

DIYABETİK AYAKTA ENDOVASKÜLER GİRİŞİMLER TANIDAN TEDAVİYE NEREDEYİZ?

Dr. BURÇAK GÜMÜŞ

**GİRİŞİMSEL RADYOLOJİ ÜNİTESİ
MEDİCANA ATAŞEHİR HASTANESİ**

Kritik Ayak İskemisi



- CLI periferik arter hastalığının en ilerlemiş safhasıdır.
- İnfrapopliteal hastalık , hayat kısıtlayıcı kladikasyo ve KAI nin en sık sebebidir.
- **İnfrapopliteal hastalık insidansı ile DM prevalansı arasında çok güçlü bir korelasyon bulunmaktadır.**
- 6 aylık mortalite % 20 ve 5 yıllık mortalite % 50 olarak bildirilmektedir (Eşlik eden diğer kardiyovasküler hastalıkların varlığına bağlı olarak).
- 6 aylık amputasyon oranı % 10-40 arasında değişim göstermektedir.
- **KAI, tüm dünyada gerçekleştirilen ampütasyonların yaklaşık % 90 ından sorumludur.**

DİYABETİKLERDE KAI

Diabetic foot ulcer severity predicts mortality among veterans with type 2 diabetes

Meghan B. Brennan^{a,b,c}, Timothy M. Hess^{a,b}, Brian Bartle^c, Jennifer M. Cooper^d, Jonathan Kang^b, Elbert S. Huang^{c,d}, Maureen Smith^a, Min-Woong Sohn^{c,e}, and Christopher Crnich^{a,l}

^aUniversity of Wisconsin School of Medicine and Public Health, 1685 Highland Ave, Madison, WI 53705

Article

Impact of Diabetes Mellitus on Critical Limb Ischemia With Below the Knee Disease: Japan Below-the-Knee Artery Treatment Subanalysis

Conclusions: Mortality, AFS, and TVR showed no significant difference between the 2 groups, but major amputation was more frequent in DG. Not only revascularization but also infection and diabetes control were very important for limb salvage in DG.

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- KAI, diyabetiklerde ortaya çıktığında bunun anlamı bu bir tıbbi acil durumdur.
- Major amputasyon riski normal popülasyona göre diyabetik grupta **10-30** kez artmıştır.
- Başlangıçta ki diyabetik ayak ülserinin ciddiyeti, takip eden mortaliteyi gösterme açısından koroner arter hastalığı, periferik arter hastalığı veya stroke a göre çok daha anlamlı bir göstergedir.

DIYABET ve KAI

Article

Impact of Diabetes Mellitus on Critical Limb Ischemia With Below the Knee Disease: Japan Below-the-Knee Artery Treatment Subanalysis

Conclusions: Mortality, AFS, and TVR showed no significant difference between the 2 groups, but major amputation was more frequent in DG. Not only revascularization but also infection and diabetes control were very important for limb salvage in DG.

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- Yara iyileşmesinde gecikme

- Amputasyon

- Kötü QOL

- Kardiyovasküler hastalık

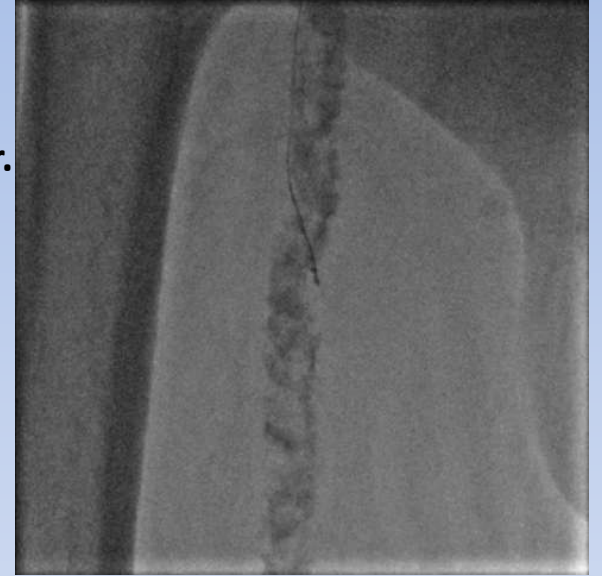
- Prematür ölüm

- DFU ve LEA QoL için kötü göstergeler olmalarının ötesinde prematür ölüm içinde bağımsız risk faktörleridir.



DİYABETİK VASKÜLOPATİ

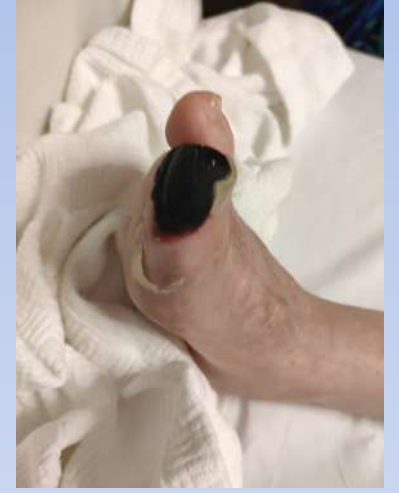
- Yoğun **KALSİFİKASYON** yükü
- DM varlığında **OKLUZİV** lezyonlar **STENOZ** lardan daha sıktır.
- Çok seviyeli, uzun segment ve **multisegmenter** hastalık
- Hem **inflow** hem de **outflow** lezyonları
- **Kollateral** azlığı



- **DİYABET NİSBETEN PEDAL SİRKÜLASYONUN KORUNDUĞU UZUN SEGMENT OKLUZİV LEZYONLARIN DOMİNANT OLDUĞU TEMEL OLARAK DİZALTI TUTULUMUYLA SEYREDEN BİR VASKÜLOPATİYE SEBEP OLUR.**

PROGNOZ

- Diyabetik hastaların **% 19-34** ü hayatları boyunca ayak ülseri geliştirirler.
- **Ülser rekürrensi** için de insidans oldukça yüksek olup bu oran ilk sene için **% 40** a, 5 sene de **% 65** e ve 10 sene içinse **% 90** a ulaşmaktadır.
- **Diyabetik ayak ülseri için en büyük riskte geçirilmiş DFU dir.**

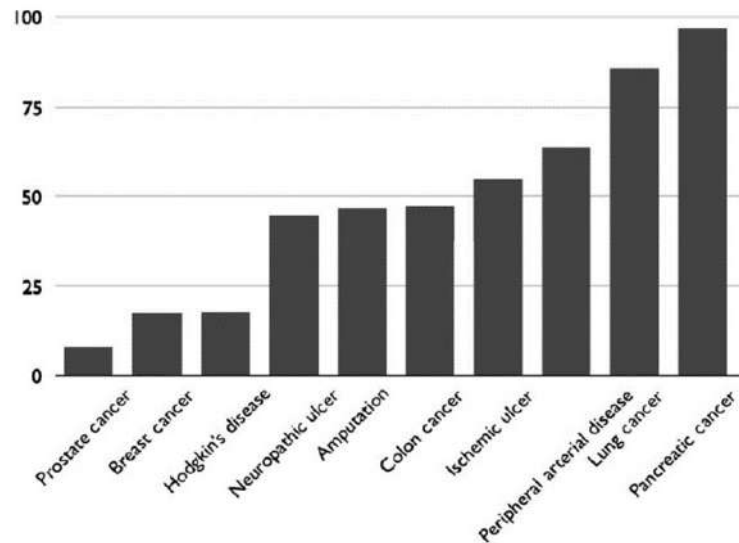


- ALARM veren bir başka data ise alt ekstremitte amputasyonuna giden hastaların **% 50 si** 5 sene içerisinde hayatını kaybediyor.
- Charcot, DFU, minör and major amputasyonlar için **5 yıllık mortalite** sırasıyla **% 29.0, 30.5, 46.2 and 56.6** olup bu oran özellikle **kronik böbrek hastalığı** ve eşlik eden diğer **ko-morbiditeleri** olan gruplarda daha da yüksektir.

KANSER VE DİYABET

Guest Editorial: Are diabetes-related wounds and amputations worse than cancer

ARTICLE #7 INTERNATIONAL WOUND JOURNAL · JANUARY 2008



Armstrong et al. *Journal of Foot and Ankle Research* (2020) 13:16
<https://doi.org/10.1186/s13047-020-00383-2>

Journal of
Foot and Ankle Research

COMMENTARY

Open Access



Five year mortality and direct costs of care for people with diabetic foot complications are comparable to cancer

David G. Armstrong*, Mark A. Swerdlow, Alexandria A. Armstrong, Michael S. Conte, William V. Padula and Siccio A. Bus

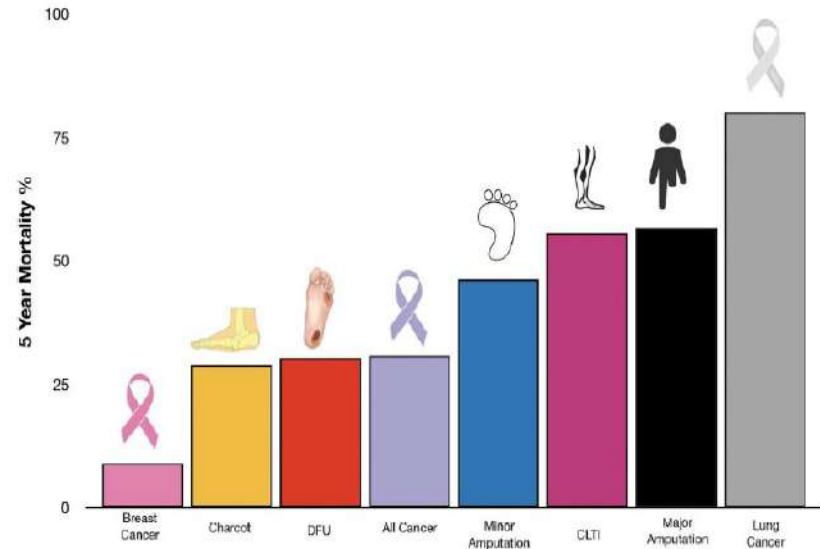
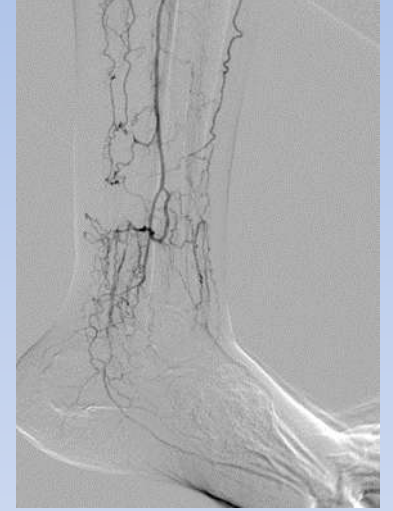


Fig. 1 Five Year Mortality of Diabetic Foot Complications and Cancer. Diabetic foot complications compared to cancer. DFU = diabetic foot ulcers [11] = 30.5%. Charcot = Charcot neuroarthropathy of the foot [14]. All Cancer = pooled 5 year survival of all cancers [11]. CLTI = chronic limb threatening ischemia [28, 29]. Major Amputation = above foot amputation [20–22, 26, 27]. Minor Amputation = foot level amputation [17, 27]

DİYABETİN VASKÜLER AYAK İZLERİ

- **İliak** tutulum çok nadir (% 1 in altında)
- **Femoropopliteal** tutulum rölatif olarak az
- Tüm lezyonların % 74 ü dizaltında
- Bunların da % 66 sı oklüzyon



- Dizaltı tutulumunun % 50 sini 10 cm nin üzerinde oklüzyonlar oluştururken, bu oran femoropopliteal bölgede sadece % 11 dir.

DİYABETİN VASKÜLER AYAK İZLERİ

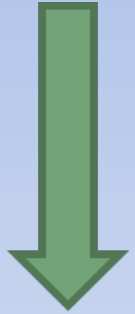
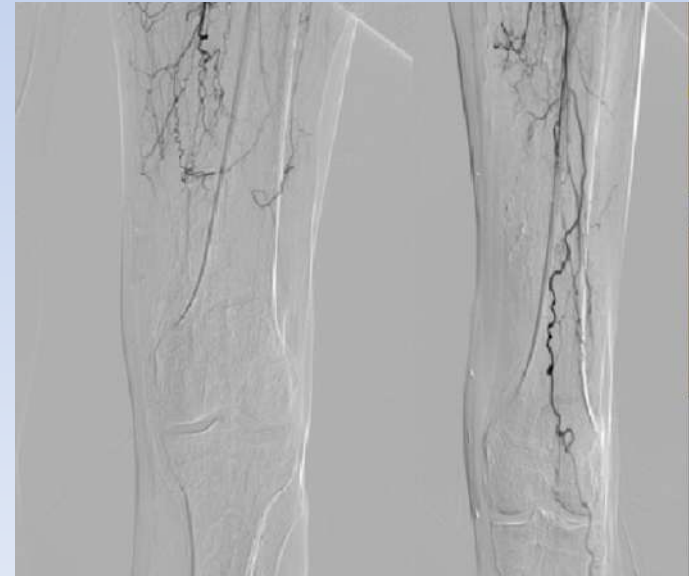
KALSİFİKASYON YÜKÜ

- Revaskülarizasyon güçlüğü
- Tromboembolik komplikasyon artışı
- Artmış restenoz oranı



AZALMIŞ KOLLATERAL

- Akut okluziv hadiselere tolerans
- Yara iyileşmesinde

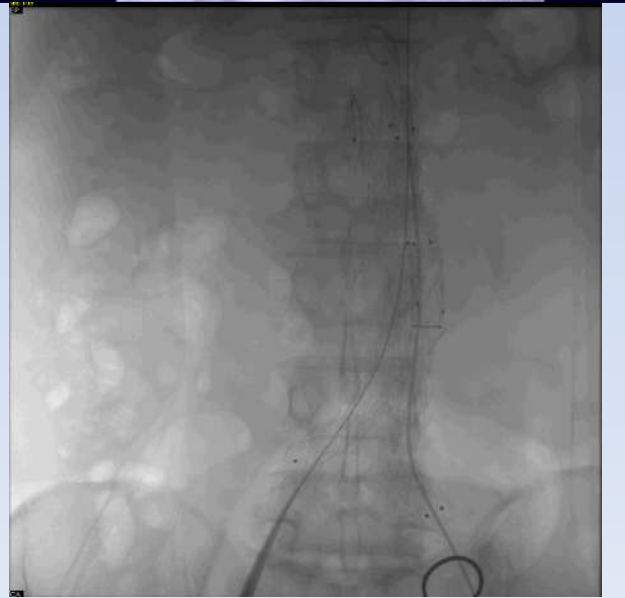
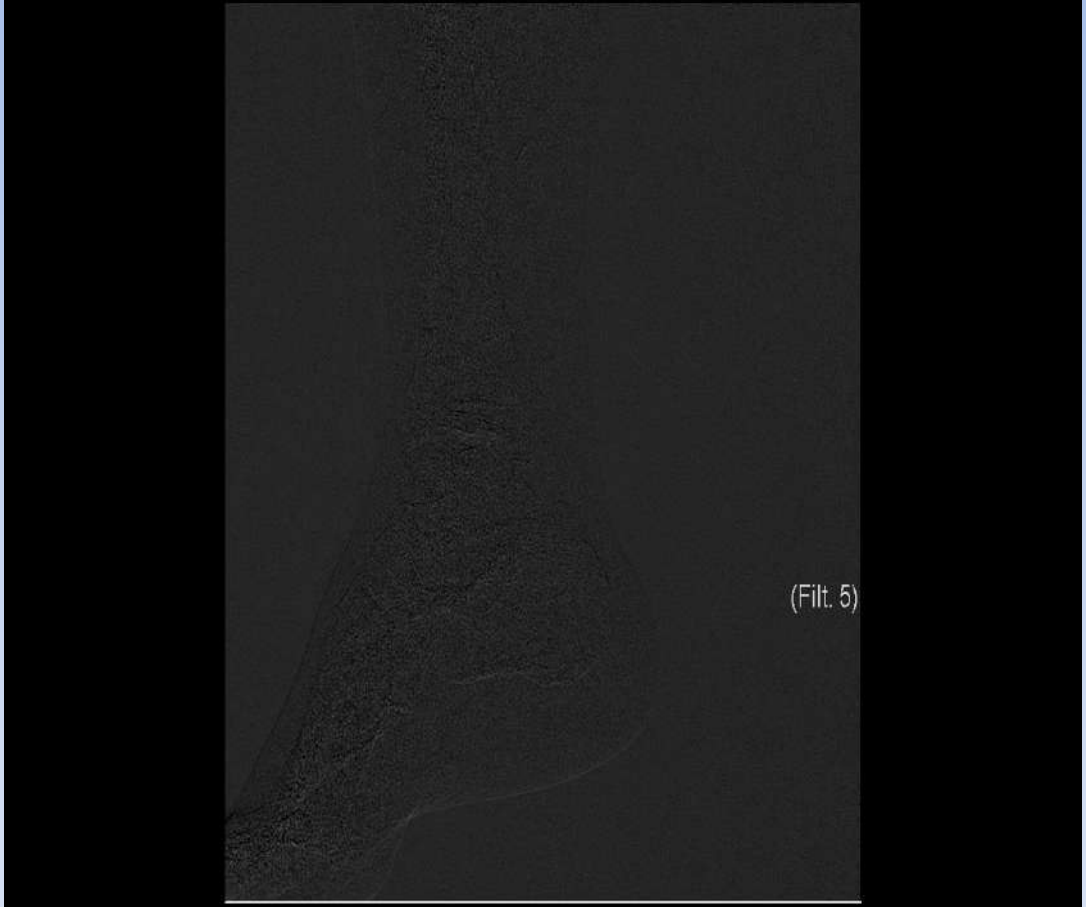


DİYABETİK NEFROPATİ

- Daha hızlı ilerleyen PAH
- Yoğun medial kalsifikasyon
- Azalmış kollateral formasyonu



- ESRD hasta grubunda PAH % 77 olarak bildiriliyor.
- Diyaliz, diyabetik hastalarda **ülserasyon** ve **amputasyon** için temel risk faktörlerinden biridir.
- **Diyalize girenlerde amputasyon oranı girmeyenlere göre 4.7 kez daha fazladır**
- **DİYABET, RENAL YETMEZLİK ve CLI özellikle revaskülarizasyon sonrası sonuçları KÖTÜ**



TASC II UPDATE

Special Article

An Update on Methods for Revascularization and Expansion of the TASC Lesion Classification to Include Below-the-Knee Arteries: A Supplement to the Inter-Society Consensus for the Management of Peripheral Arterial Disease (TASC II) The TASC Steering Committee*

Michael R. Jaff,¹ DO, Christopher J. White,² MD, Gerry R. Fowkes,³ MD, John Dormandy,⁴ DSc, Manmohan Razavi,⁵ MD, Jim Reekers,⁷ MD, and Lars Norgren,¹¹ MD, PhD

SOCIETY FOR VASCULAR SURGERY® DOCUMENT

The Society for Vascular Surgery Lower Extremity Threatened Limb Classification System: Risk stratification based on Wound, Ischemia, and foot Infection (WIFI)

Joseph L. Mills, Sr, MD,⁶ Michael S. Conte, MD,⁸ David G. Armstrong, DPM, MD, PhD,⁹ Frank B. Pomposelli, MD,¹⁰ Andres Schanzer, MD,¹¹ Anton N. Sidawy, MD, MPH,¹² and George Andros, MD,¹³ on behalf of the Society for Vascular Surgery Lower Extremity Guidelines Committee, Tucson, Ariz; San Francisco and Van Nuys, Calif; Brighton and Worcester, Mass; and Washington, D.C.

