CardioVascular Learning Network | CME

INTRAVASCULAR LITHOTRIPSY IN PAD

Clinical Benefits and Economic Considerations for Providers and Health Systems

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- **Eric Secemsky, MD, MSc, RPVI, FACC, FAHA, FSCAI, FSVM:** Consultant/Advisor—Abbott, Asahi, BD, Boston Scientific, Conavi, Concept Medical, Cook, Cordis, Endovascular Engineering, Evident Vascular, GE, WL Gore, InfraRedx, Medtronic, Penumbra, Philips, RapidAI, Rampart IC, R3 Regeneron, Shockwave Medical, Siemens, SoniVie, Teleflex, Terumo, Thrombolex, VentureMed, Verve, Zoll
- **Carol Melvin** has nothing to disclose in relation to this activity
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- **Constantino Peña, MD**: Consultant—Avanos, Asahi, Shockwave Medical, Becton Dickinson (Bard), Cook, R3, Philips Healthcare, Cordis, Biotronik; Scientific Advisory Board—Medtronic; Speaker—Becton Dickinson (Bard), Cook Medical, Penumbra, Shockwave Medical, Terumo; Investor—Cagent Medical, Fastwave

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Program Information

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- Supported by an educational grant from Shockwave IVL

Learning Objectives

- Describe the clinical role of intravascular lithotripsy in the treatment of calcified peripheral artery disease, including its integration into contemporary PAD care pathways
- Evaluate reimbursement, coding, and coverage considerations associated with the use of intravascular lithotripsy across different sites of care, and their impact on clinical and operational decision-making
- Identify multidisciplinary strategies for implementing intravascular lithotripsy within PAD programs, emphasizing collaboration among clinicians and administrators to support appropriate utilization and care delivery

PAD = peripheral artery disease.

Current Landscape of Reimbursement and Coding for PAD Therapies

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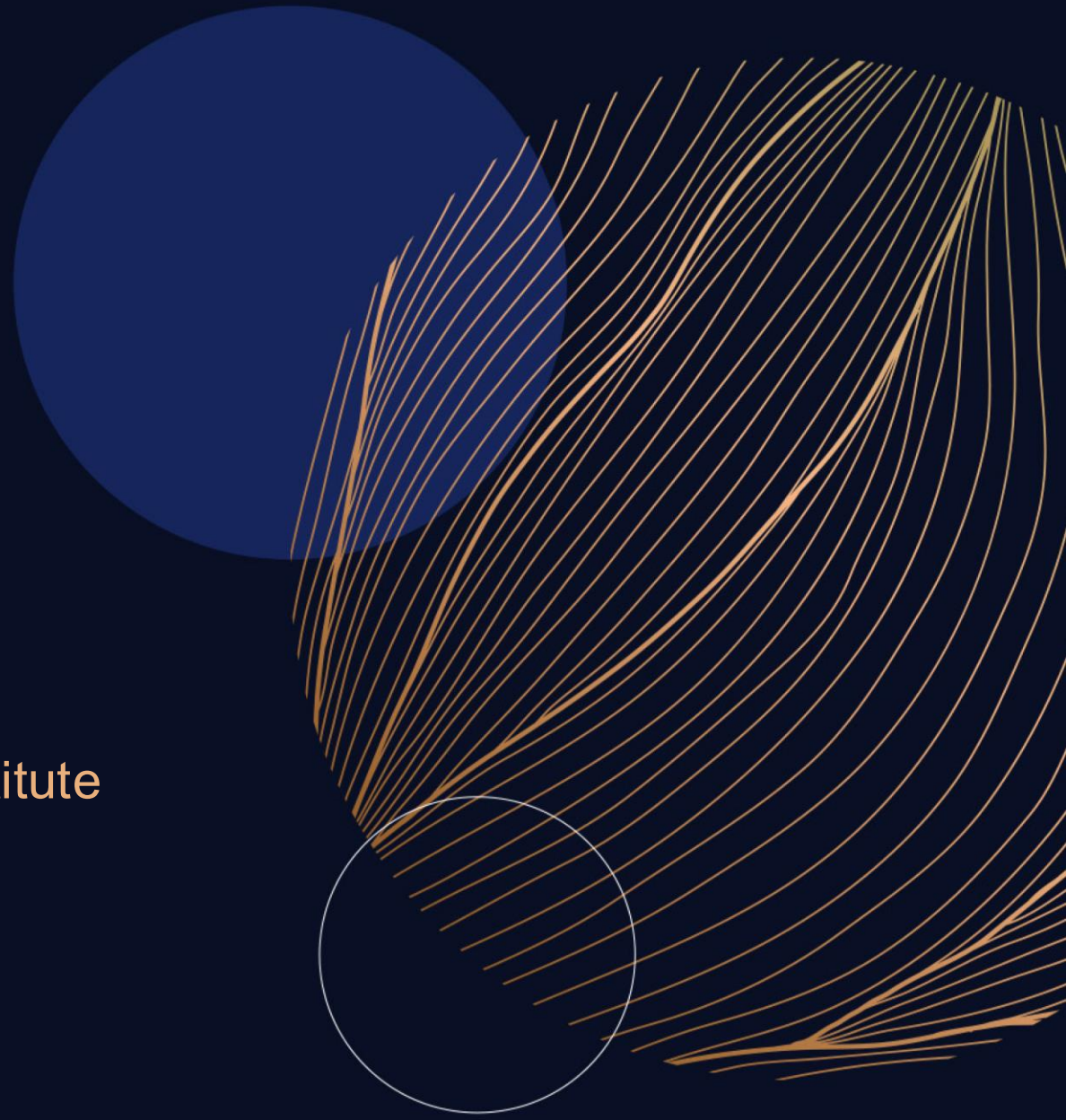


Hospital Billing and Coding in Interventional Radiology: Innovation, Complexity, and Reimbursement

- Interventional Radiology innovation is advancing rapidly, but hospital reimbursement remains largely procedure-based

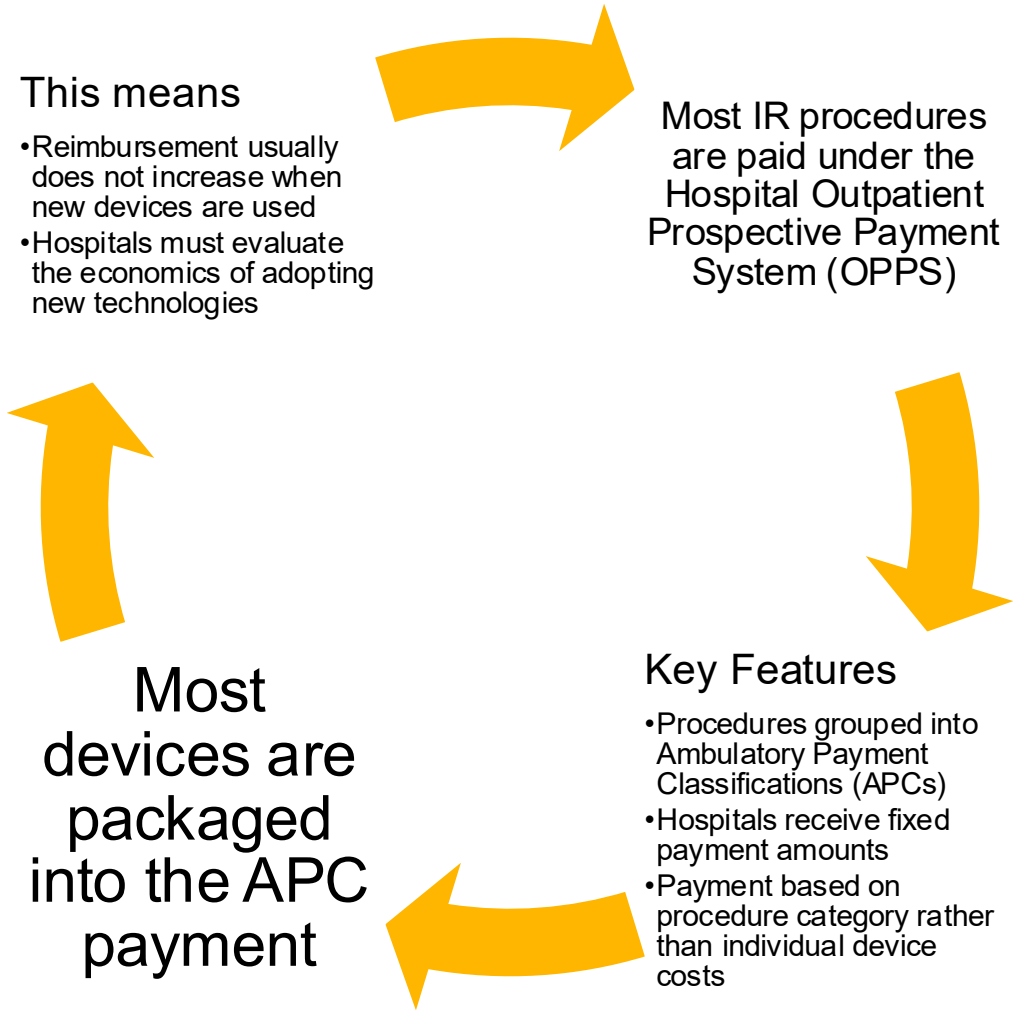
Three key themes for the talk

- Increasing procedural complexity
- Coding and documentation challenges
- Balancing innovation with reimbursement

Hospital vs Physician Billing

- Understanding the distinction
  - Physician billing
    - Professional services
  - Hospital billing
    - Facility reimbursement
    - Equipment and imaging
    - Nursing and technical staff
    - Procedural supplies and devices

Medicare Hospital Payment Structure



IR = interventional radiology.

Coding Complexity in Interventional Radiology

IR procedures often include

- Multiple vascular territories
- Image guidance
- Device placement
- Several interventions in one case
- Complex bundling rules

Key message

- Accurate coding requires complete procedural documentation

Where Hospitals Lose Revenue in Interventional Radiology

1. Documentation Gaps

- Common Issues
  - Vessels treated not clearly described
  - Imaging guidance not documented
  - Devices not specified
  - Procedural steps unclear
- Impact
  - Incomplete documentation can prevent hospitals from capturing the full complexity of the procedure

Where Hospitals Lose Revenue in Interventional Radiology

2. Device and Supply Costs

- Many IR procedures require advanced devices
  - Stents
  - Embolization materials
  - Thrombectomy systems
  - Lithotripsy catheters
- Key insight
  - Supply costs can represent 30-50% of total procedure cost

Where Hospitals Lose Revenue in Interventional Radiology

3. Bundling Rules and Coding Complexity

- Interventional procedures often involve
  - Multiple interventions
  - Complex CPT® bundling rules
  - Multiple vascular territories
- Key insight
  - Coding errors or missed components may lead to lost reimbursement or adherence risk

CPT = current procedural terminology.

Where Hospitals Lose Revenue in Interventional Radiology

4. Denials and Medical Necessity

- Hospitals frequently face denials related to
  - Medical necessity documentation
  - Payer policy differences
  - Prior authorization requirements
- Key insight
  - Managing denials requires significant revenue cycle resources
  - Hospitals must balance accurate coding, adherence, and rising technology costs while operating within a fixed procedure-based reimbursement system

Closing Message

- Interventional Radiology continues to transform patient care through remarkable minimally invasive innovations
- Our challenge is ensuring that documentation, coding accuracy, and reimbursement systems evolve alongside these advances so hospitals can continue to support and expand these life-changing treatments
- New technologies, such as intravascular lithotripsy, are a great example of how innovation can improve patient care while also highlighting the importance of aligning reimbursement models with emerging technologies

Reimbursement and Coverage Considerations for Intravascular Lithotripsy in PAD

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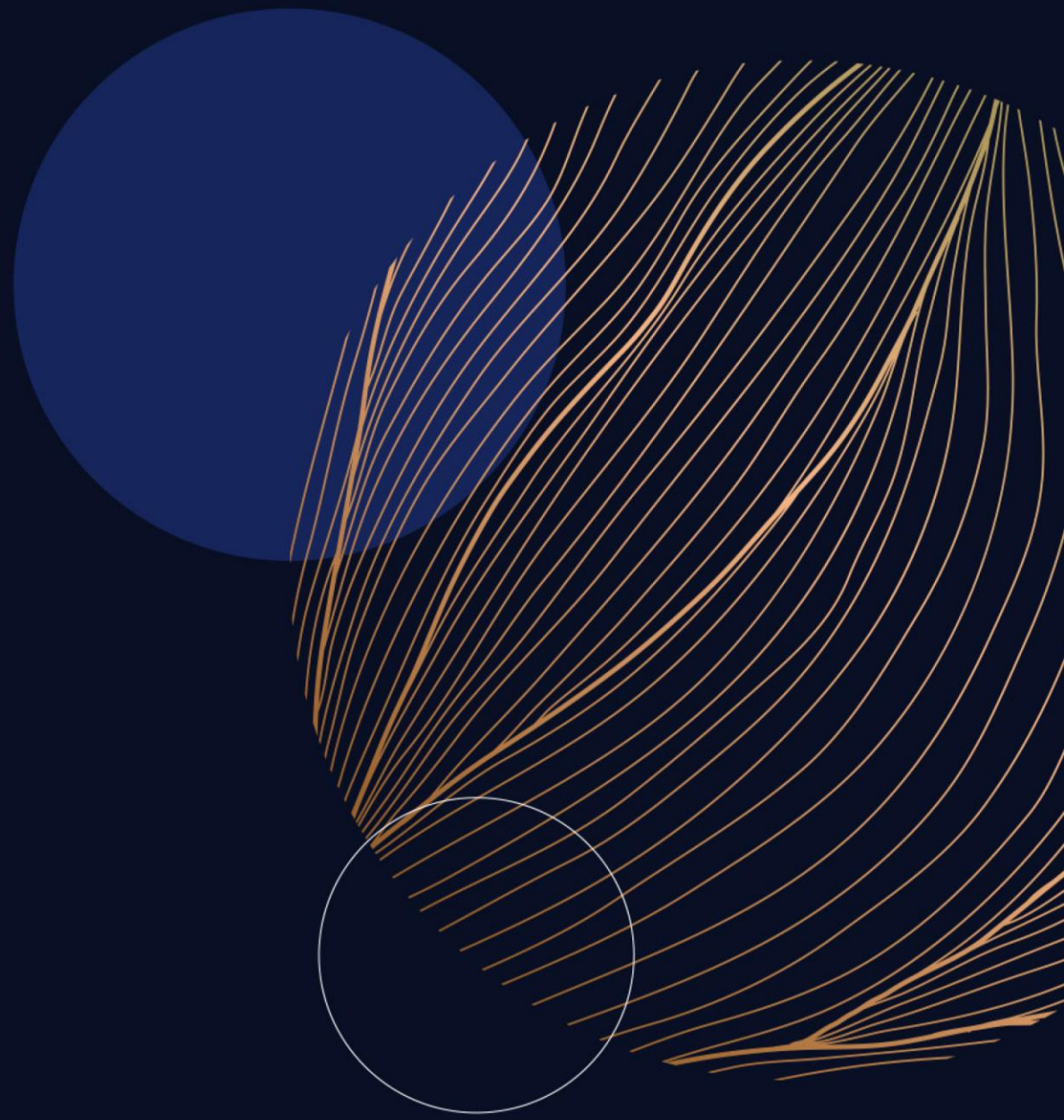
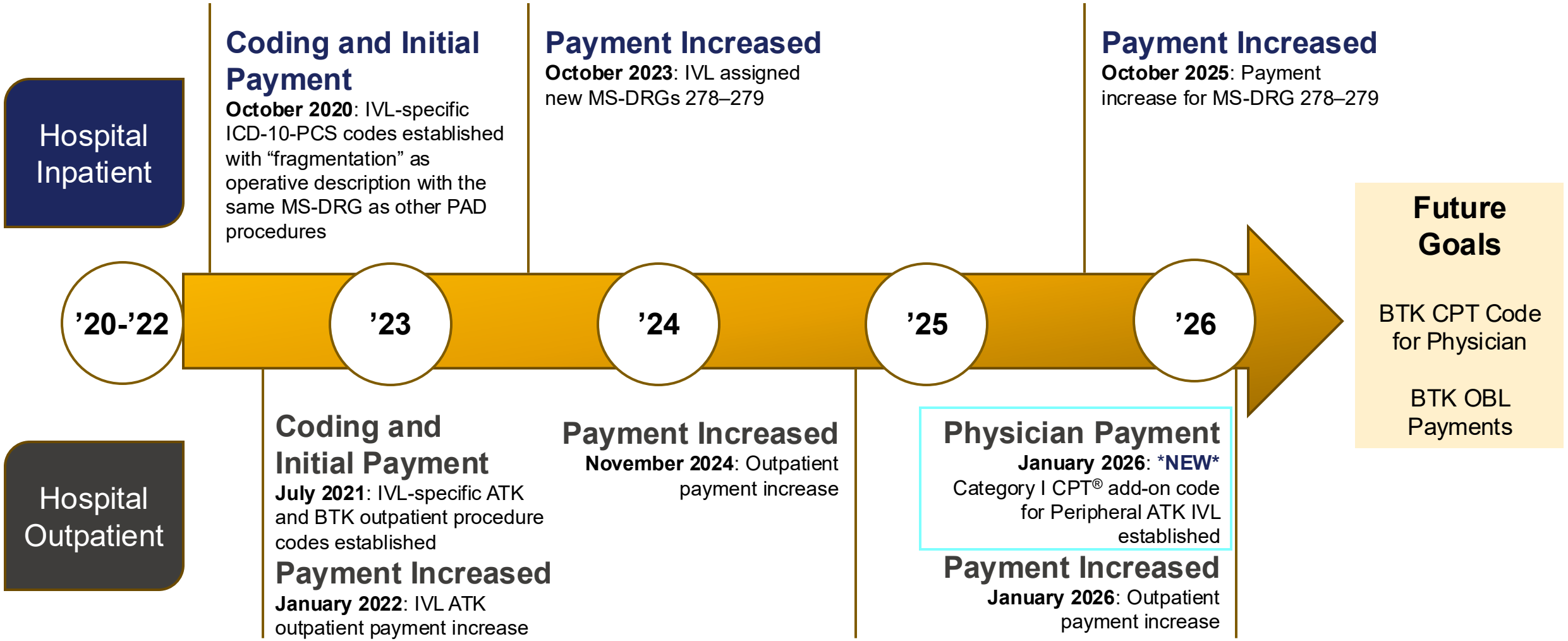


Peripheral IVL Hospital Reimbursement Evolution



IVL = intravascular lithotripsy; ICD-10-PCS = International Classification of Diseases, 10th edition, Procedure Coding System; MS-DRG = Medicare severity diagnosis-related group; ATK = above-the-knee; BTK = below-the-knee.

American Medical Association (AMA). September 11, 2025. Accessed March 17, 2026. https://www.ama-assn.org/press-center/ama-press-releases/ama-releases-cpt-2026-code-set.

Peripheral Lower Extremity Revascularization: 2026 Updates

- CPT® code overhaul
  - 46 new, more granular CPT® codes for LER replace the older set
  - Organized by 4 vascular territories: iliac, femoral/popliteal, tibial/peroneal, and inframalleolar
  - Along with lesion types: straightforward (stenosis) or complex (occlusion)
    - Generally, compared to analogous codes, procedure rates are higher for complex and lower for straightforward procedures compared to 2025
  - IVL has two new add-on codes for ATK
    - +37262 in Iliac and +37279 in fem/pop, which establishes physician payment when IVL is used in these territories
- IVL hospital rates went up in both inpatient and outpatient settings
  - C codes for IVL procedures still apply for hospital outpatient and ASCs

LER = lower extremity revascularization; ASC = ambulatory surgery center.

American Medical Association (AMA). September 11, 2025. Accessed March 17, 2026. https://www.ama-assn.org/press-center/ama-press-releases/ama-releases-cpt-2026-code-set.

New: Peripheral IVL Physician Reimbursement

+37262 **Iliac** IVL CPT® Add-On Code	**+3.00** Additional Work RVUs	**+$136** Additional Payment (based on total RVUs)
+37279 **Fem/Pop** IVL CPT® Add-On Code	**+4.00** Additional Work RVUs	**+$182** Additional Payment (based on total RVUs)

American Medical Association (AMA). September 11, 2025. Accessed March 17, 2026. https://www.ama-assn.org/press-center/ama-press-releases/ama-releases-cpt-2026-code-set.

Straightforward Iliac IVL Category I CPT® Add-On Code

Iliac IVL CPT® Code:
+37262

Add-On Code:
Additional RVUs and Fees added to peripheral, **including PTA and Stent**

Additional Work RVUs:
+3.00

Additional Professional Fees:
+$136
(Based on total relative value units)

Impact on Work RVUs when Peripheral IVL Performed

Without Peripheral IVL			With Peripheral IVL			
CPT®	Description	Work RVUs[1]		Additional Work RVUs[1]	New Work RVUs	Increase (%)
37254	PTA *(Straightforward)*	7.30	+	3.00	= 10.30	41%
37258	Stent *(Straightforward)*	8.75	+	3.00	= 11.75	34%

[1]CMS-1832-F; Medicare Physician Fee Schedule, MPFS, Calendar Year 2026 Final Rule. 10/31/25, Addendum B, using conversion factor 33.4009.
RVU = relative value units; PTA = percutaneous transluminal angioplasty.
American Medical Association (AMA). September 11, 2025. Accessed March 17, 2026. https://www.ama-assn.org/press-center/ama-press-releases/ama-releases-cpt-2026-code-set.

Straightforward Fem/Pop IVL Category I CPT® Add-on Code

FEM/POP IVL CPT® Code:
+37279

Add-On Code:
Additional RVUs and Fees added to peripheral, **including to adjunctive atherectomy**

Additional Work RVUs:
+4.00

Additional Professional Fees:
+$182
(Based on total relative value units)

Impact on Work RVUs when Peripheral IVL Performed

Without Peripheral IVL			With Peripheral IVL			
CPT®	Description	Work RVUs[1]		Additional Work RVUs[1]	New Work RVUs	Increase (%)
37263	PTA *(Straightforward)*	7.75	+	4.0	= 11.75	52%
37267	Stent *(Straightforward)*	8.75	+	4.0	= 12.75	46%
37271	Atherectomy *(Straightforward)*	9.00	+	4.0	= 13.00	44%
37275	Stent + Atherectomy *(Straightforward)*	11.00	+	4.0	= 15.00	36%

[1]CMS-1832-F; Medicare Physician Fee Schedule, MPFS, Calendar Year 2026 Final Rule. 10/31/25, Addendum B, using conversion factor 33.4009.
American Medical Association (AMA). September 11, 2025. Accessed March 17, 2026. https://www.ama-assn.org/press-center/ama-press-releases/ama-releases-cpt-2026-code-set.

Currently, there are no IVL codes for BTK.

Hospital Inpatient Coding and Payments for Peripheral IVL

FY2026 Medicare National Base Payment Rates Effective October 1, 2025

Peripheral IVL					
MS-DRG	**Description**	**Severity**	**FY2025 Medicare Base Payment[1]**	**FY2026 Medicare Base Payment[2]**	**Percent Change**
278	Ultrasound accelerated and other thrombolysis of peripheral vascular structures	MCC	$35,706	**$40,504**	**+13.4%**
279		CC/None	$22,868	**$26,243**	**+14.8%**

The FY2026 updates result in a national base payment increase of $4798 for patients with MCC and $3375 for patients with CC/none for peripheral interventions where IVL is utilized.

[1,2]National base payment rates assume full update amount for hospitals which have submitted quality data and hospitals have a wage index greater than 1. Site-specific payment rates will vary based on regional area wage differences, teaching hospital status, indirect medical education costs, quality data, additional payments to hospitals that treat a large percentage of low-income patients ("disproportionate share payments"), etc.
FY = fiscal year; MCC = major complications and comorbidities; CC = complications and comorbidities.
CMS-1808-F; Medicare Inpatient Prospective Payment System FY2025 Final Rule. CMS-1833-F; Medicare Inpatient Prospective Payment System FY2026 Final Rule.

Hospital Inpatient Payments for Other PAD Interventions

FY2026 Medicare National Base Payment Rates Effective October 1, 2025

Peripheral Procedures				
MS-DRG	**Description**	**Severity**	**FY2025 Medicare Base Payment[1]**	**FY2026 Medicare Base Payment[2]**
252	Other vascular procedures	MCC	$24,481	**$25,384**
253		CC	$18,220	**$18,888**
254		None	$12,485	**$12,965**

Therapies: PTA, DCB, Stent (Covered, BMS, DES)
All anatomical locations (including multi-level)
Majority of PAD procedures (>90%) map to these DRGs

Peripheral Atherectomy				
MS-DRG	**Description**	**Severity**	**FY2025 Medicare Base Payment[1]**	**FY2026 Medicare Base Payment[2]**
270	Other major cardiovascular procedures	MCC	$36,632	**$38,394**
271		CC	$24,581	**$25,878**
272		None	$17,857	**$18,578**

Therapies: Peripheral atherectomy (most)
All anatomical locations (including multi-level)
Specific ICD-10-PCS codes (“expiration” route) required

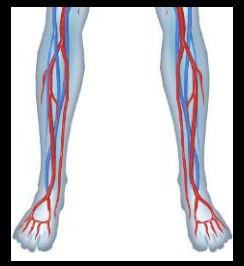
[1,2]National base payment rates assume full update amount for hospitals which have submitted quality data and hospitals have a wage index greater than 1. Site-specific payment rates will vary based on regional area wage differences, teaching hospital status, indirect medical education costs, quality data, additional payments to hospitals that treat a large percentage of low-income patients (“disproportionate share payments”), etc.
DCB = drug-coated balloon; BMS = bare-metal stent; DES = drug-eluting stent; DRG = diagnosis-related group.
CMS-1808-F; Medicare Inpatient Prospective Payment System FY2025 Final Rule. CMS-1833-F; Medicare Inpatient Prospective Payment System FY2026 Final Rule.

Hospital Outpatient Coding and Payments for Peripheral IVL

Above-the Knee (ATK)

HCPCS	Short Description	2025 National Base Payment	2026 National Base Payment
C9764	IVL + Angioplasty	$11,341	$11,794
C9765	IVL + Stent + Angioplasty	$17,957	$18,729
C9766	IVL + Atherectomy + Angioplasty	$17,957	$18,729
C9767	IVL + Stent + Atherectomy + Angioplasty	$17,957	$18,729

Below-the Knee (BTK)



HCPCS	Short Description	2025 National Base Payment	2026 National Base Payment
C9772	IVL + Angioplasty	$11,341	$11,794
C9773	IVL + Stent + Angioplasty	$17,957	$18,729
C9774	IVL + Atherectomy + Angioplasty	$17,957	$18,729
C9775	IVL + Stent + Atherectomy + Angioplasty	$17,957	$18,729

CY2026 Medicare National Base Payments Effective January 1, 2026

Note: Complexity adjustments exist when C9764 and C9772 are used in combination with secondary procedure codes. For detailed information on complexity adjustments, refer to the 2026 Peripheral IVL Hospital and ASC Coding Guide.
CY = calendar year.
CMS-1809-FC; Medicare Hospital Outpatient Prospective Payment System (OPPS) Calendar Year 2025 Final Rule. CMS-1834-FC; Medicare Hospital Outpatient Prospective Payment System (OPPS) Calendar Year 2026 Final Rule.

2026 Peripheral IVL Hospital Reimbursement Summary

Hospital Inpatient (FY2026)

- The FY2026 updates result in a national base payment increase of $4798 for patients with MCC and $3375 for patients with CC/none for peripheral interventions where IVL is utilized
- IVL, for the first time, provides the highest inpatient payment for treating calcified PAD
- Hospital-specific rates will vary according to specific locality adjustment

Hospital Outpatient, ASC, and Physician (FY2026)

- Physician payments are available for the first time for above-the-knee cases – +3.00 Work RVUs for Iliacs and +4.00 Work RVUs for Fem/Pop
- Hospital outpatient and ASC payments increased between 3%-10% depending on procedure and site of service
- Hospital-specific rates will vary according to specific locality adjustment

Reimbursement in Practice: IVL Case-Based Discussion

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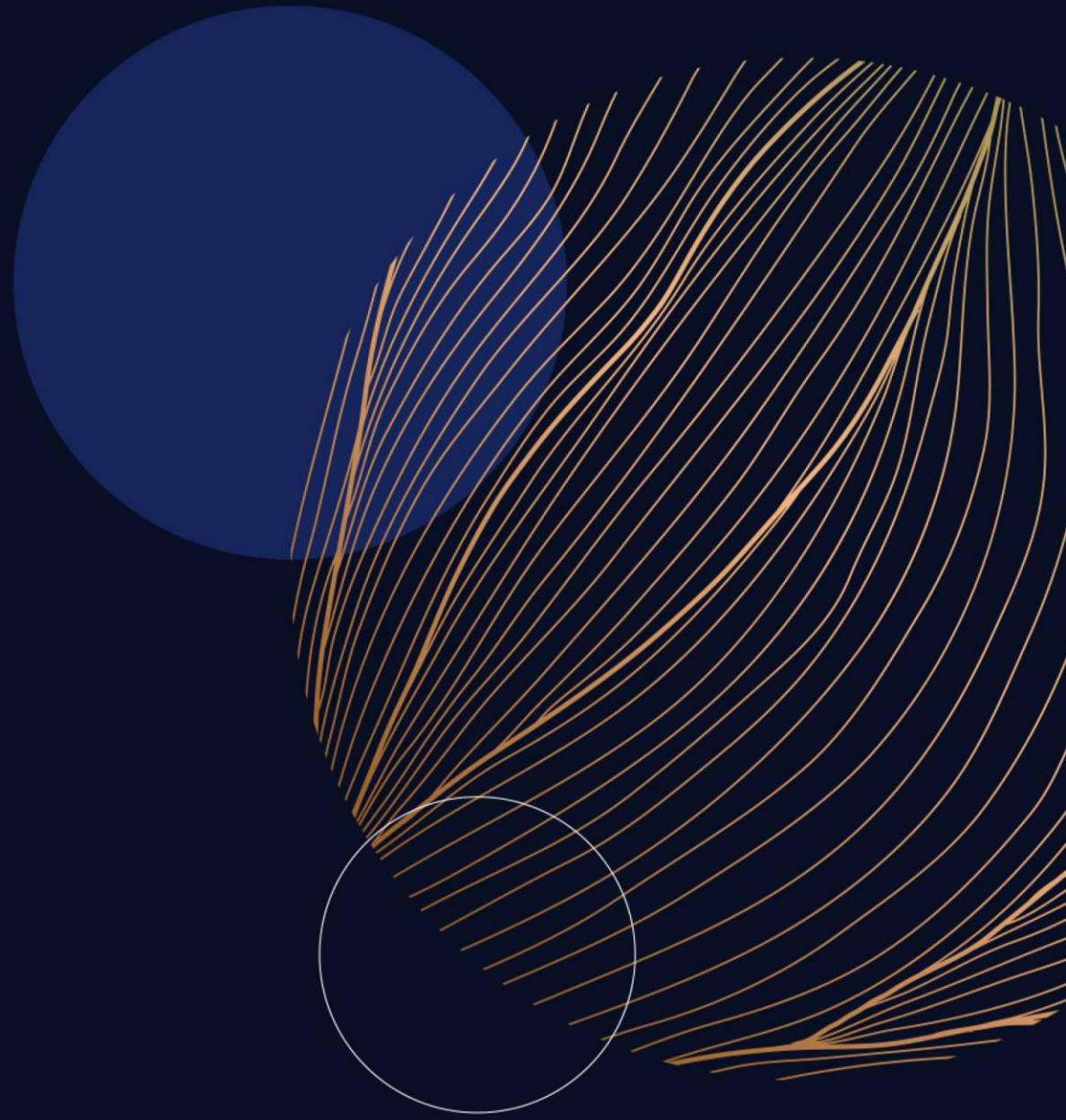


Outline

- PAD case example involving intravascular lithotripsy
- Procedural planning and documentation considerations
- Coding and reimbursement lessons learned
- Alignment of clinical goals with operational realities

Case in Review

- 71-year-old Female sent from APP clinic due to Rutherford 2A acute limb ischemia
- Exam: Diminished sensation in RLE, intact motor function
- PSH: Right common femoral artery heart pump removal with primary repair (1 year ago)
- ABI: 0.35
- Duplex: >75% stenosis of right external iliac artery, >75% stenosis of right common femoral artery, >75% stenosis of SFA
- Patient seen in ER and planned for angiogram with possible right femoral cut down with exploration
- Billed as MDM level 5 with modifier 57

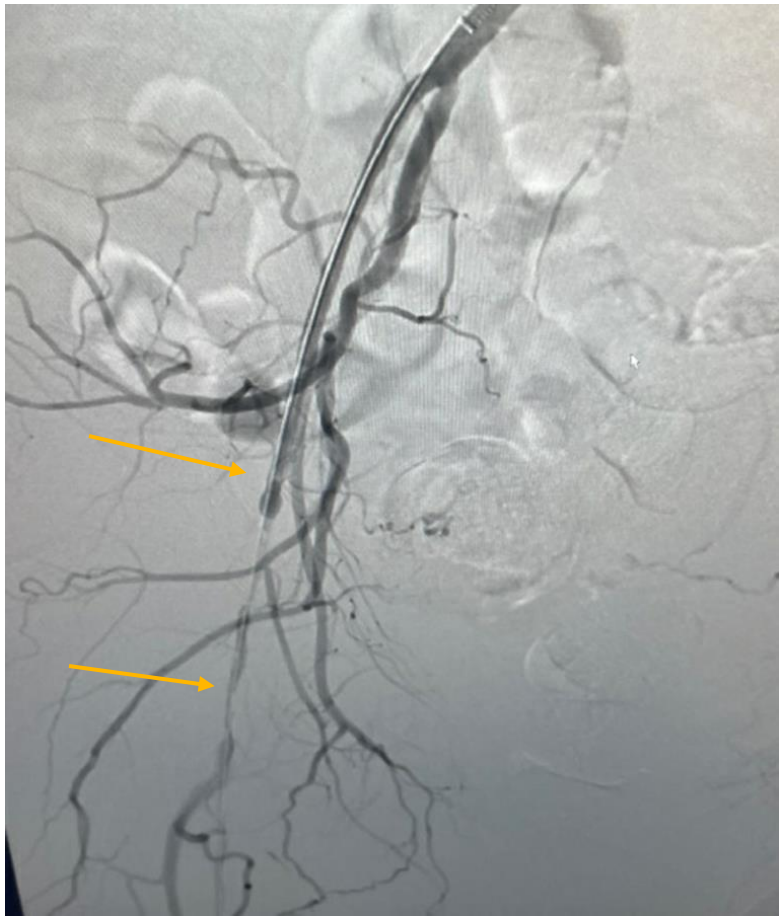
PSH = past surgical history; APP = advanced practice provider; RLE = right lower extremity; ABI = ankle-brachial index; SFA = superficial femoral artery; ER = emergency room; MDM = medical decision making.

