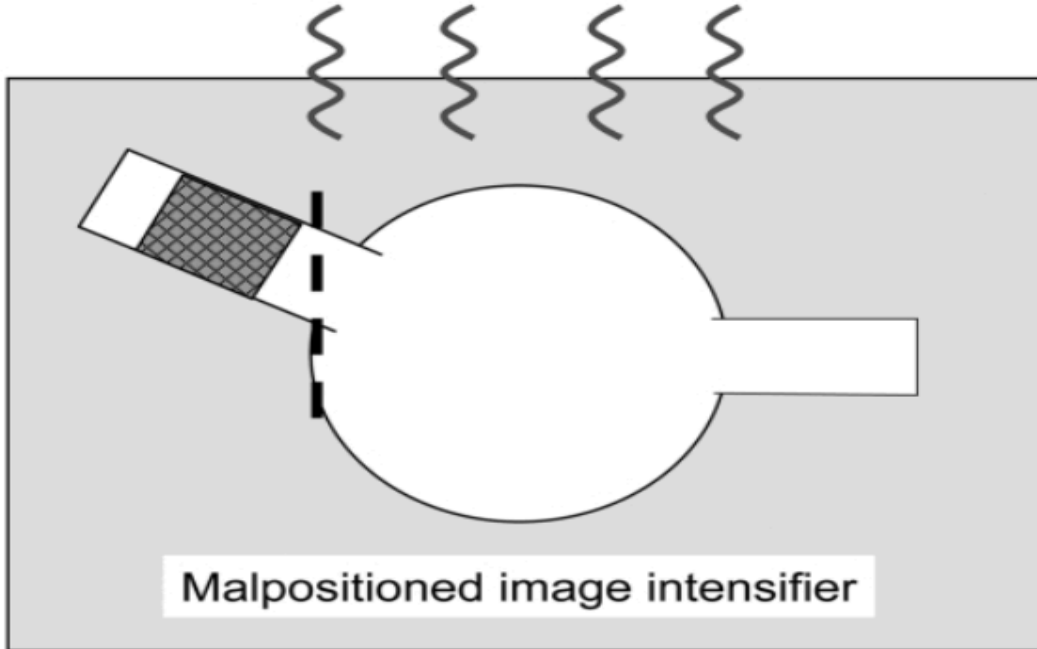
- Femoral mostly
 - Favorable imaging
 - Majority AA disease
 - 25 -45 cm sheath appropriate if iliac disease/
tortuosity
 - Prevents GC induced trauma/atheroembolism
-

RADIAL / BRACHIAL ACCESS: <5%

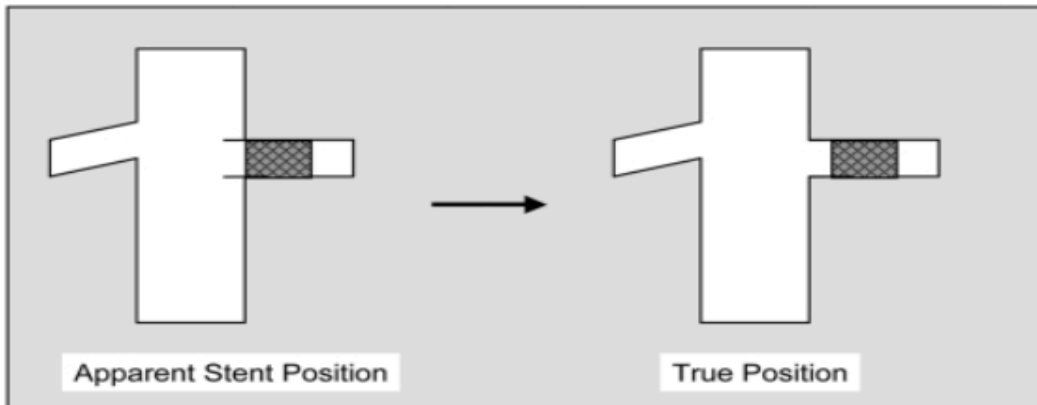
- Steep inferior coursing renal arteries



Image Intensifier



Malpositioned image intensifier



Apparent Stent Position

True Position

II ORTHOGONAL
PROXIMAL PART OF
RENAL
ARTERIES

SELETIVE RENAL ANGIOGRAPHY

Image size: 512 x 512

Joseph 10/M 5170/1302/R 009242/5170/1302/R (11 y , 10 y)

WL: 111 WW: 143

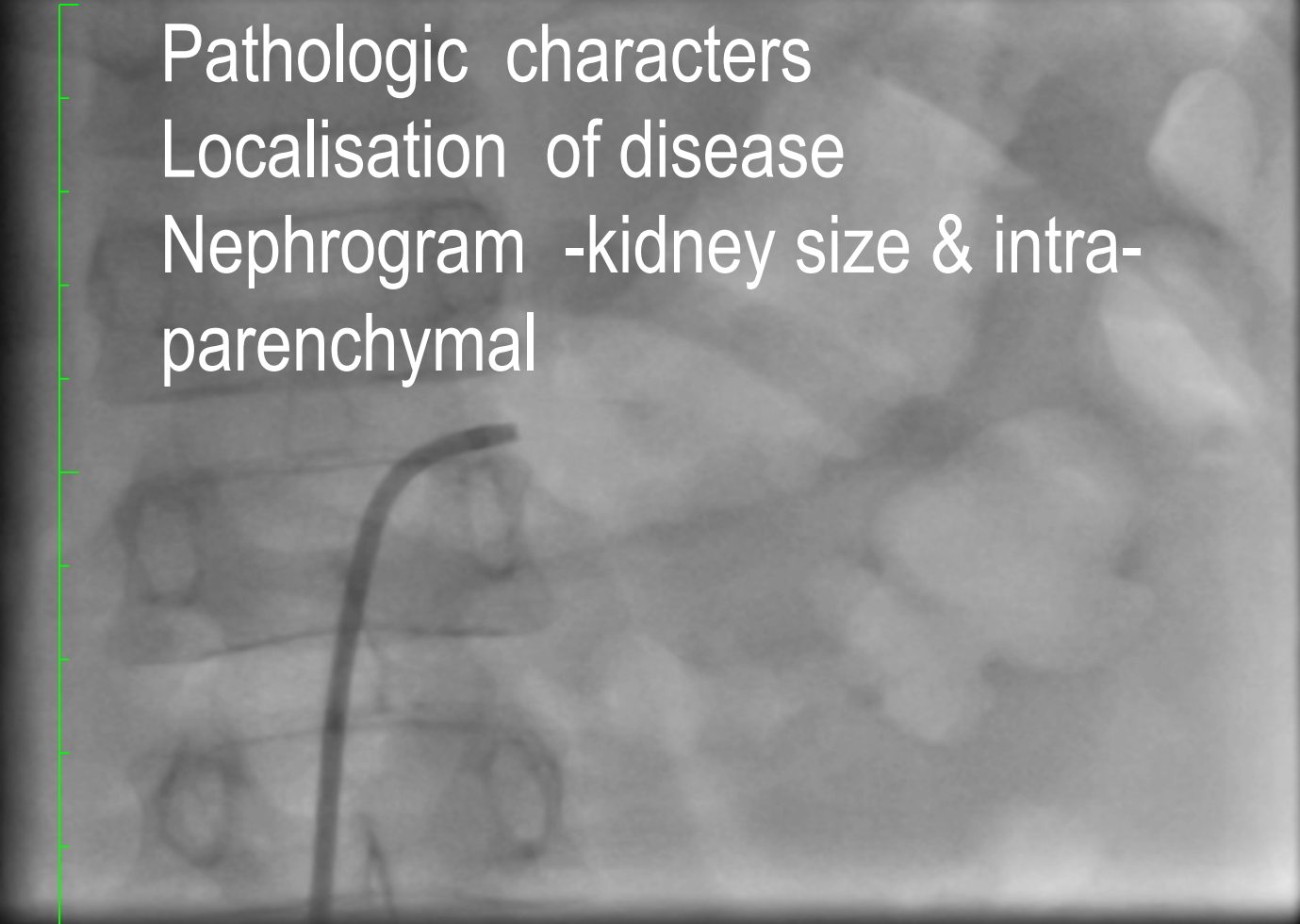
Coronary Diagnostic Coronary Catheterization