Critical limb ischemia, first defined in 1982, was intended to delineate a subgroup of patients with a threatened lower extremity primarily because of chronic ischemia. It was the intent of the original authors that patients with diabetes be excluded or analyzed separately. The Fontaine and Rutherford Systems have been used to classify risk of amputation and


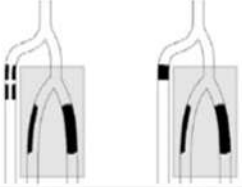
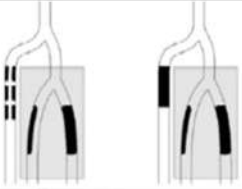

TASC A lesions		
Single focal stenosis, <5 cm in length, in the target tibial artery with occlusion or stenosis of similar or worse severity in the other tibial arteries.		
TASC B lesions		
Multiple stenoses, each <5 cm in length, or total length <=10 cm or single occlusion <=3 cm in length, in the target tibial artery with occlusion or stenosis of similar or worse severity in the other tibial arteries.		
TASC C lesions		
Multiple stenoses in the target tibial artery and/or single occlusion with total lesion length >10 cm with occlusion or stenosis of similar or worse severity in the other tibial arteries.		
TASC D lesions		
Multiple occlusions involving the target tibial artery with total lesion length >10 cm or dense lesion calcification or non-visualization of collaterals. The other tibial arteries occluded or dense calcification.		

Fig. 3. Inter-Society Consensus for the Management of Peripheral Arterial Disease (TASC) classification of infrapopliteal lesions. The unshaded area represents the target lesion; area inside the shaded rectangle represents typical background disease (see text for further ex-

Spiliopoulos S *et al.* Minimally invasive treatment of diabetic foot

Table 1 Wound Ischemia and foot infection score			
Score	Wound	Ischemia (Toe pressure TcPO ₂)	Foot infection
0	No ulcer and no gangrene	60 mmHg	Uninfected
1	Small ulcer no gangrene	40-59 mmHg	Mild (< 2 cm cellulitis)
2	Deep ulcer and gangrene limited to toes	30-39 mmHg	Moderate (> 2 cm cellulitis/purulence)
3	Extensive ulcer or extensive gangrene	< 30 mmHg	Severe (systemic response/sepsis)

TcPO₂: Transcutaneous oxygen pressure.

- Klinik başarı ve amputasyon riskine göre 3 temel noktaya dayandırılır:
- Wound
- Ischemia
- Foot Infection

TASC II VE DİYABET

Type A Lesions

- Single Stenosis ≤ 10 cm in Length
- Single Occlusion ≤ 5 cm in Length

Type B Lesions

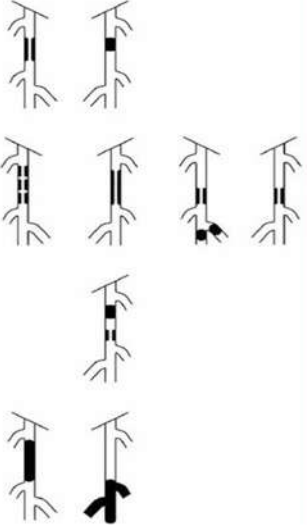
- Multiple Lesions (Stenoses or Occlusions), Each ≤ 5 cm
- Single Stenosis or Occlusions ≤ 15 cm Not Involving the Infrageniculate Popliteal Artery
- Single or Multiple Lesions in the Absence of continuous Tibial Vessels to Improve Inflow for a Distal Bypass
- Heavily Calcified Occlusion ≤ 5 cm in Length
- Single Popliteal Stenosis

Type C Lesions

- Multiple Stenoses or Occlusions Totaling >15 cm With or Without Heavy Calcification
- Recurrent Stenoses or Occlusions That Need Treatment After 2 Endovascular Interventions

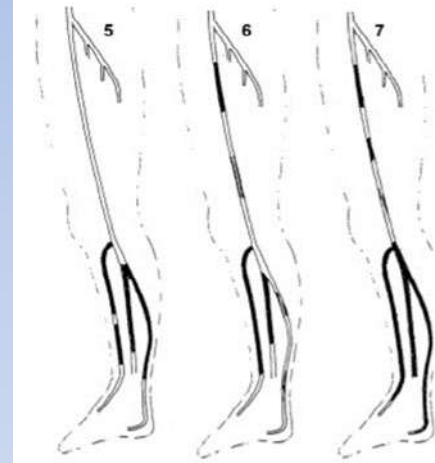
Type D Lesions

- Chronic Total Occlusions of CFA or SFA (>20 cm, Involving the Popliteal Artery)
- Chronic Total Occlusion of Popliteal Artery and Proximal Trifurcation Vessels



Vascular Involvement in Diabetic Subjects with Ischemic Foot Ulcer: A New Morphologic Categorization of Disease Severity

L. Graziani,^{1*} A. Silvestro,¹ V. Bertone,² E. Manara,³ R. Andreini,⁴ A. Sigala,⁵ R. Mingardi⁶ and R. De Giglio⁷



TASC II yeni teknikler ve dedike medikal enstrümanları içermez. Bugün TASC C ve D lezyonlar için bile öncelik ENDO

Diyabet MULTİLEVEL bir hastalık oysa TASC II anatomik bölgelere göre sınıflama yapar ve her lezyon bağımsız değerlendirilir

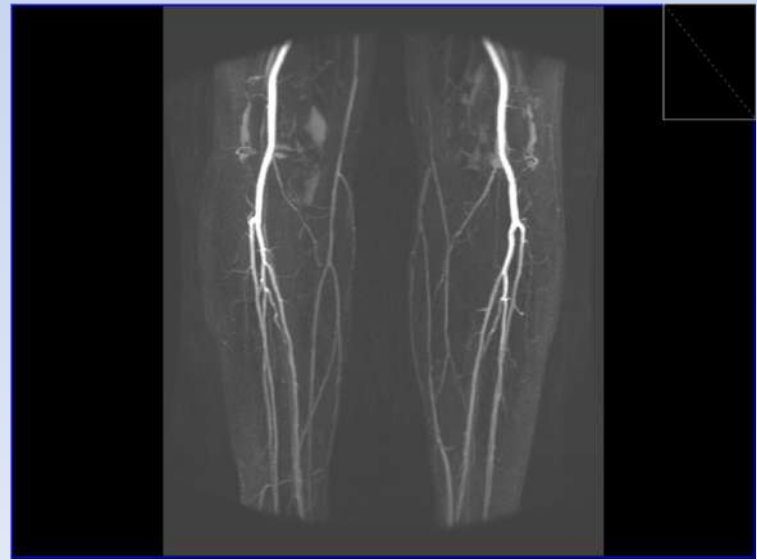
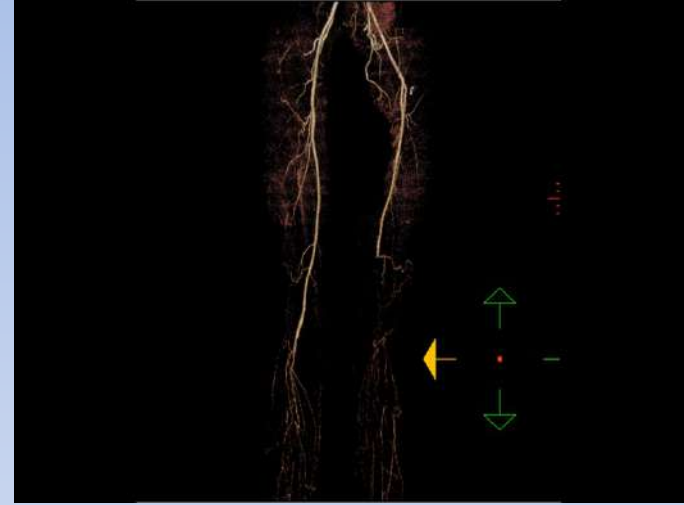
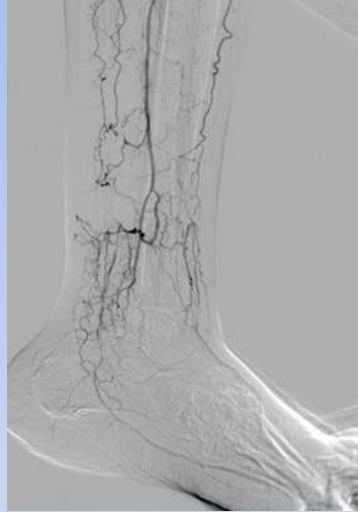
TASC II dizaltı sınıflaması için dar kapsamlı ve plantar ark revaskülarizasyonundan hiç bahsetmez

TANI

– Klinik Testler

– Görüntüleme

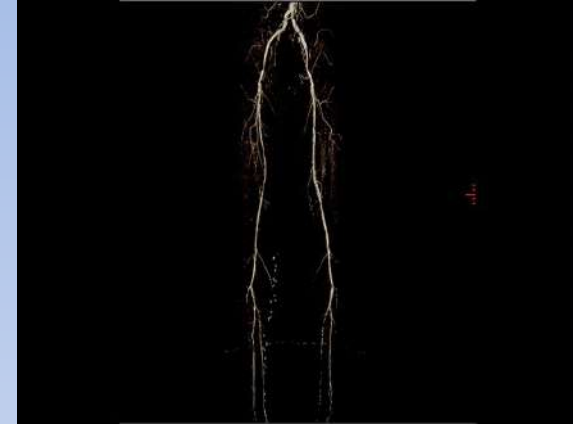
- USG
- BTA
- MRA
- Konvansiyonel DSA
- CO2 angiography***



VASKÜLER GÖRÜNTÜLEME-1

Table 8.2 Pros and cons of CTA, MRA, and contrast arteriography

	Pros	Cons
CTA	Noninvasive	Radiation exposure
	Fast scanning time	Contrast volume
	Good image resolution	Reactions to contrast
	Multiplanar and 3D reconstructions	
MRA	Noninvasive	Lowest image resolution
	No radiation exposure	Slow scanning time
	3D reconstructions	Nephrogenic systemic fibrosis
Contrast arteriography	Gold standard	Invasive
	Best image resolution	Radiation exposure
	Allows for diagnosis and treatment	Access site complications
		Reactions to contrast



- Özellikle selektif olduğunda hala **DSA ALTIN STANDART!!!**
- MRA ve BTA şüpheli ya da kesin olduğunda mutlaka **DSA !!!**
- **CE-MRA** ın özellikle distal pedal arterleri görüntülemeye DSA dan bile üstün olduğunu gösteren yayınlar var.
- **MRA in-stent stenozu göstermede başarısız.**
- Kalsifiye damarlarda BTA da **calcium blooming** ve **beam hardening artefaktları** nedeniyle stenoz oranını belirlemek zor

DİYABET ve KONTRAST NEFROPATİ


Commentary

Carbon Dioxide Automated Angiography in Patients With a High Risk of Contrast-Induced Nephropathy Who Undergo Percutaneous Interventions for Critical Limb Ischemia

Filippo Scalise, MD, FACC, FESC¹

Keywords
angioplasty, automated carbon dioxide angiography, chronic kidney disease, contrast media, critical limb ischemia, diabetic foot, endovascular interventions, iodinated contrast, pedal arteries, transcutaneous oxygen pressure

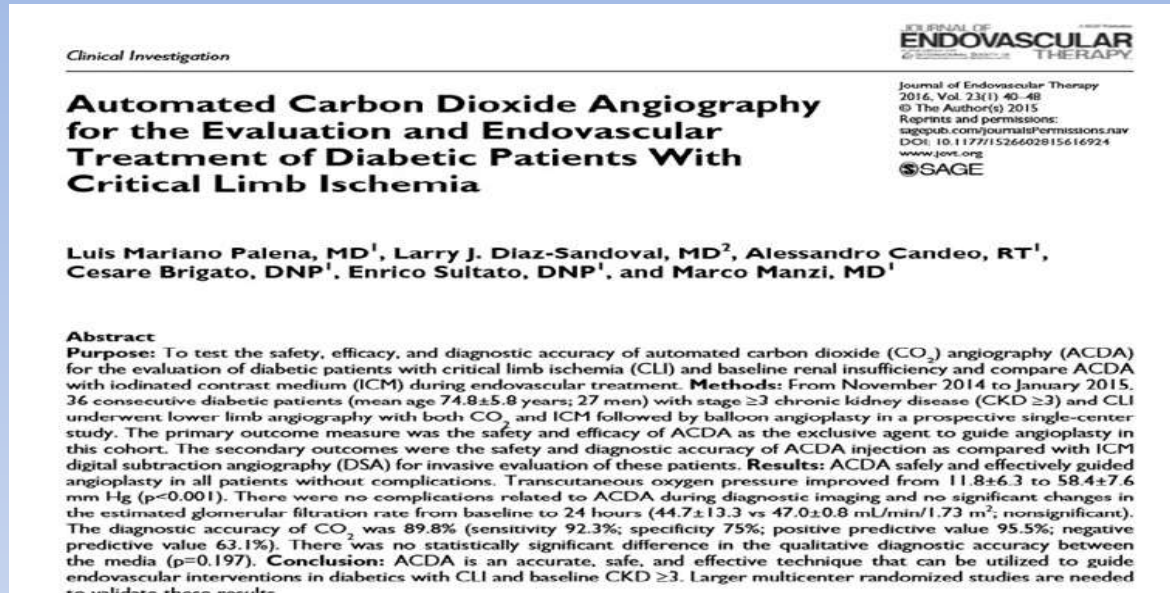
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THERAPY.
A SAGE PUBLICATION