Case in Review

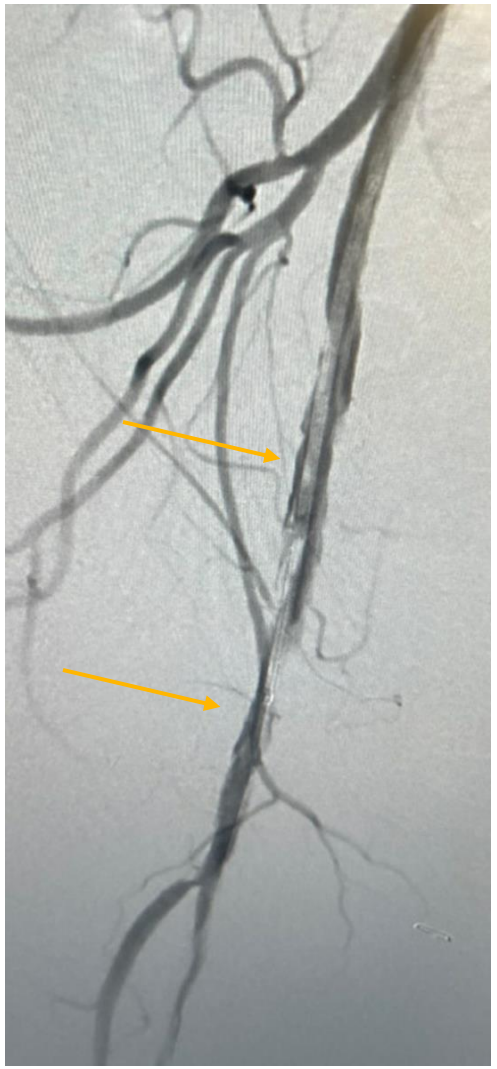
Operation

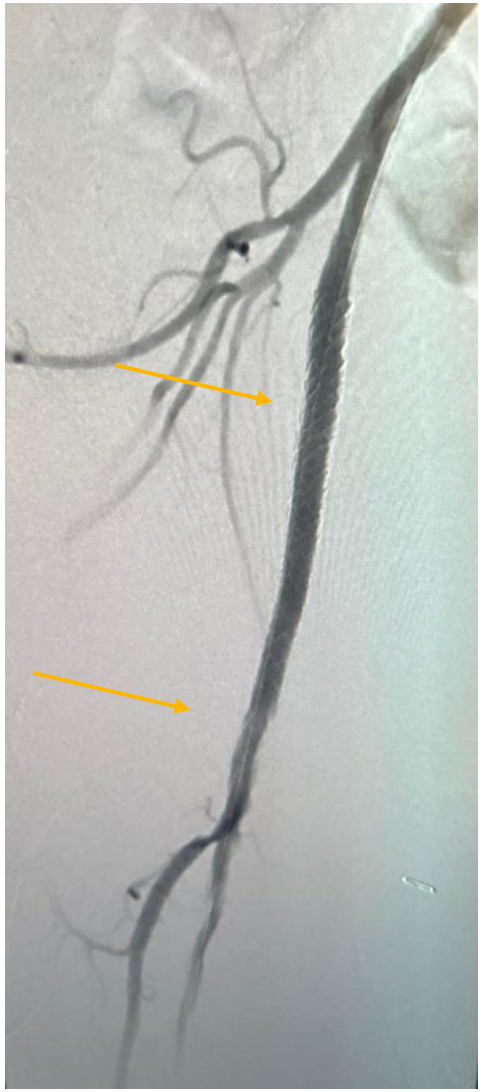
- Ultrasound-guided access of left common femoral artery
- Aortogram
- Right lower extremity angiogram with most distal catheter tip in the external iliac artery
- Intravascular lithotripsy of right external iliac artery
- Intravascular lithotripsy of right common femoral artery
- Intravascular lithotripsy of right superficial femoral artery
- Intravascular lithotripsy of right P1 popliteal artery
- Right external iliac balloon expandable covered stent 6 x 79 mm
- Drug-coated balloon angioplasty of right common femoral artery 5 x 40 mm
- Drug-coated balloon angioplasty of right superficial femoral artery 5 x 150 mm, 4 x 150 mm
- Drug-coated balloon angioplasty of right P1 popliteal artery 4 x 150 mm
- Left lower extremity angiogram with catheter tip in left external iliac
- Closure with VCD of left common femoral 7 French access

VCD = vascular closure device.



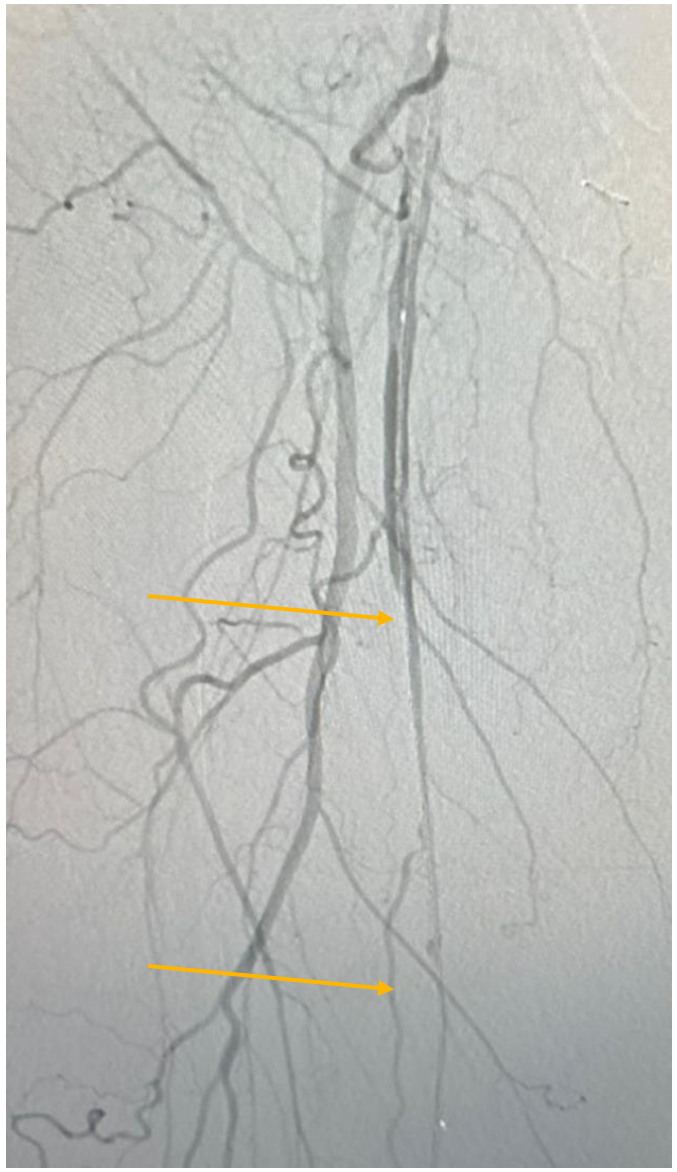
Right external iliac and common femoral arteries prior to treatment

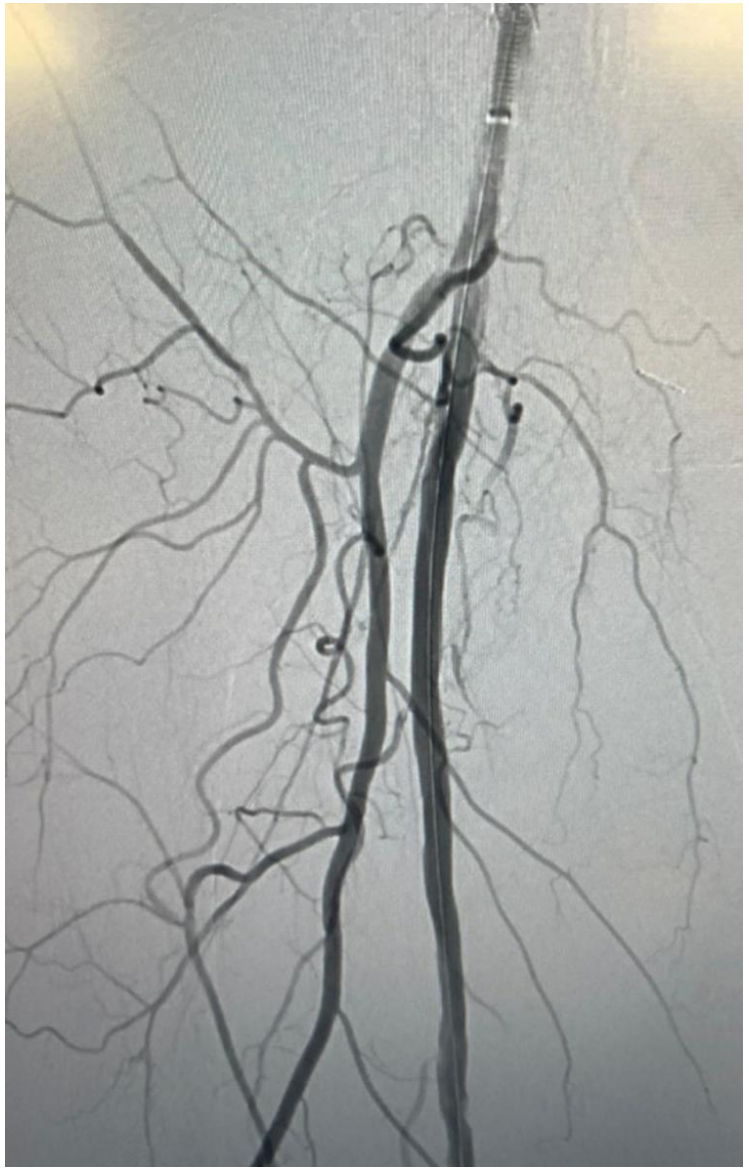




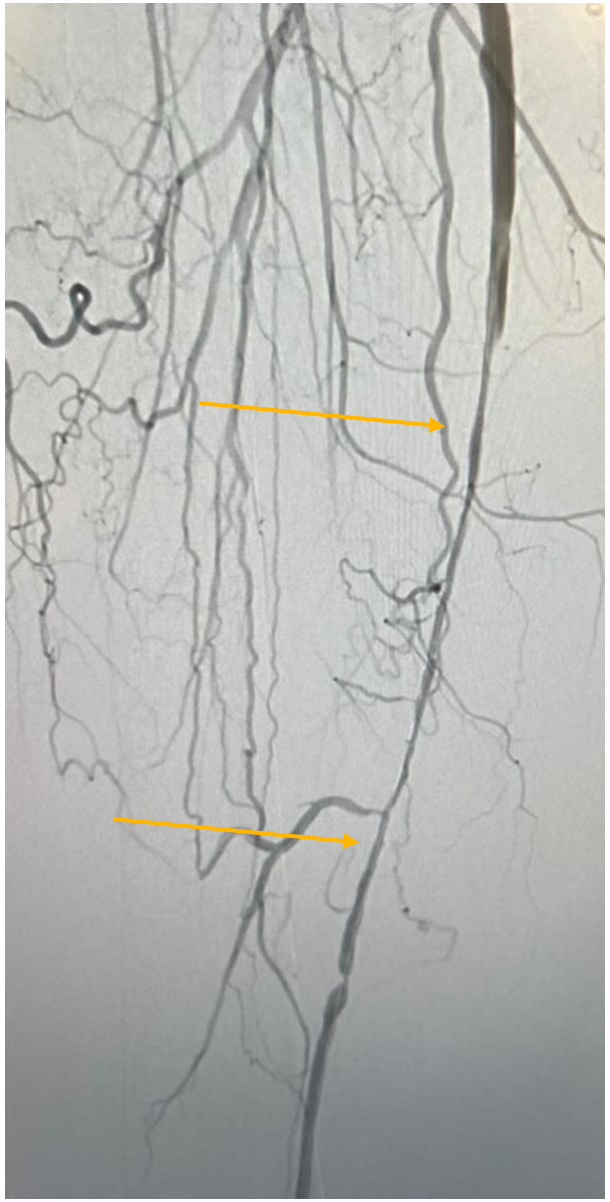
Right external iliac artery after IVL and covered stent placement
Common femoral artery after profunda buddy wire, IVL, and DCB

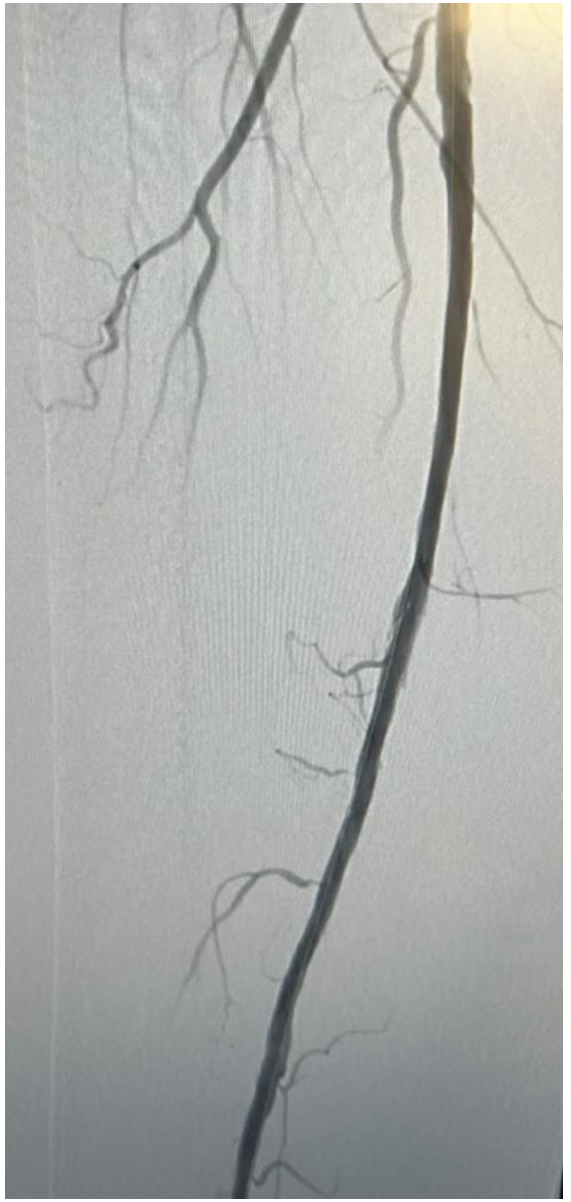
DCB = drug-coated balloon.



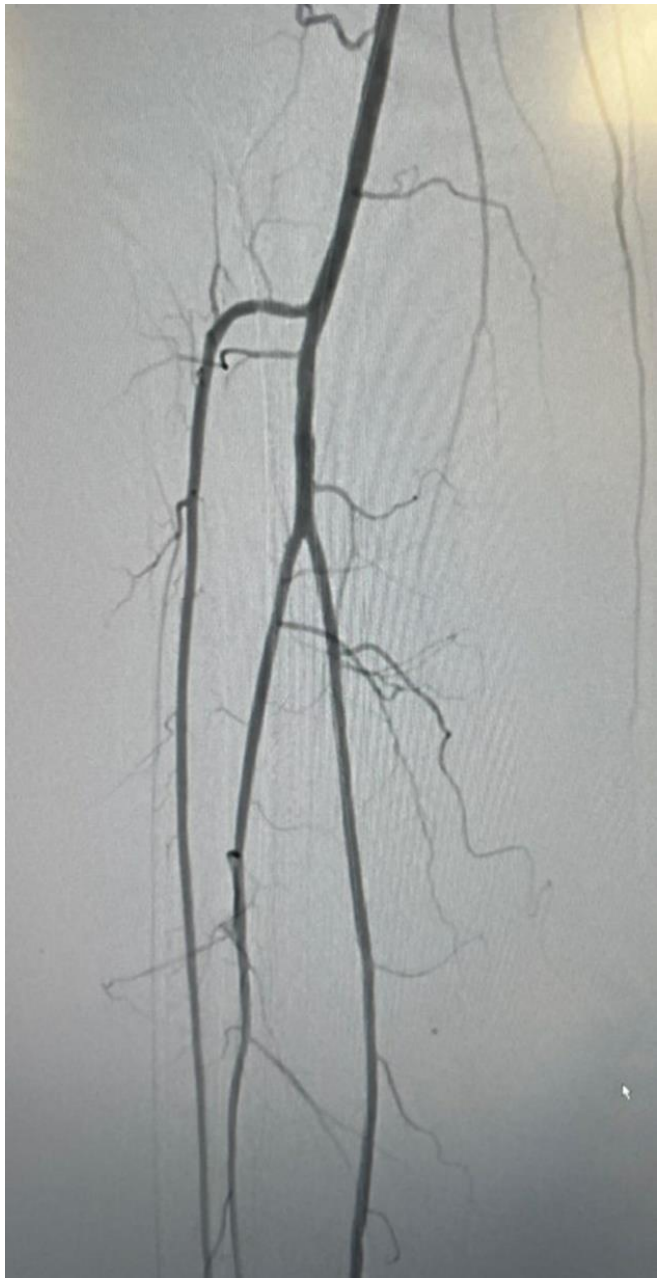


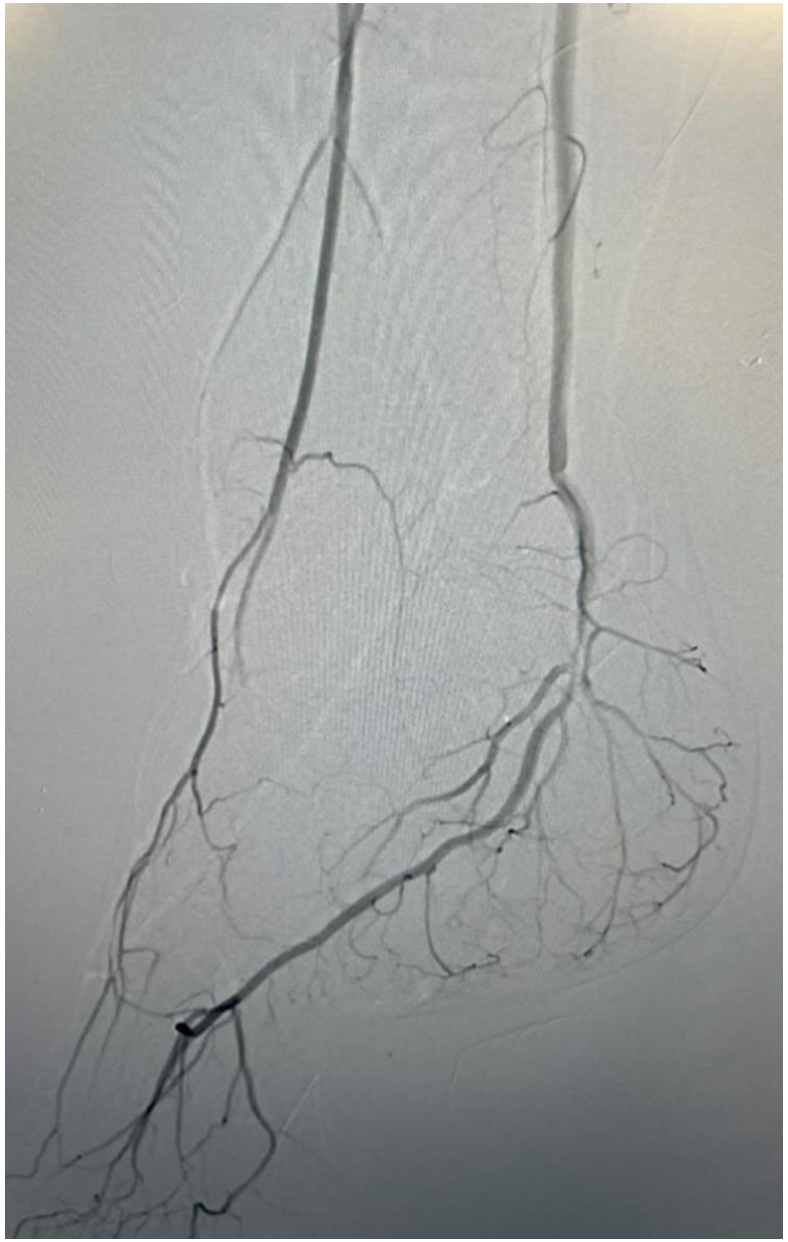
Proximal superficial femoral artery before and after IVL and DCB





Distal superficial femoral and P1 popliteal artery before and after IVL and DCB





Post-Operative Day 1: Zero-Day Global

- Patient seen, palpable pedal pulses, sensation restored
- Discharged home post-operative day (POD) 2

2026 CPT Coding Changes: Lower Extremity Endovascular Procedures

- All current lower extremity codes (37220-37235) will be deleted
- 46 new codes (37254-37299) were created
- New codes require the physician to define target lesions as either **“straightforward”** or **“complex”** (stenosis vs occlusion) ←
- Establishment of an additional “vascular territory” — Inframalleolar (below the ankle)
- Newly established additional vessel “add-on” codes for the Femoral/Popliteal territory
  - Defined as Common Femoral/Profunda and SFA/Popliteal
- Add-on codes for **IVL** in Iliac and Fem/Pop
- NOTE: Facilities will continue to use the IVL HCPCS Codes when reporting IVL procedures (ie, C9764)

American Medical Association (AMA). September 11, 2025. Accessed March 16, 2026. https://www.ama-assn.org/press-center/ama-press-releases/ama-releases-cpt-2026-code-set.

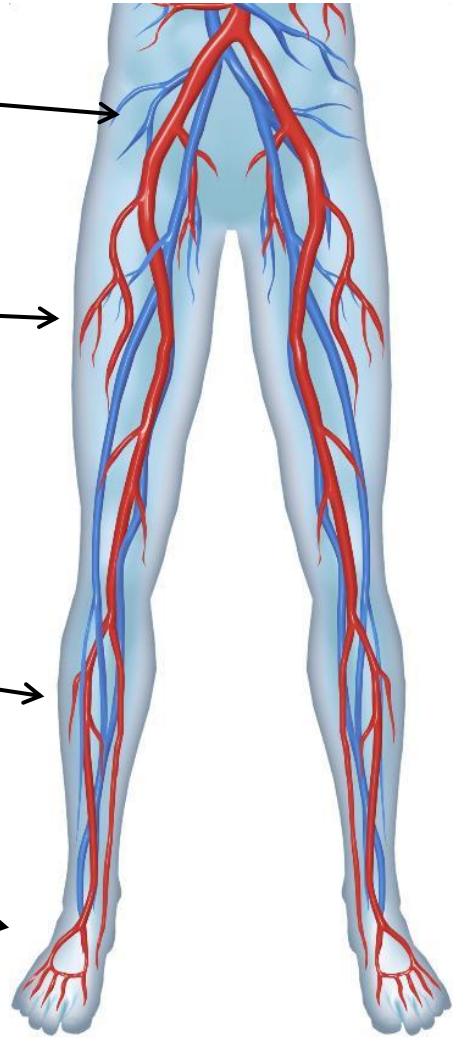
Establishing Anatomic Understanding

+ IVL codes for Iliac Territory

+ IVL codes for Femoral/Popliteal Territory

No IVL codes for Tibial/Peroneal Territory

No IVL codes for Inframalleolar Territory



New Peripheral IVL-Specific CPT Codes: IVL Add-On Codes Require Use of Appropriate Primary Procedure Codes

- Add-on codes for **IVL** in Iliac and Fem/Pop, but NOT the Tibial/Peroneal territory
- **Iliac: CPT code +37262 –** Intravascular lithotripsy(ies), iliac vascular territory, including all imaging guidance and radiological supervision and interpretation necessary to perform the intravascular lithotripsy(ies) within the same artery list separately in addition to code for primary procedure)
  - **Physician RVUs: 3.0 work RVUs/4.07 total RVUs**
- **Fem-Pop: CPT code +37279 –** Intravascular lithotripsy(ies), femoral and popliteal vascular territory, including all imaging guidance and radiological supervision and interpretation necessary to perform the intravascular lithotripsy(ies) within the same artery (list separately in addition to code for primary procedure)
  - **Physician RVUs: 4.0 work RVUs/5.44 total RVUs**

American Medical Association (AMA). September 11, 2025. Accessed March 16, 2026. https://www.ama-assn.org/press-center/ama-press-releases/ama-releases-cpt-2026-code-set.

New Peripheral IVL-Specific CPT Codes: General Coding Guidelines

- **Iliac – up to 3 IVL add-on codes should be allowed (subject to MUEs)**
  - Add-on code **37262** – A maximum of three intravascular lithotripsy add-on codes may be reported in a unilateral iliac vascular territory since there are three vessels (common iliac artery, internal iliac artery, external iliac artery) that could be treated
- **Femoral/Popliteal – up to 2 IVL add-on codes should be allowed (subject to MUEs)**
  - Add-on code **37279** – A maximum of two intravascular lithotripsy add-on codes may be reported in a unilateral femoral and popliteal vascular territory since there are only two vessels for coding purposes (**the common femoral/profunda femoris and the superficial femoral/popliteal**) that could be treated
- **Tibial/Peroneal**
  - There is **no IVL code** for reporting IVL in the Tibial/Peroneal territory
  - If IVL is performed in this territory, the **unlisted code may be used (ie, 37799)**
  - There are **no MUEs associated with unlisted codes**
- **Inframalleolar**
  - There is **no IVL code** for reporting IVL in the Inframalleolar territory
  - If IVL is performed in this territory, the **unlisted code may be used (ie, 37799)**
  - There are **no MUEs associated with unlisted codes**

***Recommendation per Society of Vascular Surgery and AMA CPT lower extremity panel.**
MUE = medical unlikely edit.
American Medical Association (AMA). September 11, 2025. Accessed March 16, 2026. https://www.ama-assn.org/press-center/ama-press-releases/ama-releases-cpt-2026-code-set.

Add-on Coc

- Designate
- Considere code in me service alw a primary c
- Add-on coc procedure **should no**
- No associa the global

PERIPHERAL IVL IN THE FEM/POP TERRITORY (CPT +37279)

Impact on Work RVUs when Peripheral IVL is Performed in the Fem/Pop Arteries						
Without Peripheral IVL				With Peripheral IVL		
CPT®	Description	Work RVUs[2]		Work RVUs[2]		Total Work RVUs
37263	PTA (Straightforward)	7.75	+	4.0	=	11.75
37265	PTA (Complex)	10.50	+	4.0	=	14.50
37267	Stent (Straightforward)	8.75	+	4.0	=	12.75
37269	Stent (Complex)	14.75	+	4.0	=	18.75
37271	Atherectomy (Straightforward)	9.00	+	4.0	=	13.00
37273	Atherectomy (Complex)	12.63	+	4.0	=	16.63
37275	Stent + Atherectomy (Straightforward)	11.00	+	4.0	=	15.00
37277	Stent + Atherectomy (Complex)	15.00	+	4.0	=	19.00

Impact on Payment when Peripheral IVL is Performed in the Fem/Pop Arteries						
Without Peripheral IVL				With Peripheral IVL		
CPT®	Description	Physician Facility Payment[2,3]		Physician Facility Payment[2,3]		Total Physician Facility Payment
37263	PTA (Straightforward)	$356	+	$182	=	$538
37265	PTA (Complex)	$482	+	$182	=	$664
37267	Stent (Straightforward)	$401	+	$182	=	$583
37269	Stent (Complex)	$674	+	$182	=	$856
37271	Atherectomy (Straightforward)	$411	+	$182	=	$593
37273	Atherectomy (Complex)	$576	+	$182	=	$758
37275	Stent + Atherectomy (Straightforward)	$501	+	$182	=	$683
37277	Stent + Atherectomy (Complex)	$682	+	$182	=	$864

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Shockwave Medical. Accessed March 16, 2026. https://shockwavemedical.com/reimbursement/peripheral-ivl.

3 Global Periods

- 0-Day Post-Operative Period (endoscopies and some minor procedures)
  - No pre-operative period
  - No post-operative days
  - Generally, a visit on the procedure day isn't payable as a separate service
- 10-Day Post-Operative Period (other minor procedures)
  - No pre-operative period
  - Generally, a visit on the procedure day isn't payable as a separate service
  - Total global period is 11 days; count the surgery day and the 10 days following the surgery day
- 90-Day Post-Operative Period (major procedures)
  - 1-day pre-operative included
  - Generally, the visit on the procedure day isn't payable as a separate service
  - Total global period is 92 days; count 1 day before surgery, the day of surgery, and the 90 days following the surgery day

How Do Global Periods Affect Physicians?

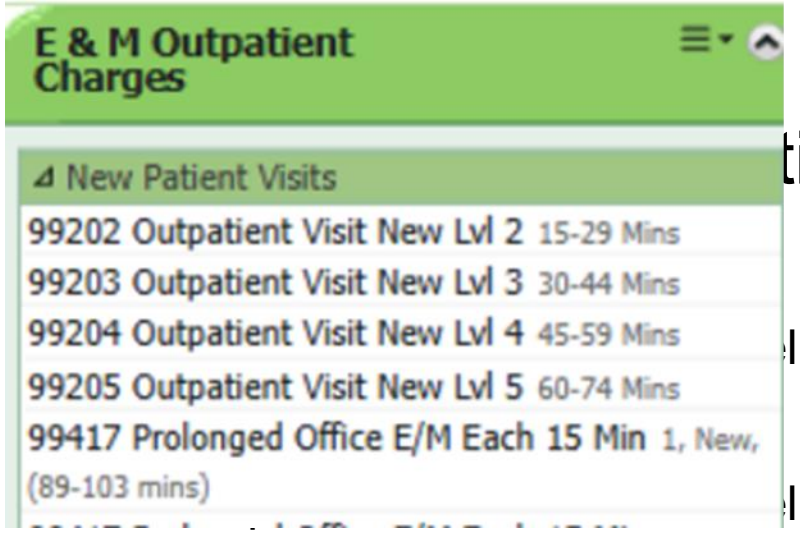
- Lower extremity intravascular lithotripsy coding is considered an add-on code
  - The CPT codes specifically for IVL do not have a designated global period, but instead fall under the global period of the entire operation
    - Example 1: LLE angiogram with SFA IVL and DCB = 0-day global, because an angioplasty is a 0-day global
    - Example 2: Open femoral endarterectomy with IVL of right CIA and stent = 90-day global, because femoral endarterectomy is a 90-day global

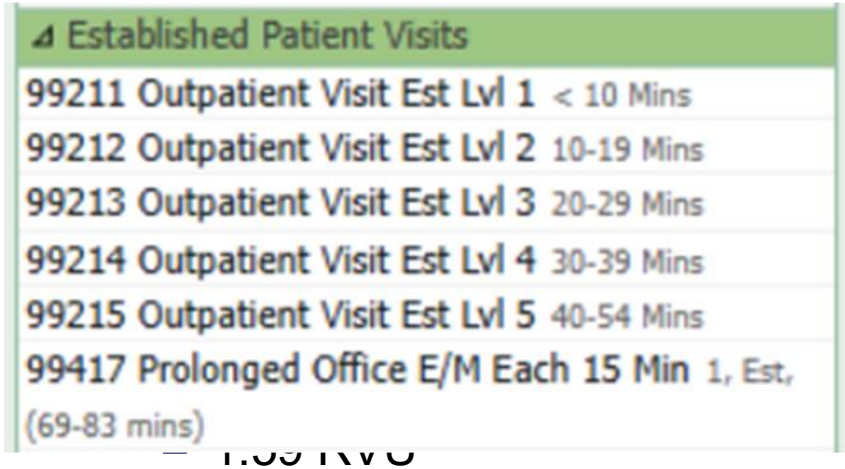
Open bypass surgery is associated with a 90-day global period. This means that any care from the day prior to surgery through 90 days after surgery related to the operation is nonbillable.

IVL allows surgeons to cross and treat lesions that previously could not be treated, pushing the need for bypass. IVL enables surgeons to perform complex peripheral angiograms, keeping care at the 0-day global period.

LLE = lower left extremity; CIA = common iliac artery.