Coro 2020

Pathologic characters

Localisation of disease

Nephrogram -kidney size & intra-
parenchymal



Product Code	French Size (F)	Length (cm)	Curve Style
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RENAL CURVE

LA6PK1W	6	47	PK1
LA7PK1W	7	47	PK1
LA8PK1W	8	47	PK1

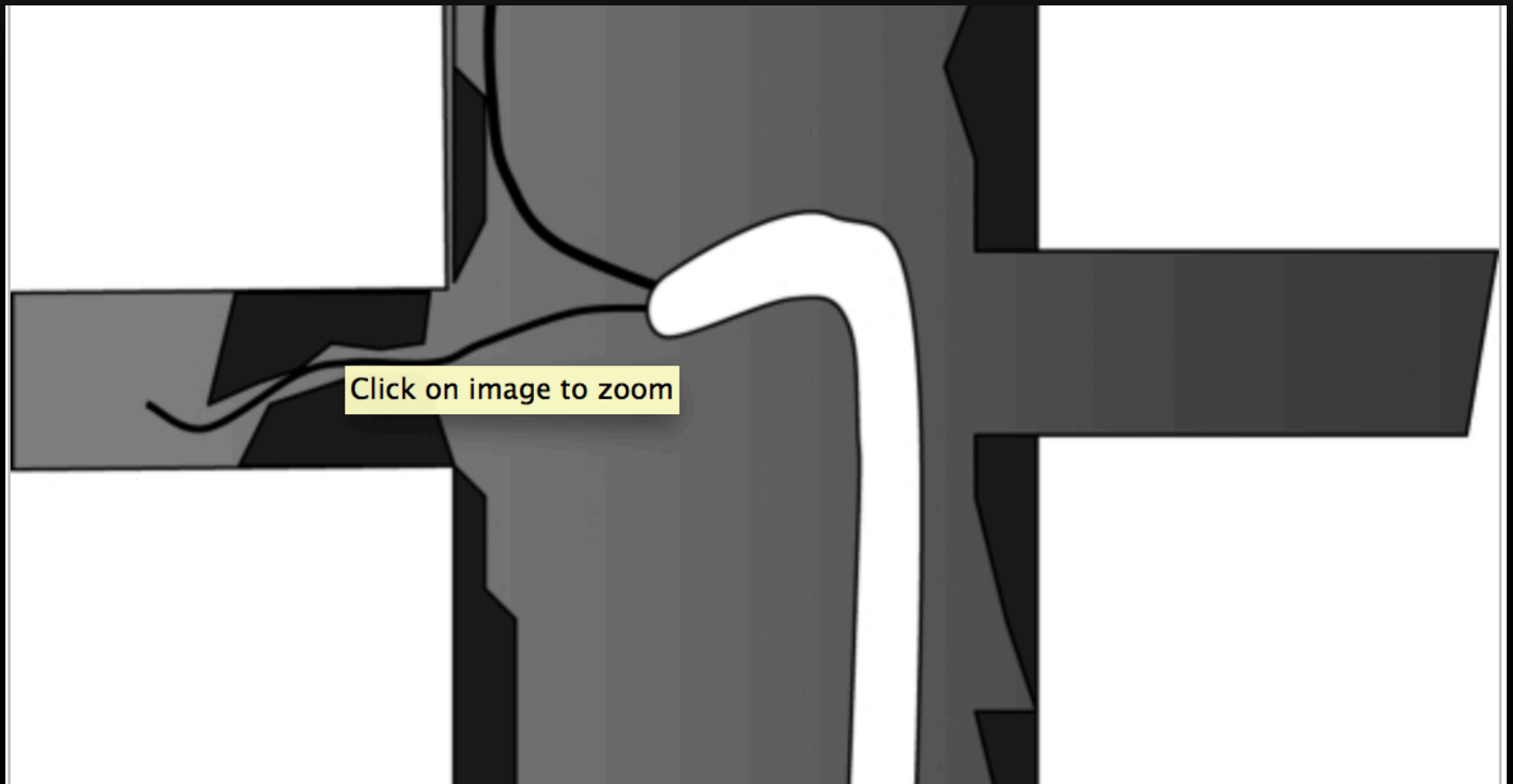


RENAL DOUBLE CURVE

LA6RDCK	6	55	RDC
LA7RDCK	7	55	RDC
LA8RDCK	8	55	RDC



THE NO TOUCH -TECHNIQUE



TRANSLESIONAL GRADIENTS

- Pull back :inconsistent;non simultaneous;non reproducible
- Not to be used
- Simultaneous placement of catheters
-4F distal to lesion & 6 F prox

GUIDE CATHETER ENGAGEMENT

- Direct /Indirect
- 4F diagnostic catheter and 6 -8 F guide catheter introduced in tandem over 0.035 “” wire into AA
- Diagnostic catheter coaxially engaged in renal artery ostium
- 0.014 “” guide wire introduced thro 4 F catheter and placed distal to lesion
- Guide catheter then railed over diagnostic catheter into renal ostium
- Once co-axial ,diagnostic catheter removed

GUIDE CATHETER HANDLING

- **Gentle handling**
- **Avoid GC induced dissection/
trauma/acute closure/
atheroembolism**