Journal of Endovascular Therapy
2016, Vol. 23(1) 49–51
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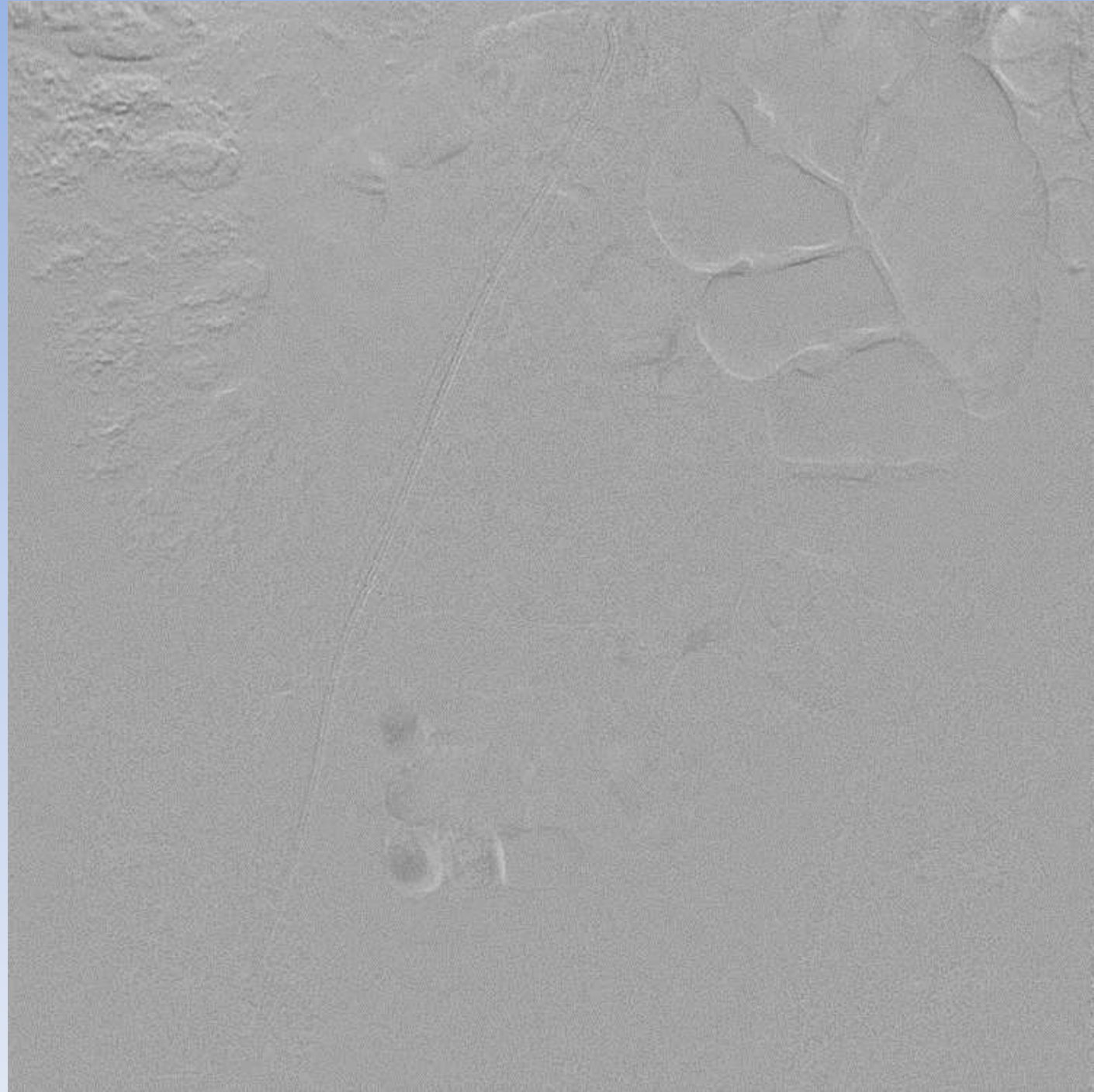
In a case series of **127** patients with Intermittant claudication and CLI about **%45** of patients had renal artery stenosis . Of these patients **% 16** were severe, **% 17** intermediate degree and **% 12** had bilateral renal artery lesions.

In 76 patients of **PAD with normal serum creatinin levels** who had undergone angiography, it is detected that **% 86** of these patients had abnormal creatinin clearence and **% 65** had **GFR** below **60mL/min**

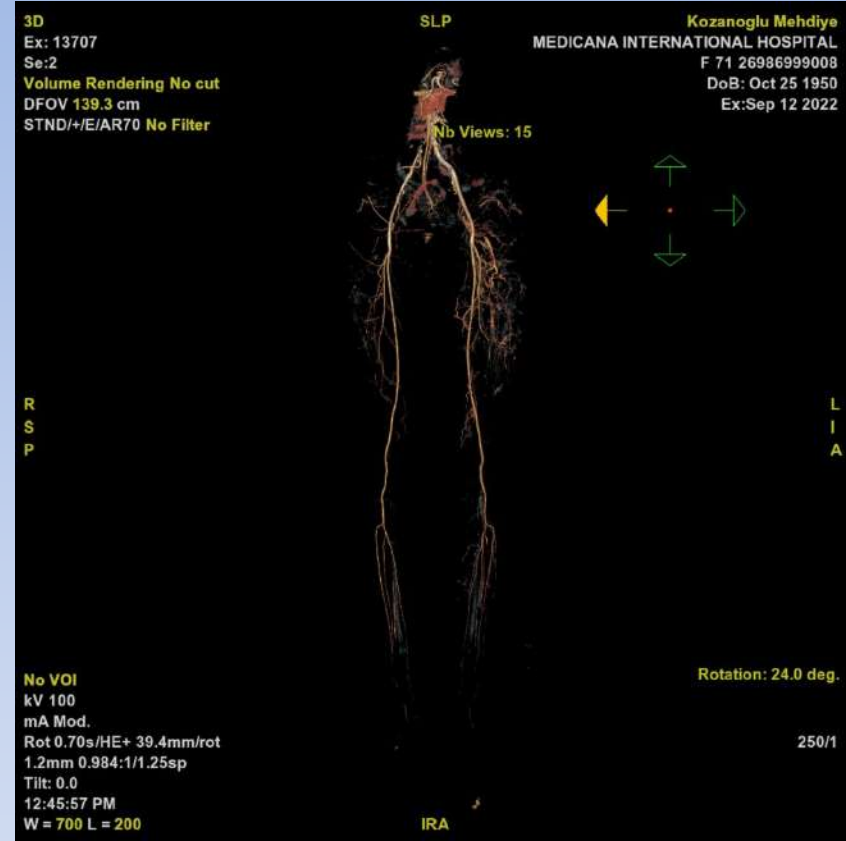
CO₂ ANJİYOGRAFI

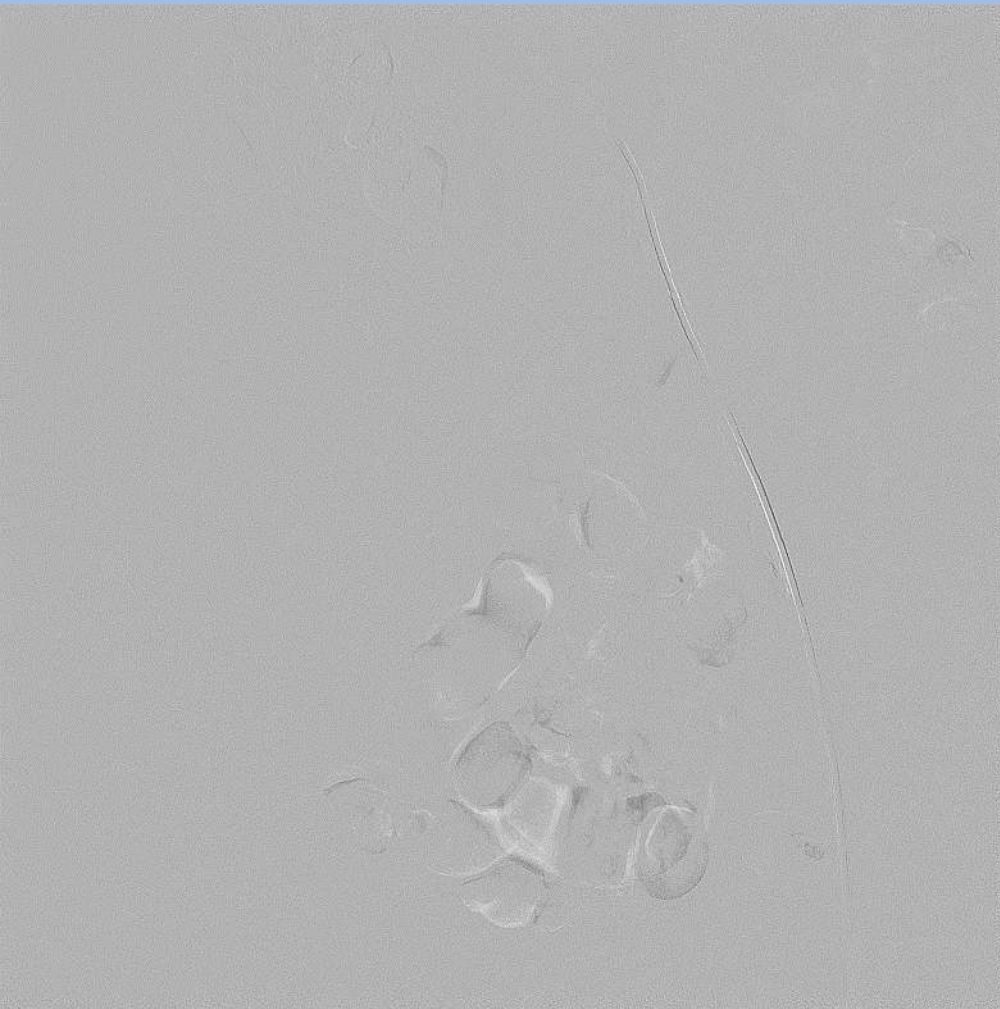


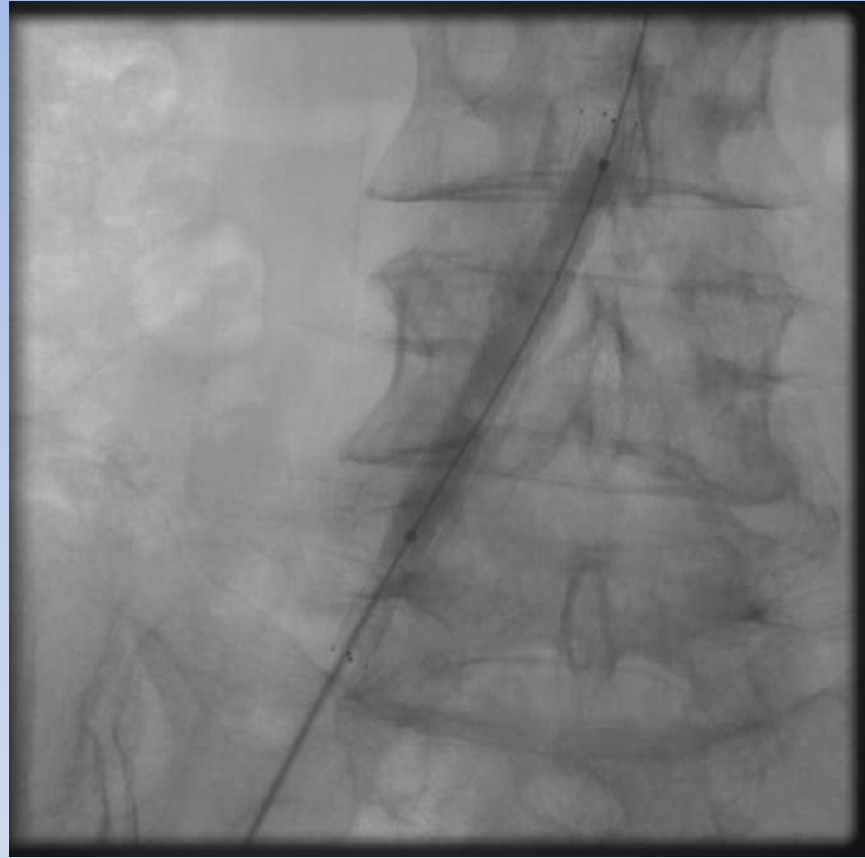
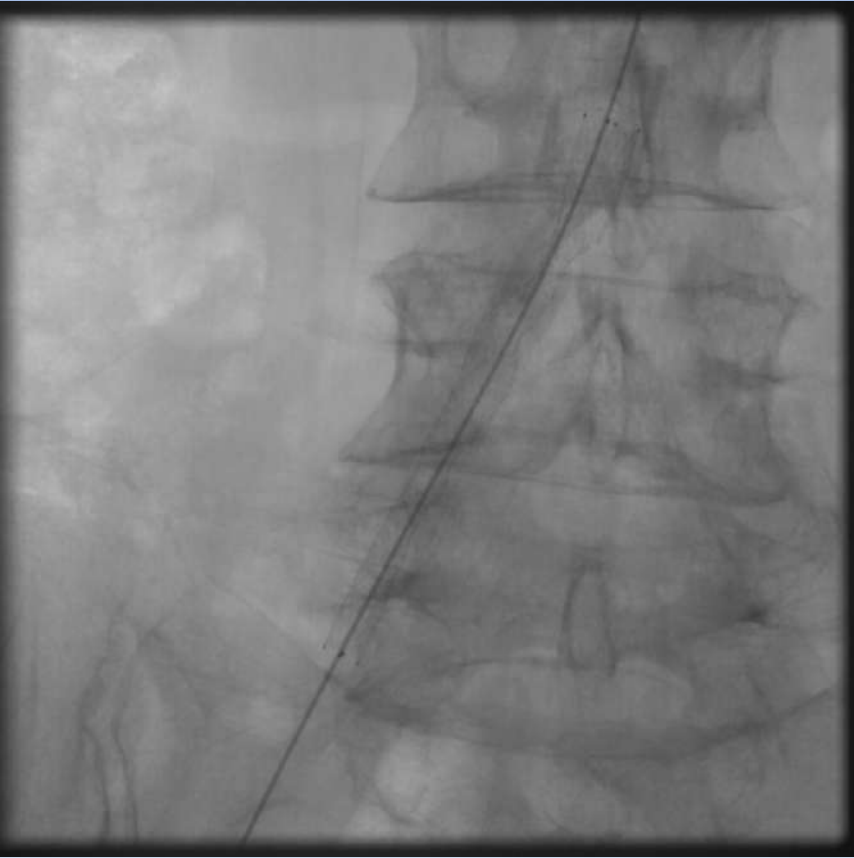
- 36 Diabetik CLI hastası
- Stage 3 CKD
- Antegrade SFA access
- Diagnostik angiografi ve PTA (aynı seansta)
- Minor Complications:
 - Transient limb and abdominal pain, diarea
- Major Complications:
 - Non –obstructing mesenteric ischemia (Mortal)

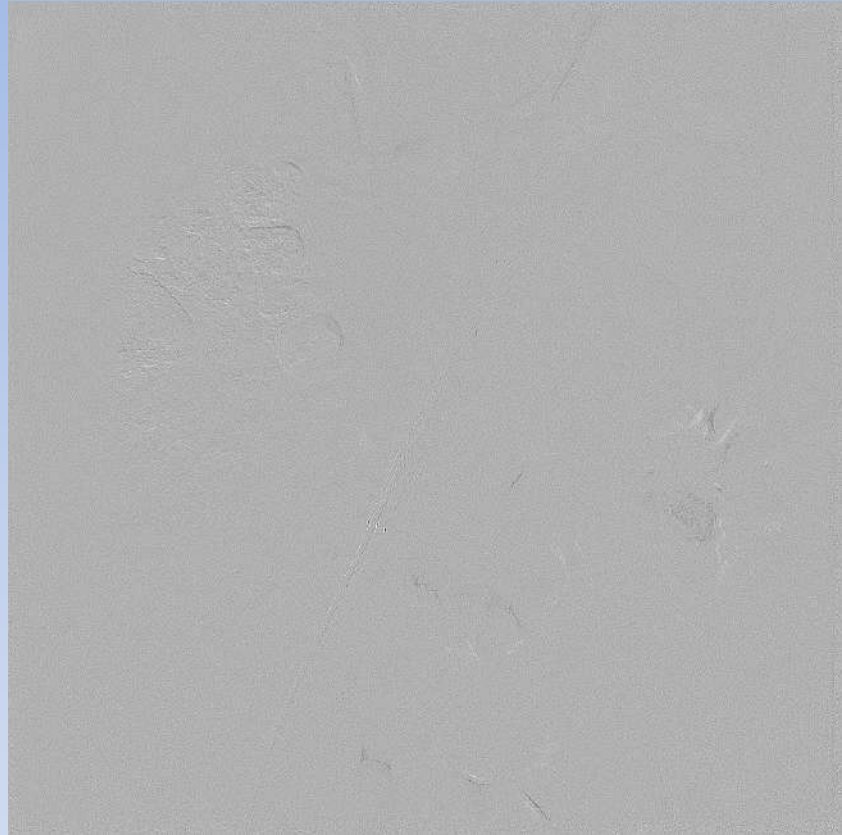
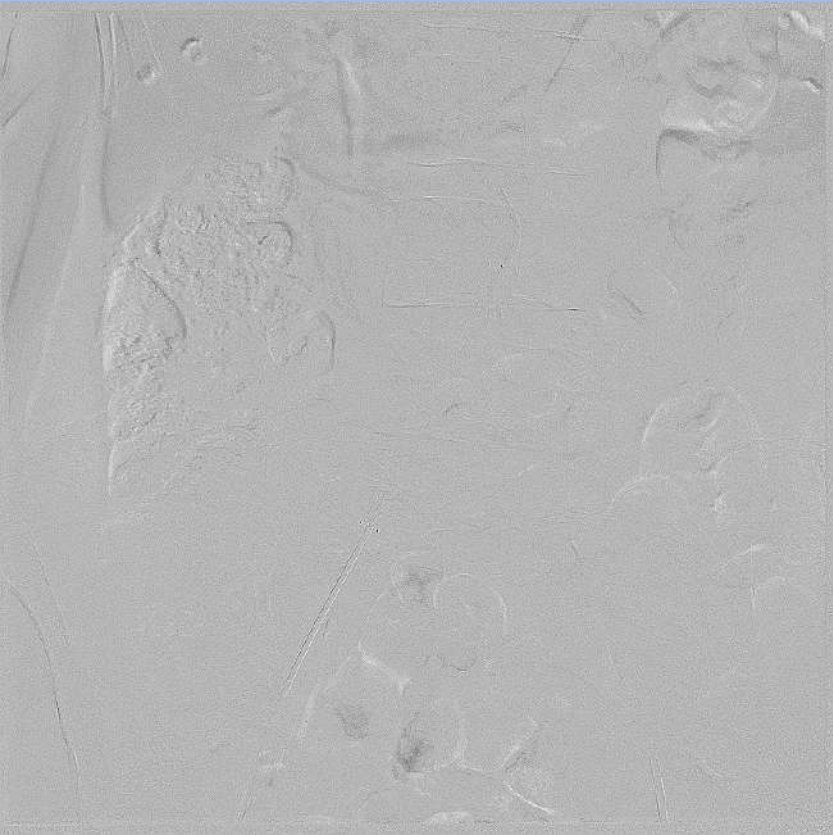