Global Period: Super Important for Billing Consults and Subsequent Inpatient/Outpatient Visits





tion vs

0.93 26%
1.6 20%
2.6 13%
3.5 11%
0.61

l 2: 35-44min

l 3: 45-59min

0.18 64%
0.7 32%
1.3 20%
1.92 14%
2.8 10%

are

: 25-34min

: 35-49min

– 2.4 RVU

– 2.72 RVU

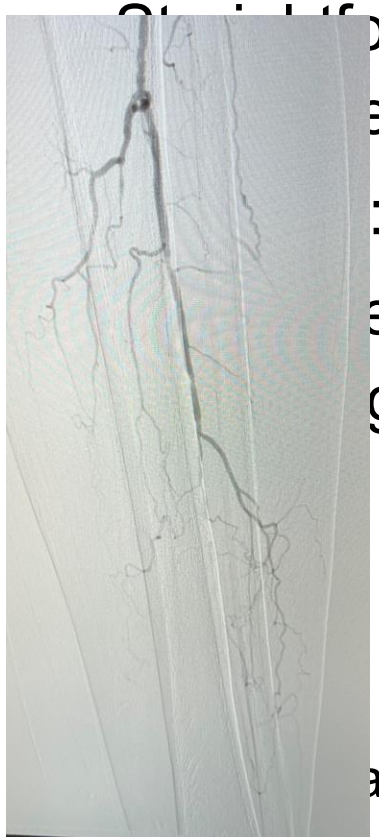
– 3.86 RVU

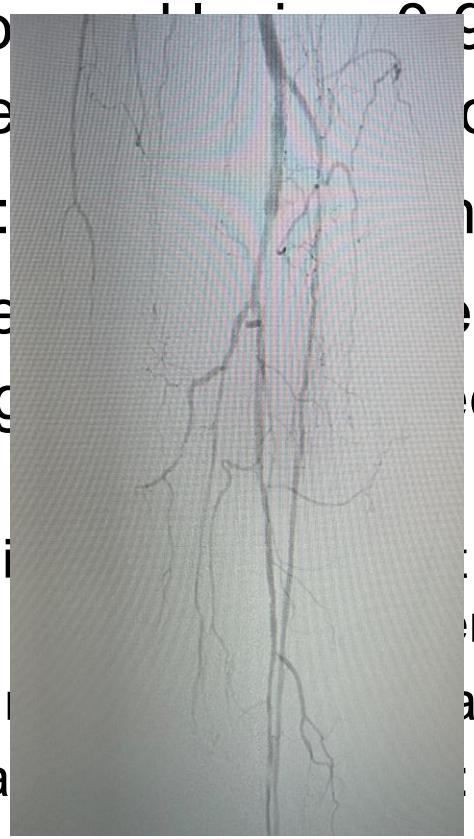
Modifier G2211

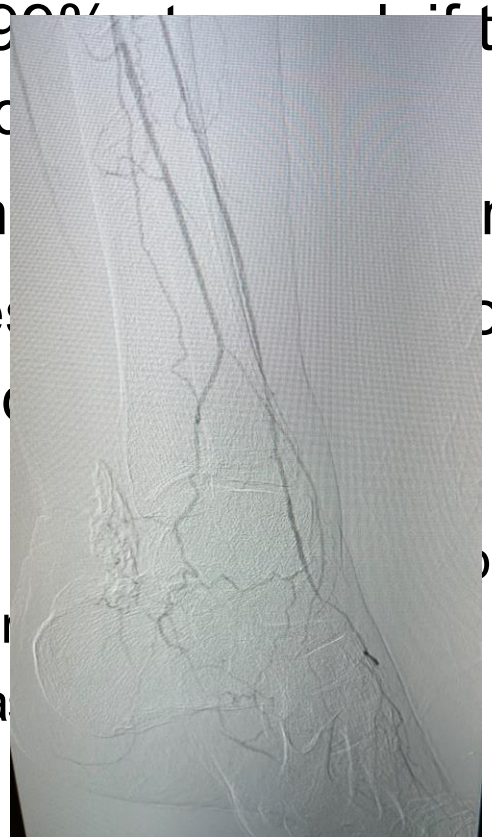
- Compensates physicians for the time and practice expense involved in building long-term relationships with patients
- For G2211, visit complexity is the cognitive load of the continued responsibility of the physician to provide ongoing care to a patient
- The act of proactive and relationship care management that goes beyond acute care is what makes up the visit complexity
- Can be used on patients with PAD, end-stage renal disease/dialysis, aortic aneurysms, carotid artery disease
- **0.33 Work RVUs and 0.49 Total RVUs**

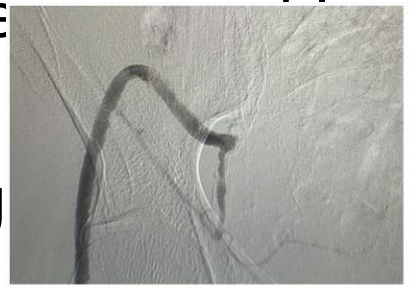
- 99233 Daily Hospital Care Level 3: 50min+
- 99254 Inpt/Obs Consultation Level 4: 60-79min
- 99255 Inpt/Obs Consultation Level 5: 80min+

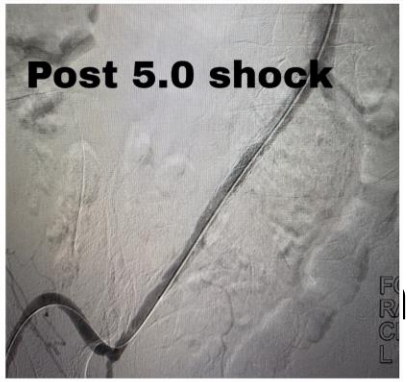
Peripheral Intravascular Lithotripsy Implications on Straightforward vs Complex

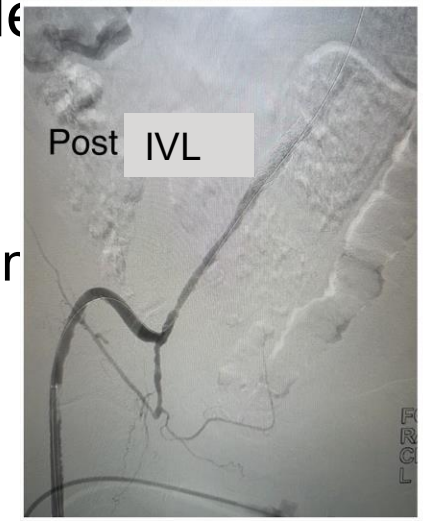


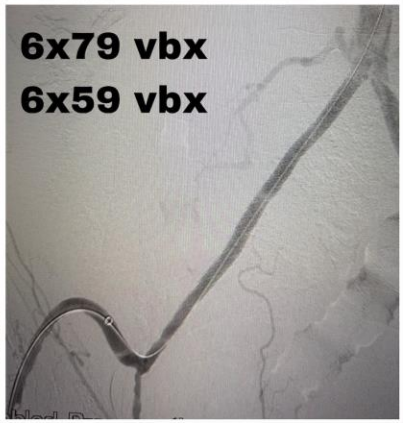












- Always do what is the best for the patient

Be Specific in Documentation

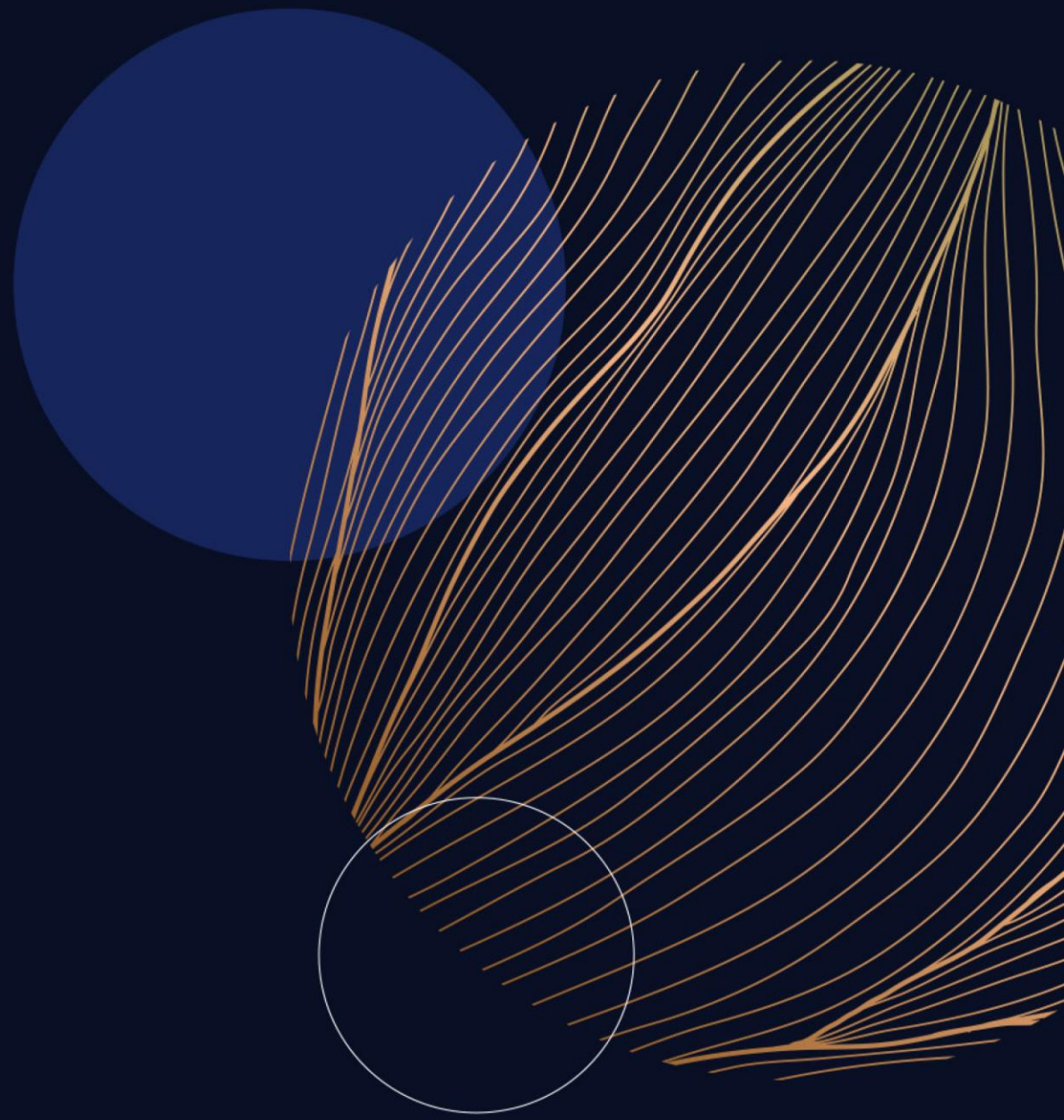
- Detailed and specific descriptors in condition terminology establish the foundation for supporting a specific diagnosis (ICD codes)
- Absence of specific details in documentation can lead to the following obstacles
  - Non-supported medical necessity for services ordered or rendered
  - Failure to obtain authorization
  - Increased costs of services due to denials mitigation efforts
  - Loss of revenue due to adjustments for poorly supported medical necessity
- In the operative report, be as detailed as possible with pre and post op diagnosis
- Present a clear picture of patients' current state of health and disease process requiring intervention
- When dictating the operation, be very specific as to where the tip of the wires and catheters are, and document ALL areas treated and imaged

In Summary

- New 2026 peripheral vascular codes, along with IVL-specific codes, open the gateway
  - IVL CPT codes are add-on codes for Iliac and Fem/Pop
- IVL is allowing cases to stay fully endovascular = zero-day global
  - Understanding, patient-centered approach
  - Open bypass will always have a place
- IVL is allowing for more complex lesions to be treated
  - Increases facility reimbursement with modifier 22
  - Treatment of occluded vessels with IVL increases the CPT complexity code

Multidisciplinary Adoption of Intravascular Lithotripsy in PAD Programs

Constantino Peña, MD
Section Lead, Interventional Radiology
Miami Cardiac and Vascular Institute
Associate Clinical Professor, FIU Herbert Wertheim College of Medicine
Miami, Florida



Outline

- Role of IVL in treating calcified PAD lesions
- Clinical scenarios where IVL may be considered within the PAD treatment algorithm
- Multidisciplinary collaboration among vascular surgery, interventional radiology, cardiology, and administration
- Programmatic considerations for integrating IVL into existing workflows

Goal of Revascularization = Restore Blood Flow

Re-establish vessel lumen

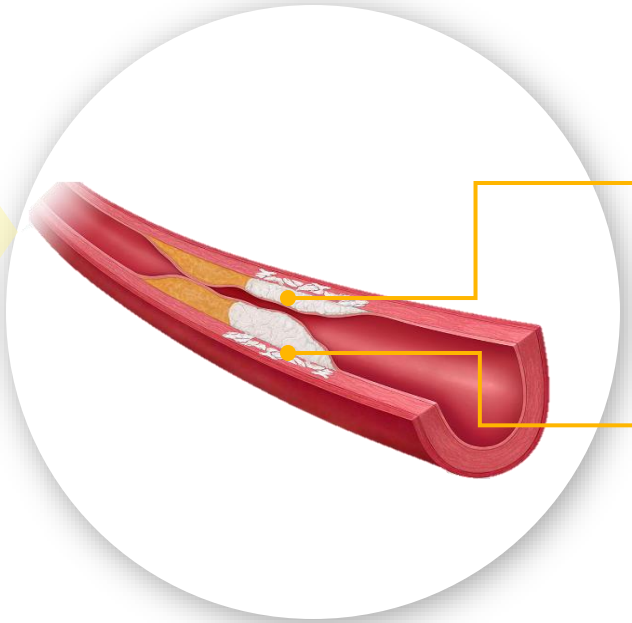
Peripheral Artery Disease (PAD)

U.S. Prevalence	Interventional Procedures	Complex, Calcified Lesions
8.5 Million	850 Thousand	30-50 Percent

Atherosclerosis

Thickening or hardening of the arteries caused by a buildup of plaque in the inner lining of the artery

Calcium in atherosclerotic plaque can prevent therapies from opening the stenotic artery



Superficial ("Intimal") Calcium

Calcification close to the inner surface of the artery (associated with obstruction and embolization)

Deep ("Medial") Calcium

Calcification in middle layer (associated with stiffening)

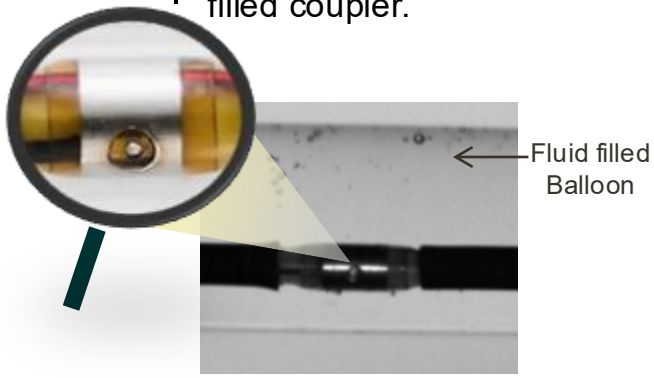
Calcified arteries resist expansion, resulting in more complications and vessel damage

Aday, AW. *Circ Res.* 2021;128(12):1818-1832. Decision Resources Group. Peripheral Vascular Devices 2020. Yost ML, The Sage Group. Published 2016. Accessed March 24, 2026. https://www.thesagegroup.us/reports/prevalence-and-significance-of-calcium-vulnerable-plaque-and-plaque-morphology-in-peripheral-artery-disease-pad. Soor GS, et al. *Pathology*. 2008;40(4):385-391

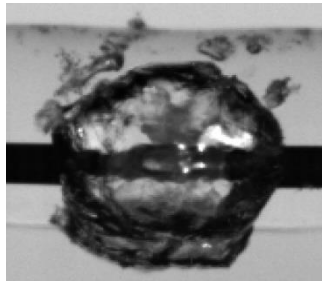
IVL's Unique Mechanism of Action

High-speed sonic pressure wave created safely inside integrated balloon

1 **Unfocused lithotripsy energy** is created at the emitters which are contained in a fluid filled coupler.



2 Electrical energy is delivered to the emitter, initiating the steam bubble, which expands and collapses—creating **sonic pressure waves**.



Video: Actuation of Single Pulse (20µs/frame)

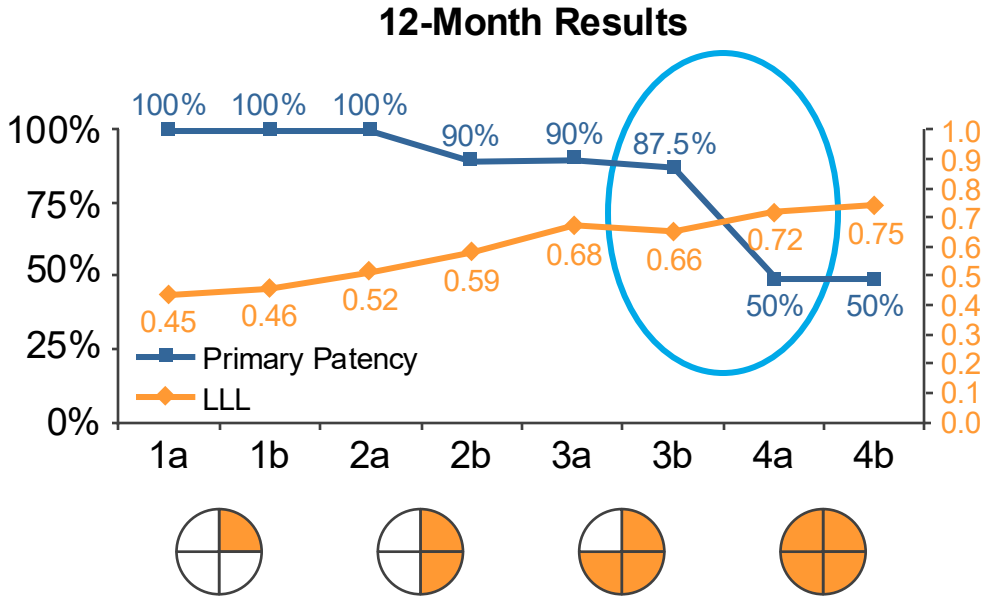
Calcified Lesions Are Challenging to Treat

- Calcified lesions respond poorly to balloon angioplasty and require high use of stents by restricting vessel compliance
- Calcified lesions are associated with a high incidence of angiographic complications
  - 71% of flow-limiting dissections occur within a calcified vessel
- Incomplete and/or eccentric stent expansion
  - Early failure, high risk of stent fracture/stent collapse
- Calcified lesions limit the effectiveness of drug-coated balloons

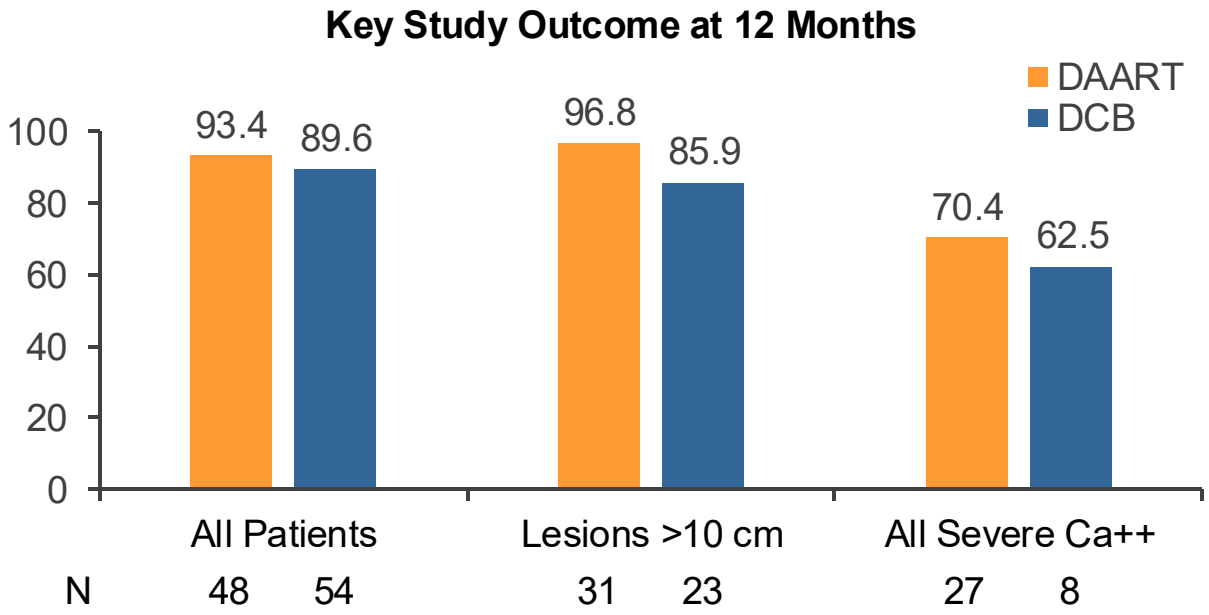
Laird J, et al. *Circ Cardiovasc Interv*. 2010;3:267-276. Adams GL, et al. *J Invasive Cardiol*. 2015;27(11):516-520. Roberts D. *Catheter Cardiovasc Interv*. 2014;84:236-244. Fanelli F, et al. *Cardiovasc Intervent Radiol*. 2014;37:898-907.

Severe Calcium Acts as a Barrier to Biologic Uptake

Calcification may impair the antiproliferative effect of drug coated balloons (DCB) by likely acting as a physical barrier to drug penetration itself



Calcium distribution evaluation by CTA (circumferential) and DSA (longitudinal)

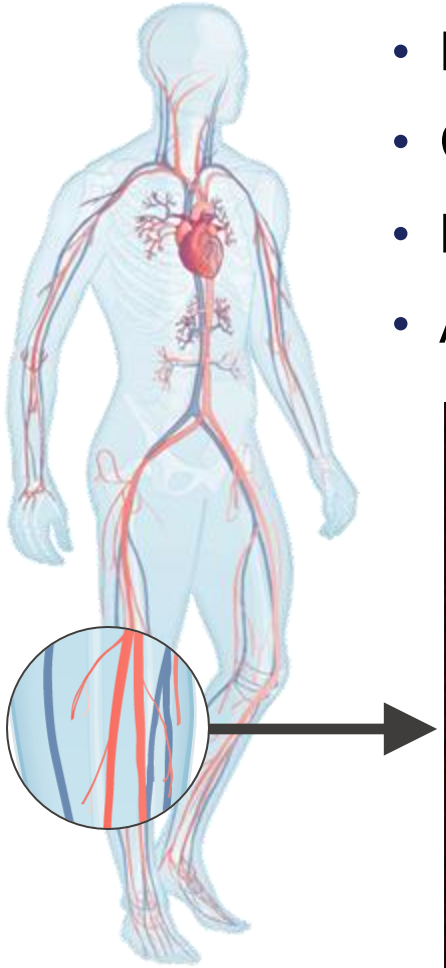


Per Core Lab Assessment. "All Severe Ca++" group includes all patients treated with DAART therapy including randomized and non-randomized patients with severe calcium.

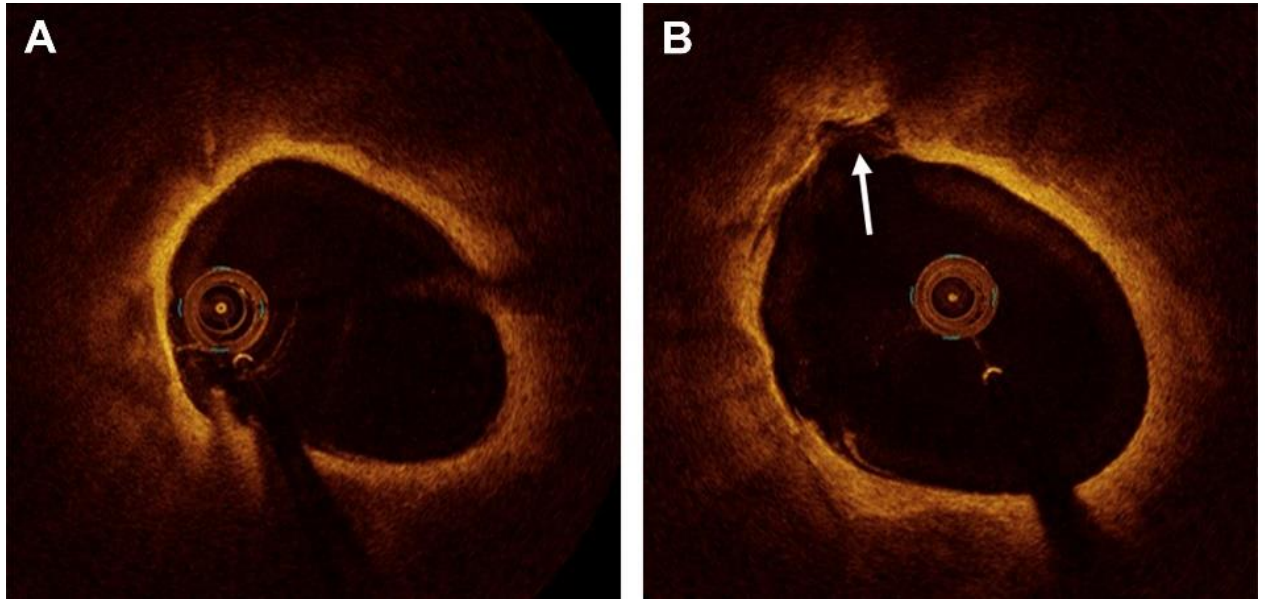
LLL = late lumen loss; DAART = directional atherectomy plus drug-coated balloon.

Fanelli F, et al. Cardiovasc Intervent Radiol. 2014;37:898-907. Zeller T, et al. Circ Cardiovasc Interv. 2017;10(9):e004848.

Peripheral Artery Disease and Calcified Lesions



- PAD associated with death, amputation, MI, stroke
- Calcified lesions are particularly challenging to treat
- Multilevel, superficial, and medial calcification, CTOs
- Associated with early recoil, dissection, TVR, restenosis



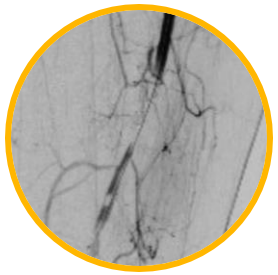
Successful endovascular treatment is highly dependent on proper lesion preparation and calcium modification

MI = myocardial infarction; CTO = chronic total occlusion; TVR = target vessel revascularization.

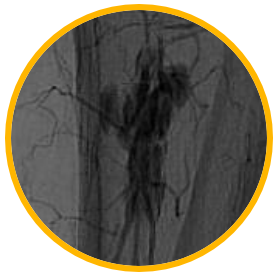
Rymer J, et al. *Circ Cardiovasc Interv*. 2020;13:e009326. Rocha-Singh KJ, et al. *Catheter Cardiovasc Interv*. 2014;83:E212-220. Baumann F, et al. *J Endovasc Ther*. 2014;21:44-51. Fanelli F, et al. *Cardiovasc Intervent Radiol*. 2014;37:898-907. Kereiakes DJ, et al. *JACC Cardiovasc Interv*. 2021;14:1275-1292.

Challenges Associated with Problematic Calcium

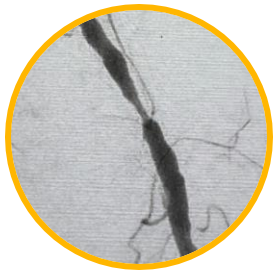
Many challenges exist when treating problematic calcium, and complications can arise



Embolization

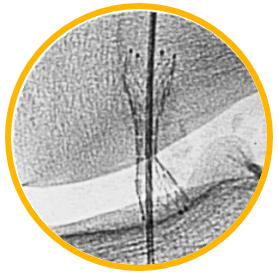


Perforations

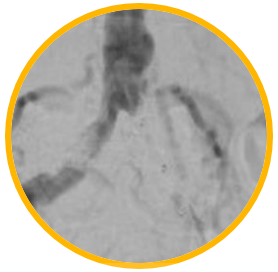


Vessel Recoil

Dissections



Stent Crush



Access for Large-Bore Devices

Technologies used to modify calcium have limitations both in mechanism of action and safety profile, including a risk of distal embolization and increased procedure time. In addition, they are contraindicated following subintimal lesion crossing, and are not specifically indicated for intervention in the iliacs.

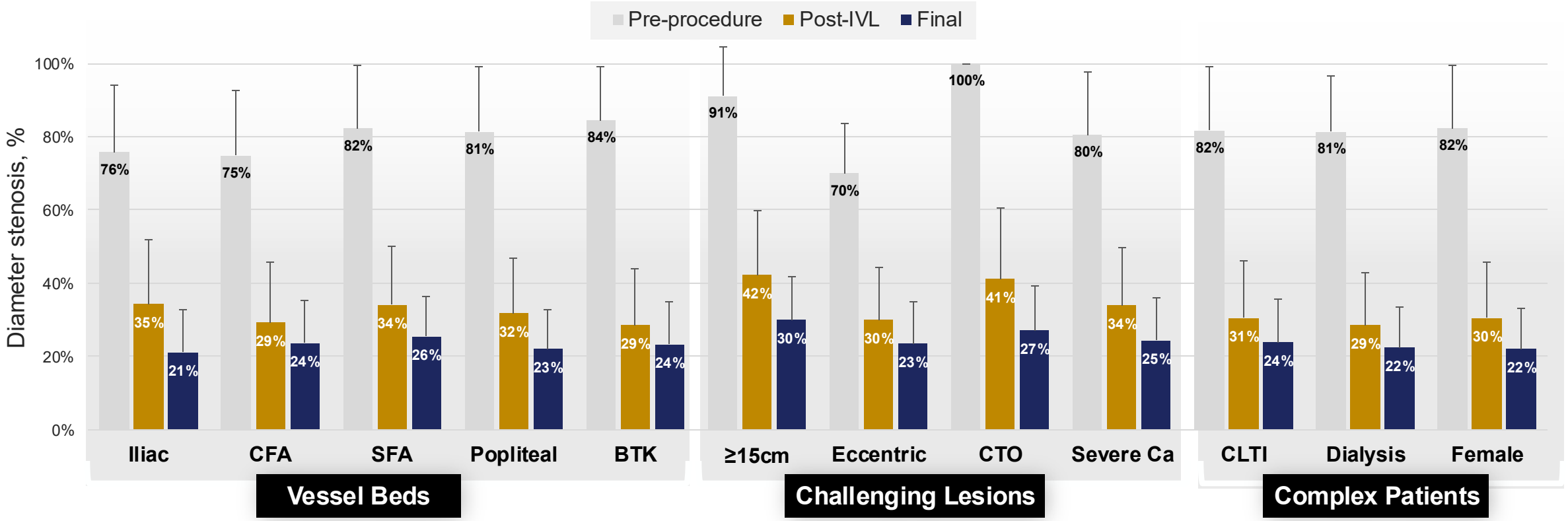
An opportunity exists for a technology to address these gaps.

Katsanos K, et al. *Cardiovasc Intervent Radiol.* 2017;40:964-977. Food & Drug Administration (FDA). Accessed March 24, 2026. https://www.accessdata.fda.gov/cdrh_docs/pdf17/K170191.pdf.

Disrupt PAD III OS: Predictable Outcomes in Challenging Situations

Predictably consistent results across vessel beds, challenging lesions, and complex patients

Majority of stenosis reduction from IVL treatment



CFA = common femoral artery; CLTI = chronic limb-threatening ischemia.

Armstrong E. Presented at: Vascular InterVentional Advances (VIVA) 2022; October 30–November 3, 2022; Las Vegas, Nevada.

Multidisciplinary Vascular Team

- Collaboration and integration to provide the best vascular care
- Improved outcomes, shorter hospital stays, and personalized care
- Comprehensive care with multiple treatment options available
- Streamlines best therapies

Calcium Challenges in Endovascular Treatment of Iliac Arteries

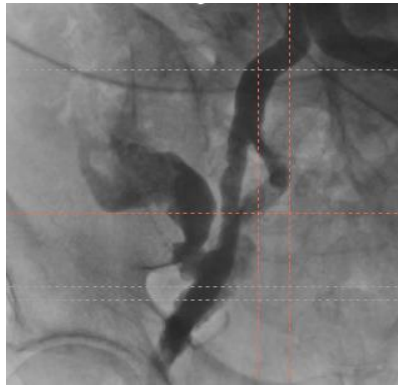
The iliac arteries are considered high-risk areas, particularly when calcium is present

Calcium causes complications

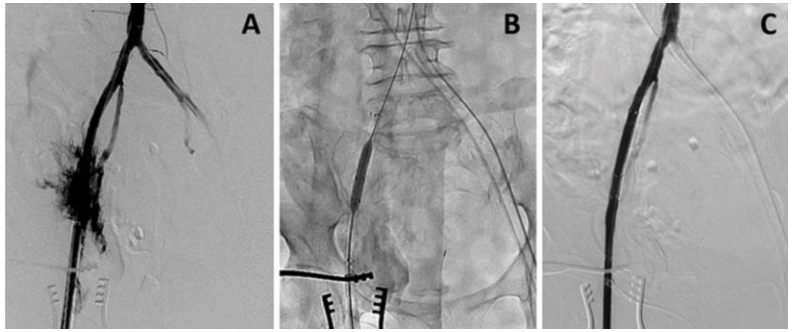
- For patients with iliac-related PAD, 70% present with moderate-to-severe calcification
- Calcium is associated with decreased procedural success and increased complications

Complications can be catastrophic

- Majority of complications are related to artery injury, distal embolization, and access site problems, and can lead to
  - Bleeding (if ruptured)
  - Acute limb ischemia (if significant dissection)



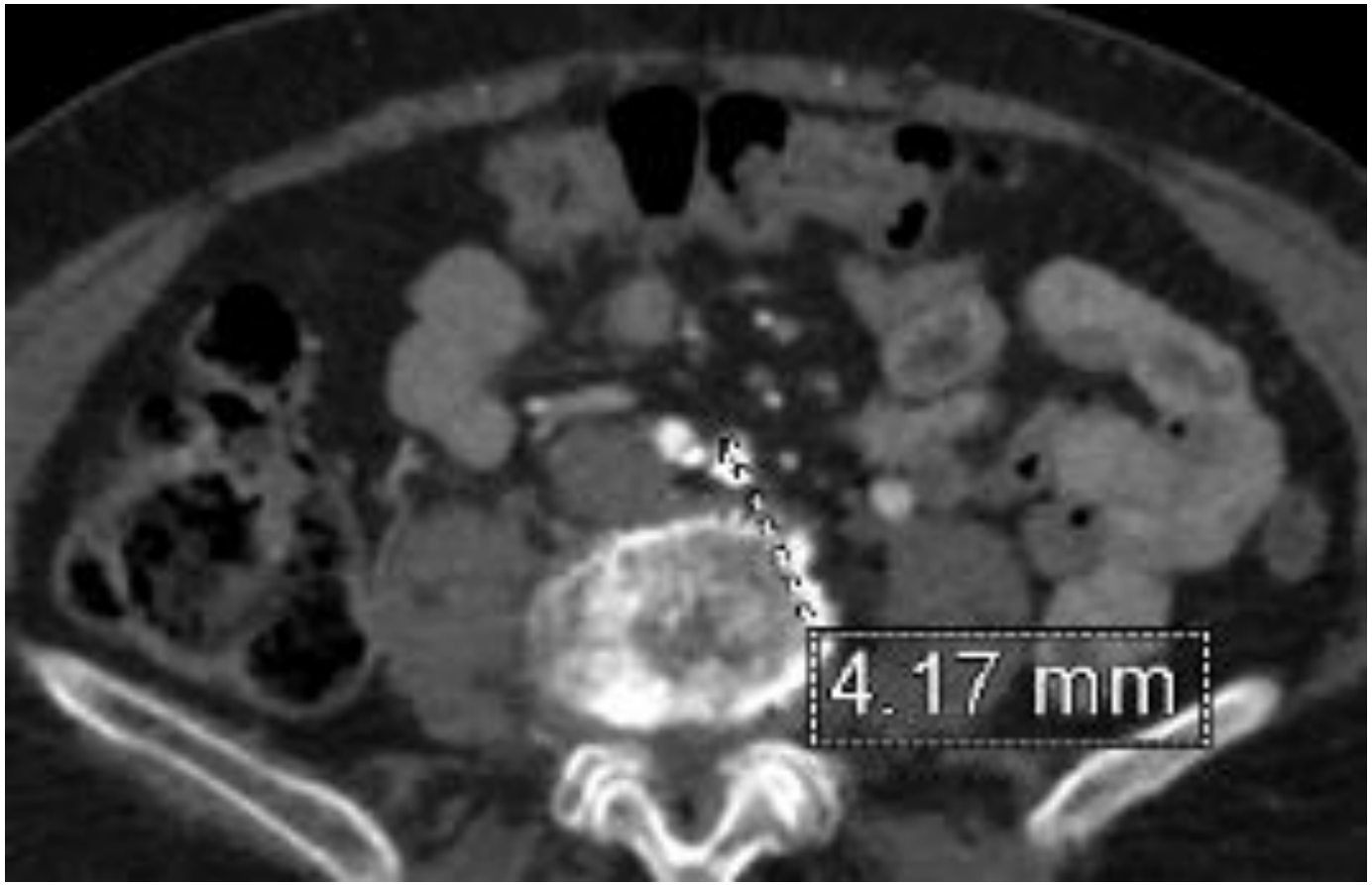
Massive hemorrhage secondary to vessel perforation

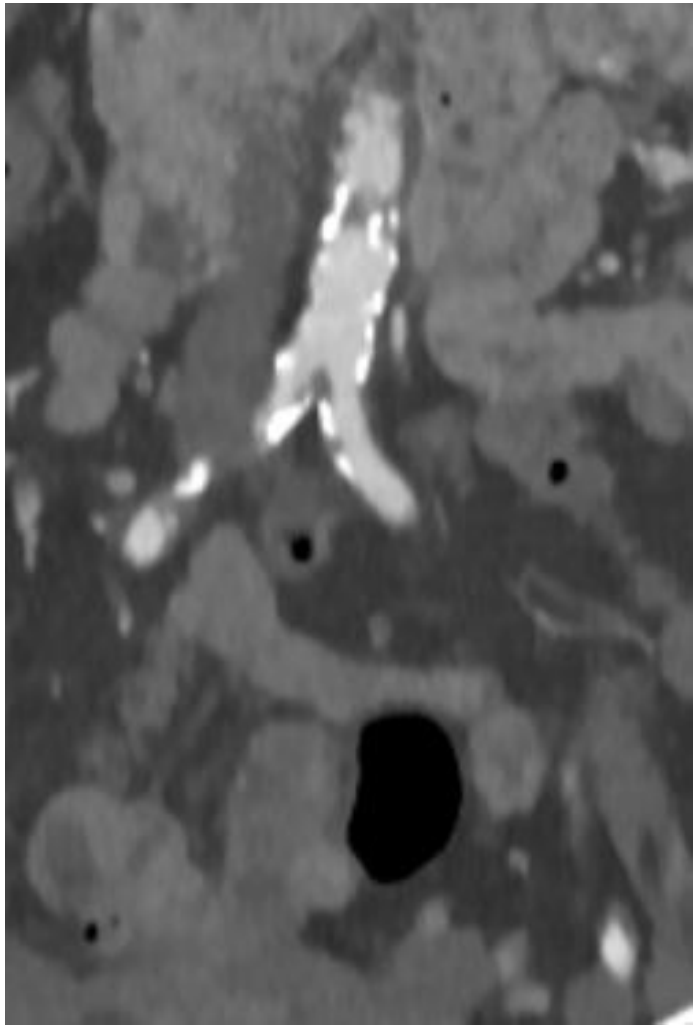


Rupture addressed with covered stent

Jaff MR. Presented at: Society for Cardiovascular Angiography and Interventions Scientific Sessions; May 10, 2012; Las Vegas, NV. Rundback JH, et al. *J Endovasc Ther*. 2017;24(3):342-348. NIH National Library of Medicine. Accessed March 24, 2026. https://clinicaltrials.gov/study/NCT00753337. Laird JR, et al. *J Vasc Interv Radiol*. 2019;30(6):836-844.e1. Armstrong EJ, et al. *Cardiovasc Revasc Med*. 2020;21(10):1262-1268. Fukuda K. Published March 22, 2017. Accessed March 24, 2026. https://www.intechopen.com/chapters/53887.