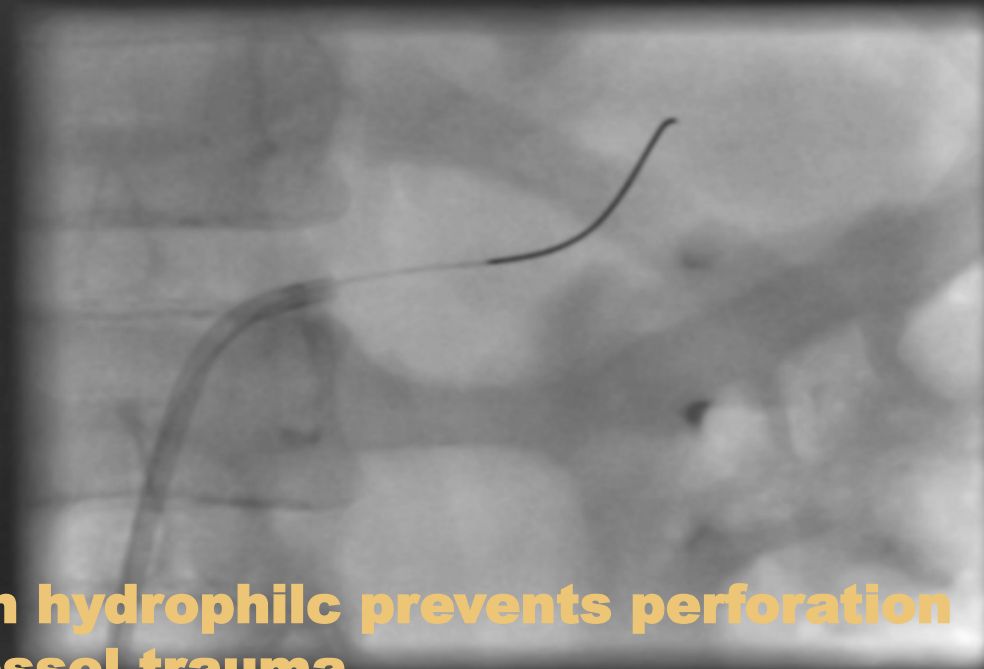


LEFT FEMORAL APPROACH ;RT RENAL
RIGHT FEMORAL _ LEFT RENAL PLASTY

CHOICE OF GUIDEWIRES

Image size: 512 x 512
WL: 109 WW: 143

Joseph 10/M 5170/1302/R 009242/5170/1302/R (11 y , 10 y)
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0.014 “ non hydrophilic prevents perforation
Minimal vessel trauma
Compatible with balloon expandable stents
Pressure wires, DPD

GUIDE WIRES

- **0.014 “ coronary wires**
- **0.018:” McNamara wires**
- **Tip to be positioned in distal main renal artery**
- **DO NOT WEDGE DISTALLY ...perforation/
perinephric hematoma,occlusion**

PREDILATATION

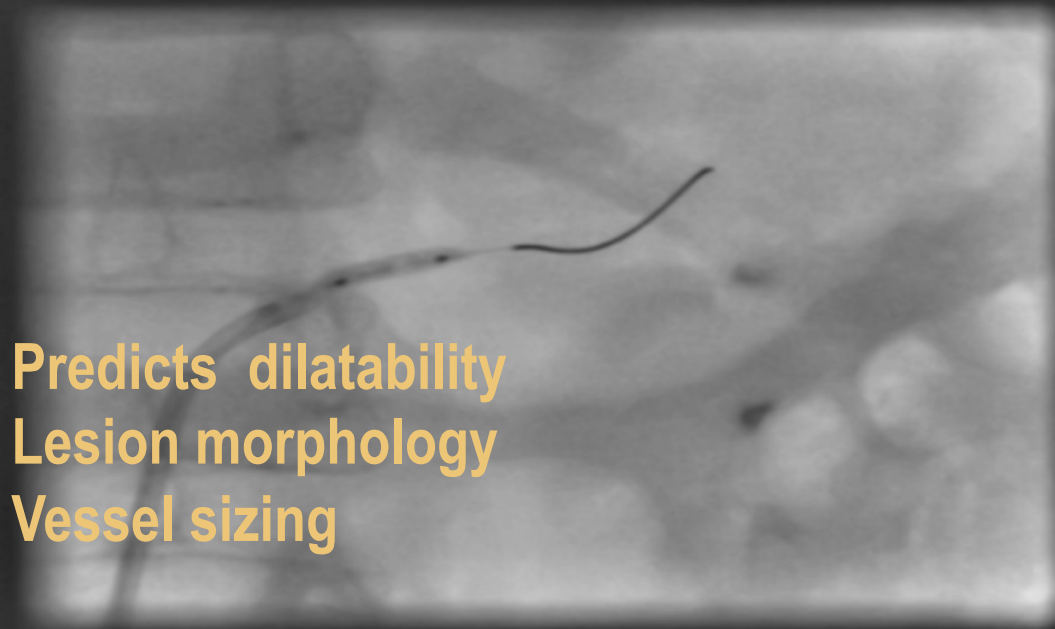
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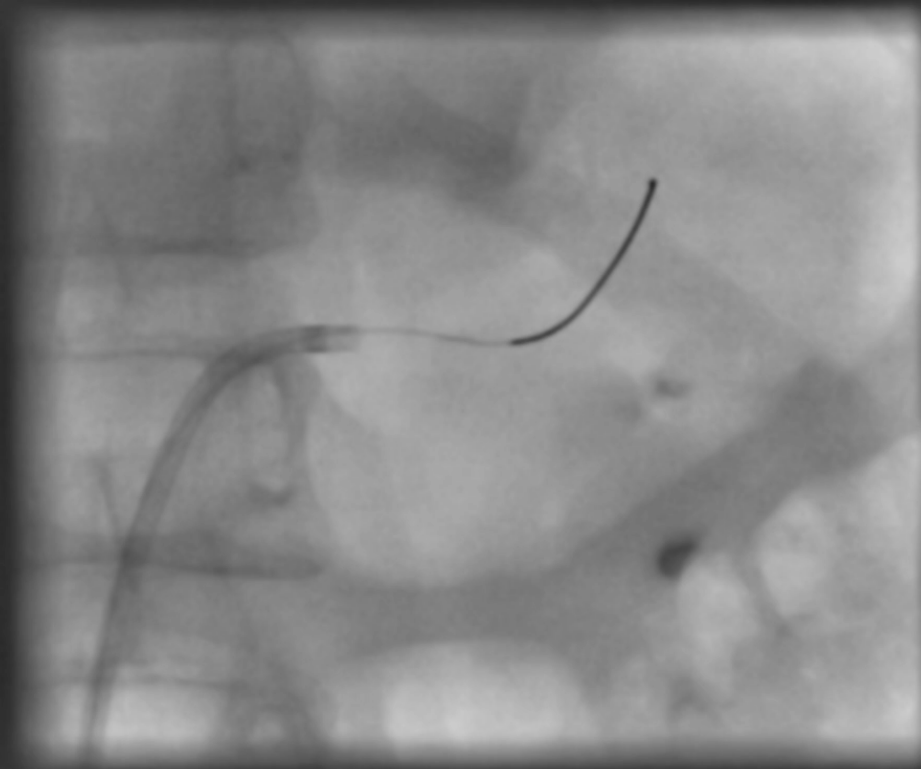
Predicts dilatability
Lesion morphology
Vessel sizing

Image size: 512 x 512
WL: 109 WW: 143

Joseph 10/M 5170/1302/R 009242/5170/1302/R (11 y , 10 y)

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WHY NOT PLAIN BALLOON PLASTY ??