- **72 yař kadın**
- **Kısa mesafe yürümek ile oluşun ağrı**

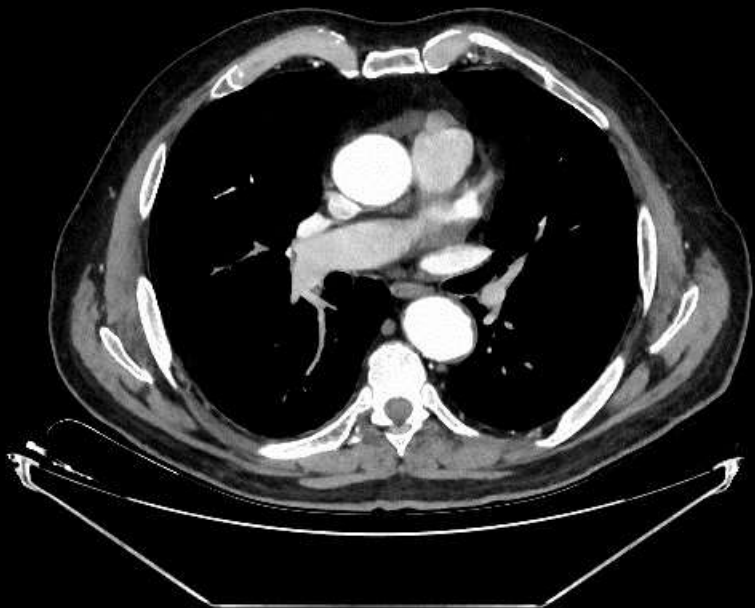








- **74 yař erkek**
- **HT**
- **Ek Őikayeti yok**
- **İstirahat kladikasyonu**



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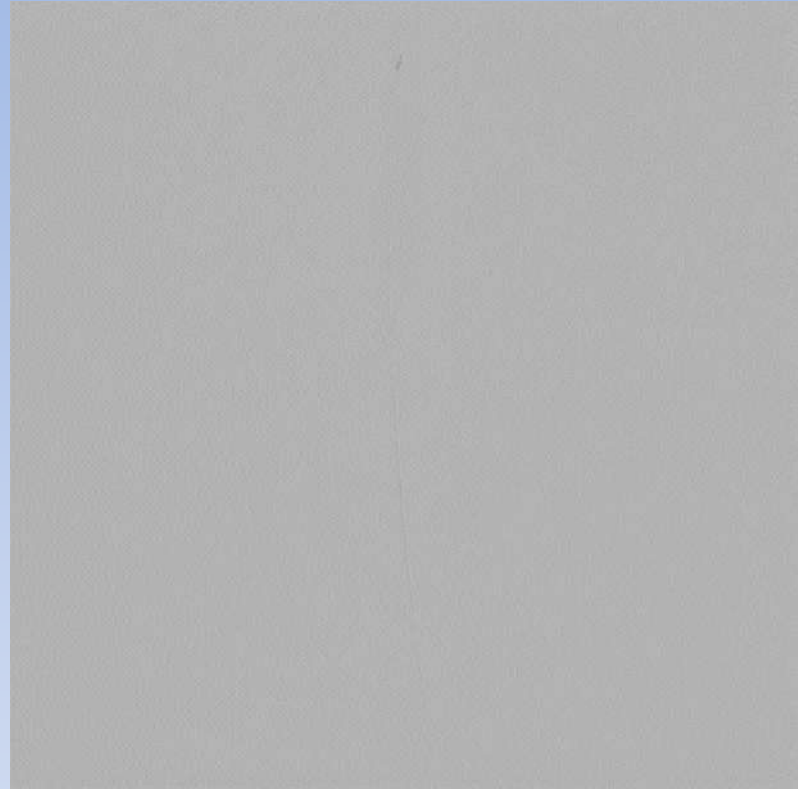
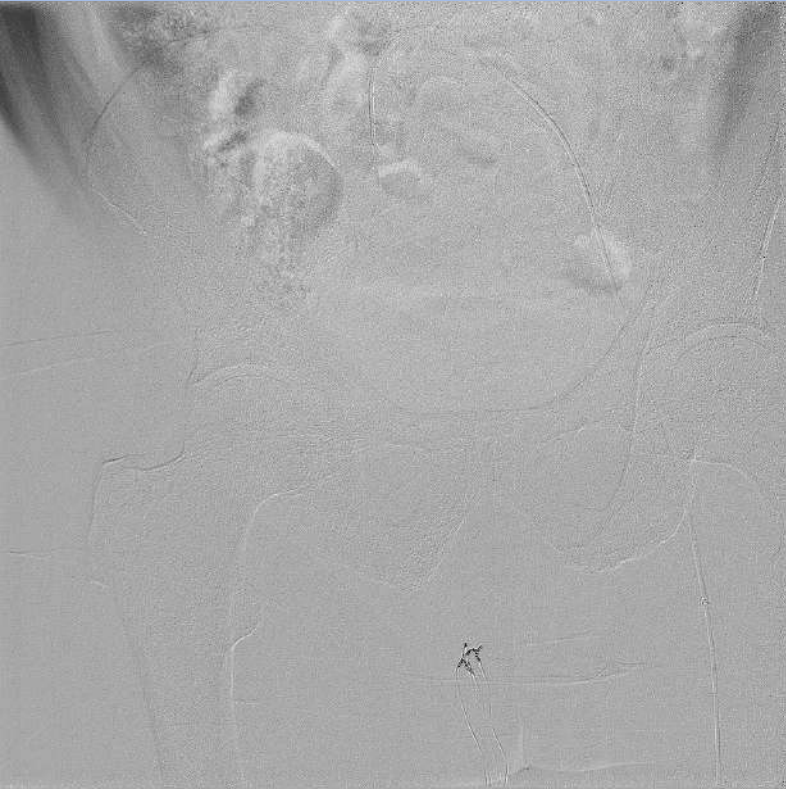
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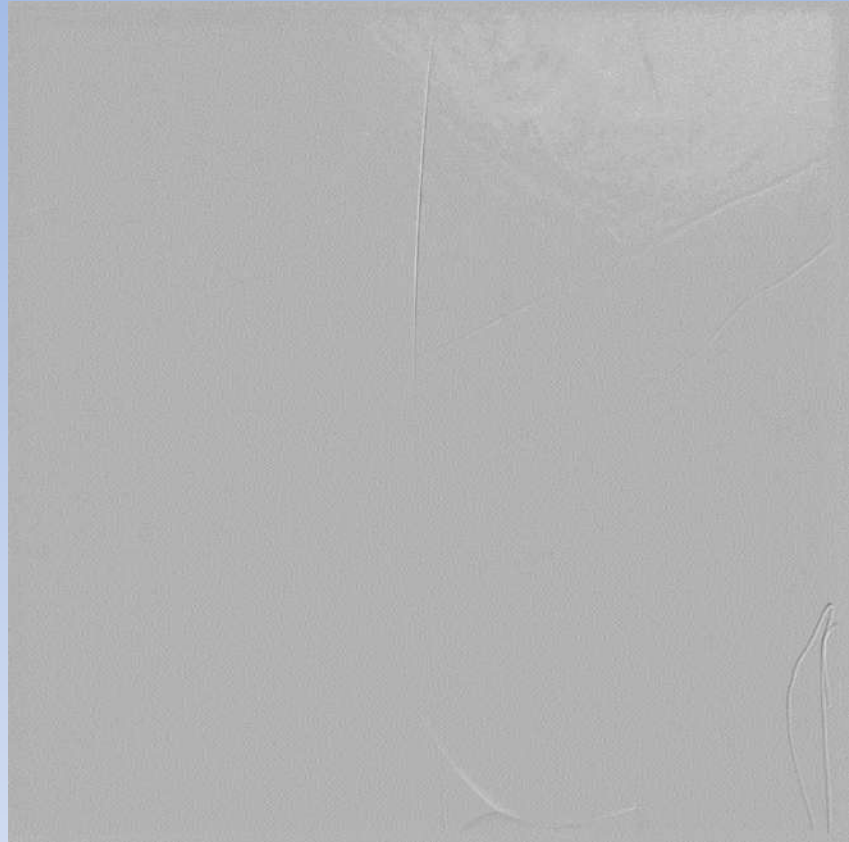
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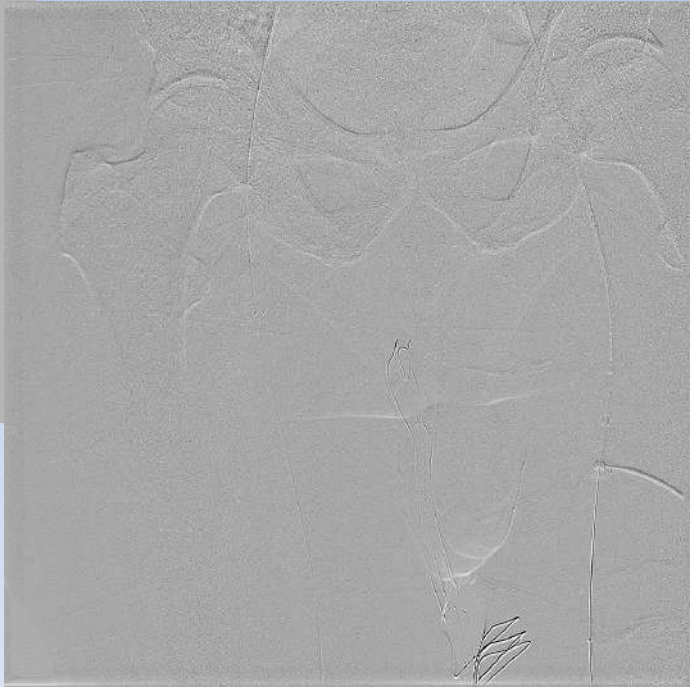
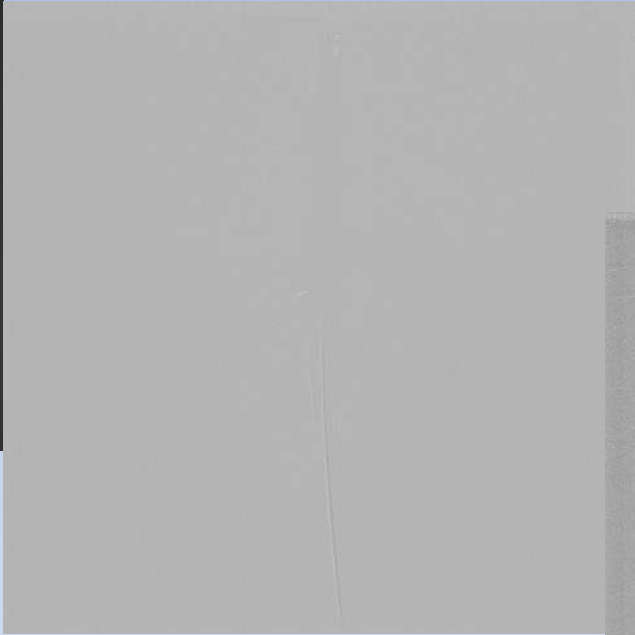
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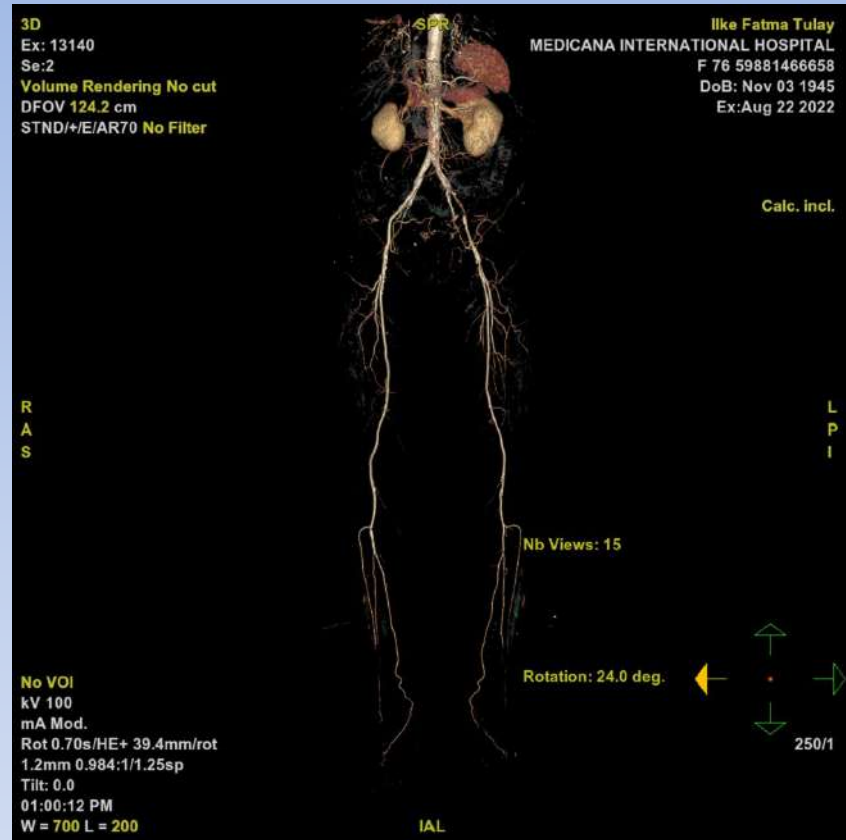
A 3D volume rendering of the abdominal aorta and its major branches, including the renal and iliac arteries. The aorta is shown in a vertical orientation, with its branches extending laterally and inferiorly. The image is in a colorized format, with the vessels appearing in shades of red and orange. The background is black.

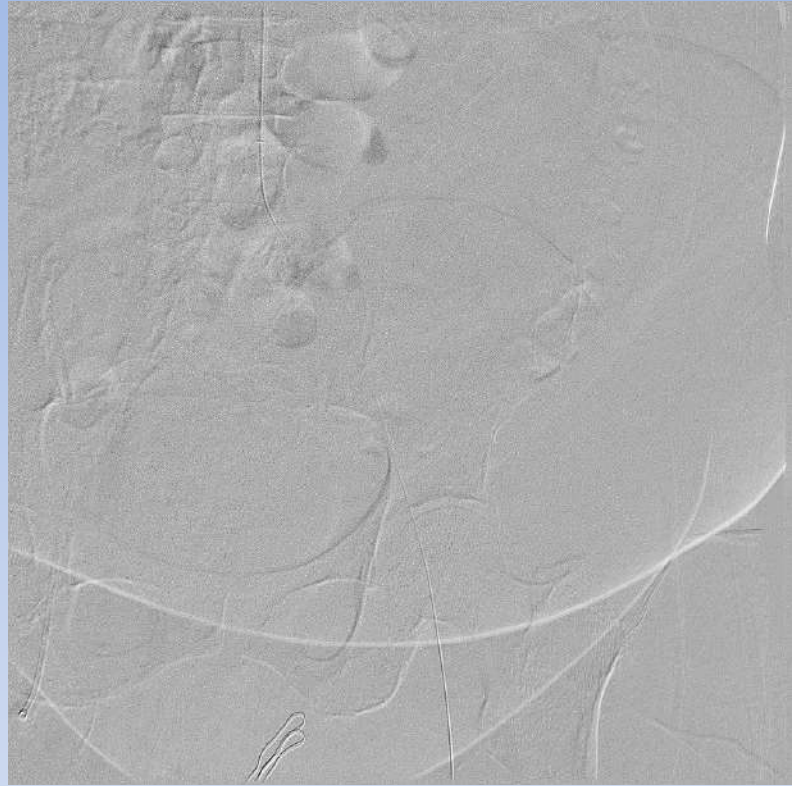
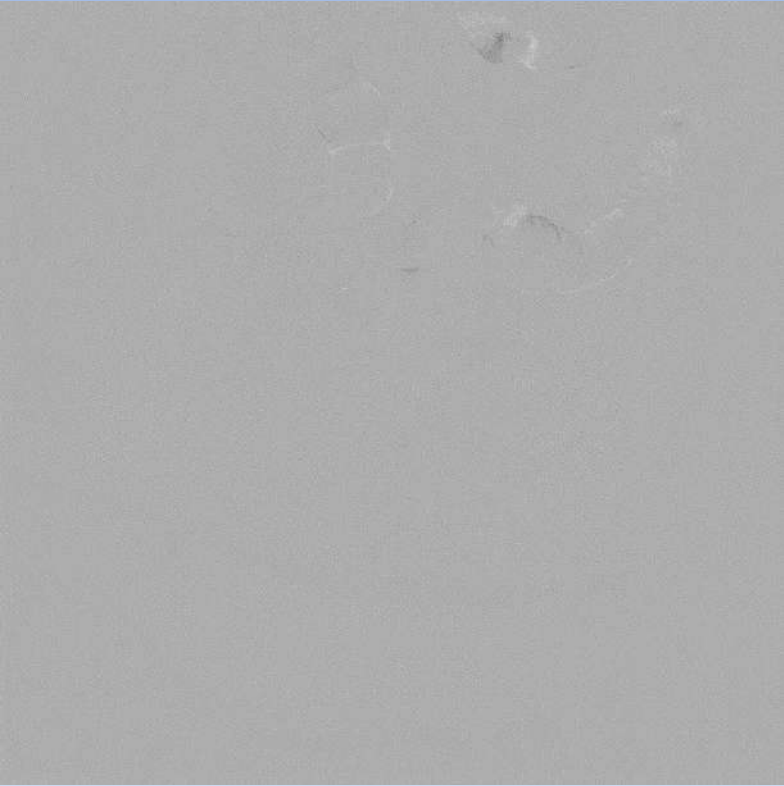