Case Study: 80yo Female for TEVAR

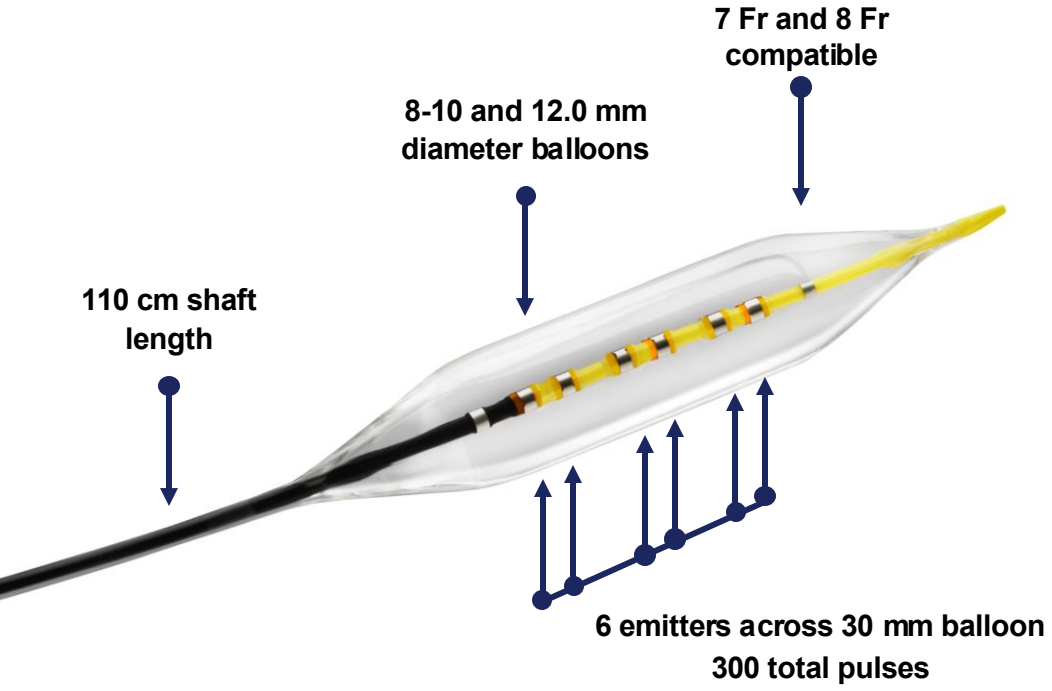




TEVAR = thoracic endovascular aortic repair.

Peripheral IVL Catheter

IVL Therapy at Ultra-Low Pressure to Treat High-Risk Vessels



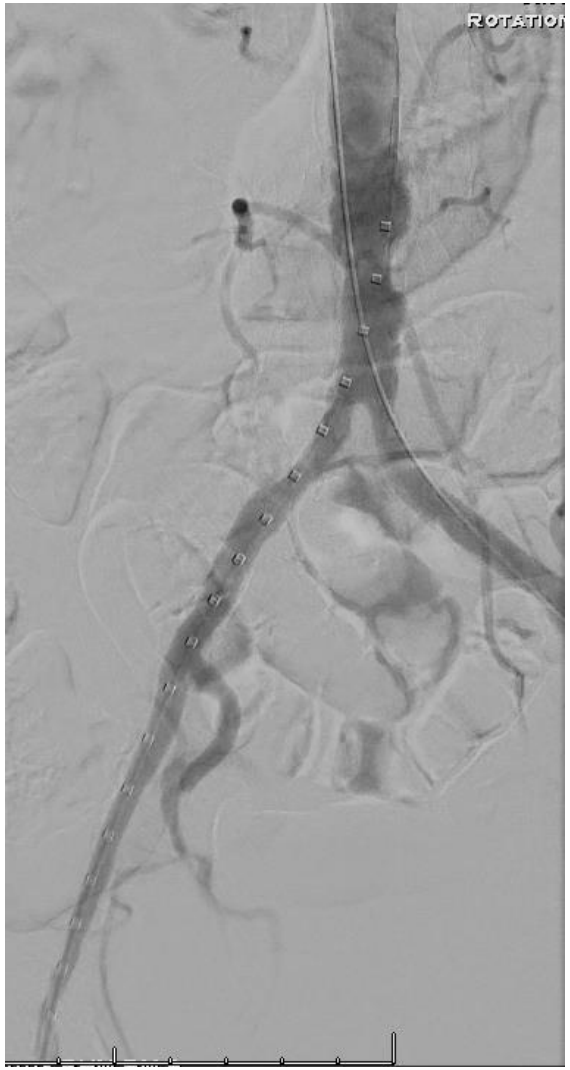
Pulsing Pressure:
2-4 atm

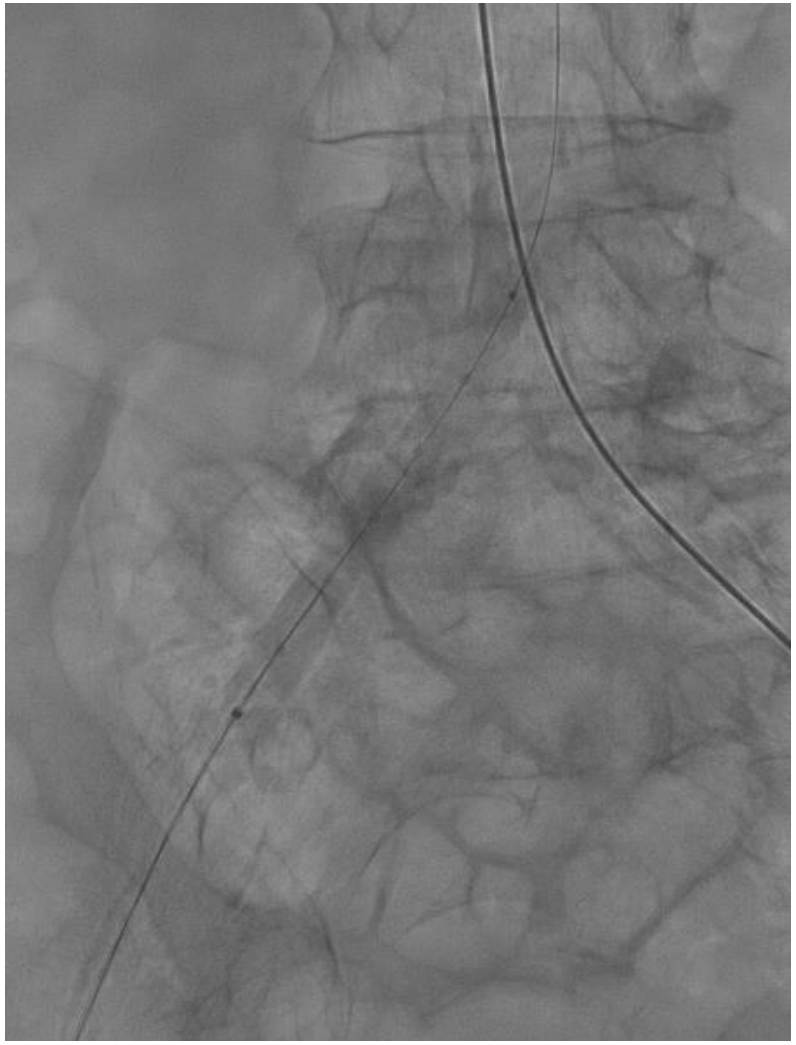
Nominal Pressure:
4 atm

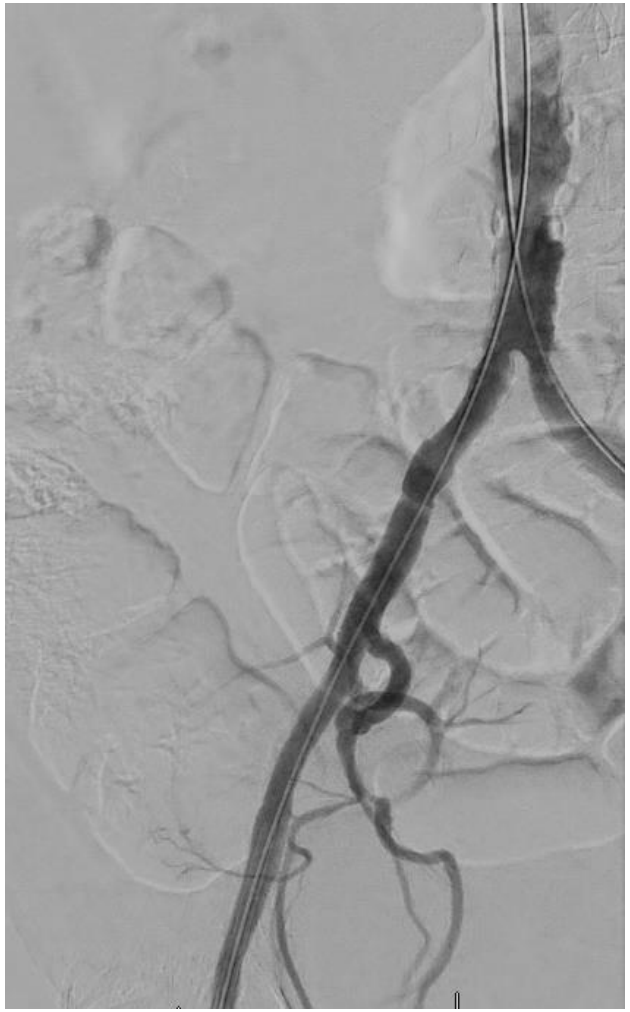
Rated Burst Pressure:
6 atm

Catalog Number	Balloon Diameter (mm)	Balloon Length (mm)	Sheath Compatibility (Fr)	Guidewire Compatibility (in)	Catheter Working Length (cm)	Pulses/ Cycle	Cycles	Pulses (Max)	Balloon Crossing Profile
L6IVL080030	8.0	30	7 Fr	.018	110	30	10	300	.086
L6IVL090030	9.0	30	7 Fr	.018	110	30	10	300	.087
L6IVL100030	10.0	30	8 Fr	.018	110	30	10	300	.091
L6IVL120030	12.0	30	8 Fr	.018	110	30	10	300	.093

Low-Pressure Lithoplasty

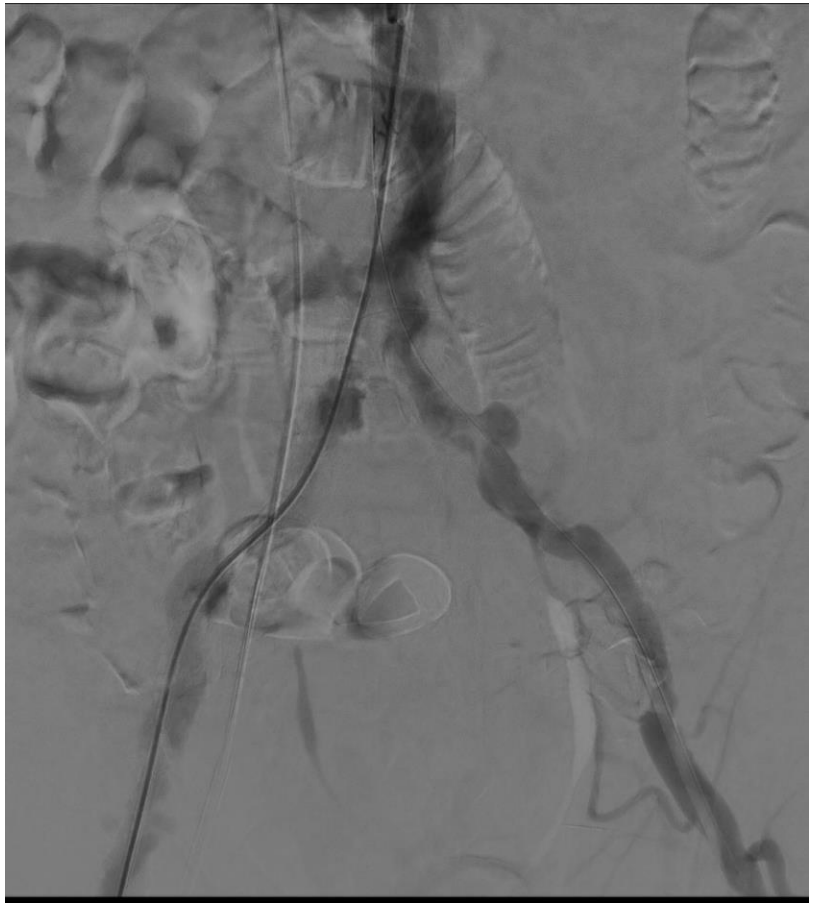






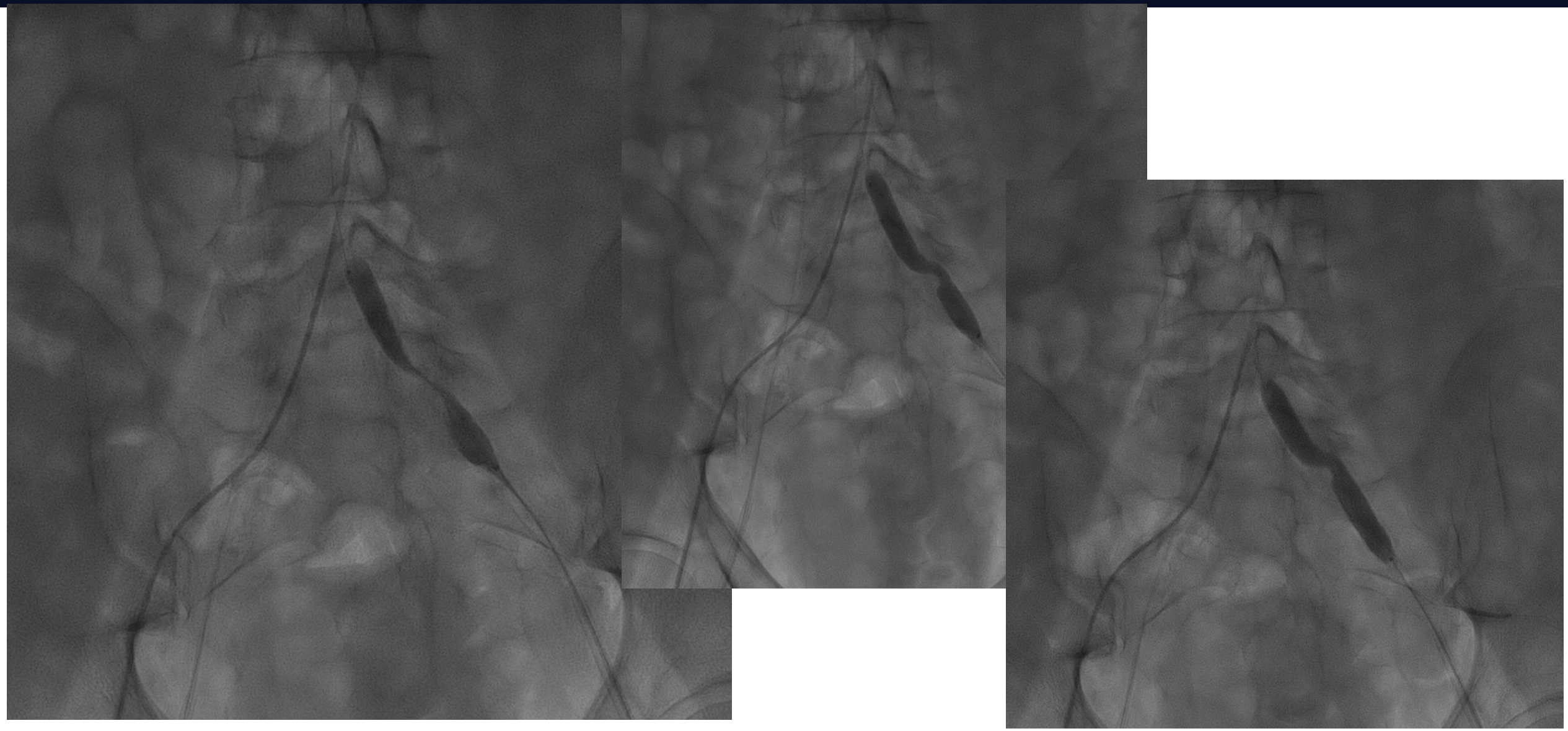
Case Study

- 75yo Male for TAVR with significant calcified stenosis at left common iliac bifurcation

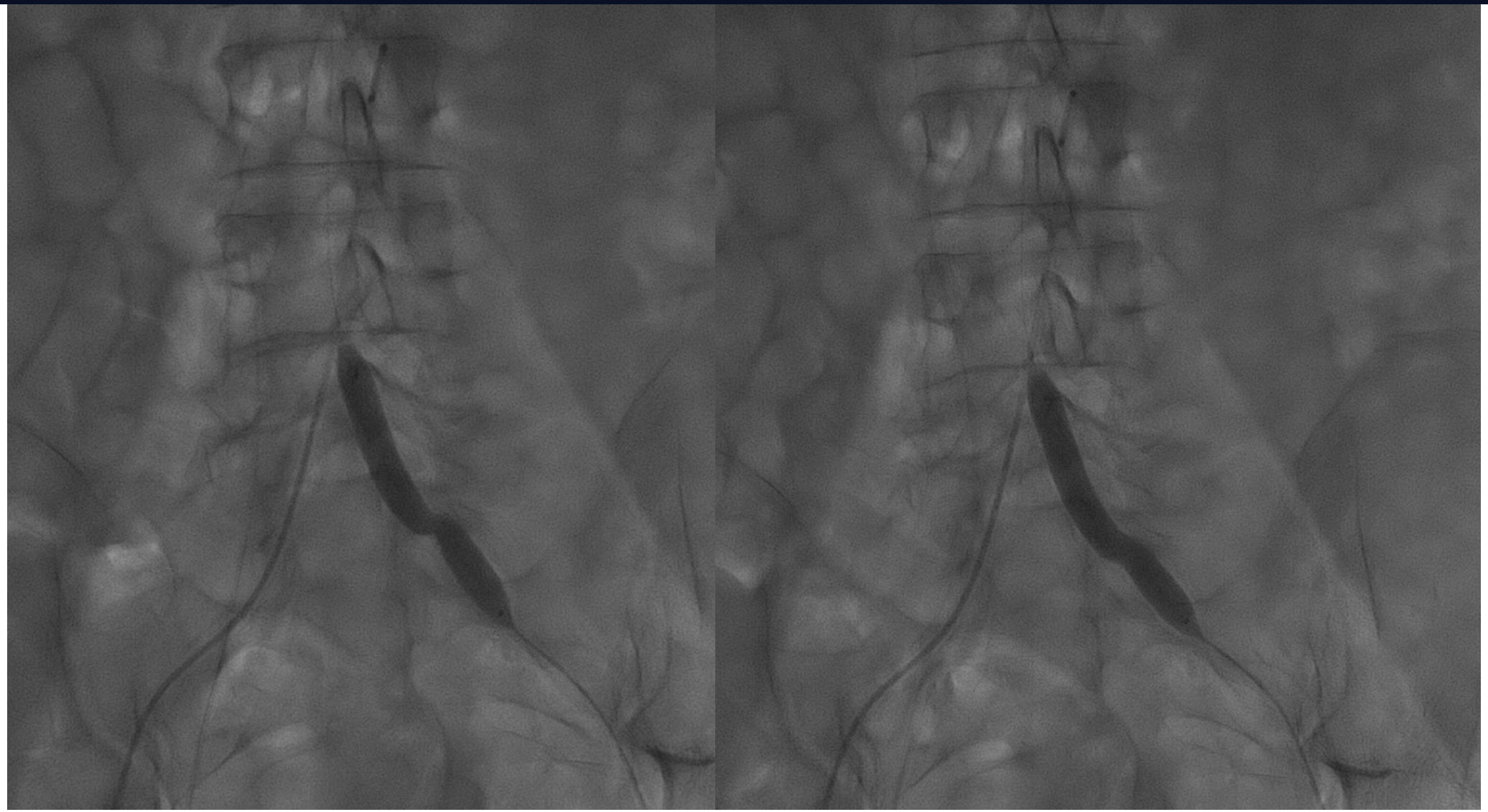


TAVR = transcatheter aortic valve replacement.

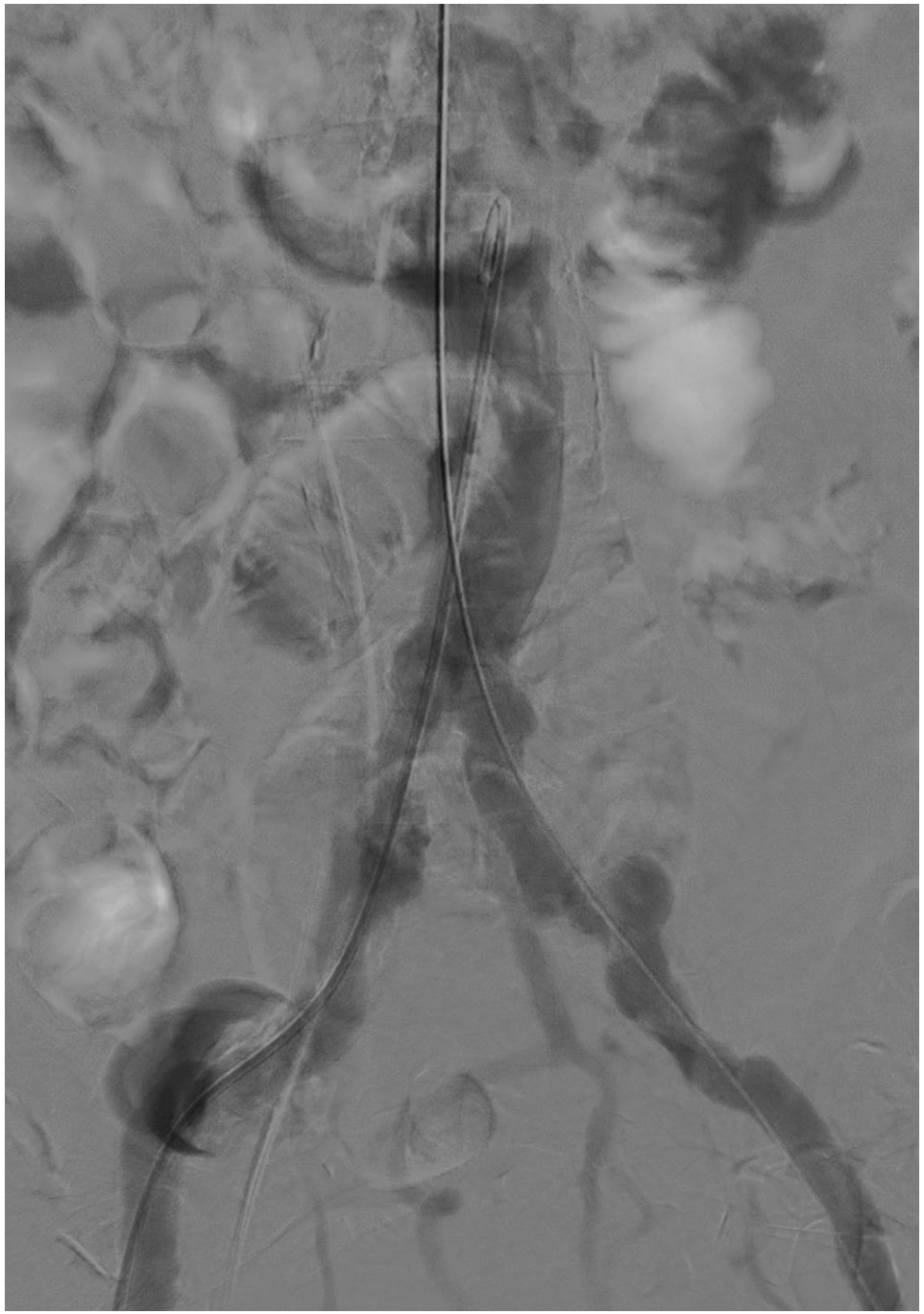
44204823.

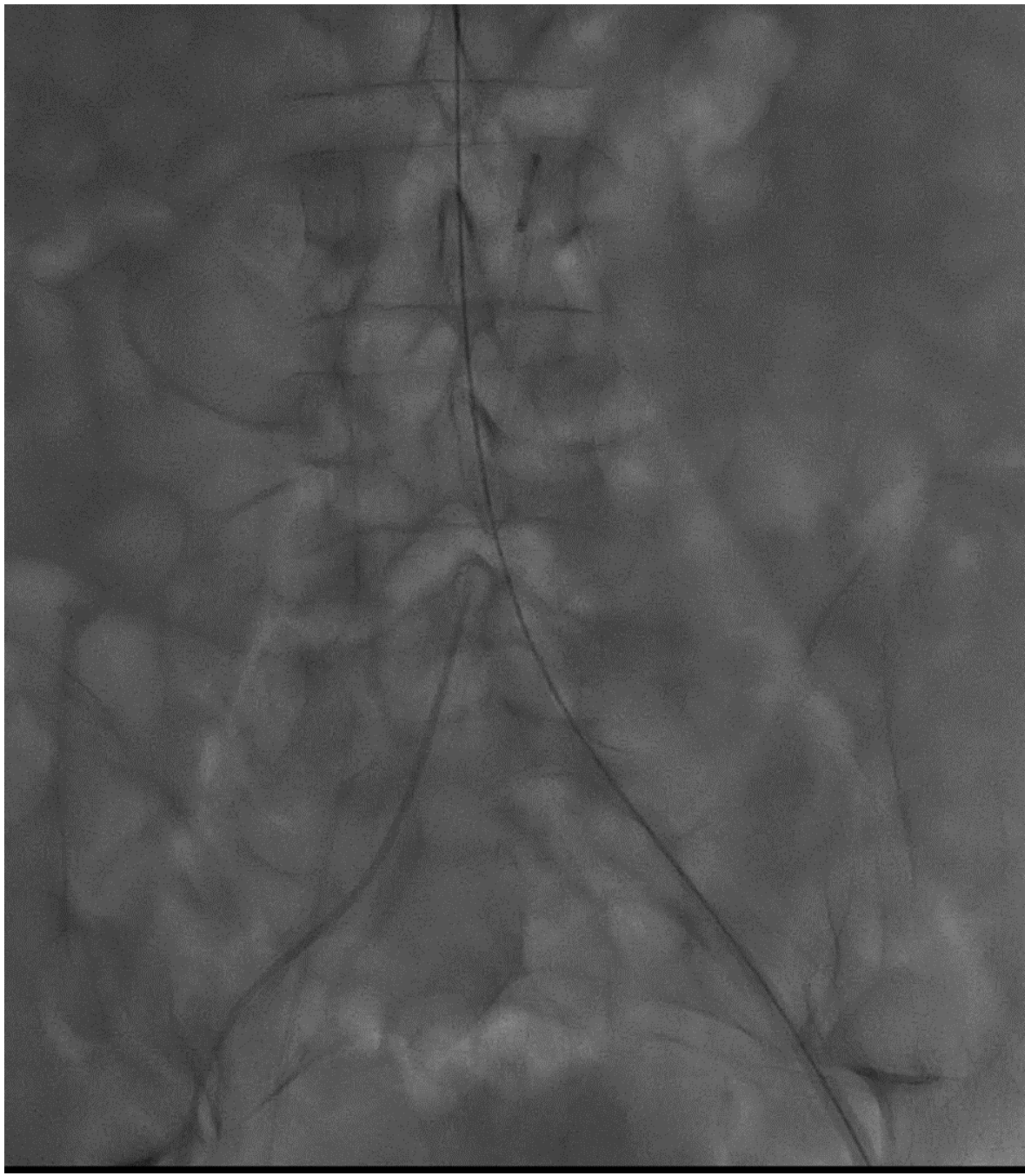


8 mm by 60 mm IVL at 2 atm; multiple treatments



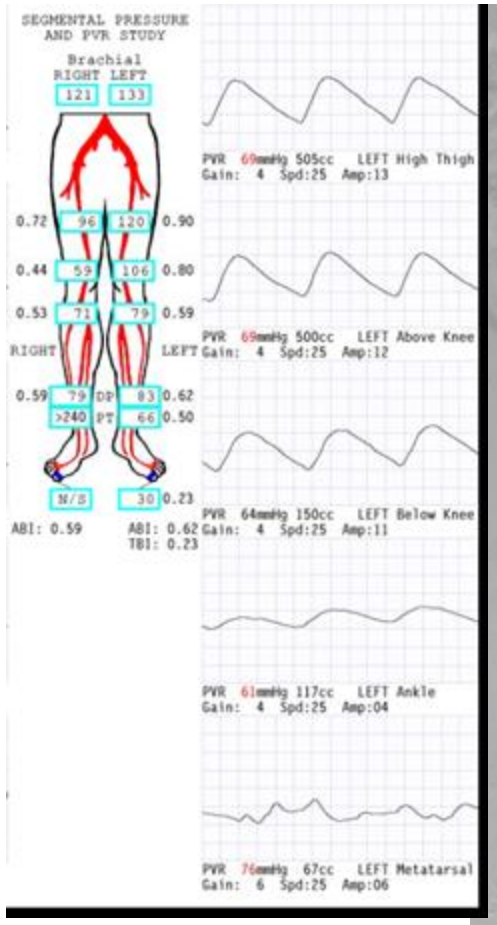
8 mm by 60 mm IVL at 2 atm; multiple treatments

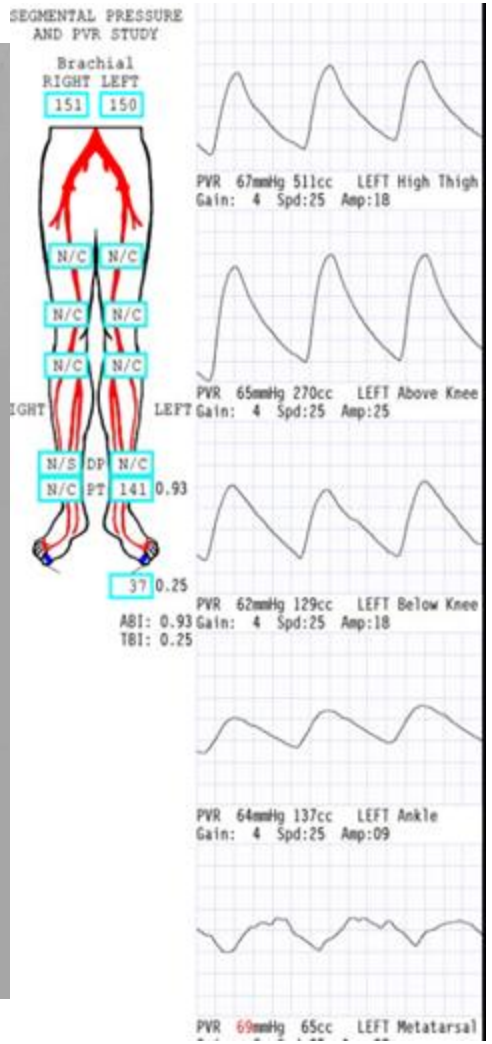




Case Study

CFA: 77yo Male RC3 Claudication

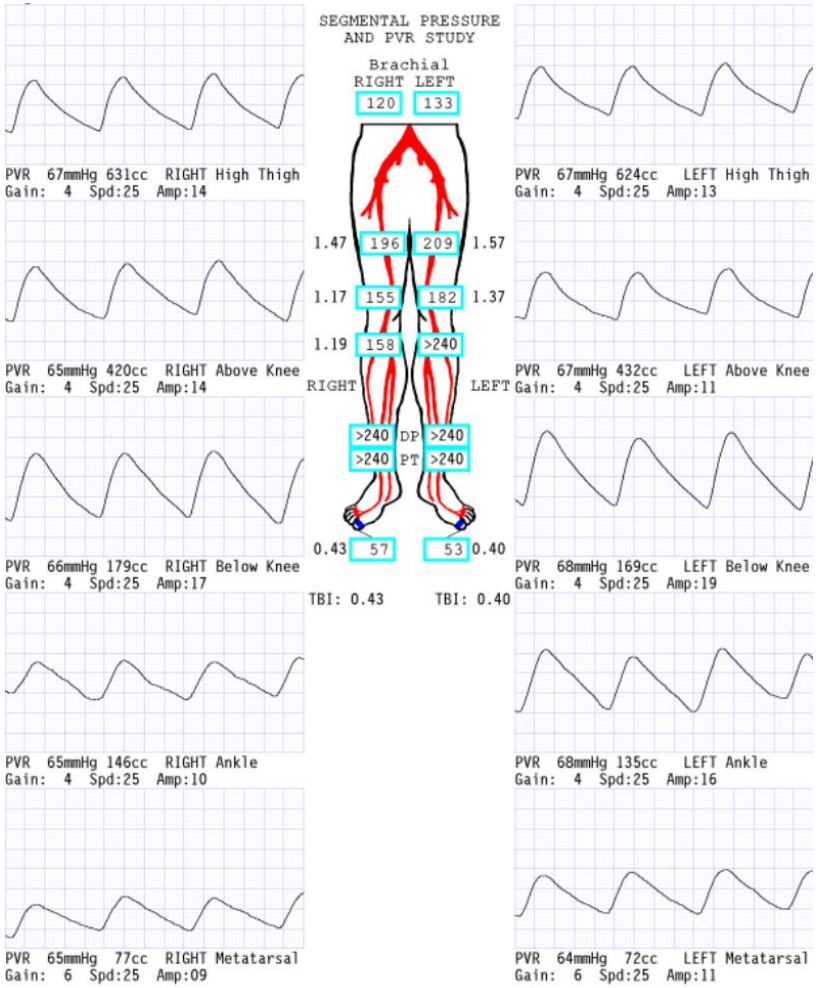




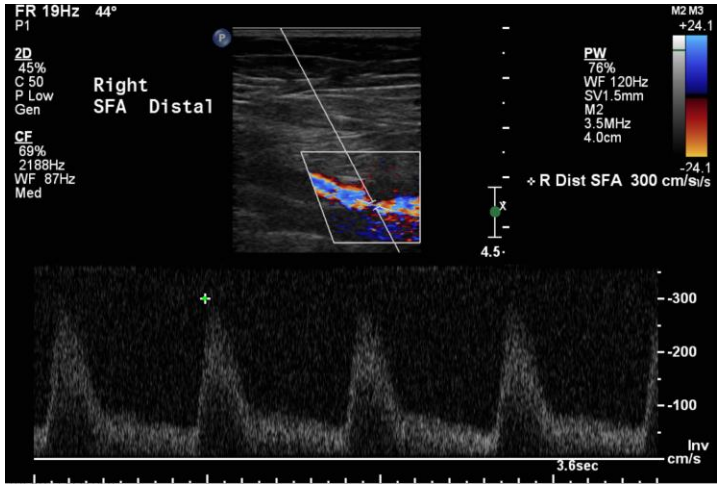
RC3 = Rutherford Category 3.