- Lower procedural success
 - Residual stenoses
 - Vessel dissection
 - Abrupt vessel closure
 - Vessel recoil- poor long term success
 - Encroachment of aortic atheroma
 - Higher restenoses
 - Only in FMD
-

RENAL STENTING

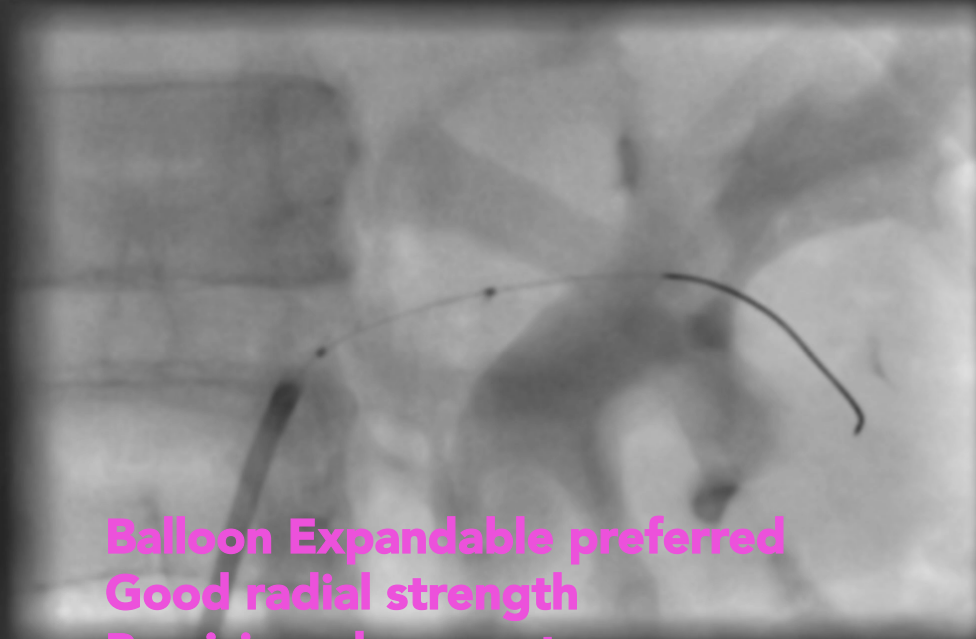
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Coronary Diagnostic Coronary Catheterization

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Balloon Expandable preferred
Good radial strength
Precision placement
1-2 mm protrusion into aorta

RENAL STENTS

- **3 FDA APPROVED 0.014 “ GUIDE WIRE COMPATIBLE balloon expandable stents platforms available**
 - **Express SD Boston Scientific**
 - **Formula Stent, Cook Medical**
 - **Herculink Elite Abbot Vascular**
-

TYPICAL STENT SPECIFICATIONS

Expanded Stent Diameter (mm)	Stent Lengths (mm)	<i>In Vitro</i>* Stent Deployment Pressure (atm)	Rated Burst Pressure RBP (atm)	Recommended Minimum Guiding Catheter ID (F) / (inches) / (mm)	Recommended Minimum Sheath / Introducer** (F) / (inches) / (mm)
4.0	12, 15, 18	11	14	6 / 0.067 / 1.70	5 / 0.071 / 1.80
4.5	12, 15, 18	11	14	6 / 0.067 / 1.70	5 / 0.071 / 1.80
5.0	12, 15, 18	11	14	6 / 0.067 / 1.70	5 / 0.071 / 1.80
5.5	12, 15, 18	11	14	6 / 0.067 / 1.70	5 / 0.071 / 1.80
6.0	12, 15, 18	11	14	6 / 0.067 / 1.70	5 / 0.071 / 1.80
6.5	12, 15, 18	11	14	6 / 0.067 / 1.70	5 / 0.071 / 1.80
7.0	15, 18	11	14	6 / 0.067 / 1.70	5 / 0.071 / 1.80

Image size: 512 x 512

Joseph 10/M 5170/1302/R 009242/5170/1302/R (11 y , 10 y)

WL: 109 WW: 143

Coronary Diagnostic Coronary Catheterization

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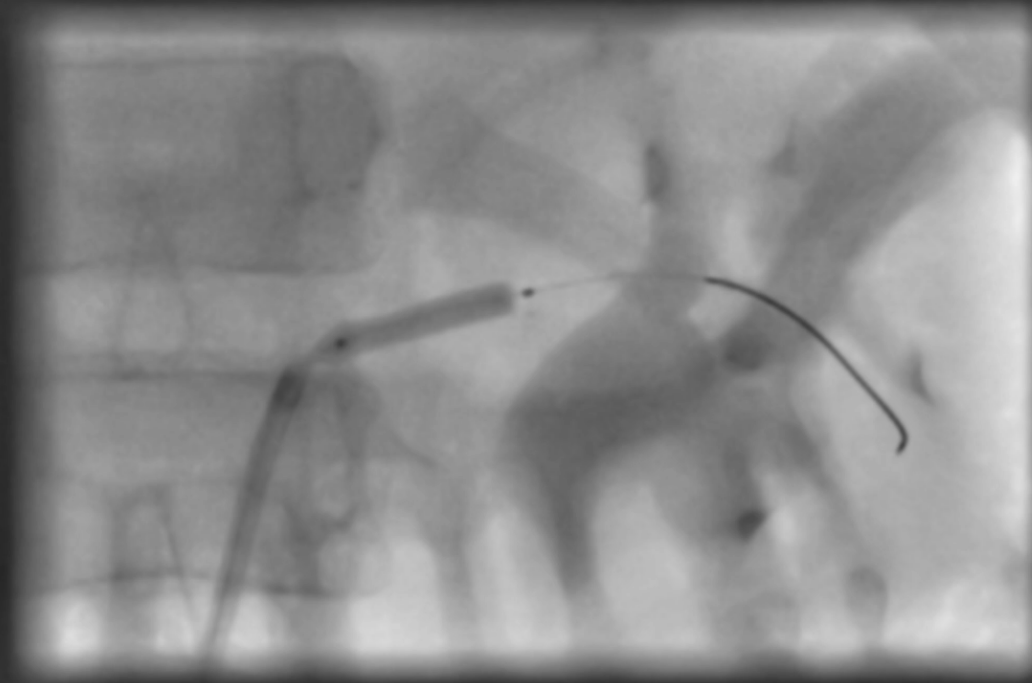
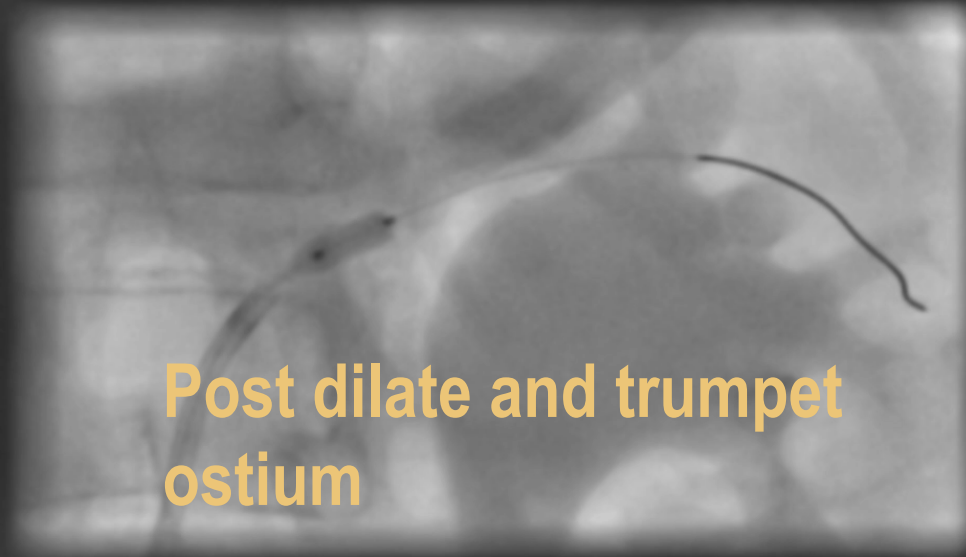