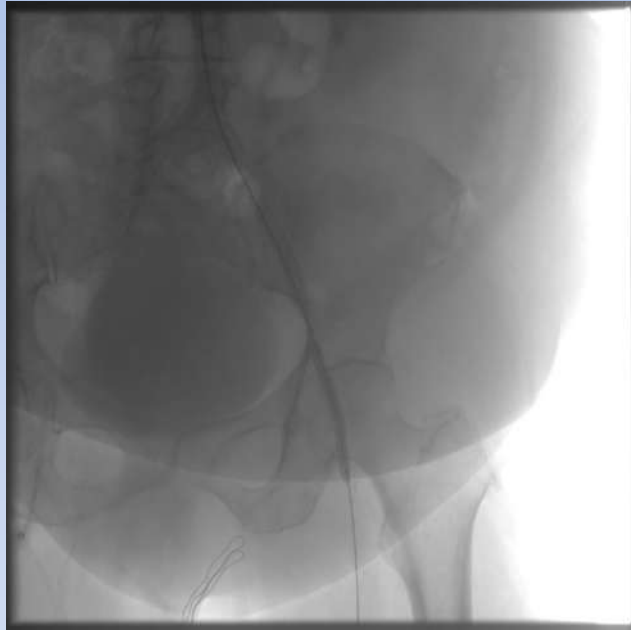
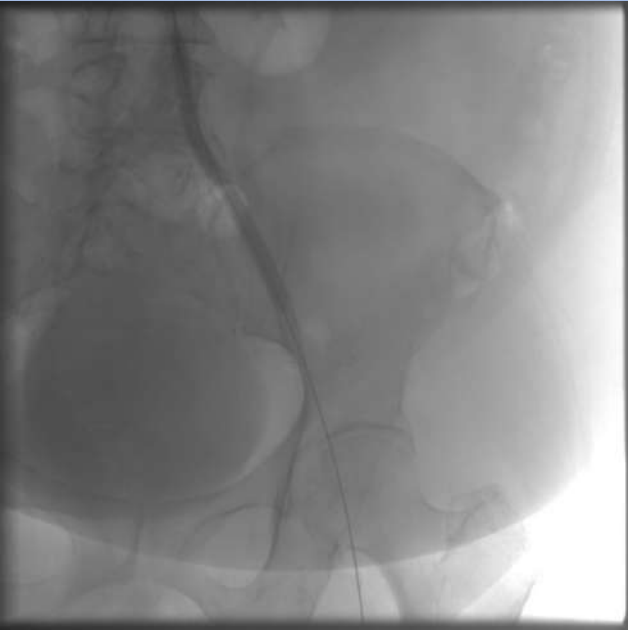




- **75 y K**
- **Diyabetik,geçirilmiş mezenterik iskemi**
- **DM,HT,KKH**
- **Sol bacakta 50 m ile kladikasyo**







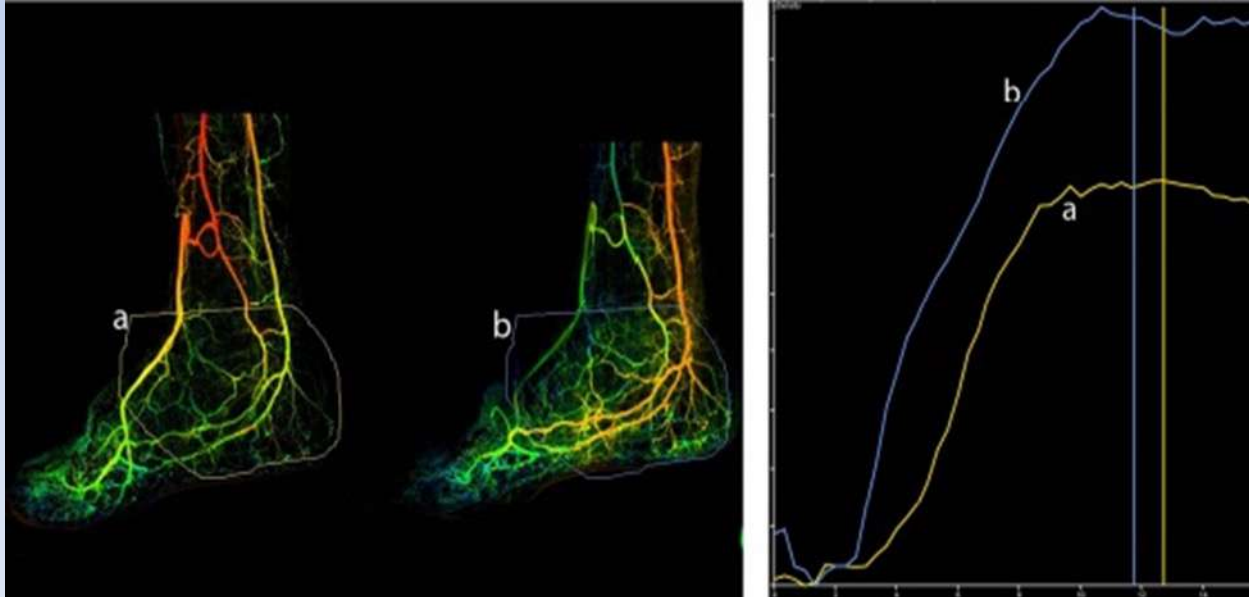
PERFÜZYON ANJİYOGRAFİ-1

Arrival time, time to peak and time-density eğrileri DSA görüntülerinden biraraya getiriliyor.

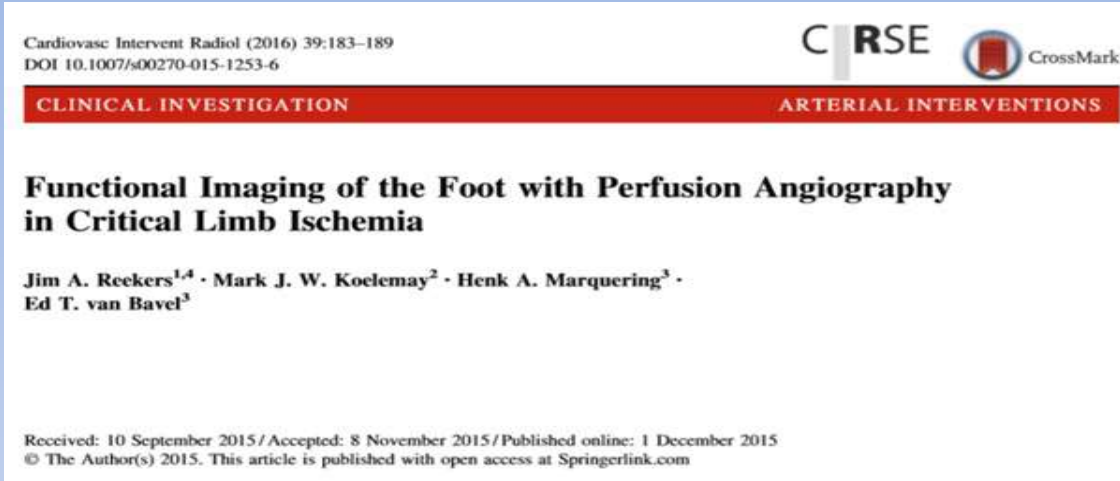
3 ana faktör önemli ;

1. Inflow
2. Ischemic Condition
3. Quality of Microcirculation

İlk iki faktör değiştirilebilir ve revaskülarizasyona cevap verebilir.



PERFÜZYON ANJİYOĞRAFI-2



INADEQUATE QUALITY OF MICROCIRCULATION IS THE REASON OF FAILURE AND AMPUTATION IN PATIENTS WHOM OPTIMAL REVASCULARIZATION ACHIEVED

PERFUSION ANGIOGRAPHY IS THE FUNCTIONAL IMAGING OF PEDAL MICROCIRCULATION AND PERFUSION CAPACITY

PERFÜZYON ANJİYOĞRAFI, REVASKÜLARİZASYON SONRASI SONUÇLARIN ÖNGÖRÜLMESİNDE BİR PARAMETRE POTANSİYELİ TAŞIYAN BELKİ DE ELİMİZDE Kİ TEK SOMUT GÖRÜNTÜLEME MODALİTESİDİR.

Pedal sirkülasyonun %90 dan fazlası microcirculation and %10 dan daha azı macrocirculation a bağlıdır.

Perfüzyon anjiyografilerde bu nedenle makrosirkülasyona bağlılık minimal olup, klinikte her zaman inflow u artırmanın iyi bir klinik sonuçla karşılık bulmaması muhtemelen bununla ilgilidir.

ANJIOZOM-1

Long-term results of direct and indirect endovascular revascularization based on the angiosome concept in patients with critical limb ischemia presenting with isolated below-the-knee lesions

Osamu Iida, MD,^a Yoshimitsu Soga, MD,^b Keisuke Hirano, MD,^c Daizo Kawasaki, MD,^d Kenji Suzuki, MD,^e Yusuke Miyashita, MD, PhD,^f Hiroto Terashi, MD, PhD,^g and Masaaki Uematsu, MD, PhD,^a *Hyogo, Fukuoka, Kanagawa, Miyagi, and Nagano, Japan*

Angiosomes: How Do They Affect My Treatment?

Luis Mariano Palena, MD,¹ Luis Fernando Garcia, MD,¹ Cesare Brigato, DNP,² Enrico Sultato, DNP,³ Alessandro Candeo, RT,⁴ Tommaso Baccaglini, RT,⁵ and Marco Manzi, MD⁶

The number of diabetic patients is actually increasing all around the world, consequently, critical limb ischemia and ischemic diabetic foot disorders related to the presence of diabetic occlusive arterial disease will represent in the next few years a challenging issue for vascular specialists. Revascularization represents one step in the treatment for the multidisciplinary team, reestablishing an adequate blood flow to the wound area, essential for healing and avoiding major amputations. The targets of revascularization can be established to obtain a "complete" revascularization, treating all tibial and foot vessels or following the angiosome and wound-related artery model, obtaining direct blood flow for the wound. In this article, we summarize our experience in endovascular treatment of diabetic critical limb ischemia, focusing on the angiosome and wound-related artery model of revascularization and the technical challenges in treating below-the-knee and below-the-ankle vessels.
Tech Vasc Intervent Radiol 17:155-169 © 2014 Elsevier Inc. All rights reserved.

Angiosome-targeted infrapopliteal endovascular revascularization for treatment of diabetic foot ulcers

Maria Söderström, MD, PhD,^a Anders Alback, MD, PhD,^a Fausto Biancari, MD, PhD,^b Kimmo Lappalainen, MD,^c Mauri Lepäntalo, MD, PhD,^a and Maarit Venermo, MD, PhD,^a *Helsinki and Oulu, Finland*

Outcomes of angiosome and non-angiosome targeted revascularization in critical lower limb ischemia

Aadarsh Kabra, MBBS, DNB, FVES, Kalkunte R. Suresh, MBBS, DABS, FACS, Vivekanand Vivekanand, MS, Motukuru Vishnu, MBBS, MS, FNB, Raj Sumanth, MS, and Muralikrishna Nekkanti, MBBS, MS, DNB, *Bangalore, India*

- Anjiozom konsepti sağlıklı hastalarda geliştirilen bir plastik cerrahi teorisidir.
- Özellikle pedal anatomik varyasyonların hiçbirini içermez
- Hallux genel olarak bir plantar anjiozomudur ancak DP arterinde bir anjiozomu olabilir.
- DP % 12-15 vakada yoktur veya ileri derecede hipoplaziktir ki ant tibial arter devamlılığı tarsal arter ile olabilir.
- % 12-15 vakada İNKOMPLET ARK mevcuttur.
- Topuk dual beslenmeye sahip olup peroneal ve PTA den gelen dallarla beslenir.

ANJİYOZOM-2

INVITED COMMENTARY

Commentary on “Angiosome-targeted Lower Limb Revascularization for Ischaemic Foot Wounds: Systematic Review and Meta-analysis”

R. Forsythe, R. Hinchliffe *

St George's Vascular Institute, London SW17 0RE, UK

- Angiosome teorisi KAI veya diyabet hastalarında çok sağlıklı öngörülemez ve uygulanamaz.
- Yeni bilimsel datalar bize KAI gibi vasküler yatağın içerdiği anormallikler nedeniyle perfüzyon paterni bozulmuş subgruplarda, diyabetik hastalar gibi kollateral formasyonu bozulmuş grupta veya varolan mikrovasküler yatağın atrofiye uğradığı durumlarda anjiozom modelinin kan akımı topografik dağılımını pek öngöremediğini göstermektedir.
- Bir yaranın topografik lokasyonu her zaman o anjiozomun besleyici arteri ile korelasyon göstermez.

TEDAVİ

Endovascular Treatment of Critical Limb Ischemia In Buerger Disease (Thromboangiitis Obliterans) With Midterm Follow-Up: A Viable Option When Bypass Surgery Is Not Feasible

Sadık Ahmet Uyanık, MD¹, Umud Öğüşlü, MD¹, İbrahim Sani Aminu, MD², Birnur Yılmaz, MD¹, Halime Çevik, MD¹, Eray Atlı, MD¹, Burçak Gümüş, MD¹

Interventional Radiology - Original Research

Keywords

Buerger disease, endovascular treatment, thromboangiitis obliterans

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The authors declare that they have no disclosures relevant to the subject matter of this article.

OBJECTIVE. Thromboangiitis obliterans (TAO) is an occlusive inflammatory disease affecting small- and medium-sized vessels that causes decrease in life quality and eventually limb loss. The only proven treatment method is smoking cessation, but it may be insufficient for limb salvage in patients with critical limb ischemia. In this single-center retrospective study, the feasibility and efficiency of endovascular treatment in TAO were evaluated.

MATERIALS AND METHODS. After approval of the local institutional review board, 41 patients who underwent endovascular treatment of TAO between January 2014 and June 2019 were evaluated retrospectively. Technical success and procedure-related complications were recorded. Decrease in Rutherford classification score, relief of pain, and wound healing were evaluated to determine clinical success. Primary patency, limb salvage rate, and amputation-free survival were also evaluated.

RESULTS. A total of 45 limbs were treated during the study period. Technical success was achieved in 82.2% of procedures. Mean follow-up was 29.8 months. Clinical improvement was achieved in 35 limbs. Three patients underwent major amputation and 12 patients underwent minor amputation. Amputation-free survival and limb salvage were both 93.3% at both 1 and 2 years. Reintervention was performed in 14 patients because of occlusion and clinical relapsing of the symptoms.

CONCLUSION. Endovascular treatment of TAO is feasible, has a potential to prevent limb amputation in patients with critical limb ischemia, and has acceptable technical success and limb salvage rates. Because there is no consensus in treatment of TAO, prospective comparative studies are needed to determine the effectiveness of an endovascular approach.