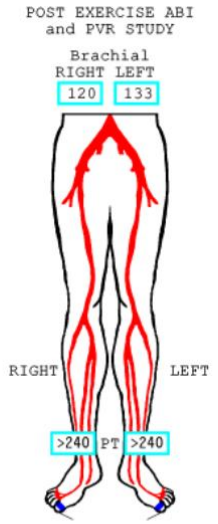
Case Study

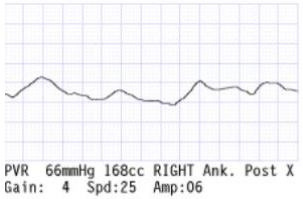
53yo Male with right leg claudication at one block (RC3)

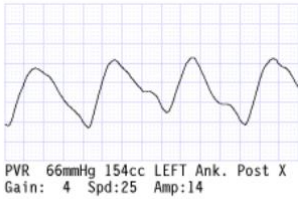


ABI – N/A
TBI – 0.41
Severe calcinosis
Monophasic distal SFA



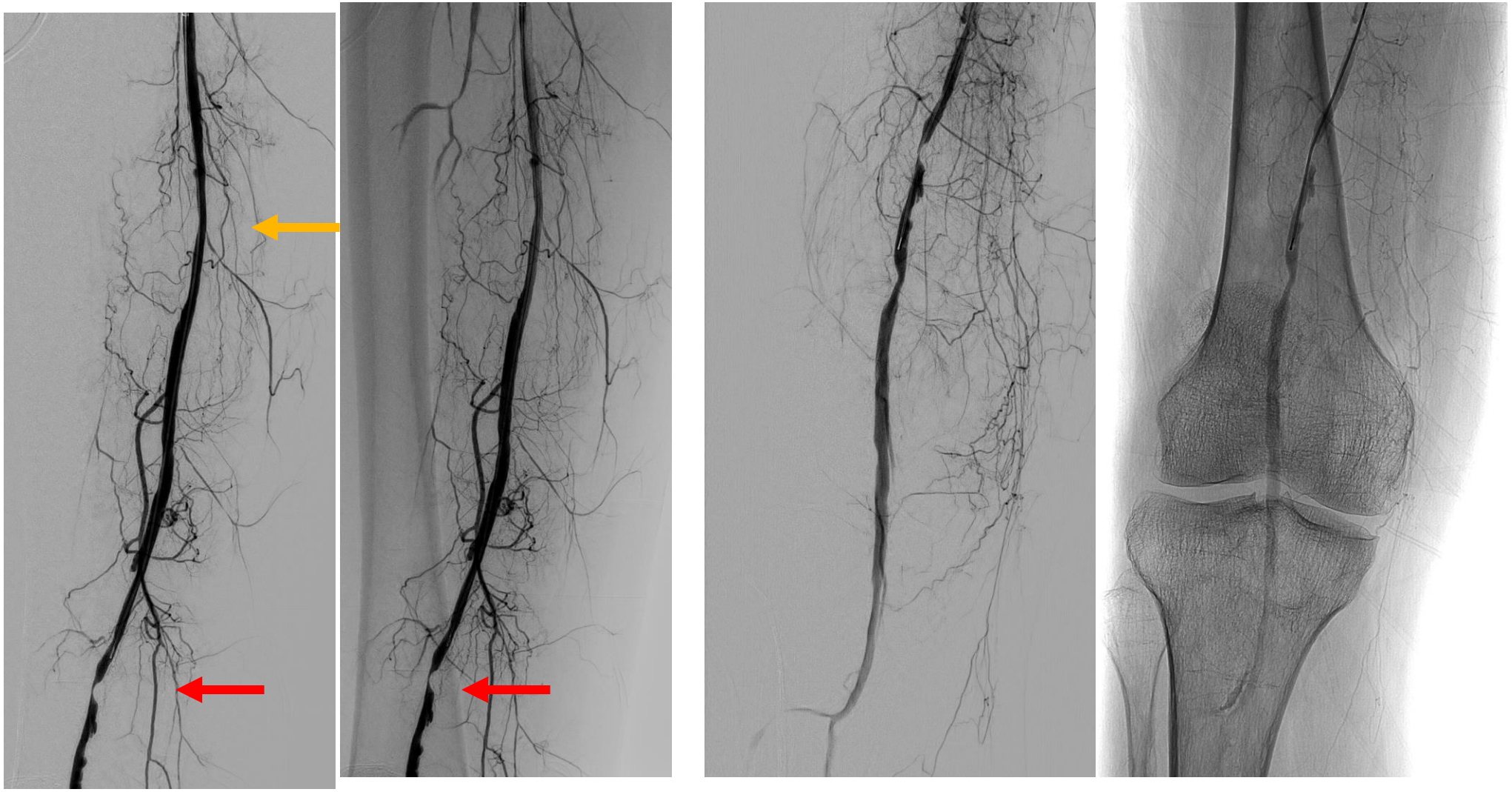




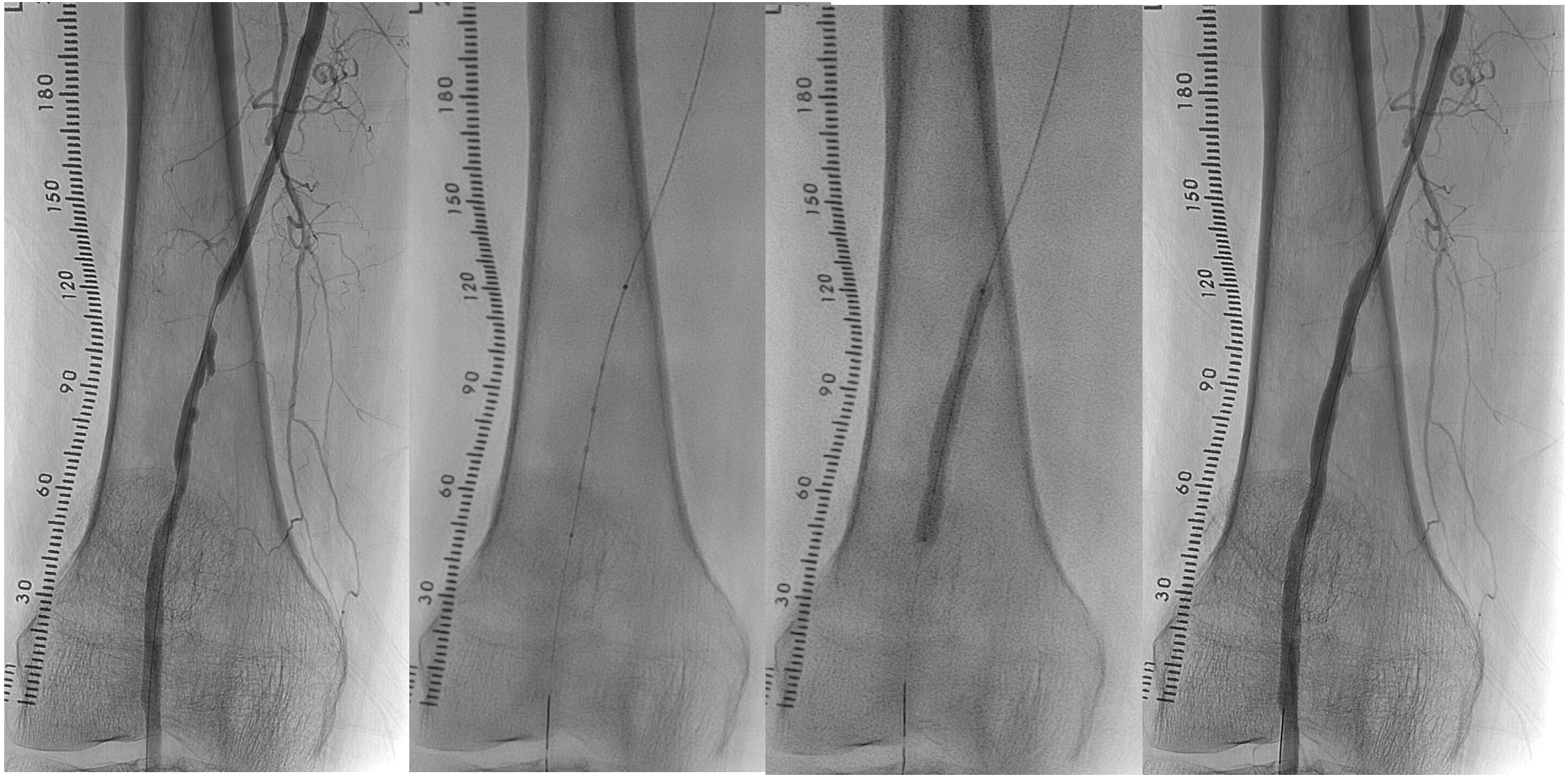


TBI = toe-brachial index.

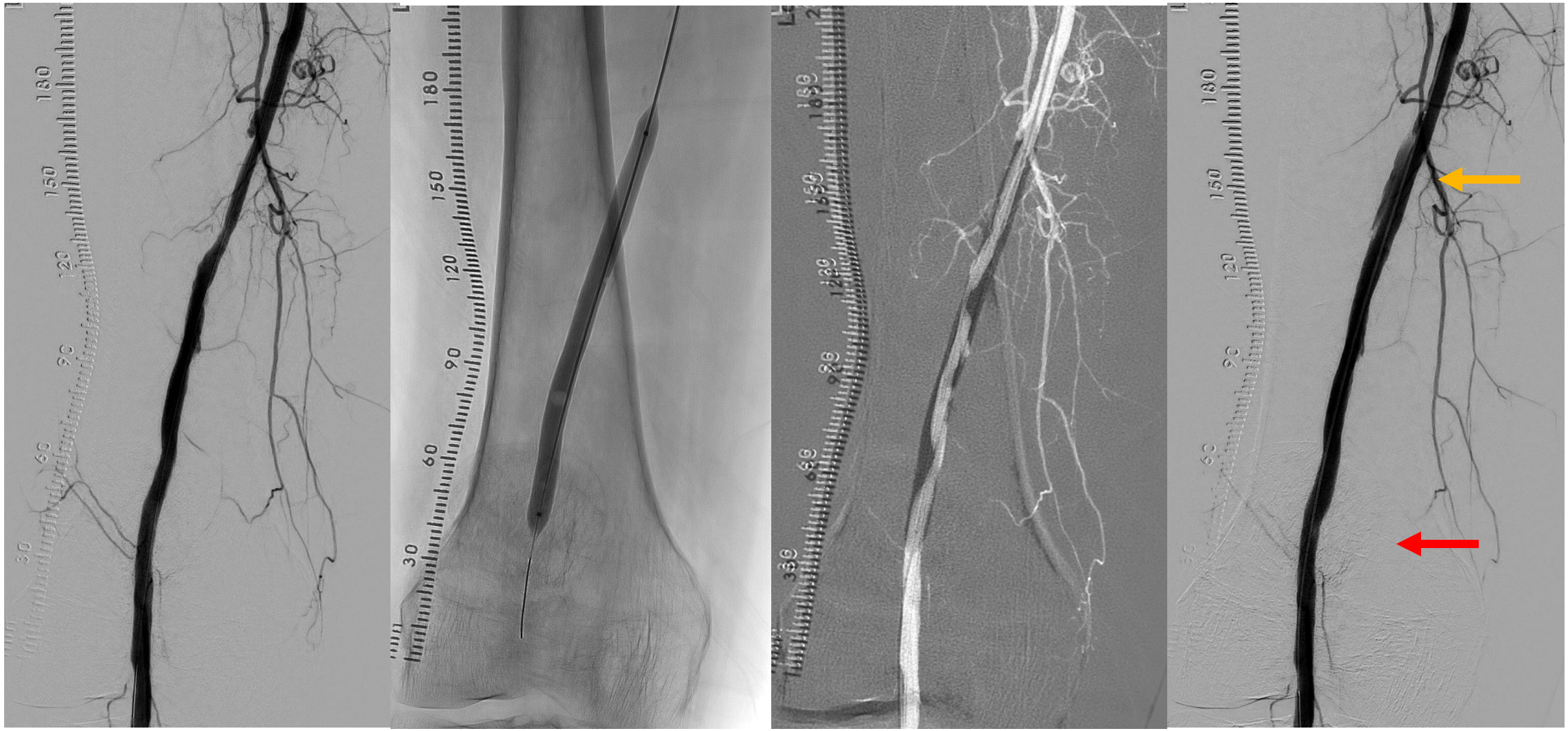
Distal SFA Stenosis



Intravascular lithotripsy of SFA lesion



Conventional Balloon Angioplasty of SFA Lesion



Clinical and Anatomical Complexity in CLTI

PATIENT PRESENTATION

Diabetes and CKD are key comorbidities in CLTI patients

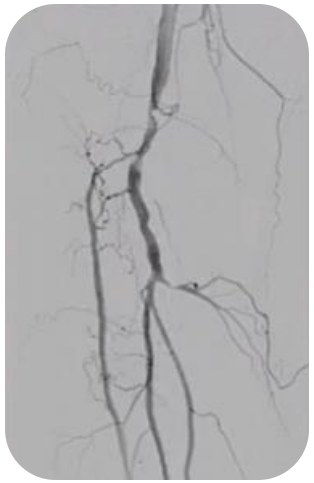
~50-70%
CLTI patients with diabetes

~25-55%
CLTI patients with CKD

High Prevalence of BTK Disease in CLTI Patients

Symptomatic rest pain or tissue loss

LESION COMPLEXITIES



Small vessels

Long diffuse

Early recoil

Commonly moderate/severe calcification

TREATMENT CHALLENGES

Achieving distal perfusion

Maintaining patency

Wound healing

Multidiscplinary care vital to prevent limb loss

CKD = chronic kidney disease.

Callegari S, et al. *J Vasc Surg*. 2025;82(4):1401-1411. Menard MT, et al. *J Vasc Surg*. 2023;78(3):711-718.25. Fereydooni A, et al. *Vasc Med*. 2020;25(1):78-87. Rivera FB, et al. *Cardiorenal Med*. 2024;14(1):533-542. Soon SXY, et al. *Vasc Specialist Int*. 2021;37:13. Hawkins BM, et al. *JSCAI*. 2022;1(3):100015. Mustapha JA, et al. *Circ CV Interventions*. 2016;9e003468.

CLTI-Related Amputations Associated with High Mortality Rates and Cost

CLTI is a complicated and severe disease state on the rise

Prevalence

4 million
people affected

500-1000 new cases annually per million individuals, and growing

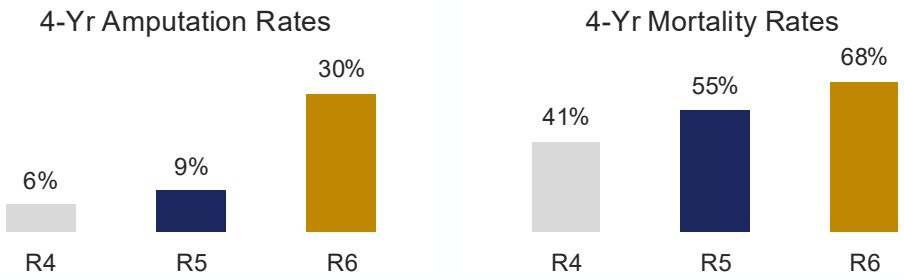
U.S. Major Amputation Rates

70,000
annual amputations

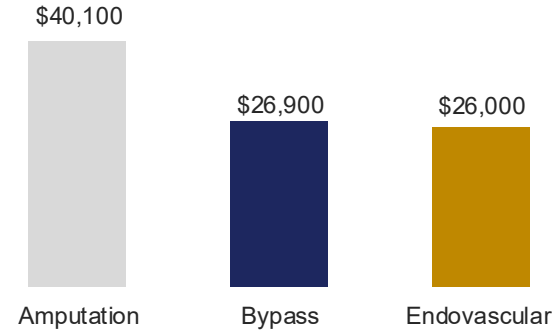
$13 billion
in direct costs

$25 billion
in total costs

CLTI Amputation Results in Higher Mortality



Amputation Costs 35% More Than Revascularization

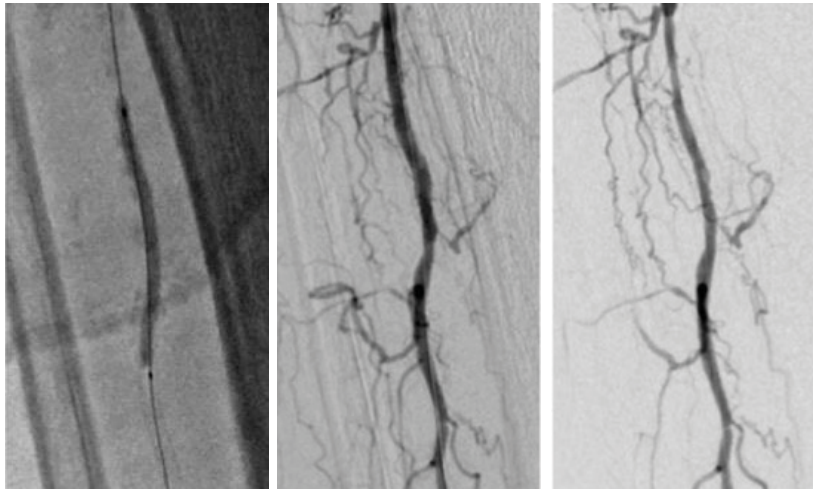


Torres C, et al. *J Crit Limb Ischemia*. 2023;3(3):e103-e113. Teraa M, et al. *J Am Heart Assoc*. 2016;5(2):e002938. Yost ML, Endovascular Today. Accessed March 24, 2026. https://evtoday.com/articles/2014-may/cost-benefit-analysis-of-critical-limb-ischemia-in-the-era-of-the-affordable-care-act. Yost ML, Endovascular Today. Accessed March 24, 2026. https://evtoday.com/articles/2021-may/the-true-prevalence-of-pad-and-the-economics-of-major-amputation. The Sage Group. Published July 17, 2019. Accessed March 24, 2026. https://www.dicardiology.com/content/annual-us-economic-burden-critical-limb-ischemia-exceeds-200-billion.

BTK Intervention Is Complicated by Calcium

Possible complications for BTK therapy

- Dissections leading to bailout stenting, increasing costs, and limiting future options
- Poor vessel expansion limiting acute gain
- Acute recoil limits acute gain and reduces patency



POBA | Initial angiogram | Angiogram after 15 min

15 min — Results 15 min after POBA

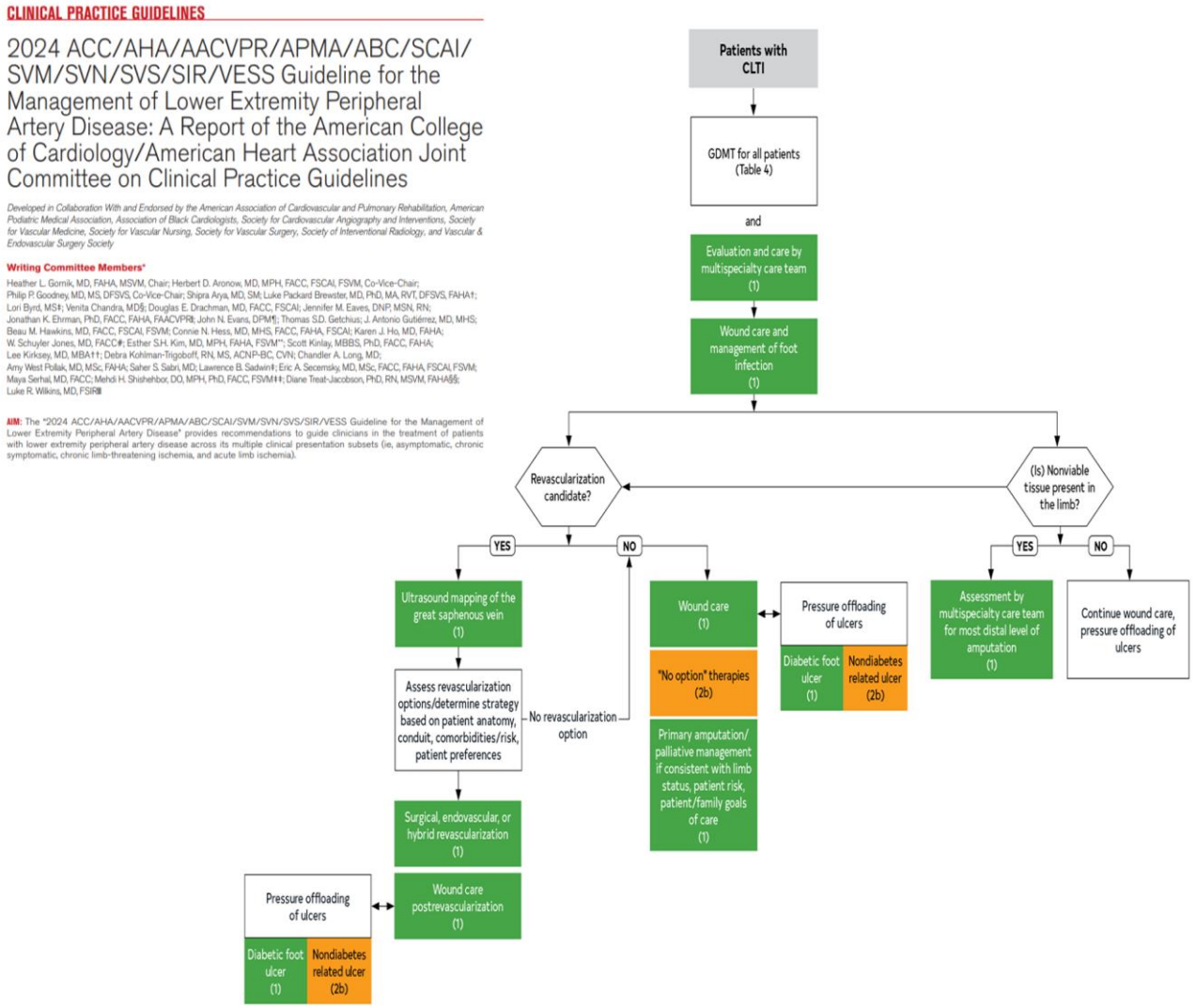
97% — of vessels recoiled

29% — Average vessel recoil

POBA = plain old balloon angioplasty.

Fitzgerald PJ, et al. *Circulation*. 1992;86(1):64-70. Rocha-Singh KJ, et al. *Catheter Cardiovasc Interv*. 2014;83(6):E212-E20. Baumann F, et al. *J Endovasc Ther*. 2014;21(1):44-51.

Current Treatment Paradigm in CLTI



CLINICAL PRACTICE GUIDELINES

2024 ACC/AHA/AACVPR/APMA/ABC/SCAI/SVM/SVN/SVS/SIR/VESS Guideline for the Management of Lower Extremity Peripheral Artery Disease: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

Developed in Collaboration With and Endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation, American Podiatric Medical Association, Association of Black Cardiologists, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine, Society for Vascular Nursing, Society for Vascular Surgery, Society of Interventional Radiology, and Vascular & Endovascular Surgery Society

Writing Committee Members*

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AIM: The "2024 ACC/AHA/AACVPR/APMA/ABC/SCAI/SVM/SVN/SVS/SIR/VESS Guideline for the Management of Lower Extremity Peripheral Artery Disease" provides recommendations to guide clinicians in the treatment of patients with lower extremity peripheral artery disease across its multiple clinical presentation subsets (ie, asymptomatic, chronic symptomatic, chronic limb-threatening ischemia, and acute limb ischemia).

Key Takeaways

- Multispecialty care team
  - Focus on wound healing, limb preservation, and survival
  - Revascularization is central to salvage the limb, if feasible
  - Endovascular, surgical, or hybrid individualized strategy
- Adjunctive care
  - Ongoing foot/wound care alongside revascularization and medical therapy for optimal outcomes
- Amputation is selective
  - Often a last-resort strategy, favoring the most distal functional level

Gornik, et al. *Circulation.* 2024;149(24):e1313-e1410.

IVL Catheters for Patient-Specific Treatment

	IVL Action (Animations NOT to Scale)	Treatment Steps
Balloon-based IVL		1. Deliver catheter and inflate balloon to low pressure 2. Sonic pressure waves generated from IVL emitters in balloon modify calcium 3. Expand vessel
Non-balloon-based IVL		1. Deliver catheter 2. Sonic pressure waves generated at distally positioned IVL emitter 3. Modify calcium and advance across lesion 4. Post dilatation

Case Study: Great Toe Ulcer

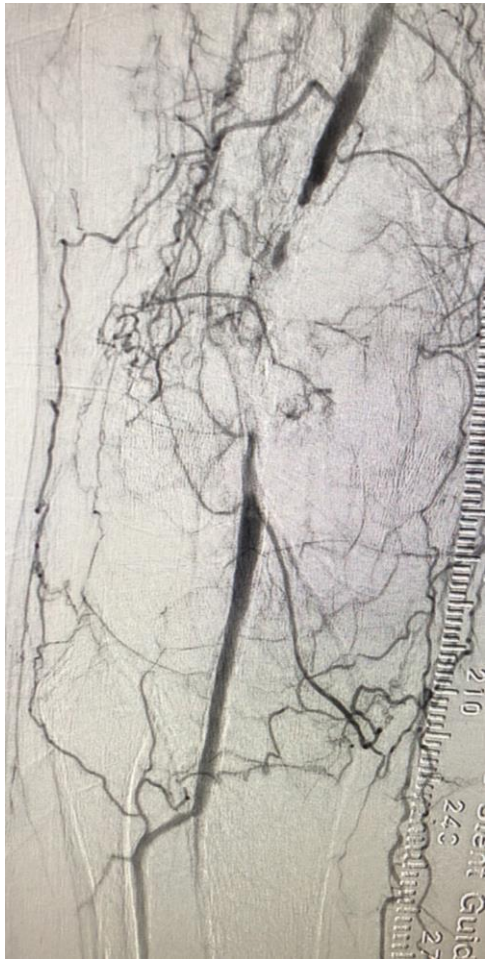
Patient Background
- 73yo patient with diabetes and RC5 CLTI; presents with great toe ulceration and femoropopliteal occlusion

Considerations
- Significant calcification
- Vessel location
- Vessel diameter
- Runoff vessels

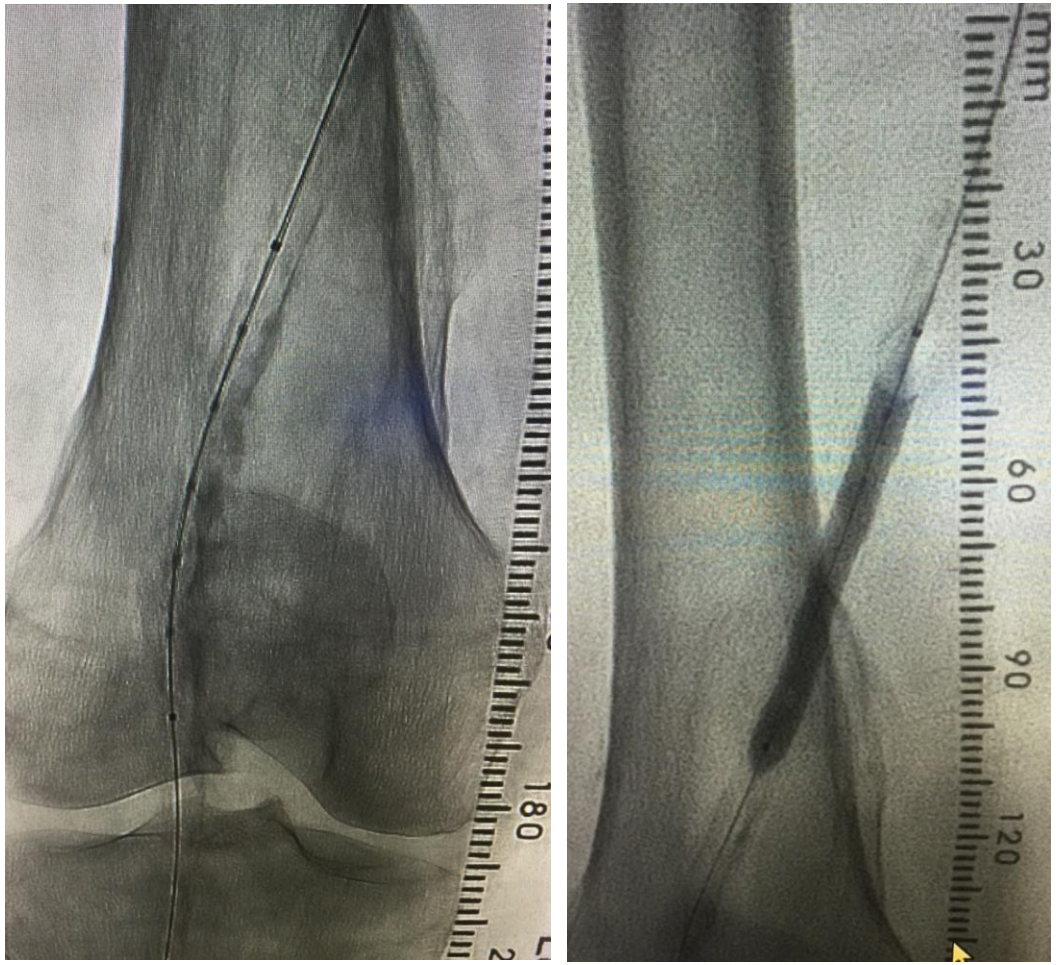
Case Goal
- Restore in-line flow to the foot to heal the great toe ulceration

Outcome
- Heavily calcified femoropopliteal occlusion treated successfully with peripheral IVL
- Previously non-healing toe ulcer was healed

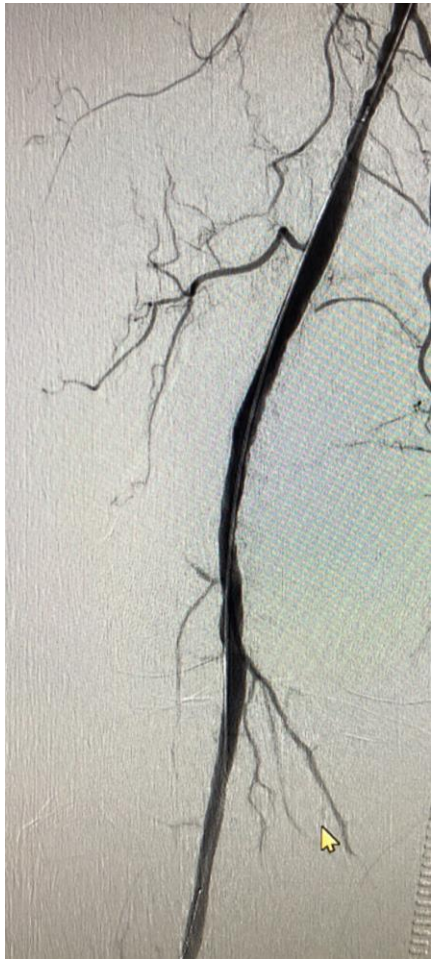
Pre-Procedural Imaging



Therapy



Result



Physician: Dr. Constantino Peña

Benefits of IVL for BTK Lesions

IVL for the treatment of calcified infrapopliteal disease

Reduces Elastic Recoil	• IVL safely selects and modifies superficial and deep calcium without negatively impacting soft tissue, increasing vessel compliance and reducing elastic recoil
Failed PTA	• Extensive calcification leads to a loss of compliance and higher recoil rates post-PTA • IVL fractures both superficial and deep calcium, maximizing luminal gain
Bifurcation/Trifurcation Disease	• IVL can be utilized in areas of severe angulation • IVL allows for the option of a buddy wire to be utilized, preserving vessel access
Enhanced Safety Profile	• IVL has been proven to reduce significant dissection and the need for provisional stenting over conventional PTA in peripheral vessel beds
Subintimal Use	• IVL is safe to work in subintimal planes and effectively modify eccentric calcium

Kereiakes DJ, et al. *JACC Cardiovasc Interv.* 2021;14(12):1275-1292. Kahlon RS and Soukas PA. Infrainguinal Endovascular Interventions: Leaving the Least Behind. HMP Global; 2021. Ganguli S, et al. Infrainguinal Endovascular Interventions: Leaving the Least Behind. HMP Global; 2021. Holden A. Presented at: The Leipzig Interventional Course (LINC) 2018; January 30–February 2, 2018; Leipzig, Germany. Gray WA. Presented at: VIVA 2020; November 6-8, 2020; Virtual. Madhavan MV, et al. *Catheter Cardiovasc Interv*. 2020;95(5):959-968.