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WL: 109 WW: 151

Joseph 10/M 5170/1302/R 009242/5170/1302/R (11 y , 10 y)
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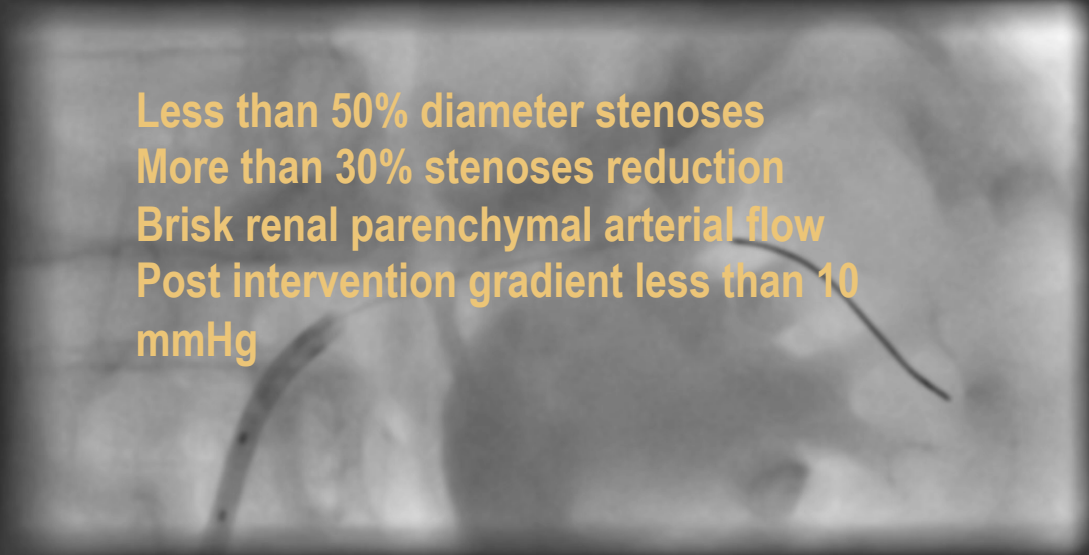


**Post dilate and trumpet
ostium**

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WL: 109 WW: 151

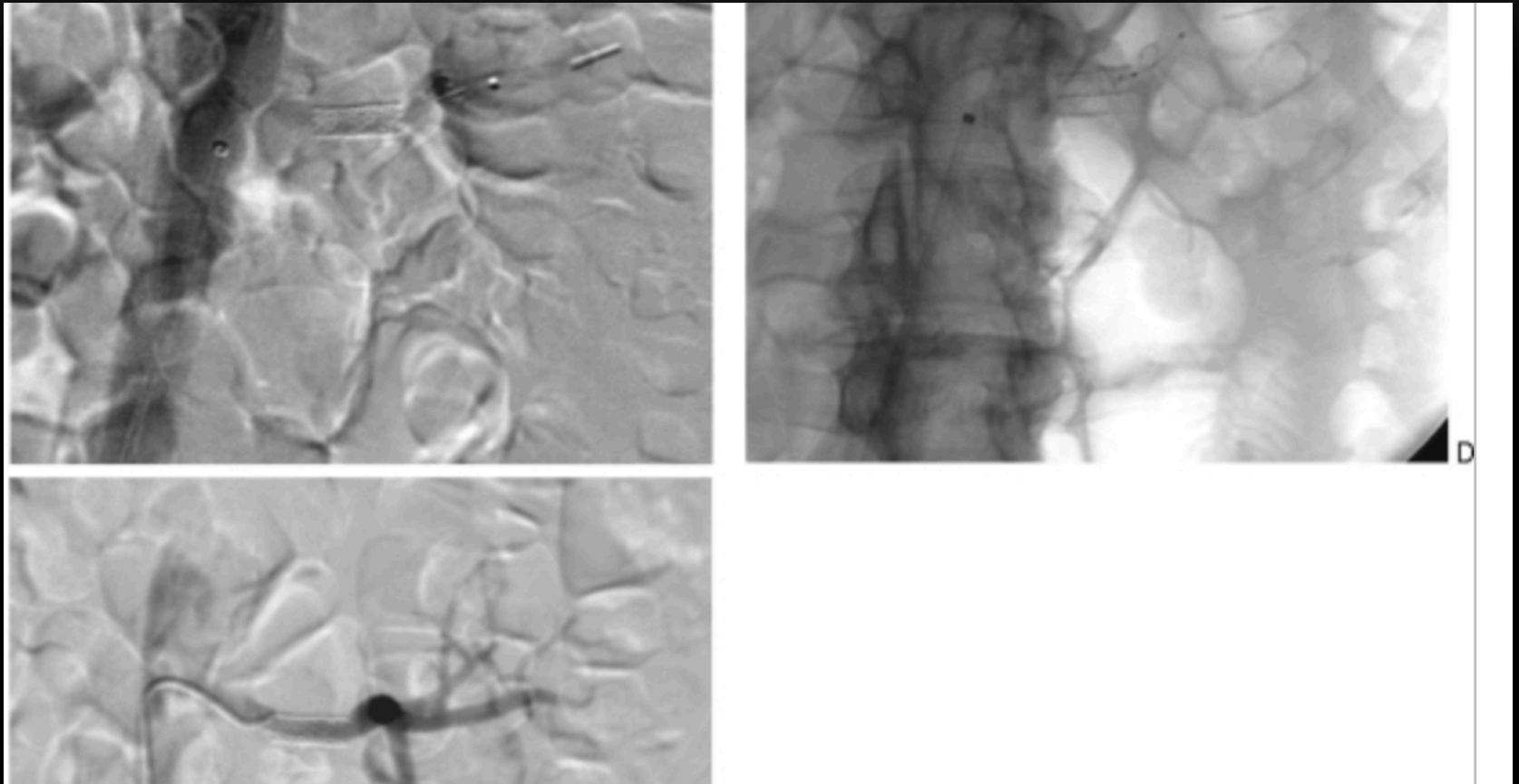
Post Stenting - Distal dissection, Embolism, Residual thrombus, perforation Renal hematoma

Josep C. M. 5070/1302/5170/1302/R (11 y , 10 y)
Coronary Diagnostic Coronary Catheterization
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Less than 50% diameter stenoses
More than 30% stenoses reduction
Brisk renal parenchymal arterial flow
Post intervention gradient less than 10
mmHg

DISTAL PROTECTION DEVICE



No Randomised Data No dedicated devices! May be used if eGFR less than 45 ml/min and single kidney

ROLE OF IVUS

- **Could be useful**
 - **Lesion assessment,ISR,stent thromboses.**
 - **Lesion morphology,vessel sizing**
 - **Post Intervention---**
 - **Apposition,Expansion,lesion coverage,**
 - **Dissection,thrombus,hematoma,**
 - **Perforation ,Rupture**
-

MULTI SOCIETAL GUIDELINES: REVIEW

CARDIAC DISTURBANCE

Hemodynamically Significant RAS with:

- Recurrent unexplained CHF OR
- Sudden, unexplained pulmonary edema.