- Revaskülarizasyon KAI hastalarında ilk hedef tedavidir.
- Artan tecrübe ve endovasküler teknolojinin gelişimi artık en kompleks lezyonların bile endovasküler yolla tedavisini mümkün kılmaktadır.
- **KAI tedavisi =Kompleks lezyon tedavisi**

Femoro-popliteal okluziv hastalığı olan 6024 hastalık 61 çalışmanın retrospektif review ünde, 12 aylık primer patensi oranı

Nitinol stentlerde	% 77.2
Kaplı stentlerde	% 68.8
İlaç salınımlı stentlerde	% 84
İlaç salınımlı balonlarda	% 78.2
Kriyo/PTA	% 60.7
Lazer atarektomi	% 51.1
Directional atarektomi	% 63.5
Kombinasyon tedavilerde	% 70.2

1 YILLIK EKSTREMİTE SAĞKALIMI

3 ARTER PATENT	% 83.0
2 ARTER PATENT	% 80.4
1 ARTER PATENT	% 73.1
PATENT ARTER YOK	% 56.4



PTA of the infrapopliteal arteries: long-term clinical follow-up and analysis of factors influencing clinical outcome. Peregrin JH et al. Cardiovasc Intervent Radiol 2010 Aug

Infrapopliteal PTA uzun dönem sonuçları: 1266 hasta ve 1445 işlem

1 yıllık primer ekstremitte sağkalımı	% 76.1
1 yıllık sekonder ekstremitte sağkalımı	% 84.4
5 yıllık ekstremitte sağkalımı	% 78.8
10 yıllık ekstremitte sağkalımı	% 73.3

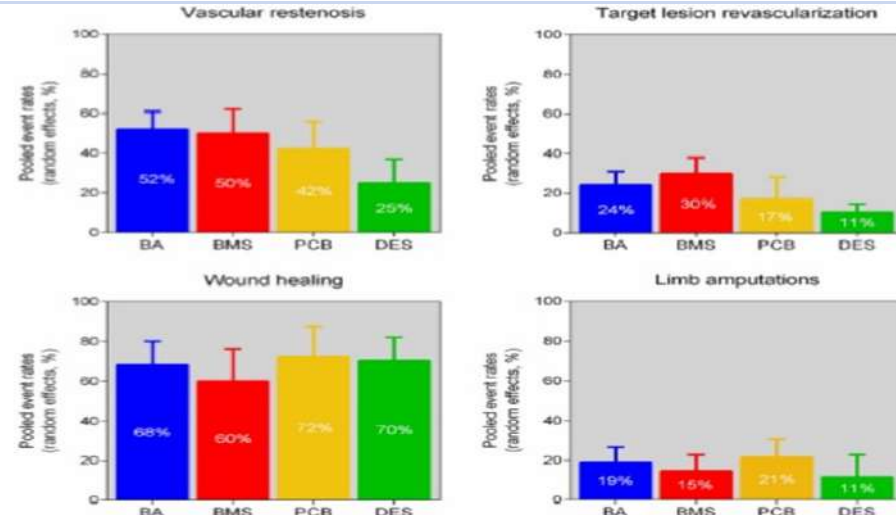
PTA of the infrapopliteal arteries: long-term clinical follow-up and analysis of factors influencing clinical outcome. Peregrin JH et al. Cardiovasc Intervent Radiol 2010 Aug

Meta-analysis

ENDOVASCULAR
THERAPY

Comparative Effectiveness of Plain Balloon Angioplasty, Bare Metal Stents, Drug-Coated Balloons, and Drug-Eluting Stents for the Treatment of Infrapopliteal Artery Disease: Systematic Review and Bayesian Network Meta-analysis of Randomized Controlled Trials

Konstantinos Katsanos, MSc, MD, PhD, EBIR¹, Panagiotis Kitiros, MD, PhD², Stavros Spiliopoulos, MD, PhD, EBIR¹, Athanasios Diamantopoulos, MD, PhD¹, and Dimitris Karnabatidis, MD, PhD, EBIR¹





Amputation-free survival in patients with diabetic foot ulcer and peripheral arterial disease: Endovascular versus open surgery in a propensity score adjusted analysis

Talha Butt^{a,b,*}, Erika Lilja^a, Targ Elgzyri^{a,c}, Jan Apelqvist^{a,c}, Anders Gottsäter^{a,b}, Gunnar Engström^a, Stefan Acosta^{a,b}

^a Department of Clinical Sciences, Malmö, Lund University, Skåne University Hospital, Sweden

^b Vascular Center, Department of Cardio-Thoracic Surgery and Vascular Diseases, Skåne University Hospital, Sweden

^c Department of Endocrinology, Skåne University Hospital, Sweden

Table 3

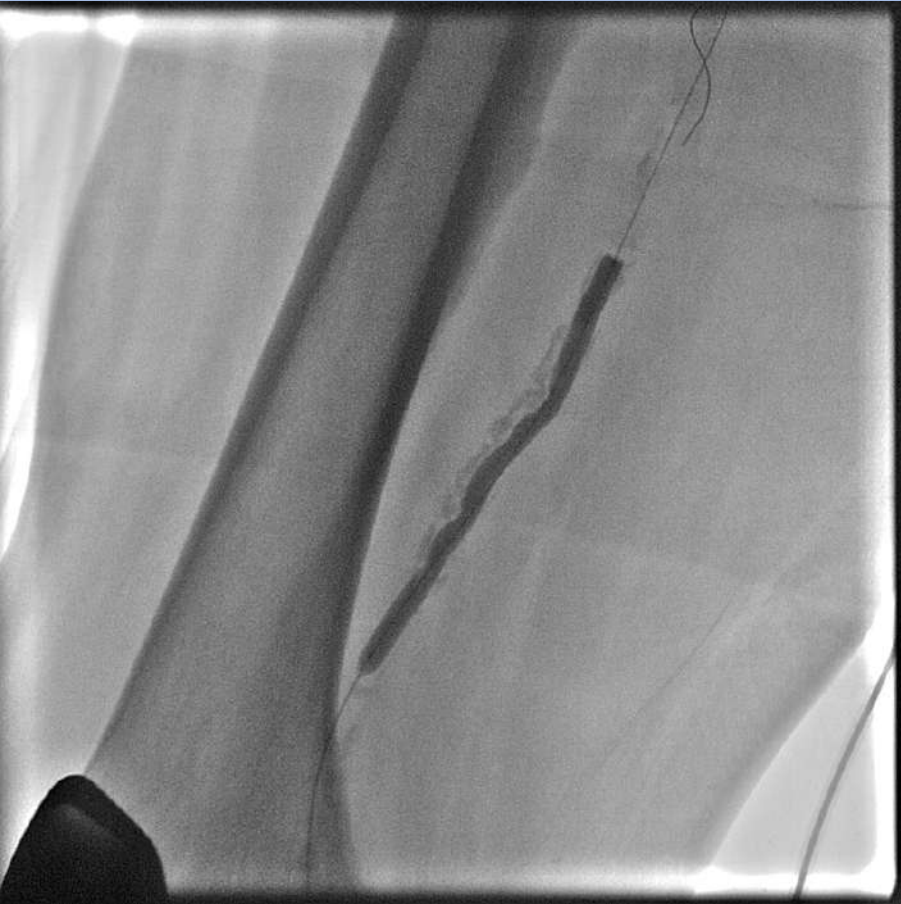
Comparison of anatomic levels of arterial disease in endovascular versus open vascular surgery first procedure.

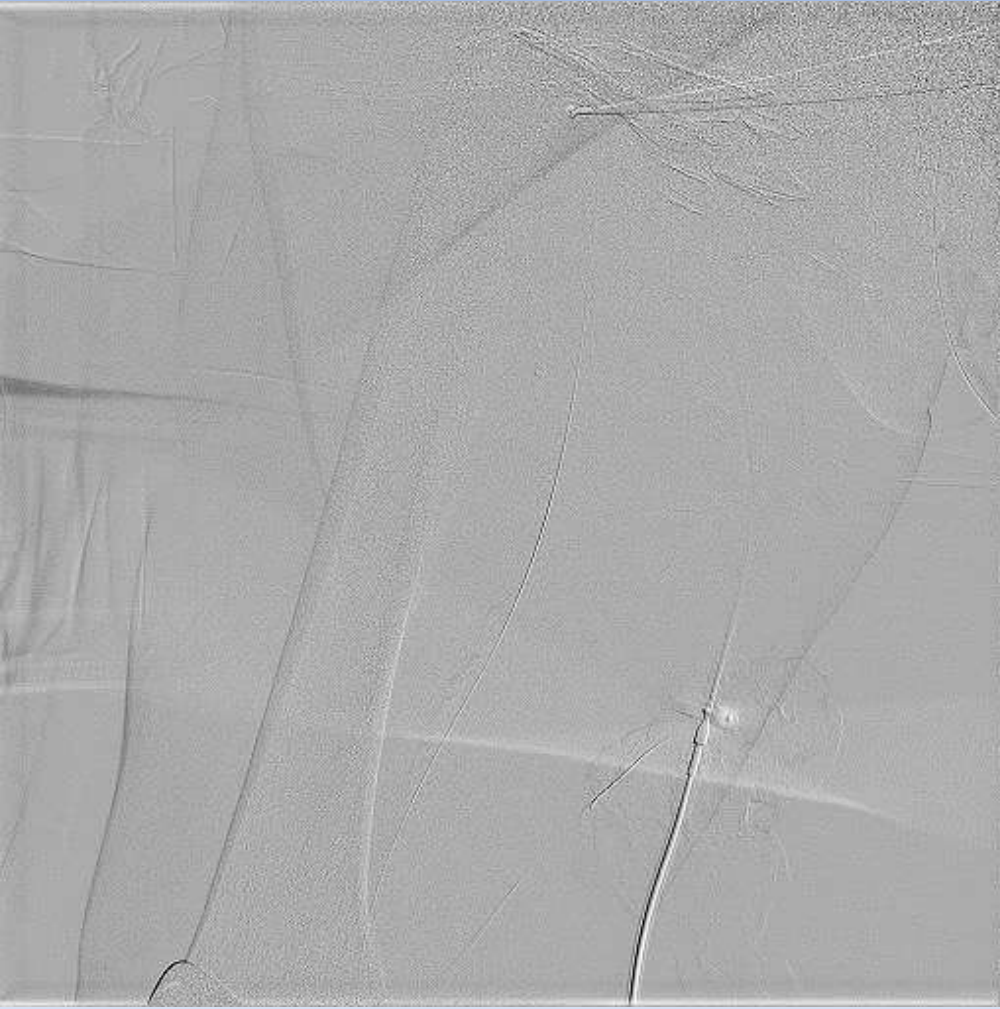
Anatomic level	All limbs, n = 349	Endovascular surgery, n = 243	Open vascular surgery, n = 106	p-Value
Aorto-iliac (%)	37 (10.6)	32 (13.2)	5 (4.7)	0.018
Femoro-popliteal (%)	112 (32.1)	81 (33.3)	31 (29.2)	0.45
Infra-popliteal (%)	40	40 (16.5)	0 (0%)	-
Multi-level (≥ 2 levels) (%)	160 (45.8)	90 (37.0)	70 (66.0)	0.0001

- 1984-2006, 376 HASTA 408 Ekstremitte
- 289 Endovascular, 119 Cerrahi
- 3 yıllık Major amputasyon ve Mortalite oranları benzer

- **72 yaş erkek**
- **Her iki ayakta iyileşmeyen yara, Rutherford 4**
- **DM, KKY**

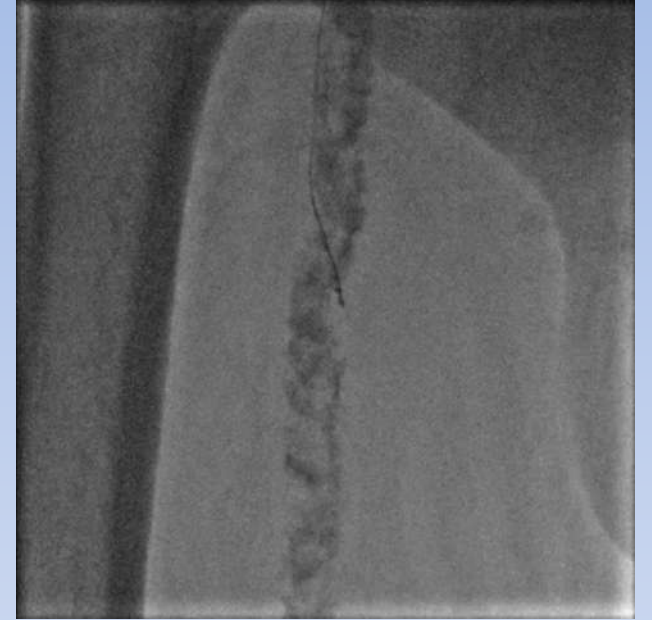






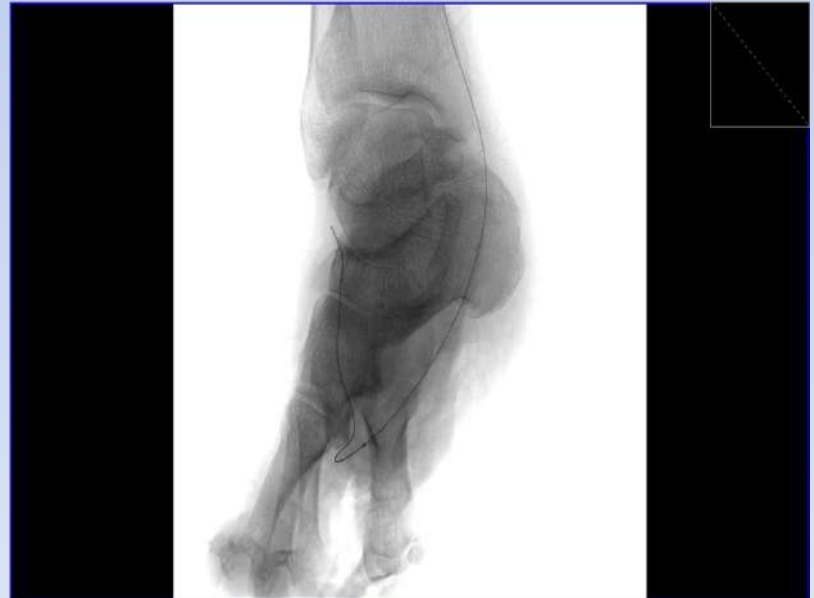
KOMPLEKS LEZYONLAR

- Ağır kalsifikasyon
- Uzun segment CTO
- Multisegmental lezyonlar
- Zayıf run-off (Distal akım)
- Atrofiye pedal sirkülasyon (Desert foot Phenomenia)
- Geçirilmiş cerrahi ve endovasküler girişim



ALTERNATİF YAKLAŞIMLAR

- Konvansiyonel antegrad yaklaşım vakaların çoğunda yeterli
- Fakat ,vakaların % 10-40 ında teknik başarısızlık bildiriliyor...
- Alternatif teknikler, başarı oranlarını arttırmak ve teknik başarısızlığın üstesinden gelerek ekstremitte sağkalımını artırmak amacıyla kullanılabilirler.



Alternative Teknikler

- Pedal-plantary Loop
- Trans-collateral angioplasty
- Combined antegrade-retrograde Technique (CART)
- Crossing devices
- Deep vein arterialization



Pedal-plantar Loop Technique

- Plantar ark patensisi hızlı yara iyileşmesi için çok
- Pedal ark kullanılarak kronik total oklüzyonların geçilmesi mümkün olabilir.
- Düşük-profil balon ve destek kateterlerine ihtiyaç vardır.
- Genellikle düşük profilli 0.014 inch sistemler kullanılır

Images in cardiovascular medicine



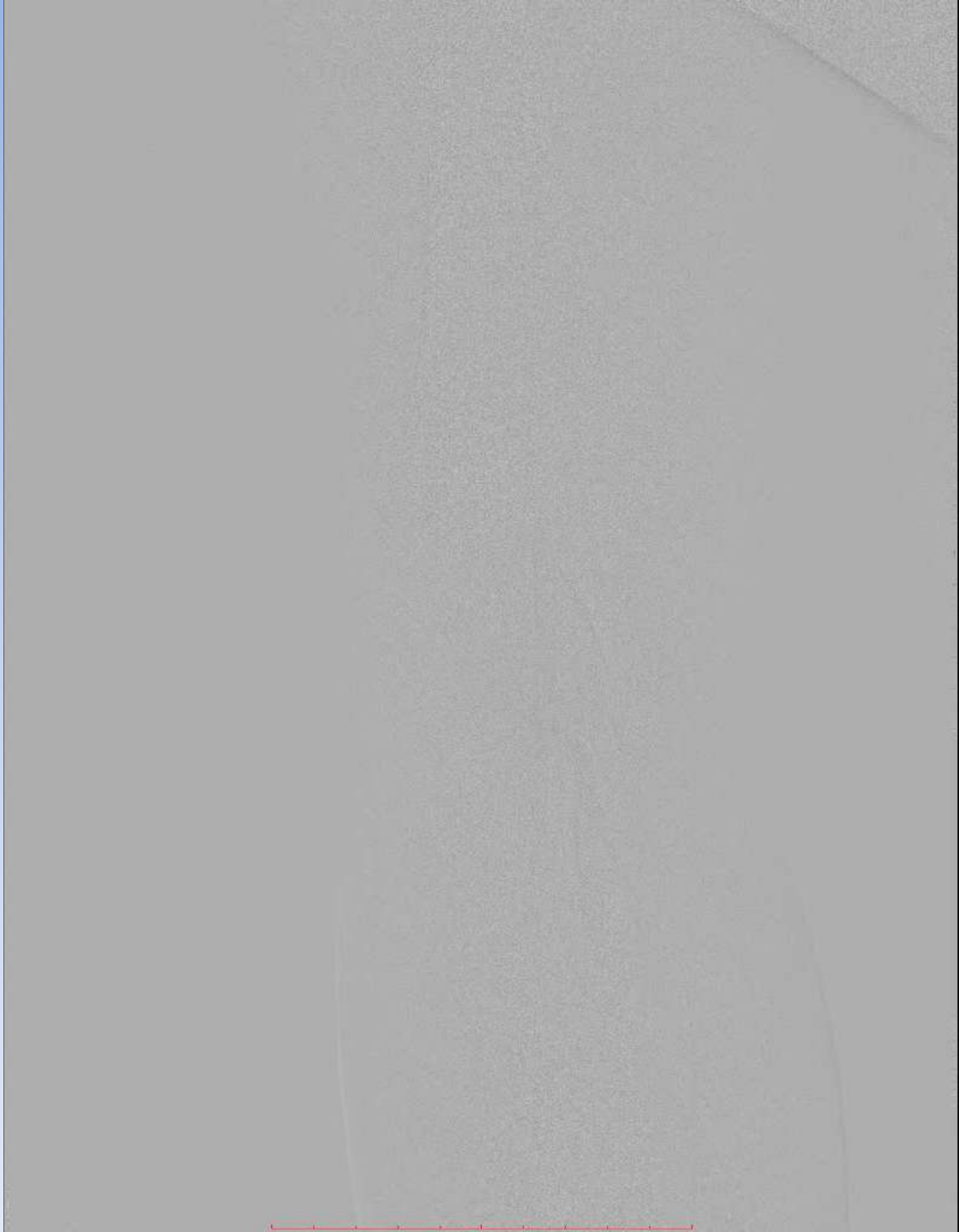
Plantar to dorsalis pedis artery subintimal angioplasty in a patient with critical foot ischemia: a novel technique in the armamentarium of the peripheral interventionist