Creating an Algorithm for BTK Lesions

Factors including expectation prior to treatment

Lesion Factors

- Location
- Length
- Outflow of that vessel
- Outflow of other vessels

Indication

- Gangrene
- Tissue loss

Patient Factors

- Expectation prior to treatment
- DM
- ESRD

Prior Treatments

- Successful?
- Duration?

DM = diabetes mellitus; ESRD = end-stage renal disease.

Case Study: Non-Healing Toe Ulcer

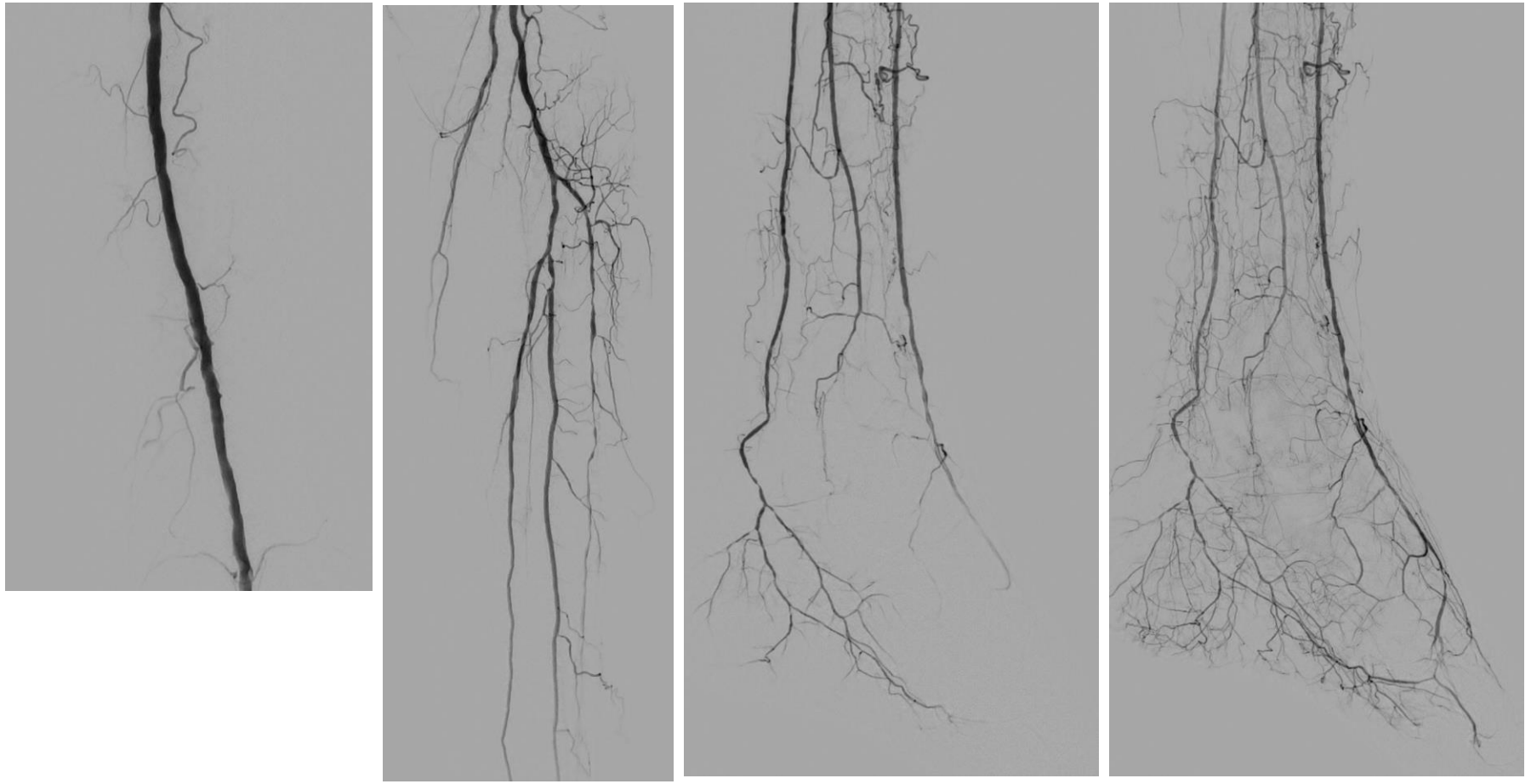
Patient Background

- 68yo Male with non-healing left toe ulceration, ESRD, s/p right transmetatarsal amputation

Case Goal

- Restore in-line flow to the foot to heal the left toe ulceration

Pre-Procedural Imaging

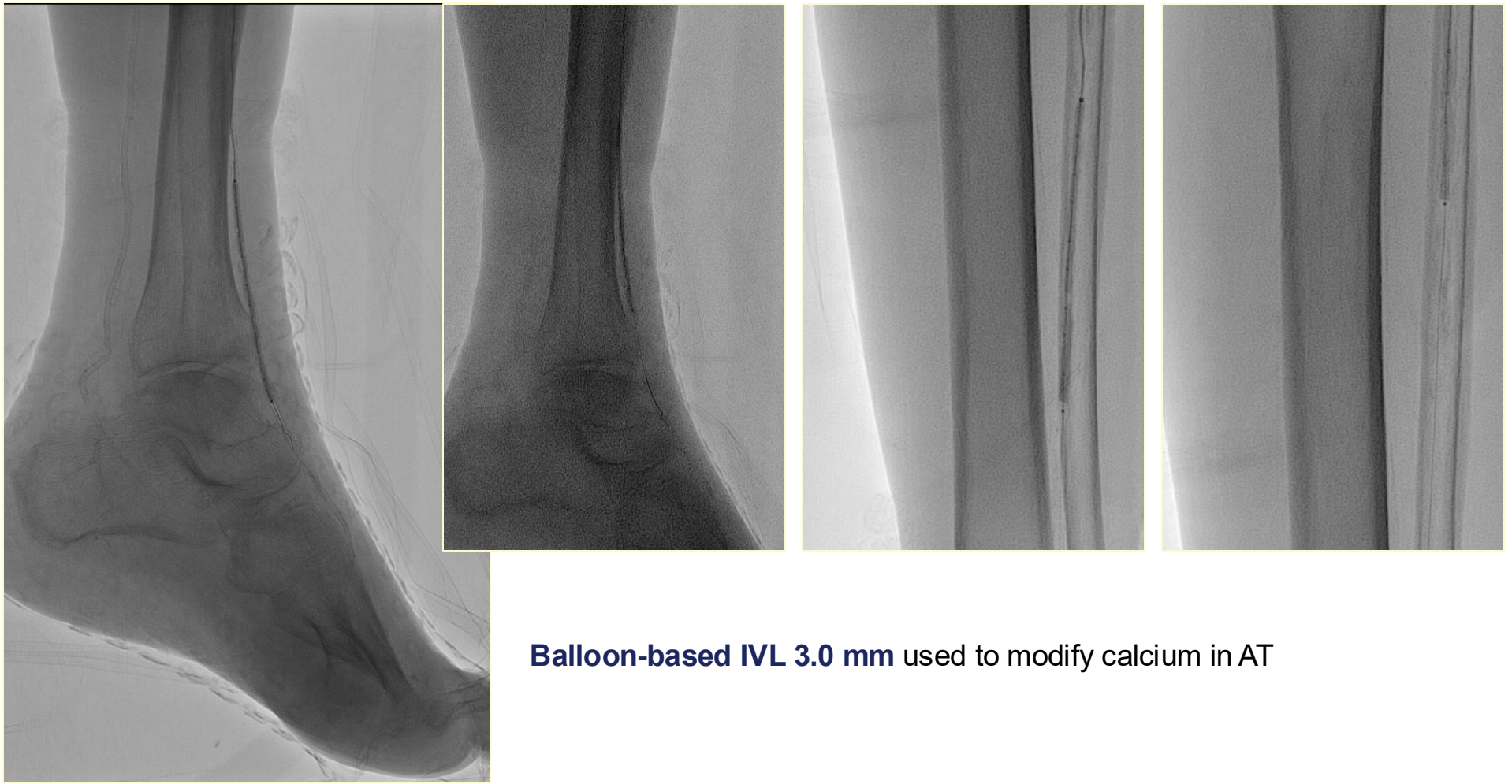


Physician: Dr. Constantino Peña

Case Study: Non-Healing Toe Ulcer

Therapy

Balloon-based IVL; 3.0 mm



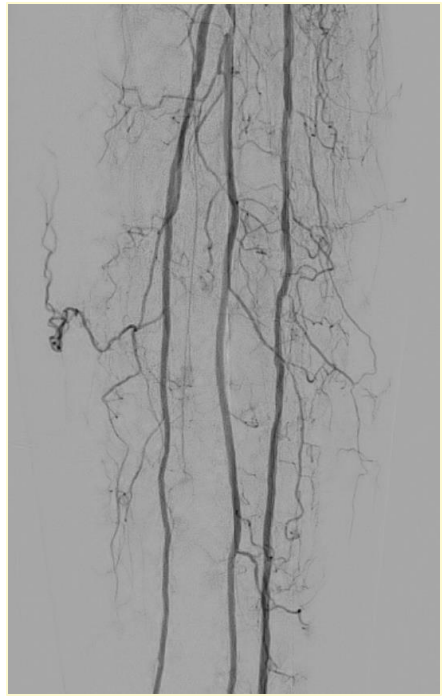
Balloon-based IVL 3.0 mm used to modify calcium in AT

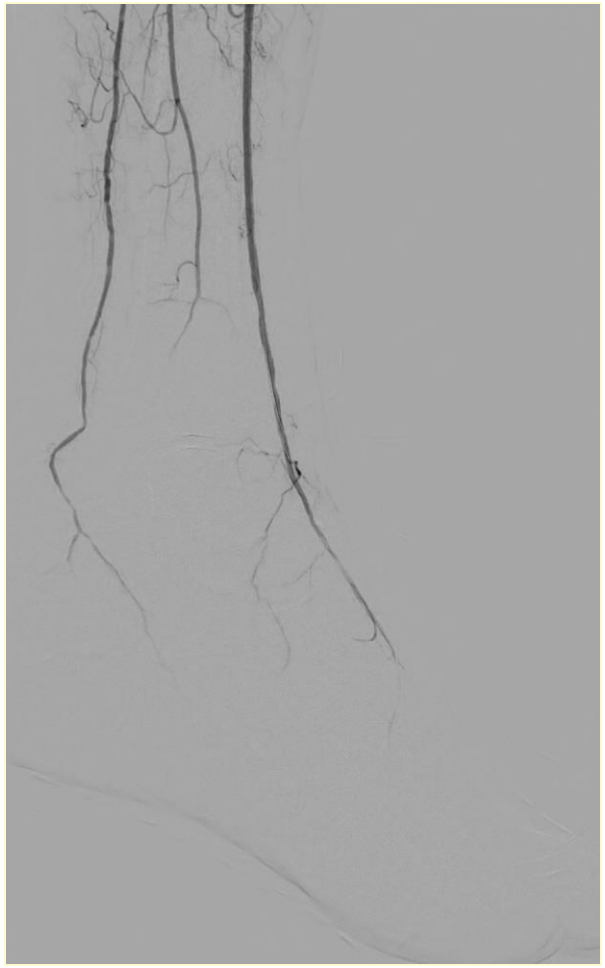
AT = anterior tibial artery.

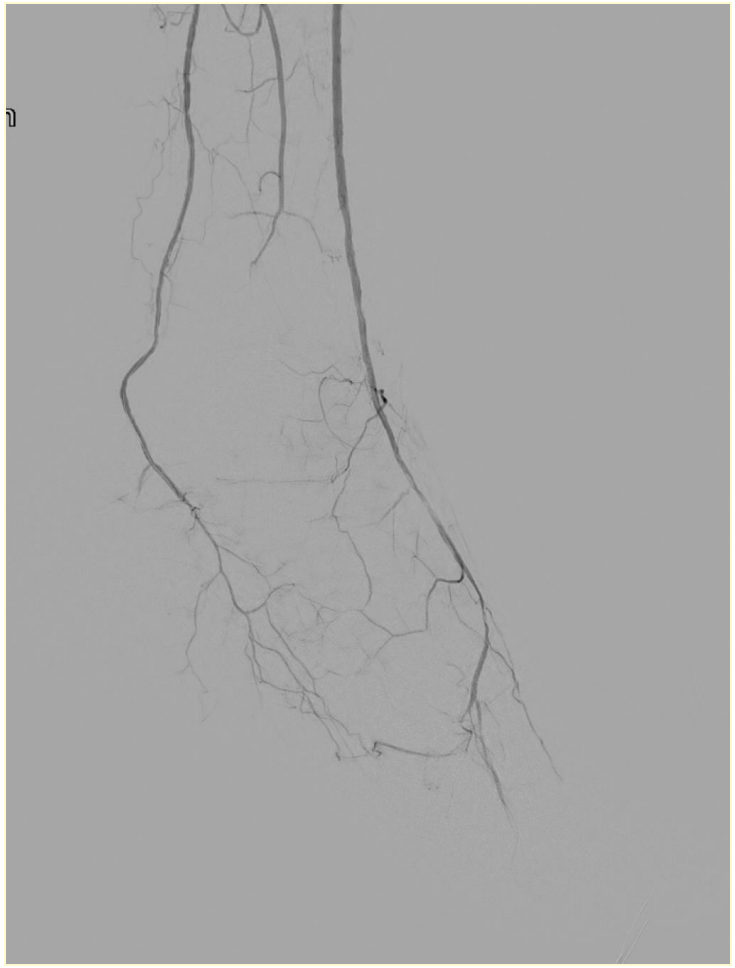
Physician: Dr. Constantino Peña

Case Study: Non-Healing Toe Ulcer

Post-IVL to AT







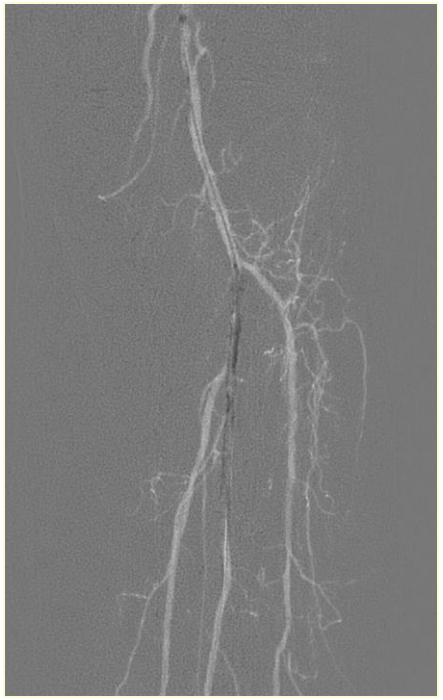
Improved flow in AT following balloon-based IVL.

Physician: Dr. Constantino Peña

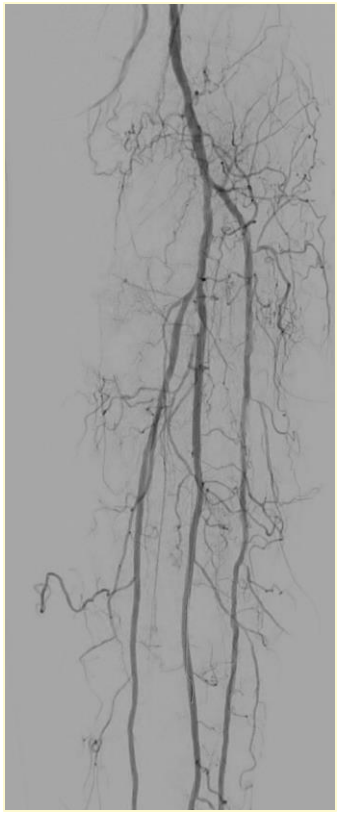
Case Study: Non-Healing Toe Ulcer

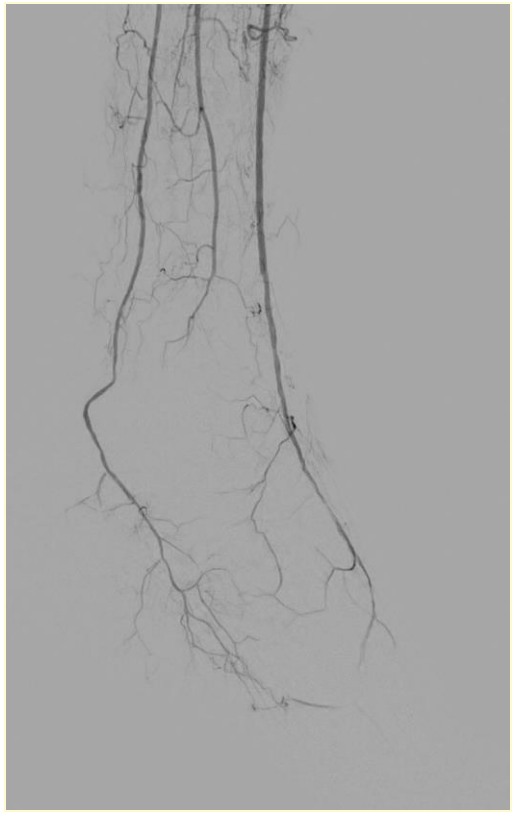
Post-IVL to AT and Peroneal

Balloon-based IVL; 3.0 mm



Balloon-based IVL 3.0 mm used to modify calcium in peroneal





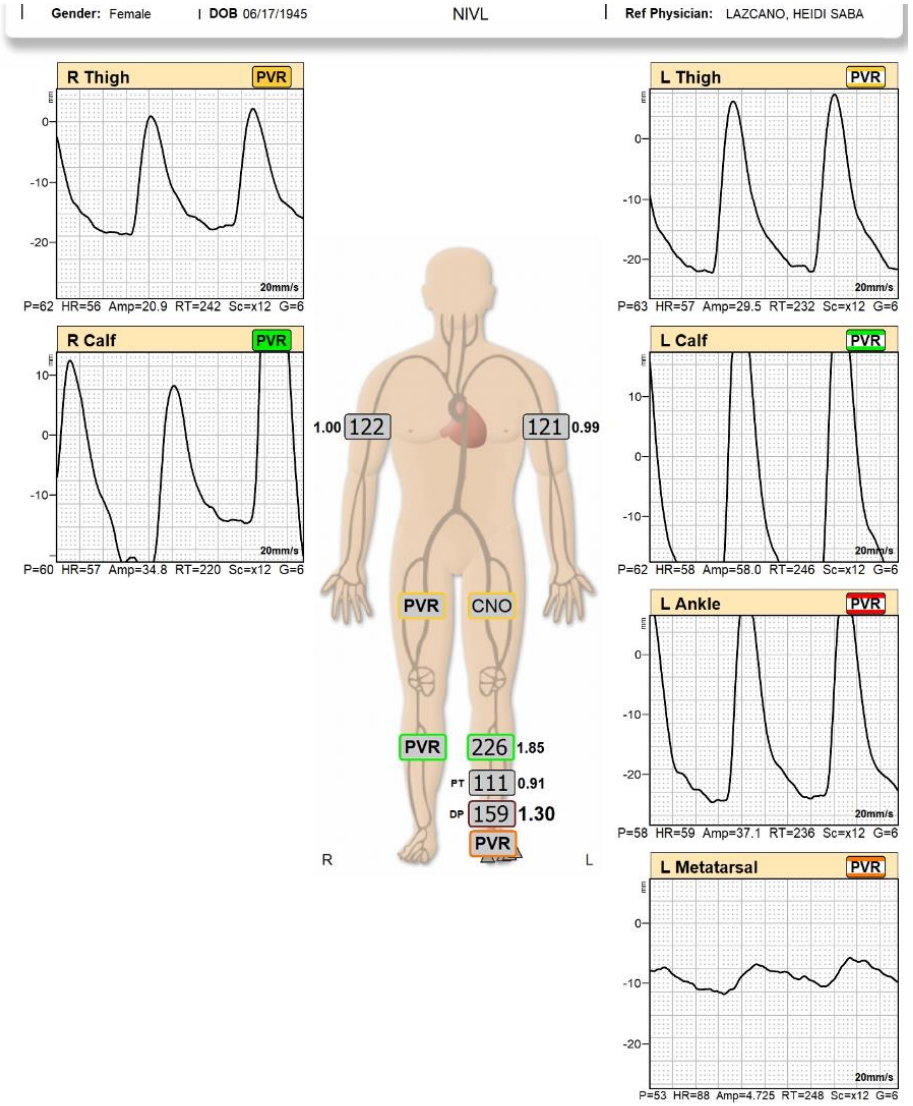
Restored flow in AT and peroneal.

Both AT and peroneal had significantly improved flow following balloon-based IVL therapy. Previously non-healing toe ulcer was healed at 1-month check-in.

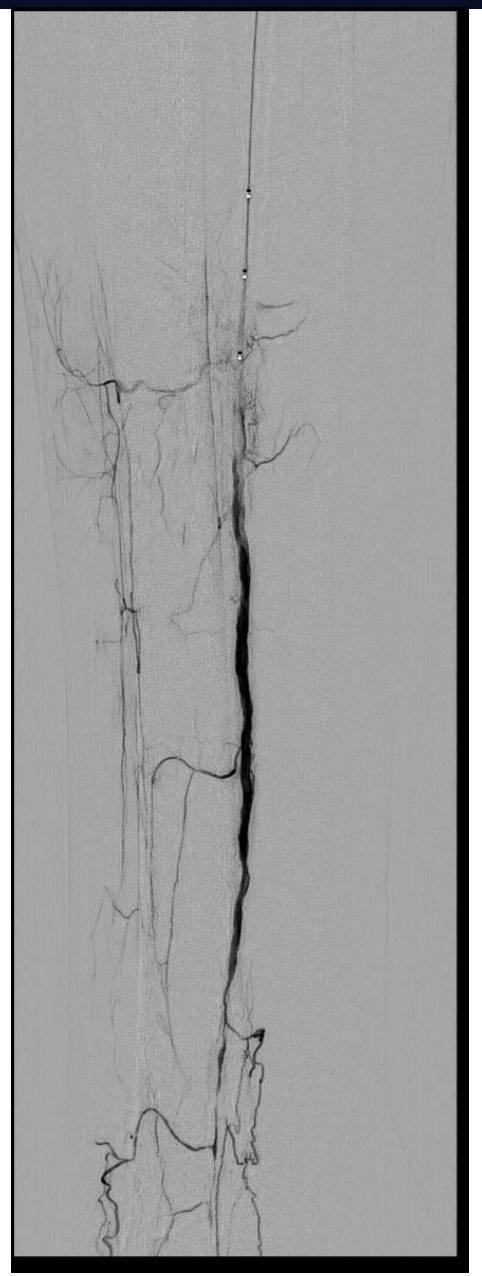
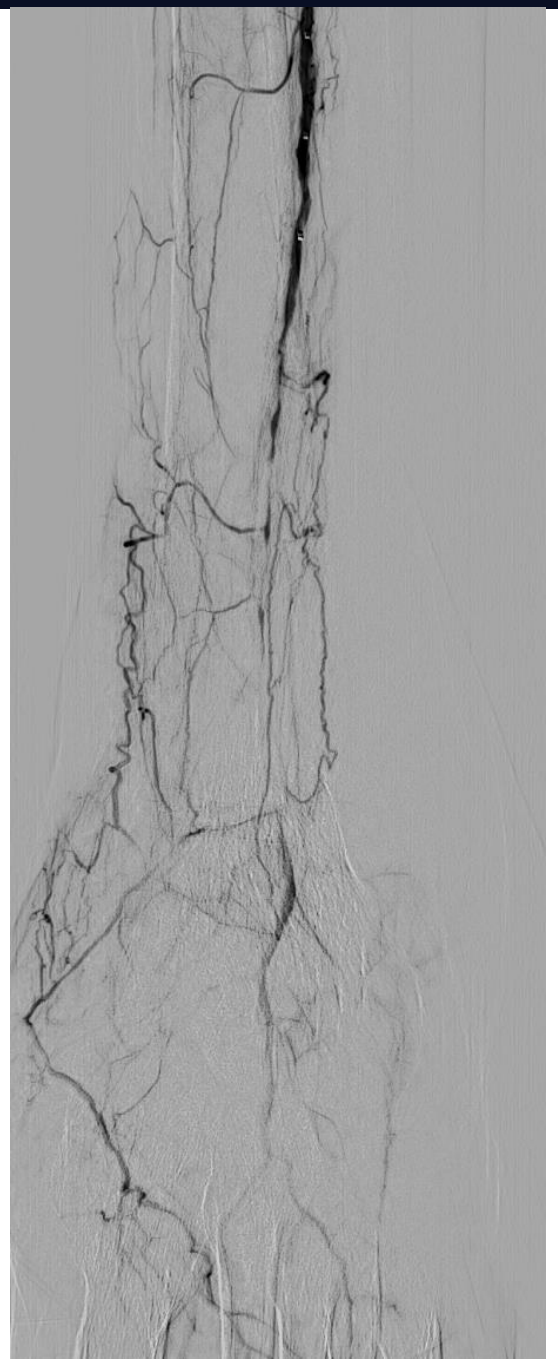
Physician: Dr. Constantino Peña

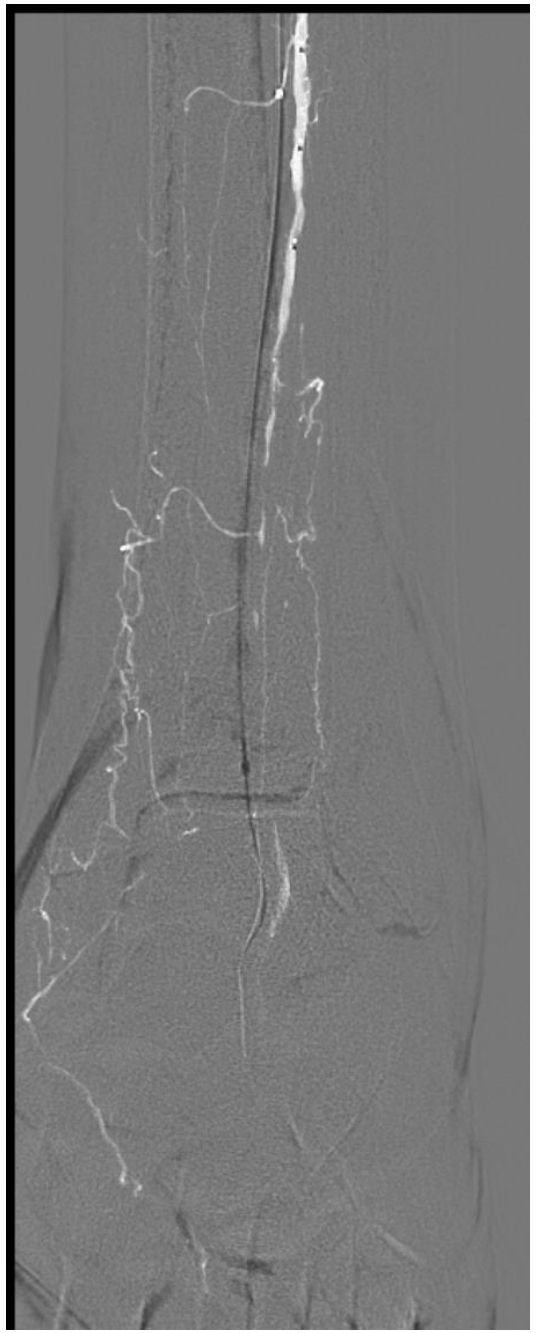
Case Study

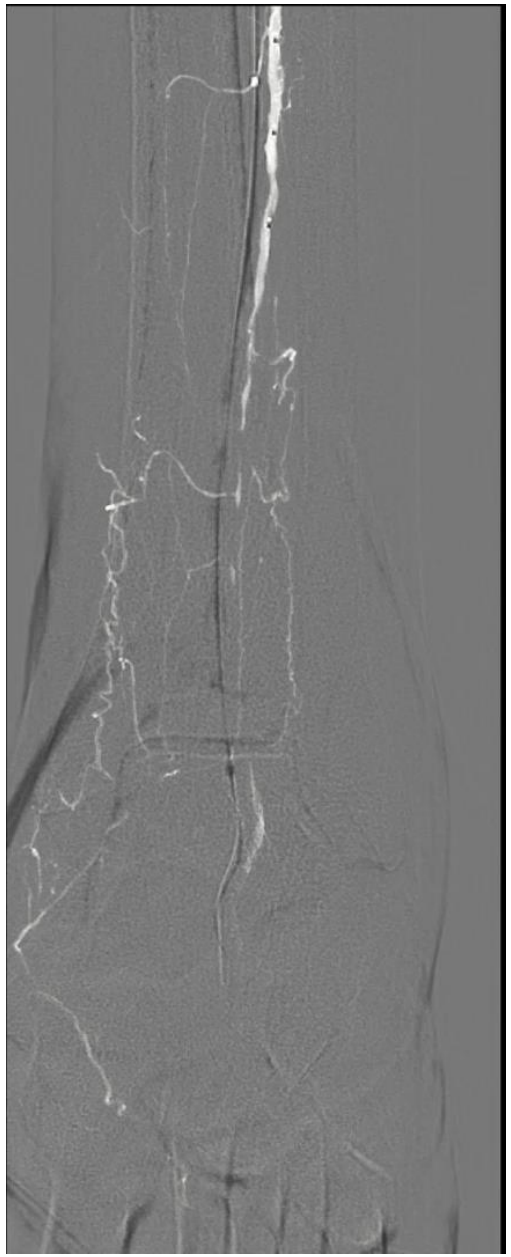
- 80yo Female with RC5 CLTI in left foot and toes

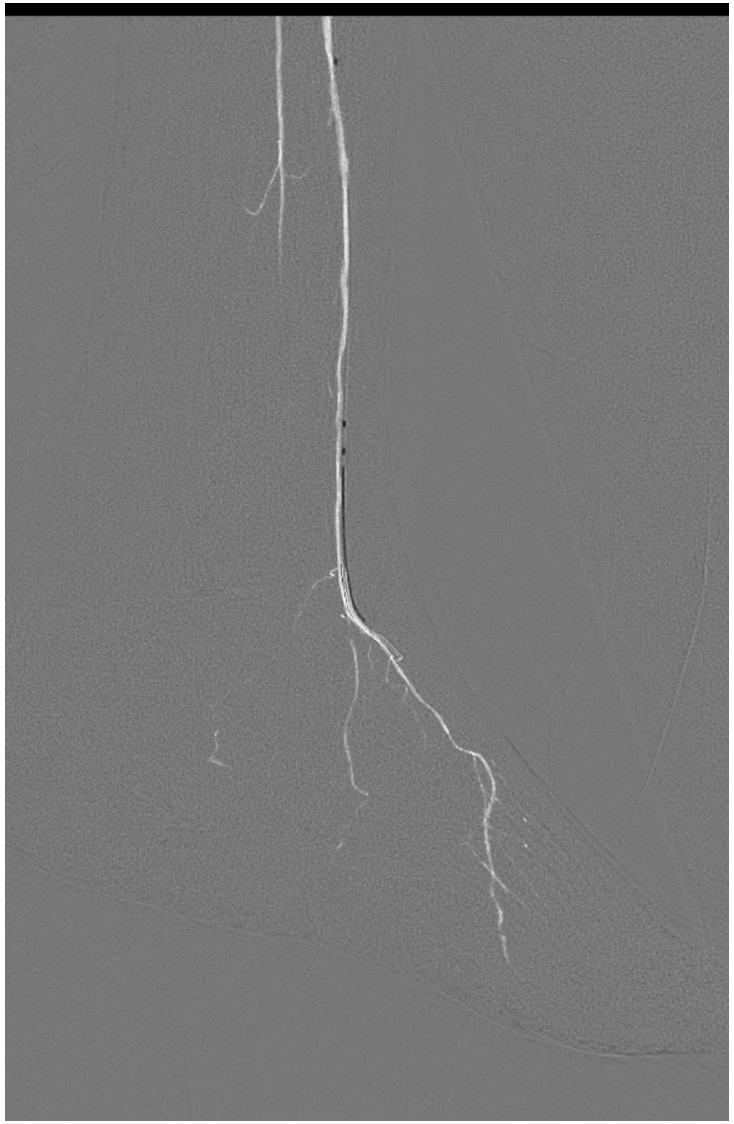

Gender: Female
DOB 06/17/1945
NIVL
Ref Physician: LAZCANO, HEIDI SABA
R Thigh
PVR
20mm/s
P=62 HR=56 Amp=20.9 RT=242 Sc=x12 G=6
L Thigh
PVR
20mm/s
P=63 HR=57 Amp=29.5 RT=232 Sc=x12 G=6
R Calf
PVR
20mm/s
P=60 HR=57 Amp=34.8 RT=220 Sc=x12 G=6
L Calf
PVR
20mm/s
P=62 HR=58 Amp=58.0 RT=246 Sc=x12 G=6
1.00 122
121 0.99
PVR
CNO
PVR
226 1.85
PT 111 0.91
DP 159 1.30
PVR
R
L
L Ankle
PVR
20mm/s
P=58 HR=59 Amp=37.1 RT=236 Sc=x12 G=6
L Metatarsal
PVR
20mm/s
P=53 HR=88 Amp=4.725 RT=248 Sc=x12 G=6