(Class I, LOE B)

RAS and Unstable Angina

(Class IIa; LOE B)

RESISTANT HYPERTENSION

RAS with:

- Accelerated, Resistant or Malignant HTN
- HTN with unilateral small kidney
- HTN with medication intolerance

(Class IIa; LOE B)

ISCHEMIC NEPHROPATHY

RAS and CRI with:

- Bilateral RAS OR
- RAS to a solitary functioning kidney

(Class IIa; LOE B)

RAS and CRI with

- Bilateral RAS OR
- RAS to a solitary functioning kidney

(Class IIa; LOE B)

RAS and CRI with unilateral RAS
(2 kidneys present).

(Class IIb; LOE C)

Asymptomatic bilateral or solitary
viable kidney with hemodynamically
significant RAS

(Class IIb, LOE C)

Asymptomatic Unilateral
hemodynamically significant RAS in a
viable kidney

(Class IIb, LOE C)

Fig. 2. Review of Multi-Societal Guidelines Recommendations Adapted from [10]: Multisocietal Guideline Indications for renal artery revascularization. RAS, renal artery stenosis; CRI, chronic renal insufficiency; LOE, level of evidence.

THANK YOU









Image size: 512 x 512

Mr.Sidhardhan 73/M 329/069/R01 039538/329/R01 (77 y , 73 y)

WL: 118 WW: 143

Coronary Diagnostic Coronary Catheterization

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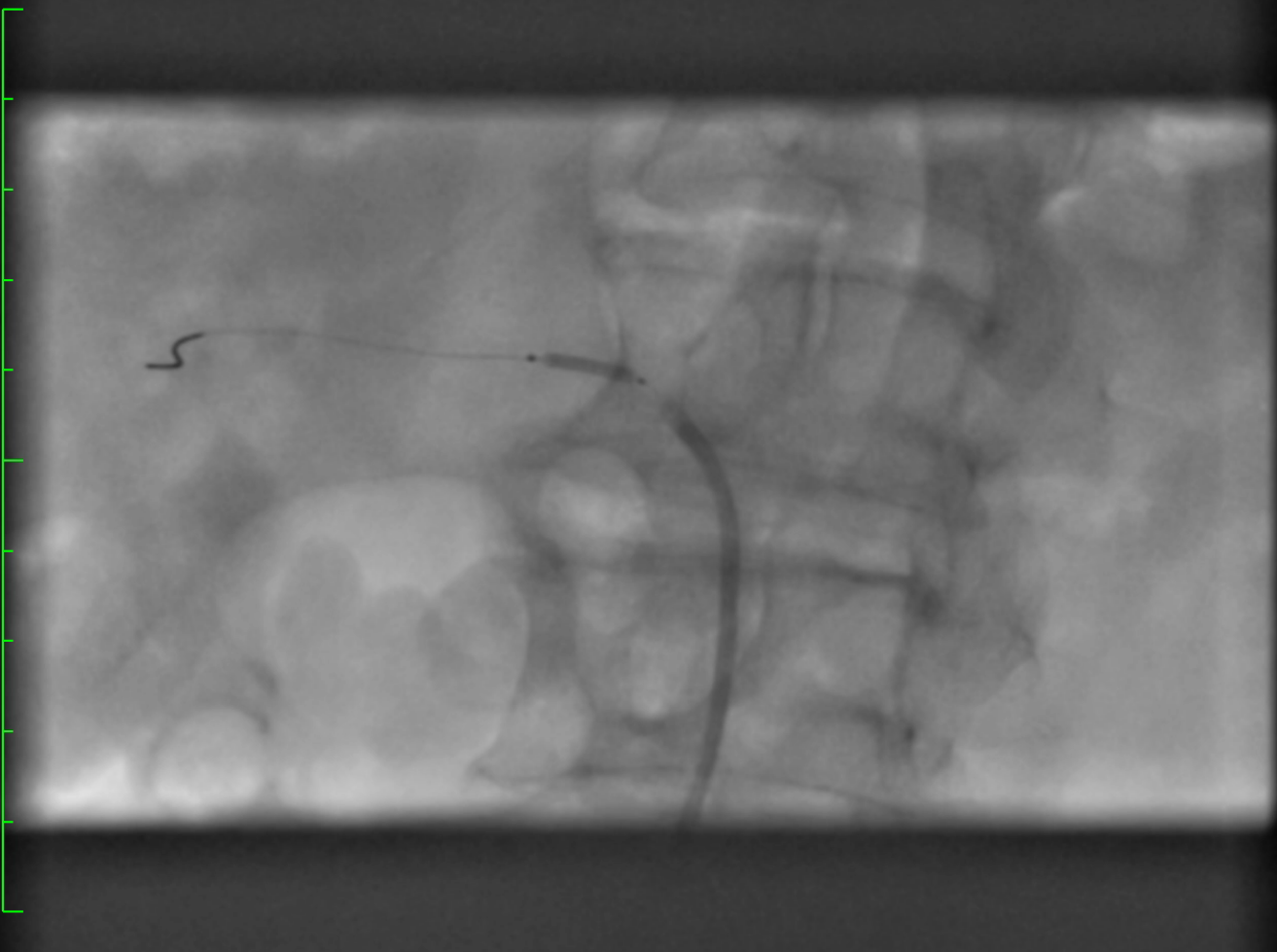


Image size: 512 x 512 Mr.Sidhardhan 73/M 329/069/R01 039538/329/R01 (77 y , 73 y)
WL: 120 WW: 143 Coronary Diagnostic Coronary Catheterization
Coro 2020