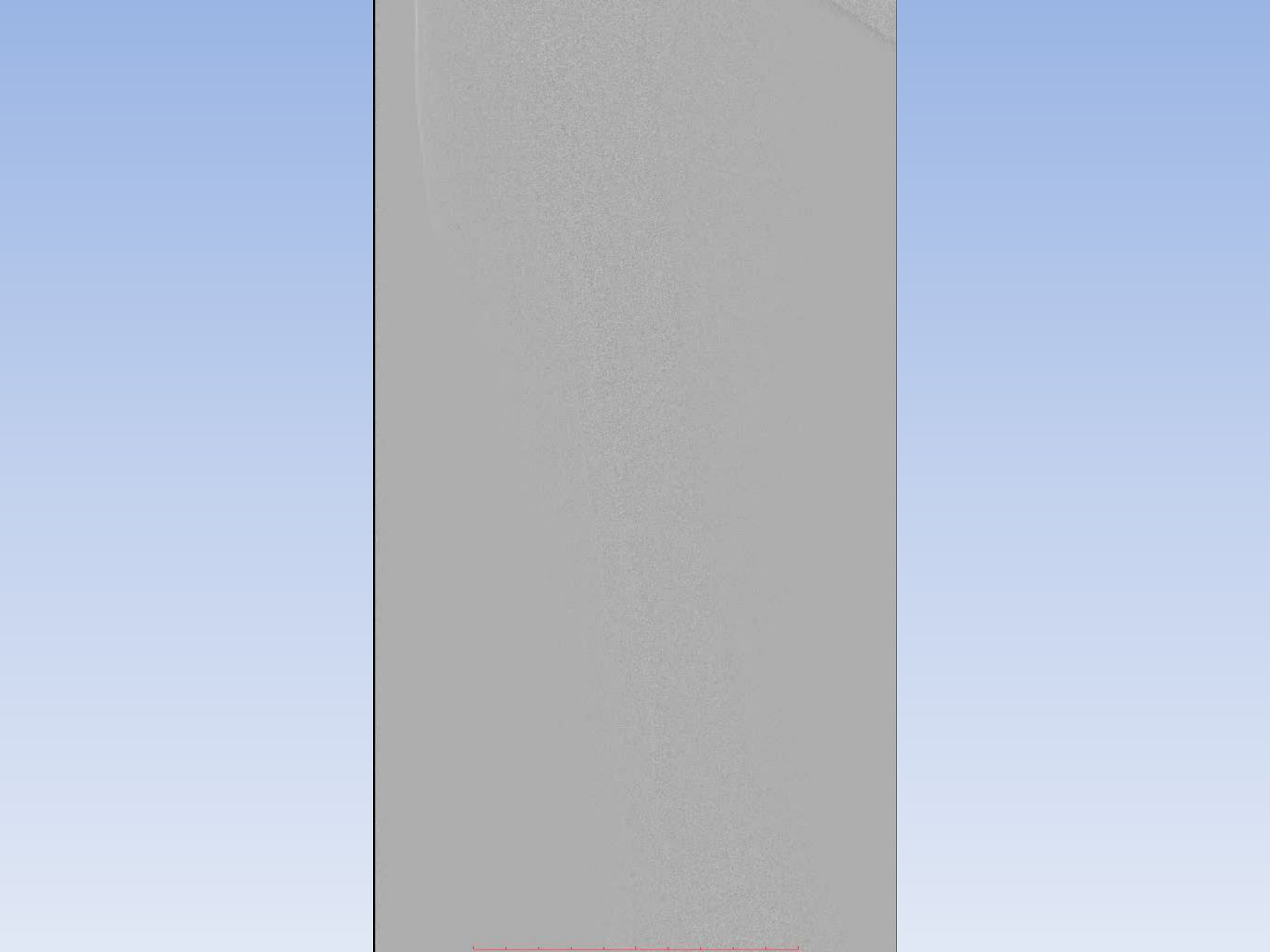
Massimiliano Fusaro^a, Luca Dalla Paola^b, Cesare Brigato^a, Mario Marangotto^a, Simone Nicolini^a, Redi Ripay^a and Giuseppe G.L. Biondi-Zoccai^{a,c}



- 48 yaşında bayan
- DM,CRF
- Kalkaneal alan ve topukta iyileşmeyen geniş yara
- Rutherford 5



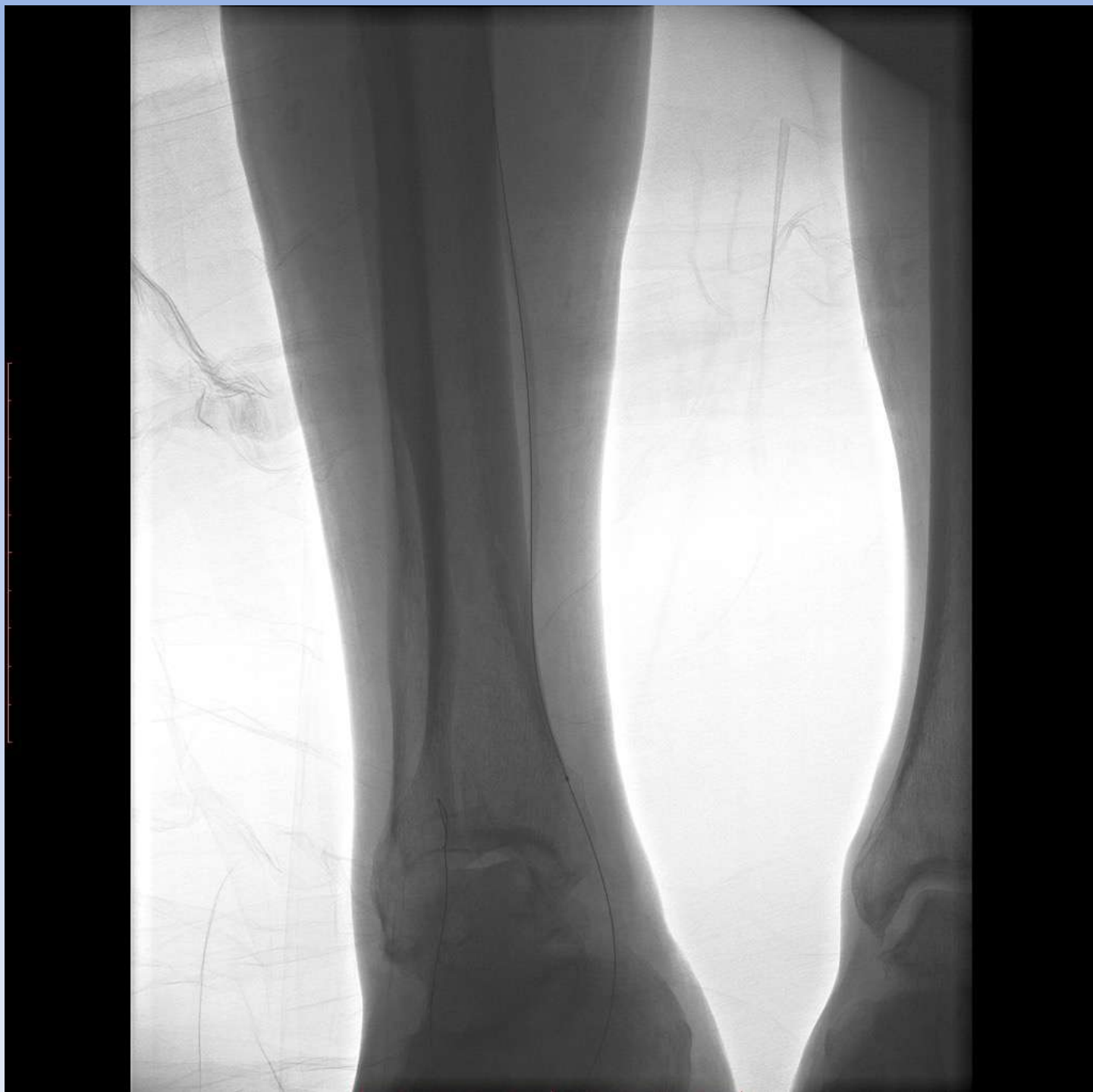










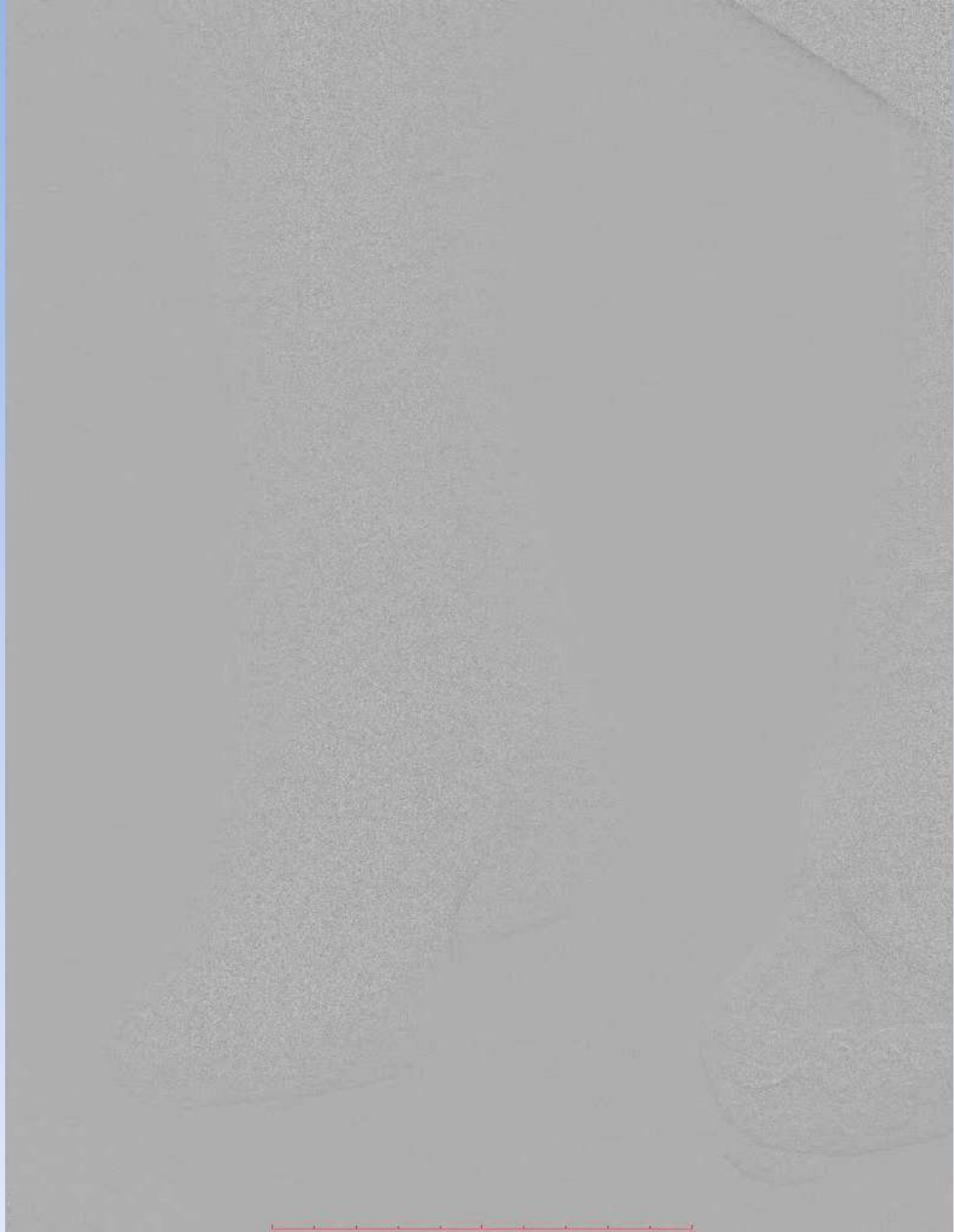














Transkollateral Teknik

Bazı vakalarda, peroneal arter hedef revaskülarizasyon için bir köprü olarak kullanılabilir.

Peroneal kollaterals kullanıldığı için çok düşük profilli malzeme ihtiyacı vardır.

İkinci bir akses ihtiyacı olmaz.

**“Trans-Collateral” Angioplasty for a Challenging
Chronic Total Occlusion of the Tibial Vessels:
A Novel Approach to Percutaneous Revascularization
in Critical Lower Limb Ischemia**

Massimiliano Fusaro,^{1*} MD, Pierfrancesco Agostoni,² MD,
and Giuseppe Biondi-Zoccai,³ MD

69 y.o kadın

DM,HT,HL

Lateral kalkaneal ülserasyon

Rutherford 5





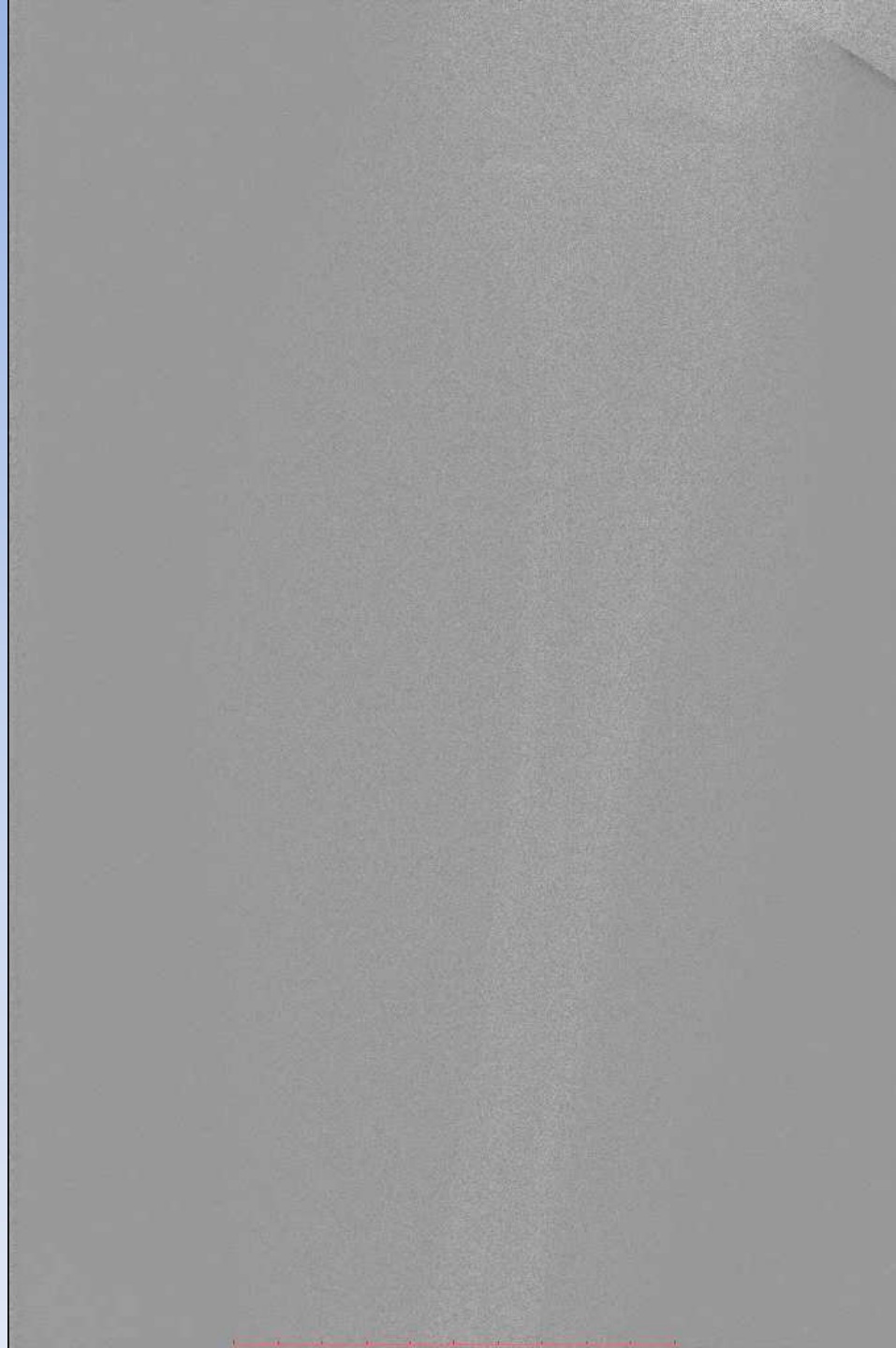
















Crossing Devices

Ciddi kalsifiye lezyonlarda yararlı

Femoropopliteal kullanımları daha çok bildirilmiş

Flouroscoy veya IVUS rehberliğinde

67 y.o erkek

DM,HT,CAD

Rutherford 6

İstirahat ağrısı

**Daha önceki endovasküler denemeler
başarısız**

Amputasyon güdüğünde iyileşmeyen yara

(Filt. 5)