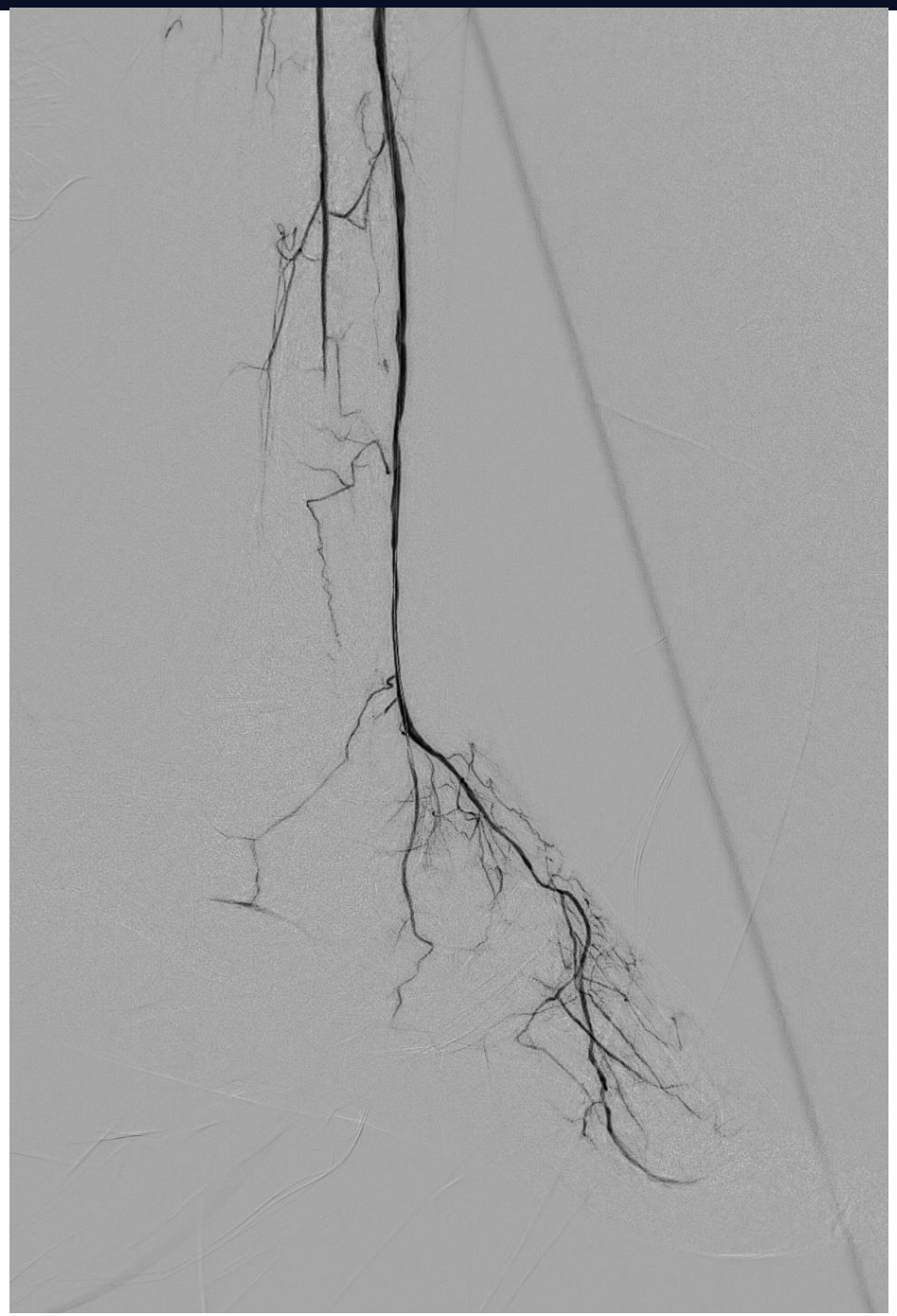









2 mm PTA



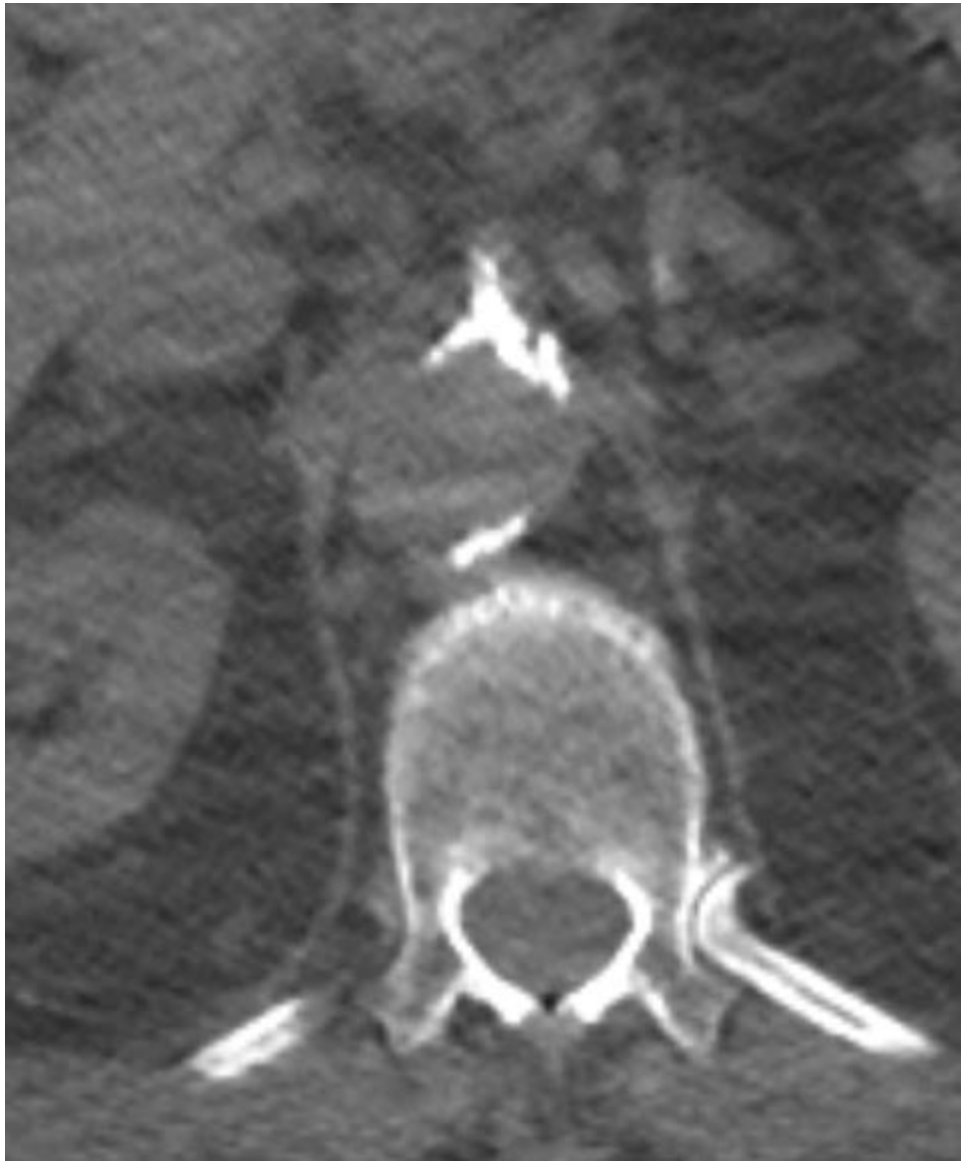
Non-balloon-based IVL to dorsalis pedis; 2 mm and 2.5 mm

Case Study

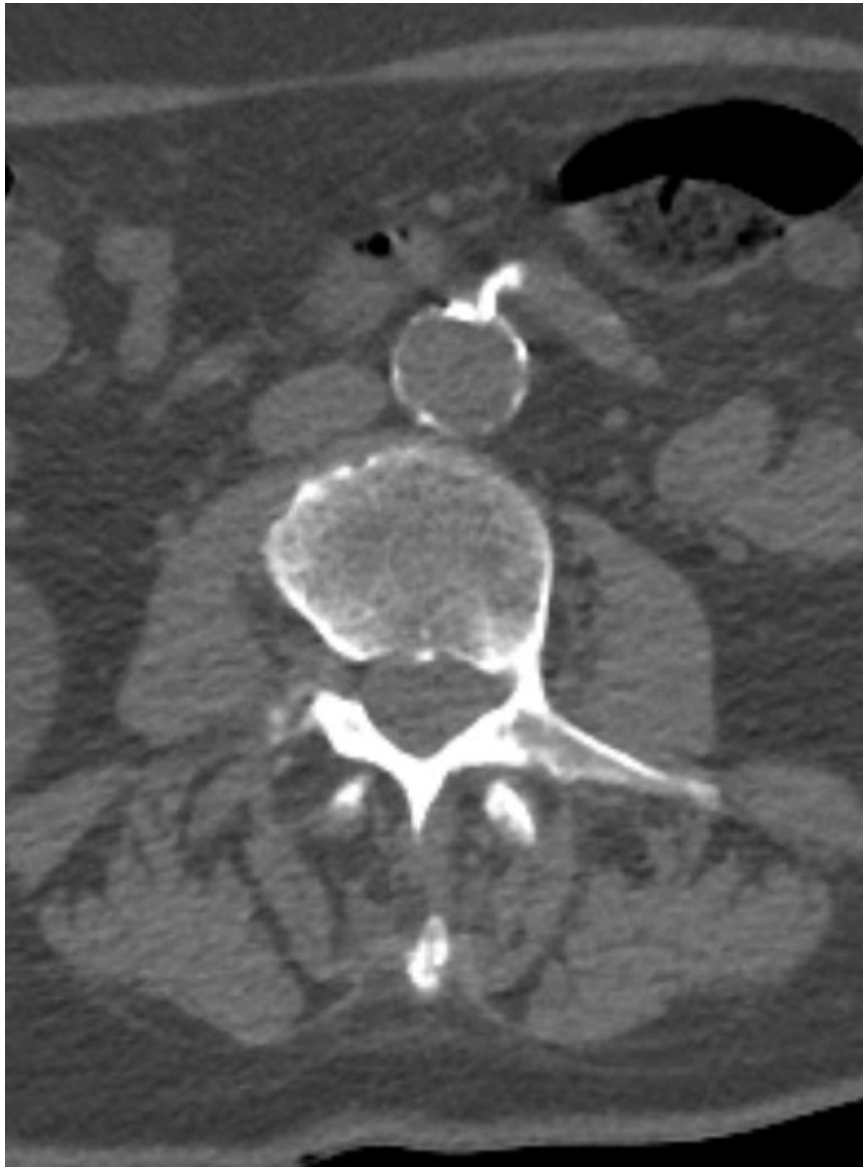
- 92yo Male with weight loss and abdominal pain with eating

Occluded SMA

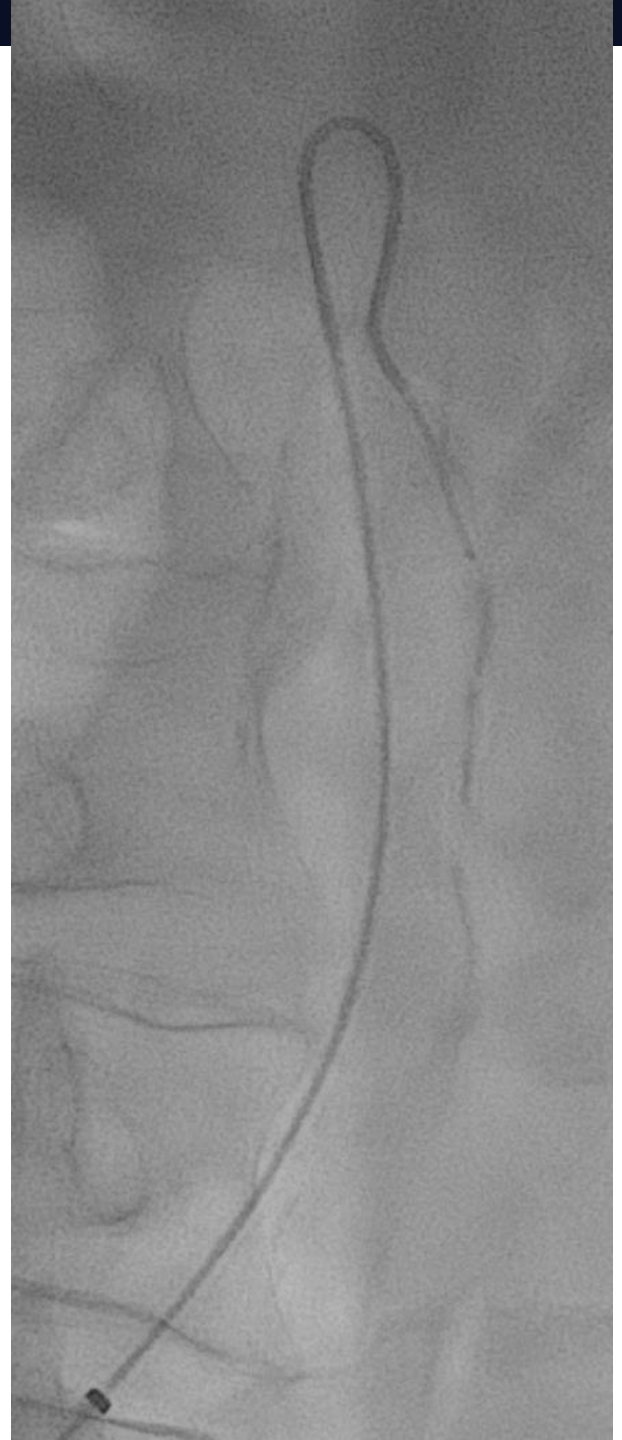
Stenotic celiac

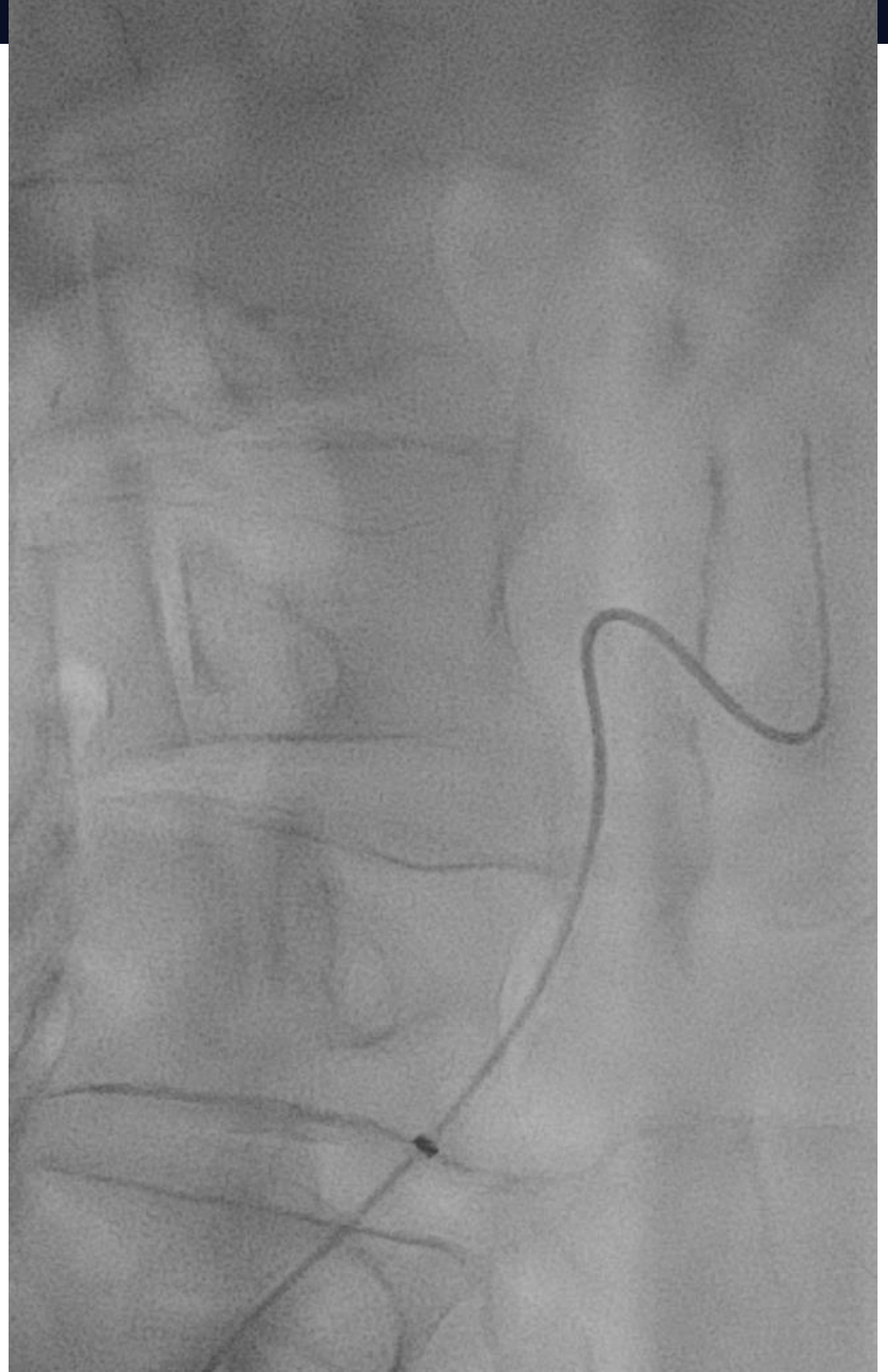


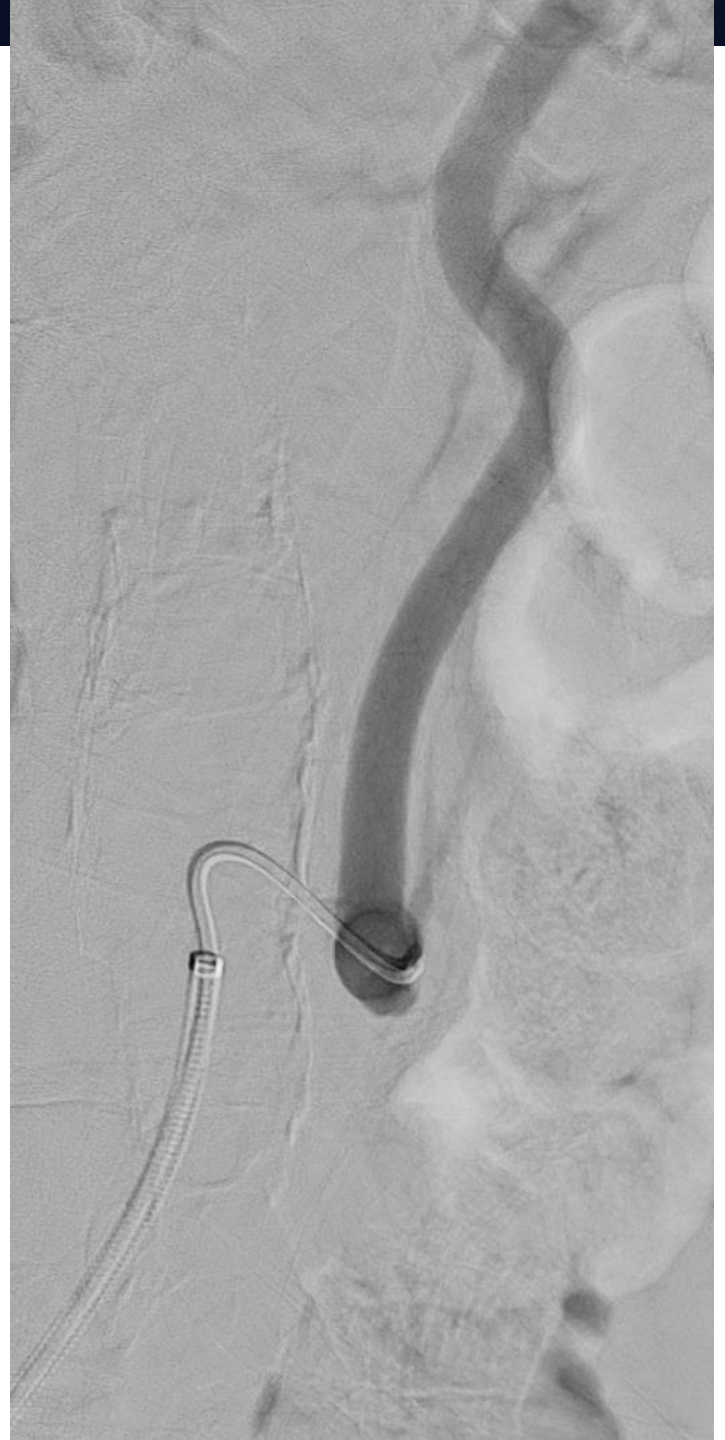
Super tight IMA

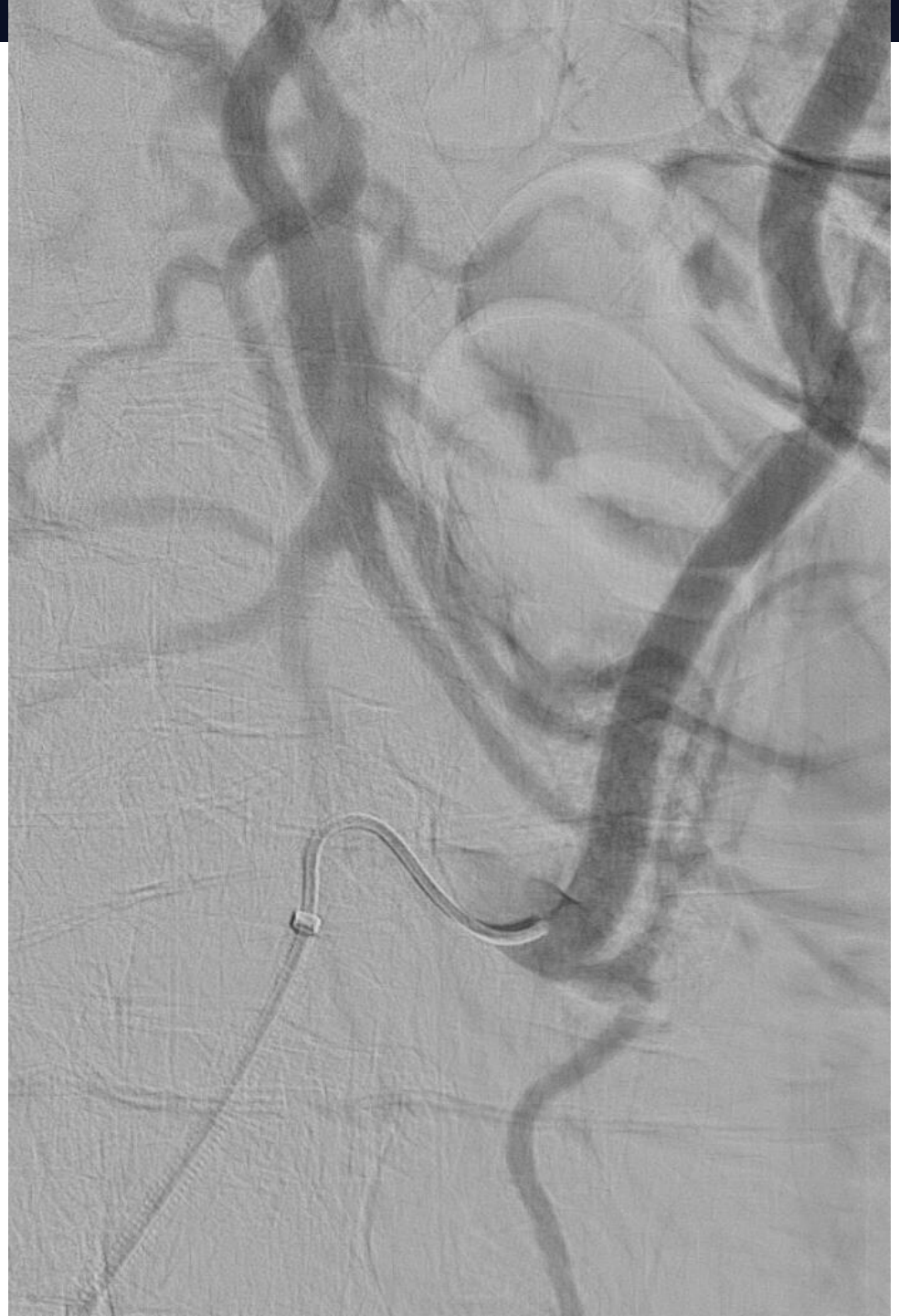


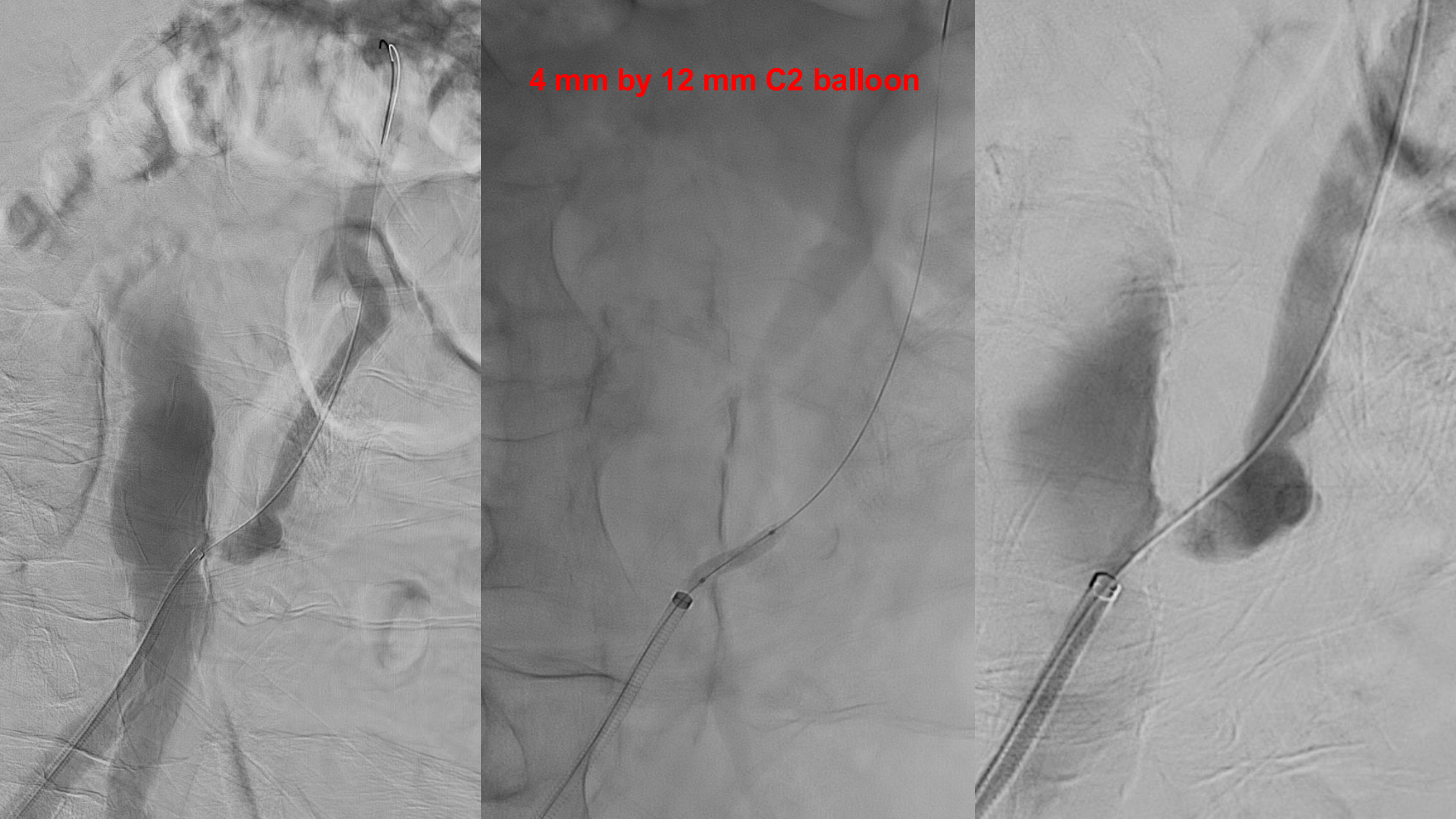
SMA = superior mesenteric artery; IMA = inferior mesenteric artery.