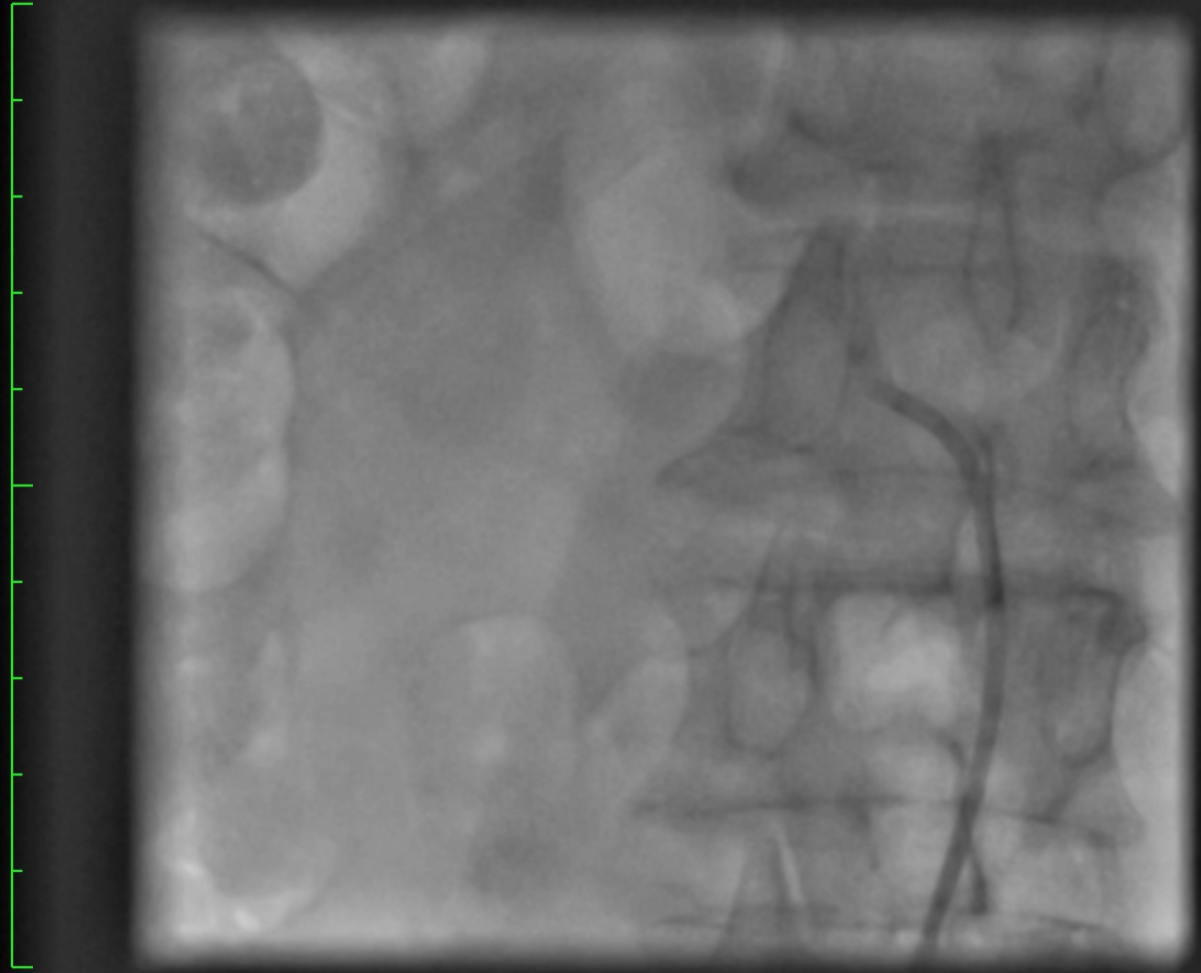


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Mr.Sidhardhan 73/M 329/069/R01 039538/329/R01 (77 y , 73 y)

WL: 118 WW: 143

Coronary Diagnostic Coronary Catheterization

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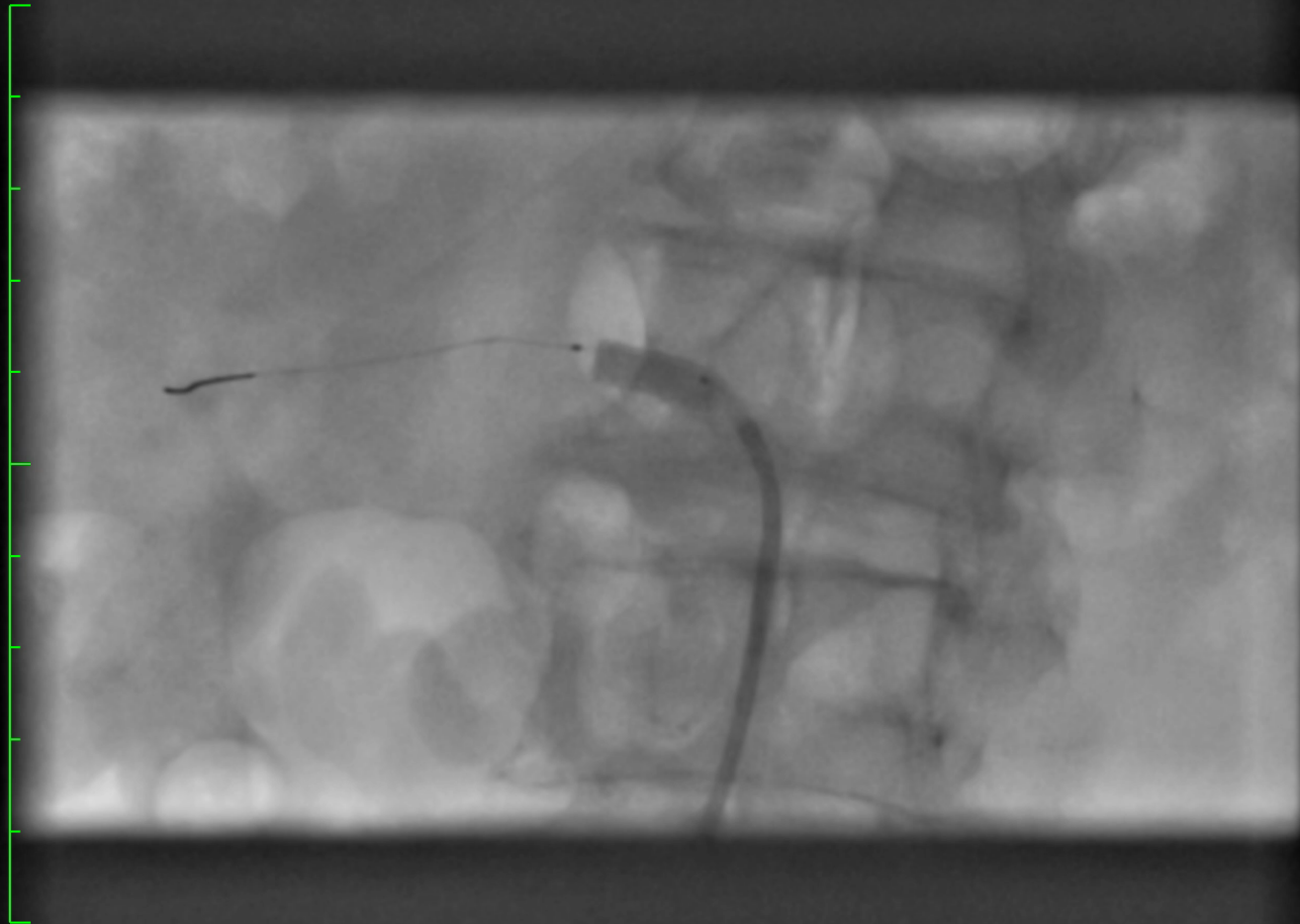