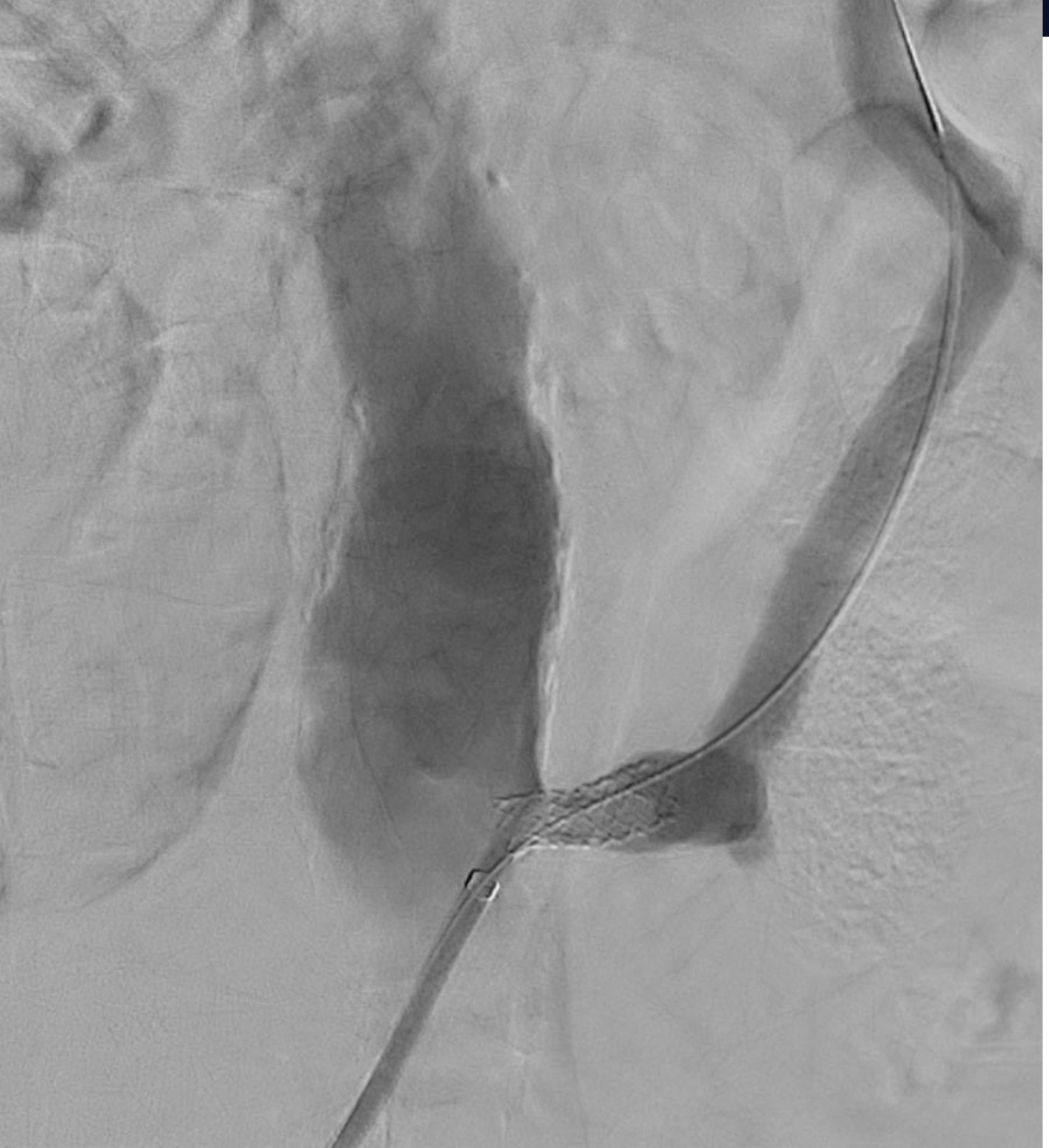


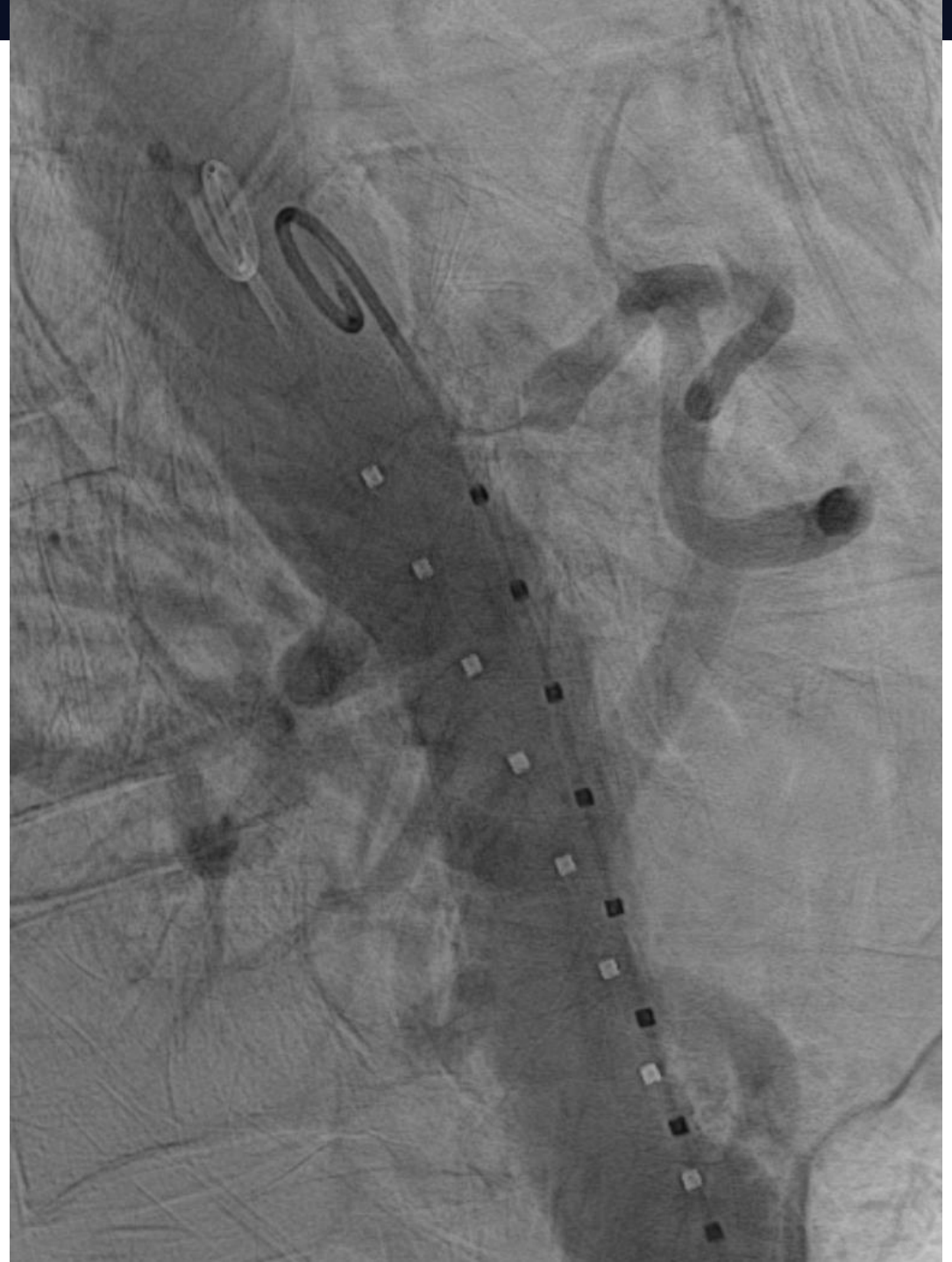


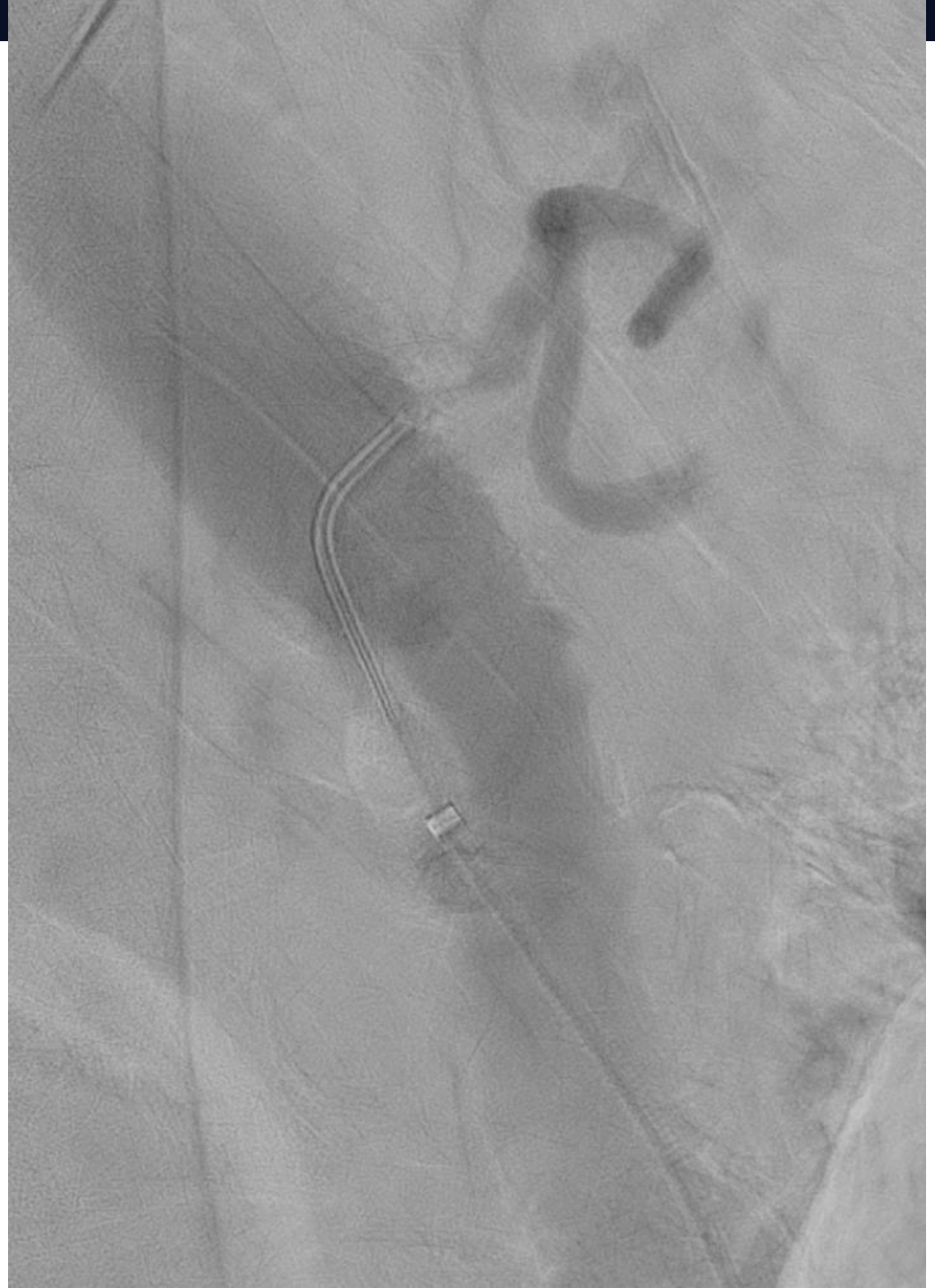


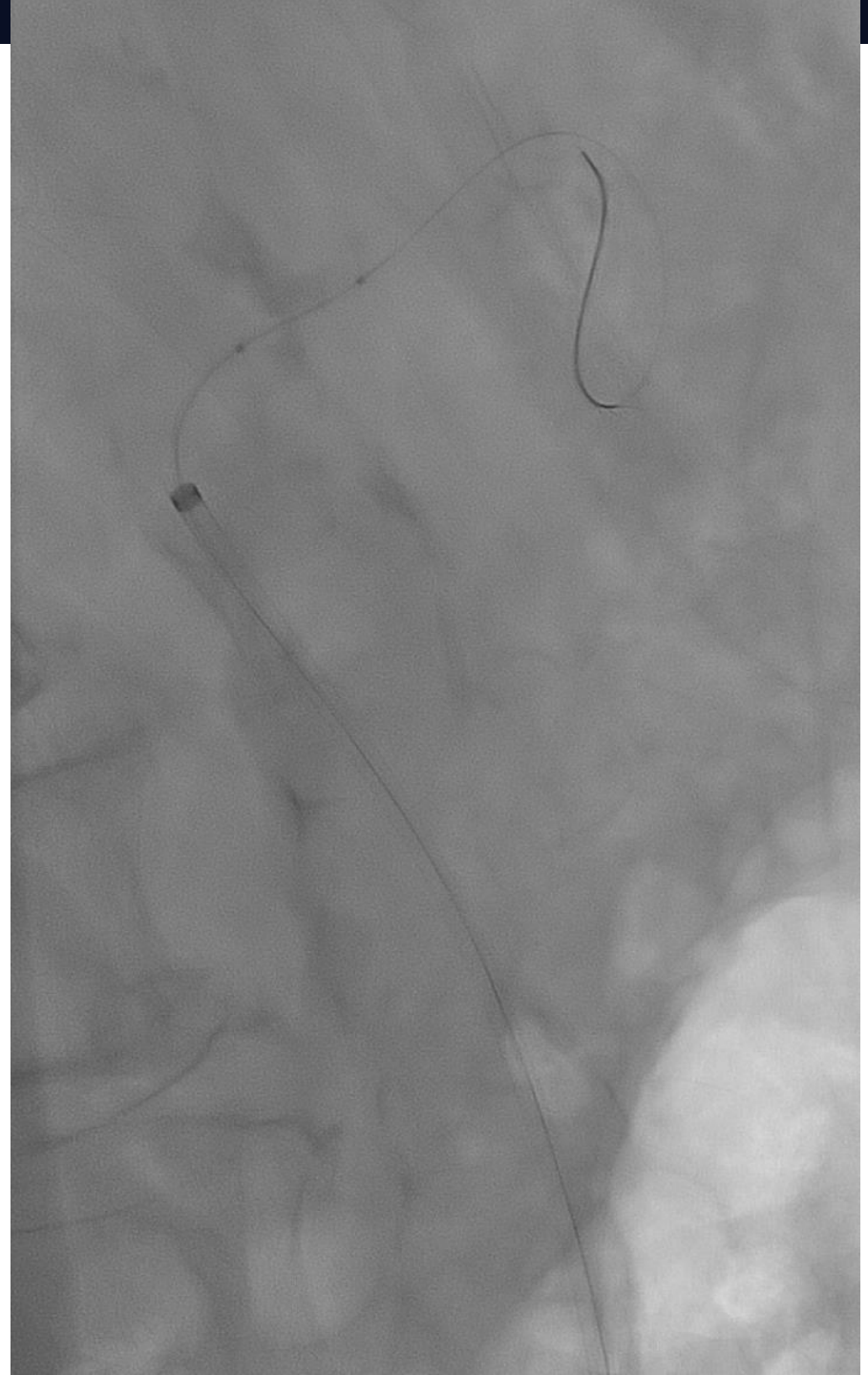

4 mm by 12 mm C2 balloon

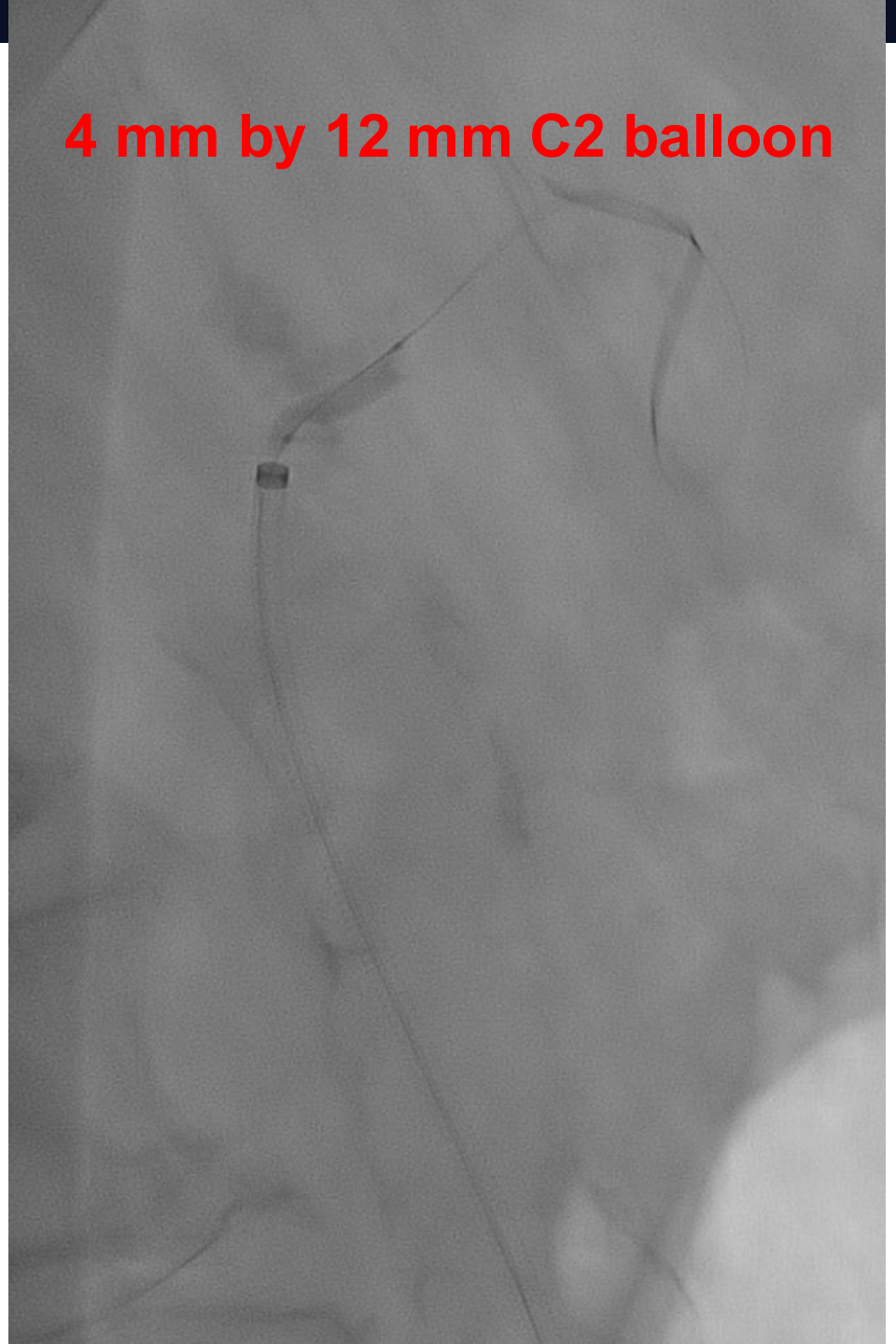

Express 0.018 5 mm by 14 mm

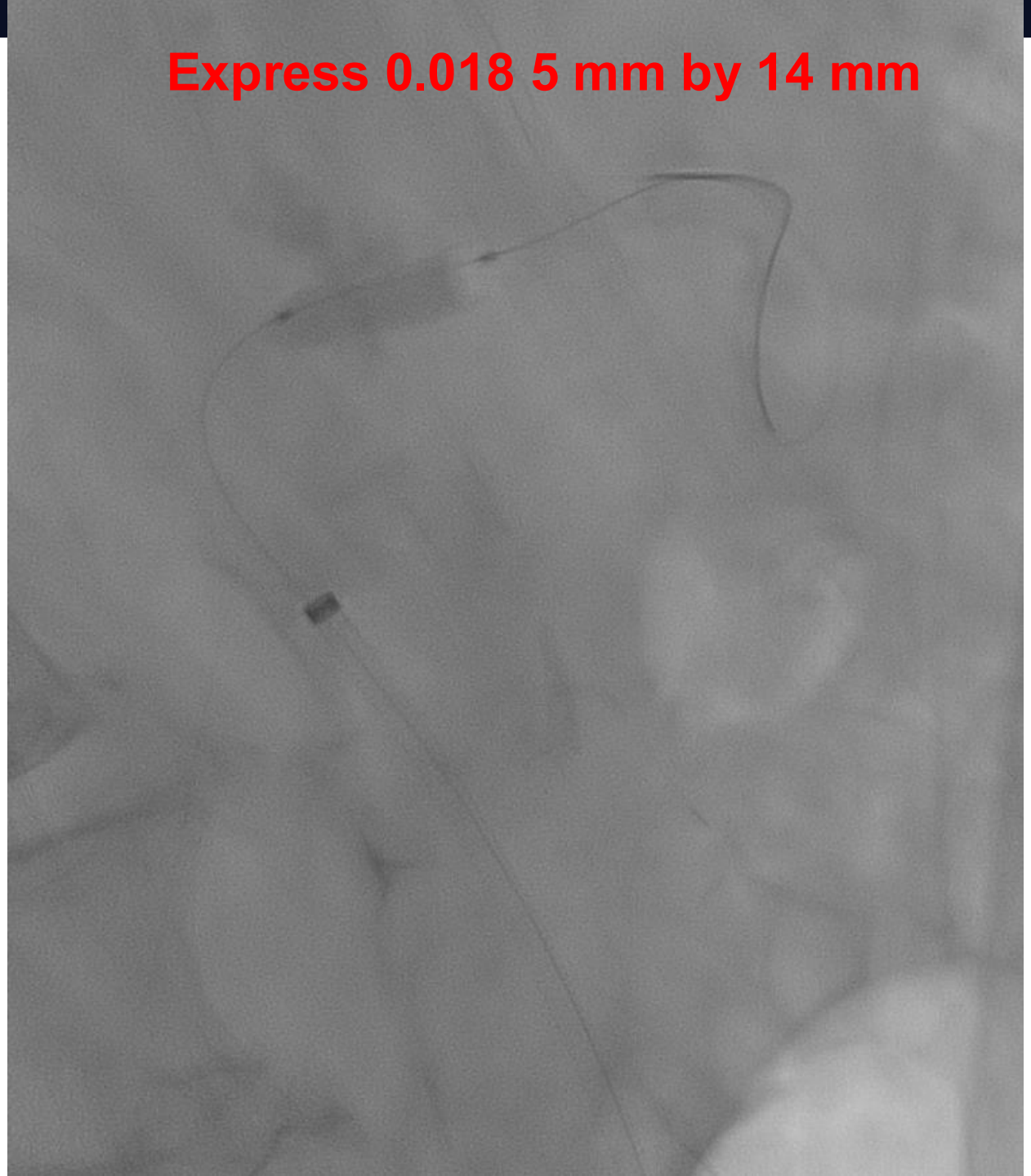


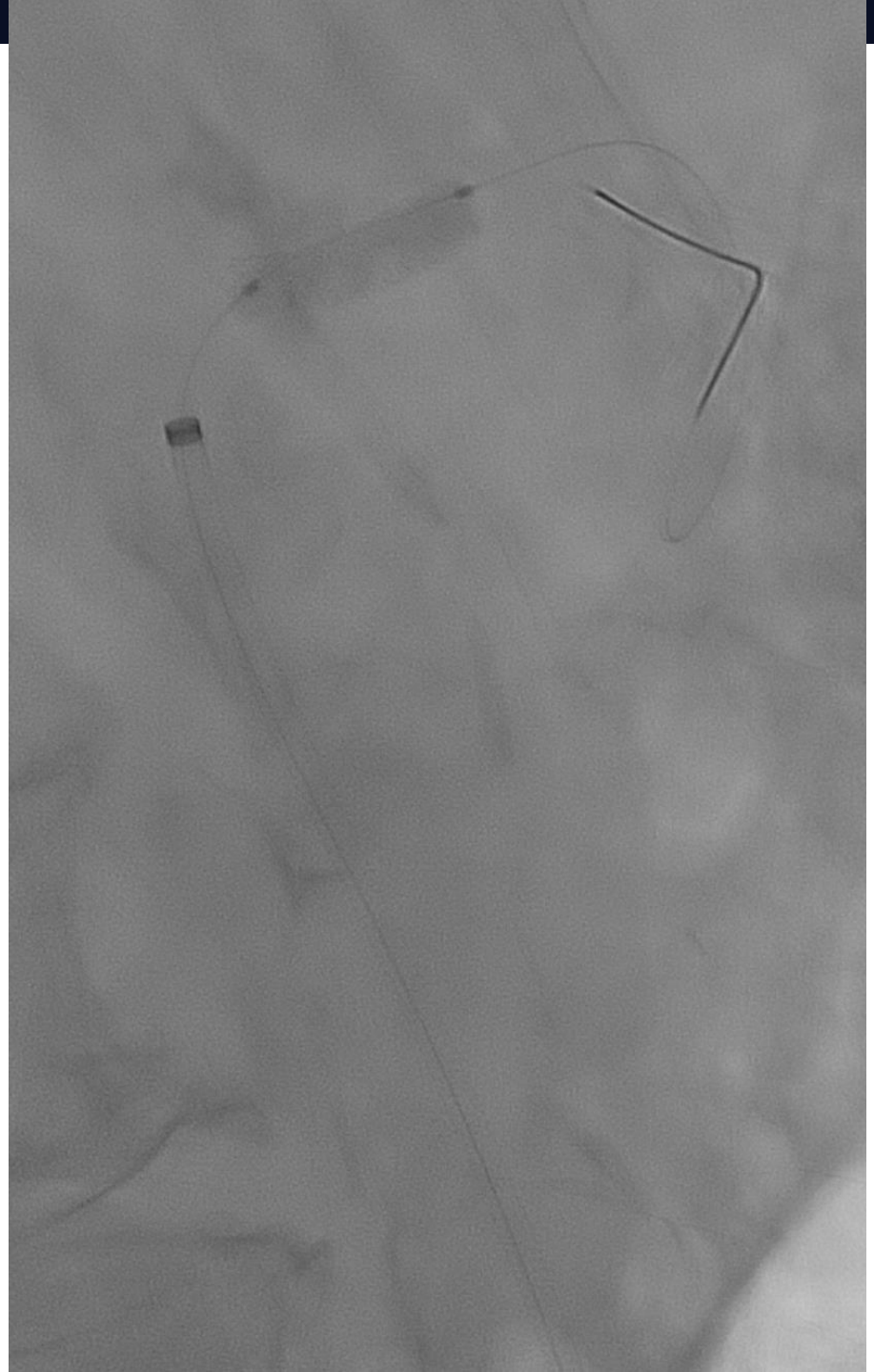


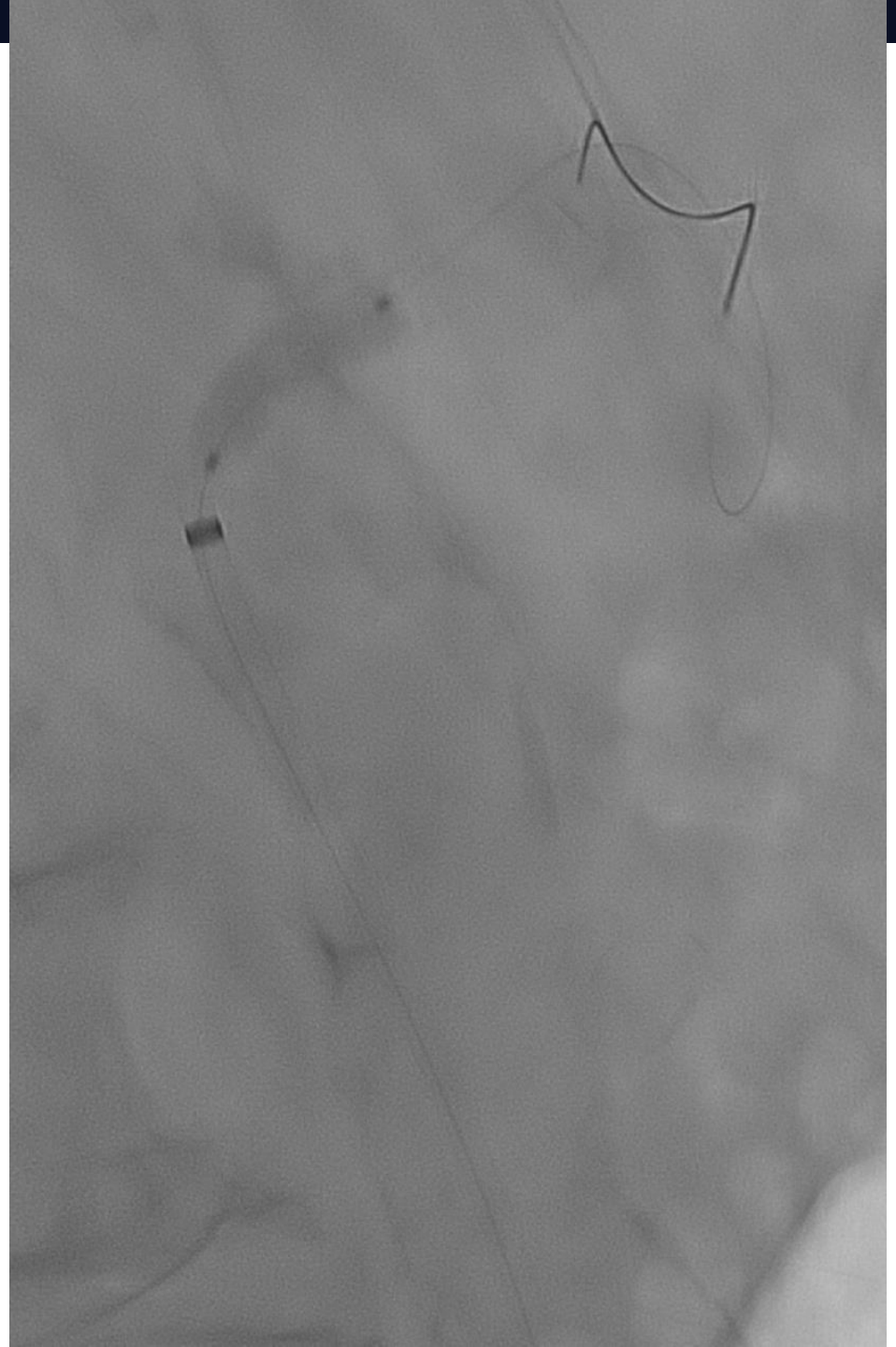


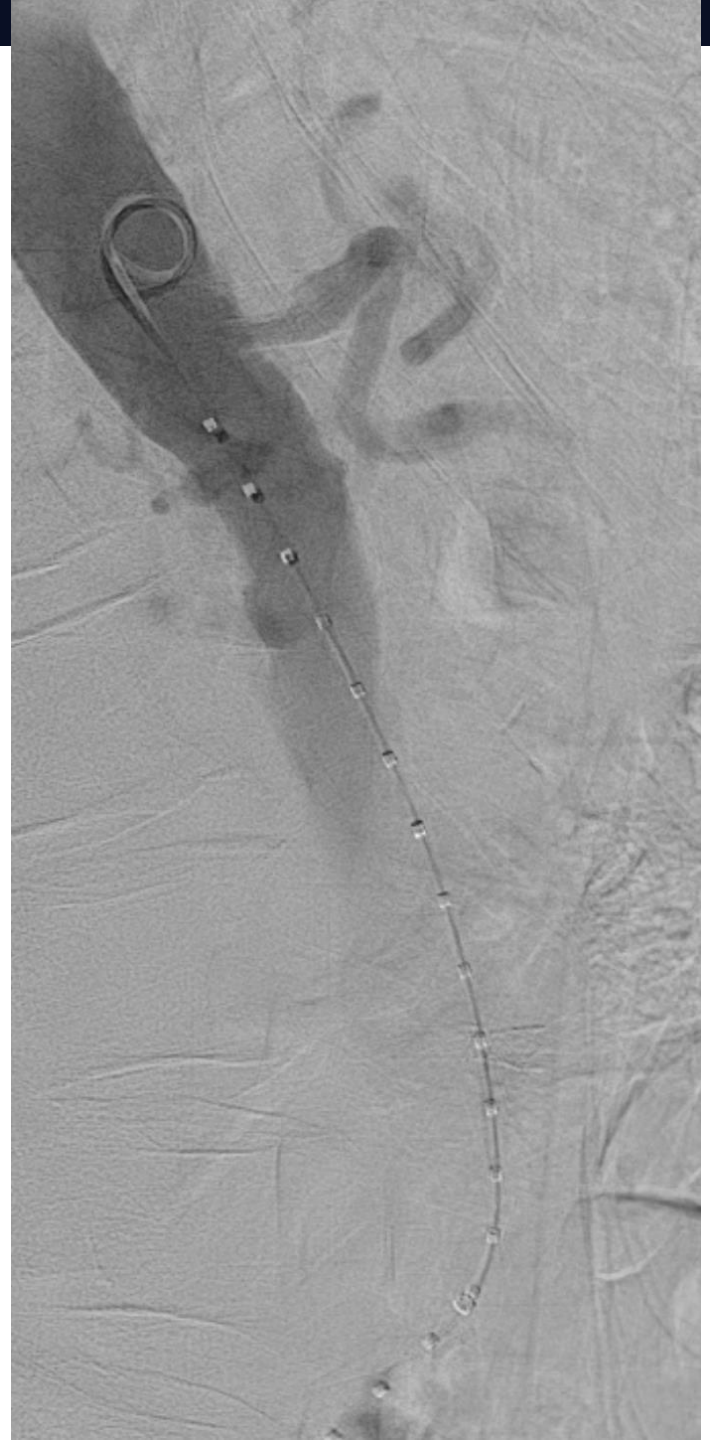


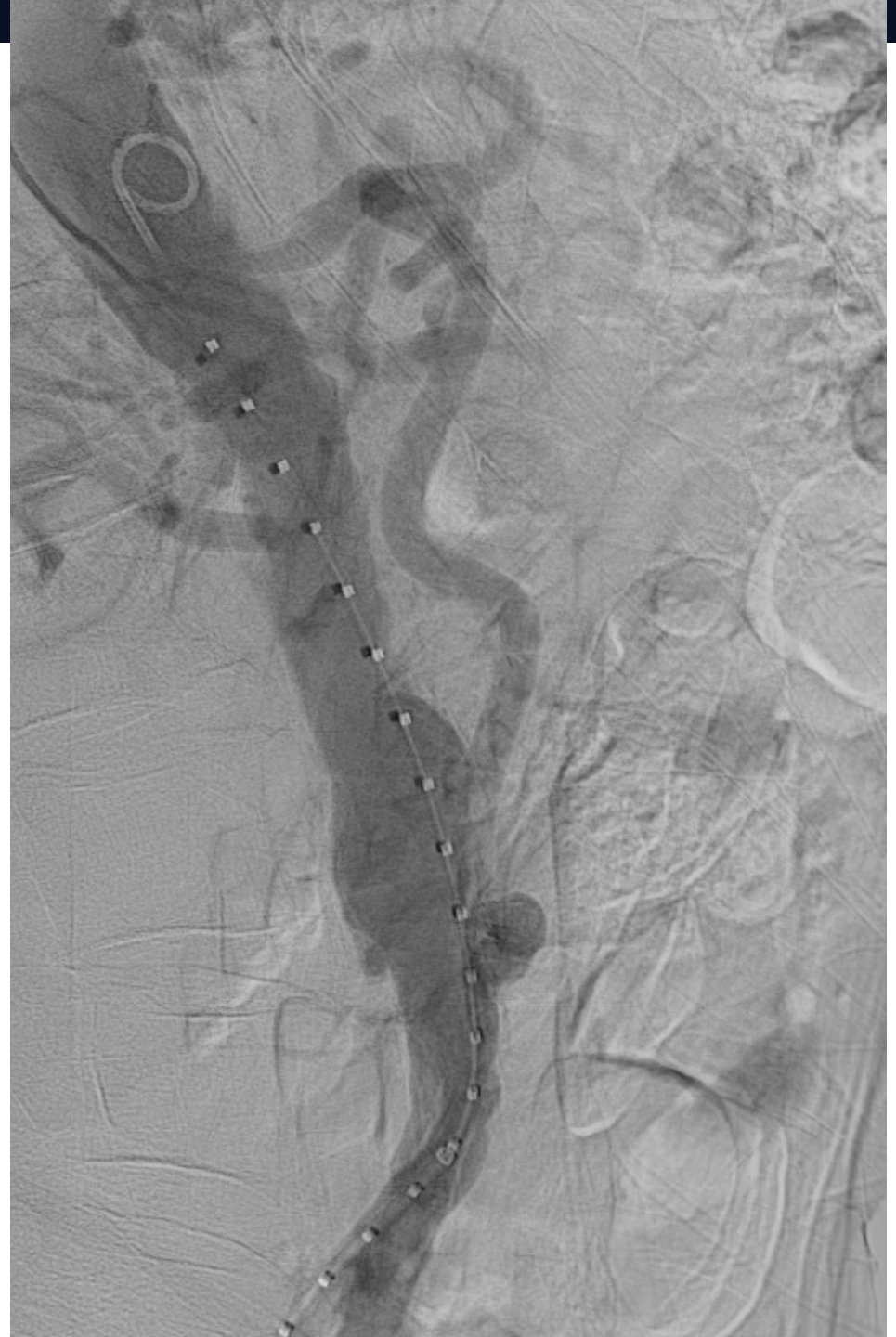

4 mm by 12 mm C2 balloon

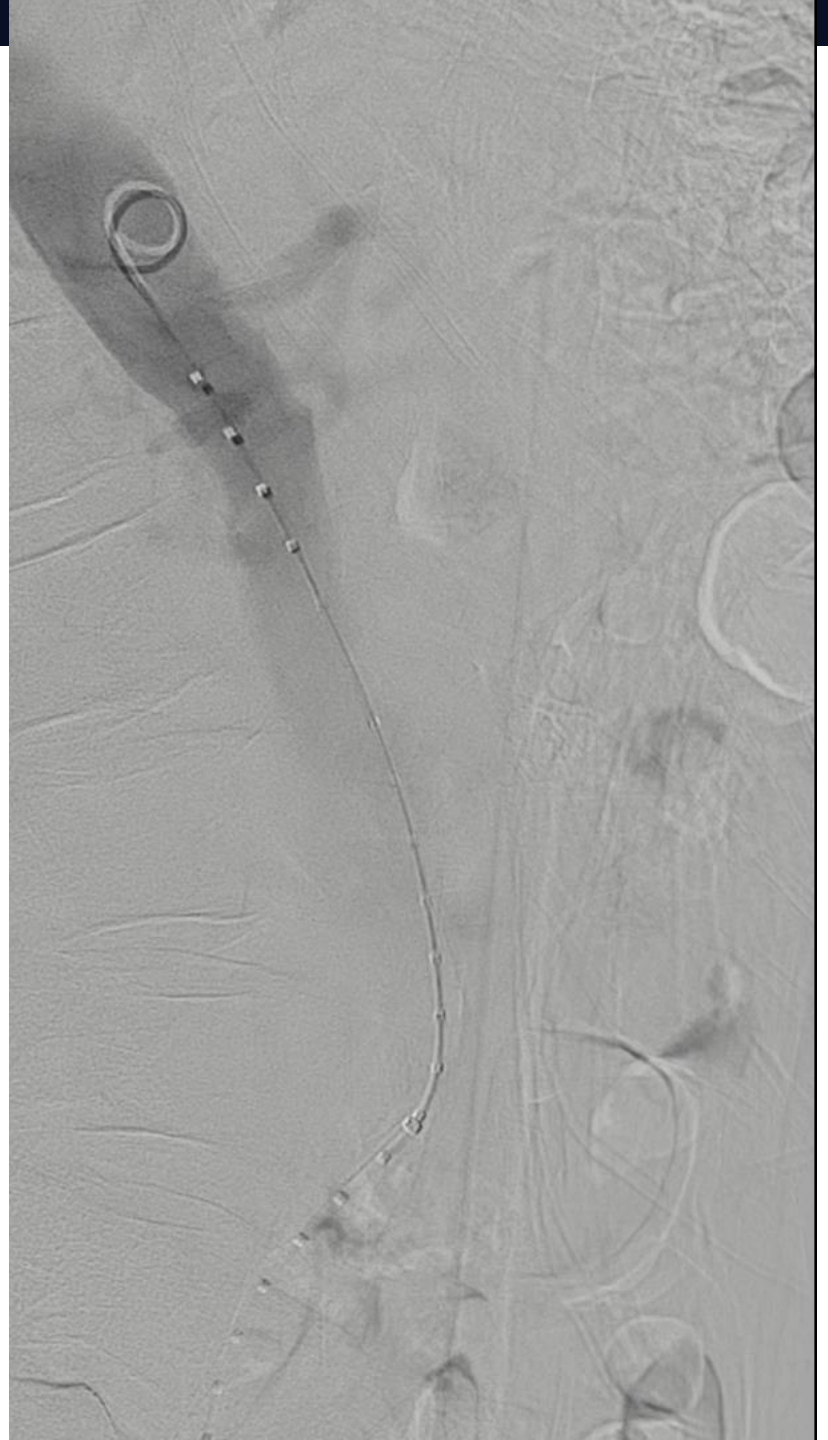

Express 0.018 5 mm by 14 mm











Thank You

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BAPTIST HEALTH SOUTH FLORIDA

Miami Cardiac & Vascular Institute
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Q&A