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WL: 113 WW: 143

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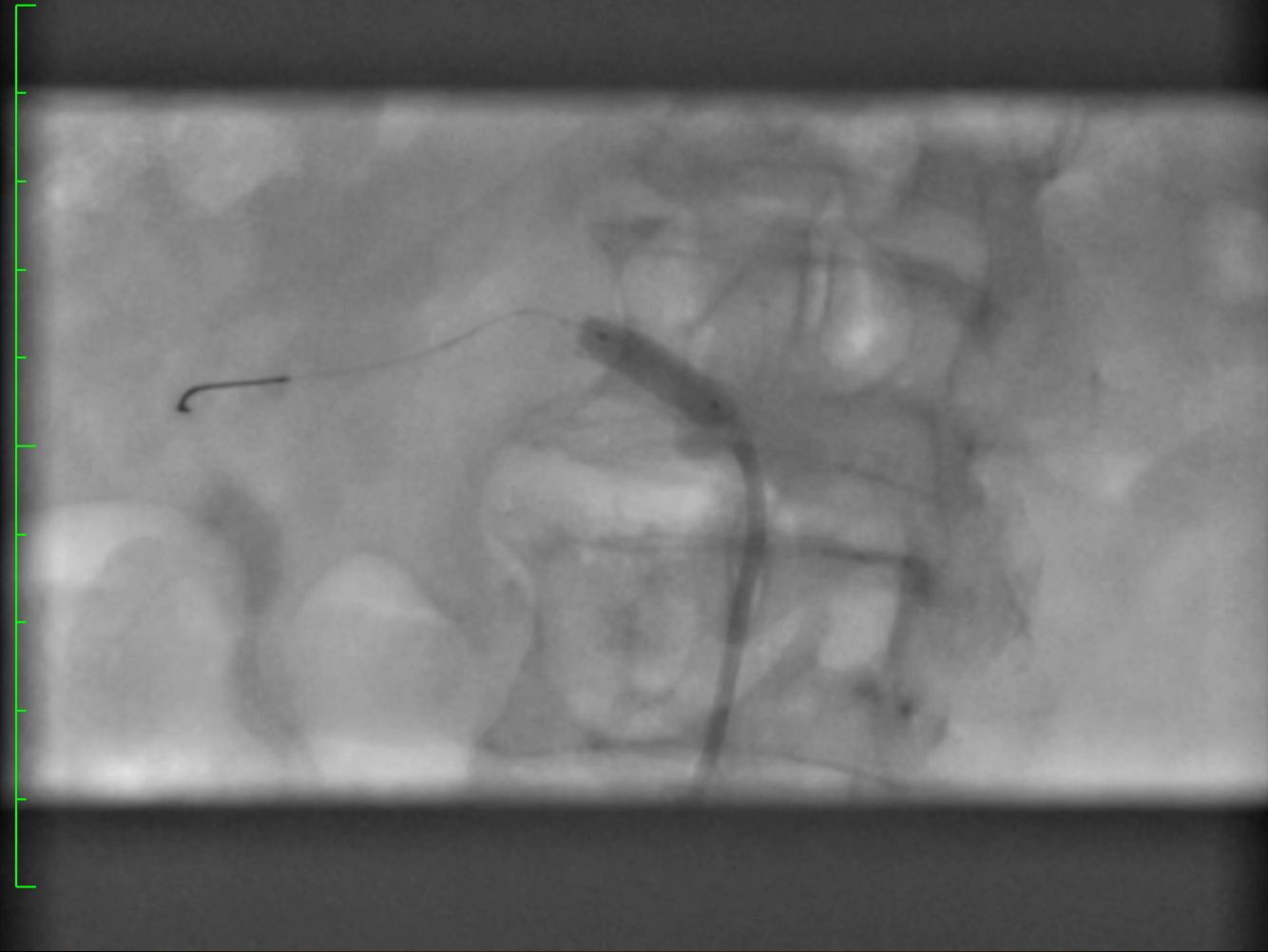


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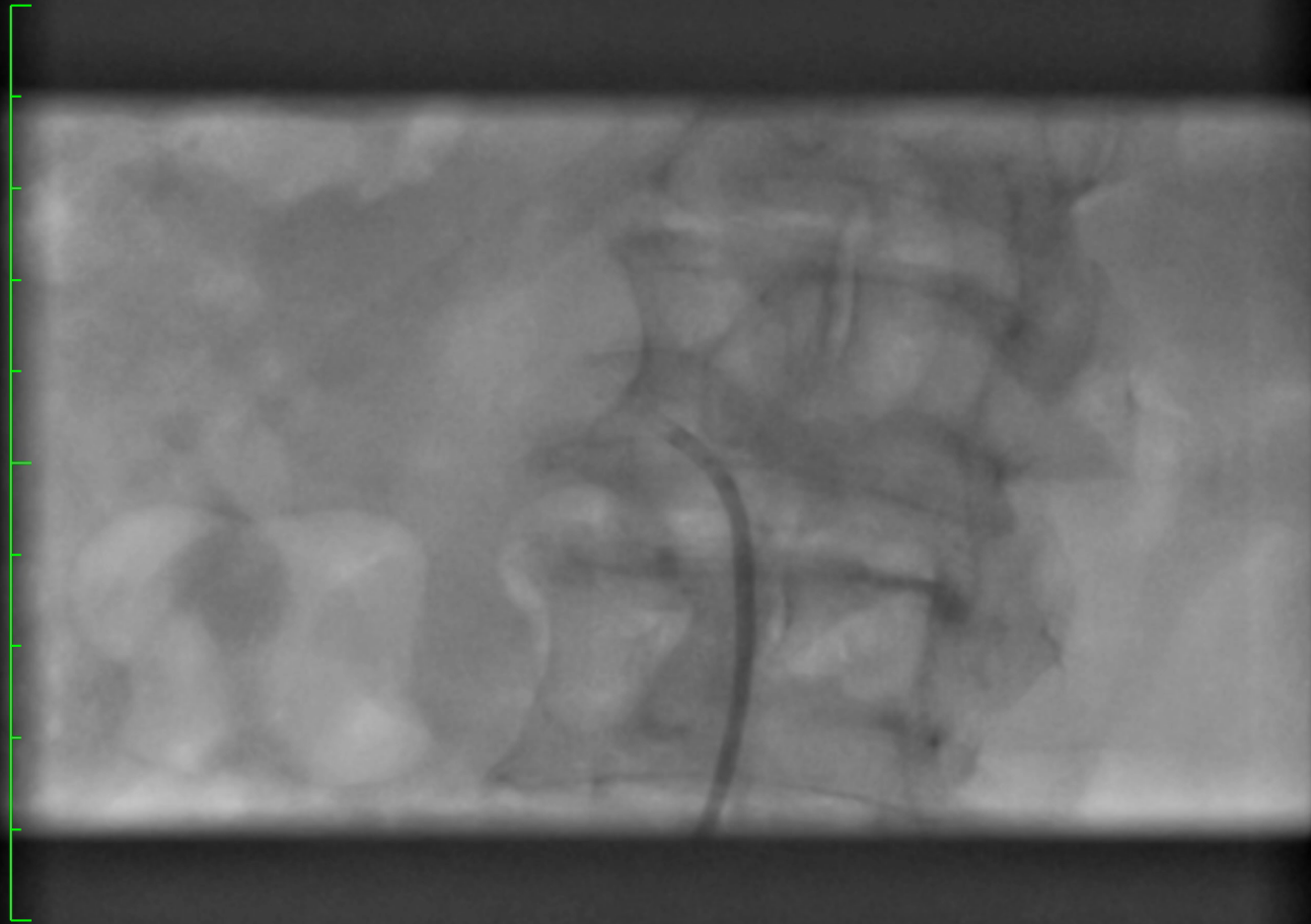


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Coronary Diagnostic Coronary Catheterization

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