(Filt. 5)

(Filt. 5)





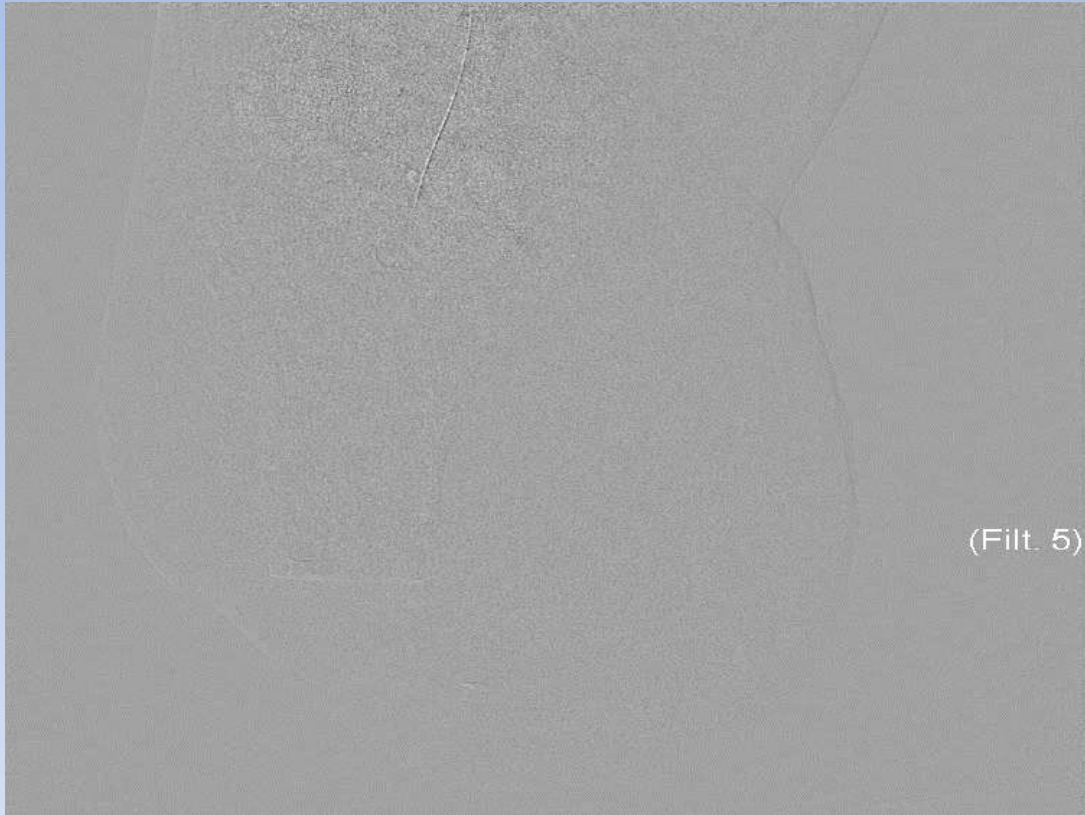




(Filt. 5)



(Filt. 5)



(Filt. 5)

- **64 y.o E**
 - **İstirahat ağrısı**
 - **Uzun segment ileri derecede kalsifiye SFA CTO**
 - **Rutherford 4**
-
- **Double ballon technique**

(Filt. 5)

(Filt. 5)

(Filt. 5)



(Filt. 5)









(Filt. 5)



(Filt. 5)(FLT:e1)



(Filt. 5)



(Filt. 5)

Retrograd Pedal Akses

CLINICAL STUDY



Retrograde Pedal Access via Occluded Arteries in Endovascular Treatment of Critical Limb Ischemia

Sadık Ahmet Uyanık, MD, Umut Öğüşlü, MD, Birnur Yılmaz, MD, Halime Çevik, MD, Eray Atlı, MD, and Burçak Gümüş, MD

ABSTRACT

Purpose: To evaluate the feasibility and technical outcomes of retrograde access via occluded pedal arteries in endovascular treatment of critical limb ischemia (CLI) when the conventional antegrade approach fails.

Materials and Methods: One hundred fifty-one patients with CLI (age $69 \text{ y} \pm 10.5$; 116 men) who were not surgical candidates and were treated via retrograde pedal access between January 2016 and January 2018 were evaluated retrospectively. Seventy patients in whom retrograde access was performed through occluded arteries constituted the occluded group, and 81 patients who were treated via retrograde access from patent arteries constituted the nonoccluded group. Pedal access success, lesion crossing success, angiographic success, overall technical success, and procedure-related complications were evaluated and compared between groups.

Results: Pedal access success (74 of 78 vs 83 of 87 attempts; $P = .873$) and lesion crossing success (64 of 78 vs 77 of 87 lesions; $P = .340$) were comparable between subgroups. Angiographic success (54 of 78 vs 77 of 87 lesions; $P = .012$) and overall technical success (48 of 70 vs 72 of 81 patients; $P = .004$) rates were lower in the occluded group. Procedure-related complications were similar between groups ($P = .096$).

Conclusions: Retrograde pedal access from occluded pedal arteries is a feasible option when an antegrade approach fails in endovascular treatment of CLI. Although it has lower technical success, its use enables angiosome-directed therapy and has the potential to improve the outcomes of the procedure.

- Antegrad yaklaşımda teknik başarısızlık durumunda
- CTO nun distal güdüğü daha az fibrotiktir
- Daha fazla mekanik destek ve itebilme gücü
- Kombine antegrade ve retrograde yaklaşım lümeneye tekrar giriş şansını artırabiliyor
- SAFARI veya double balloon teknikleri kullanılabilir

- **56 y.o K**
- **DM, CRF**
- **İstirahat ağrısı, major doku kaybı ve gecikmiş yara iyileşmesi**
- **Rutherford 6**
- **Daha önce başarısız endovasküler girişim**

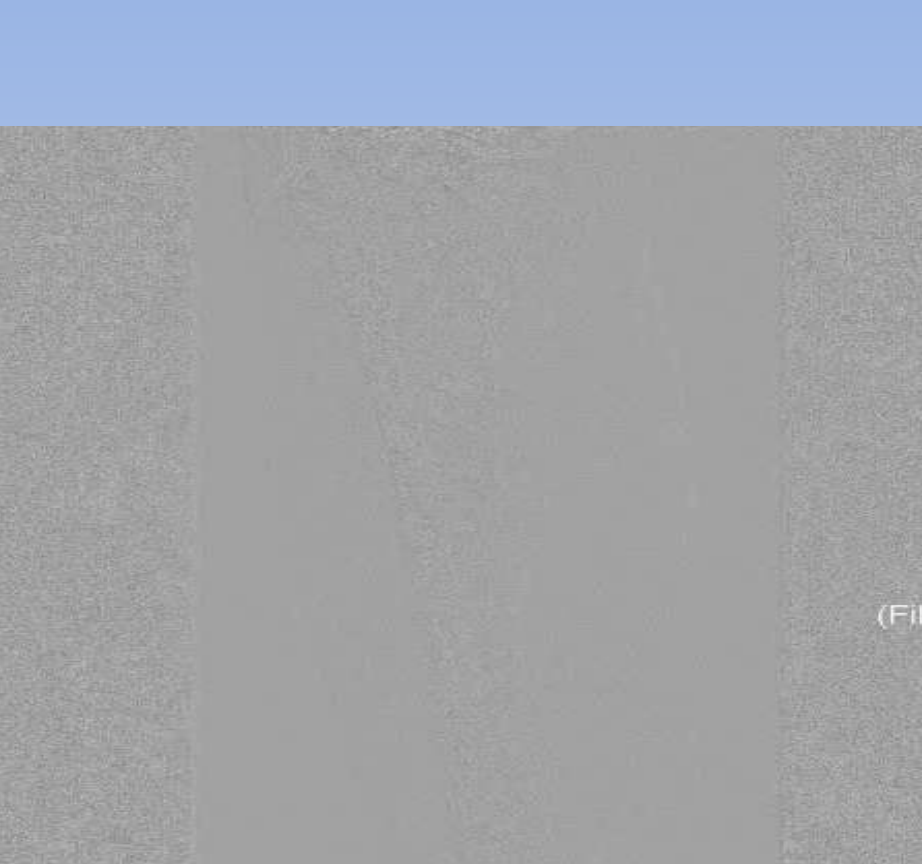


(Filt. 5)



(Filt. 5)

Diagnostic angiography showed patent SFA and popliteal artery



(Fil



(Filt. 5)

Long segmental CTO of PTA and plantary arteries



After failed attempt of antegrade recanalization, puncture of the occluded PTA was performed.



- Combined antegrade-retrograde approach



(Filt. 5)

(Filt. 5)

Combined antegrade-retrograde approach was used but re-entry in the lateral plantar artery was failed and guidewire ended in subintimal space



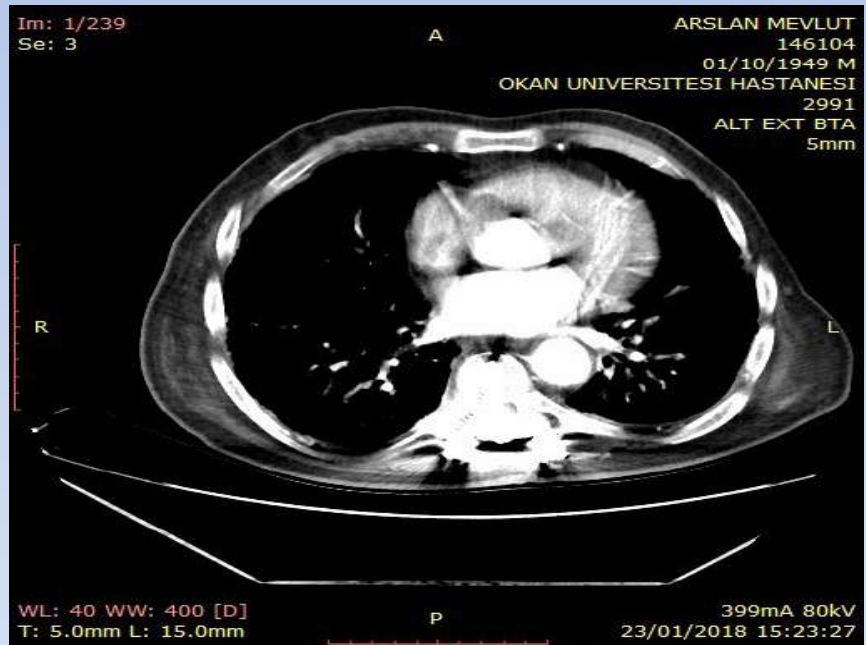
Puncture of lateral plantar artery at sole of the foot

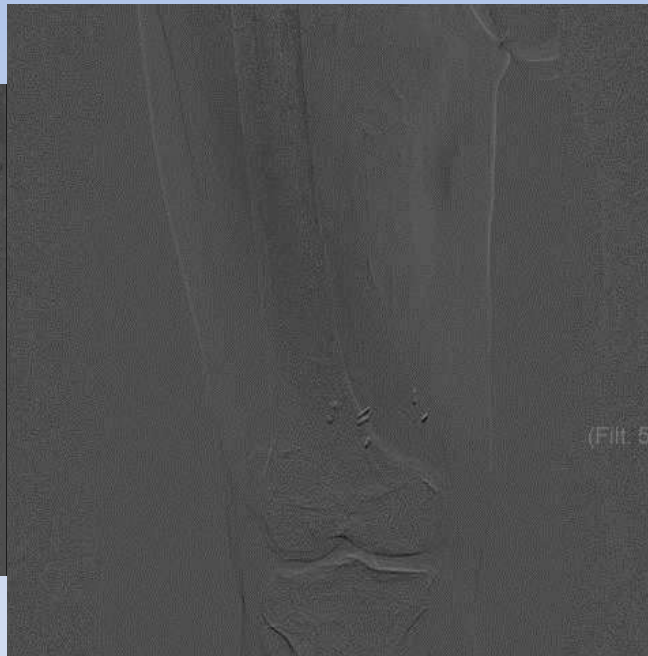
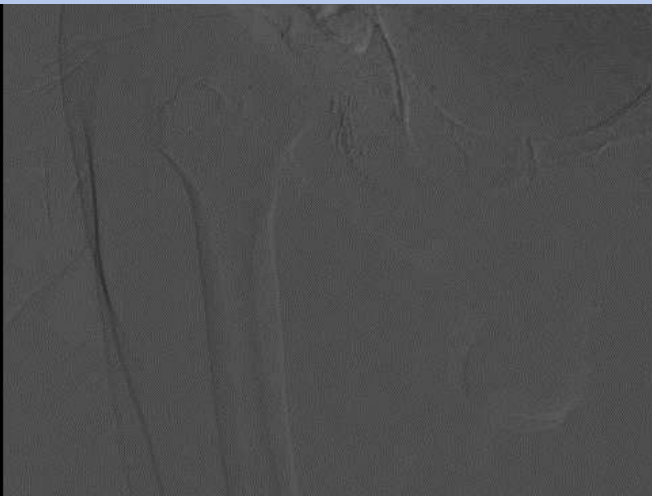


Angiography after retrograde angioplasty

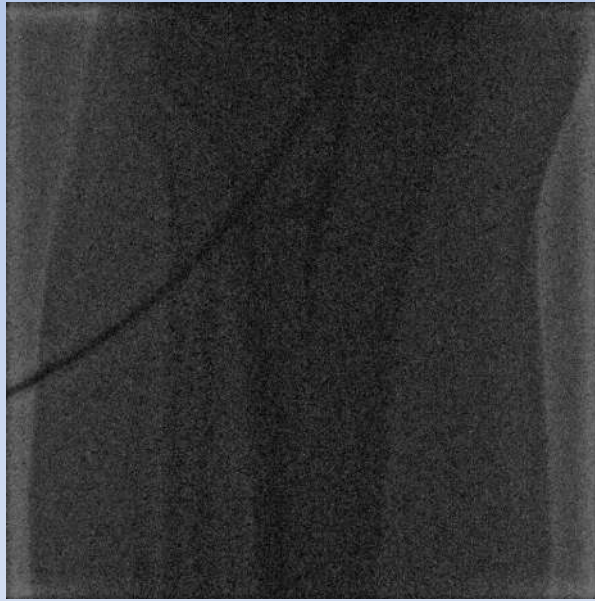
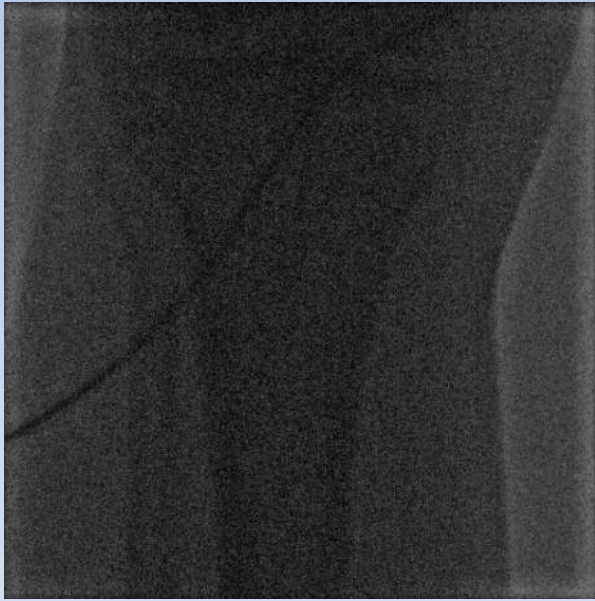
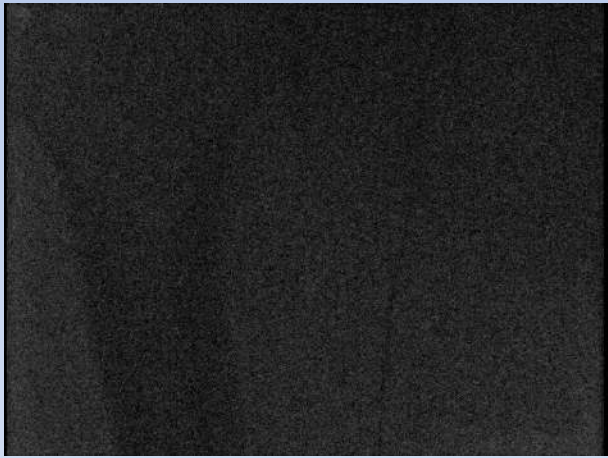
- **70 y E**
- **Topukta doku kaybı (Rutherford 5)**
- **İstirahat ağrısı**
- **DM, CAD, HT, HL**
- **Daha önce Fem-pop bypass (2 yıl önce)**
- **Ayakta ısı kaybı, sensor veya motor kaybı yok**
- **Dorsalis pedis ve posterior tibial arter de puls yok**







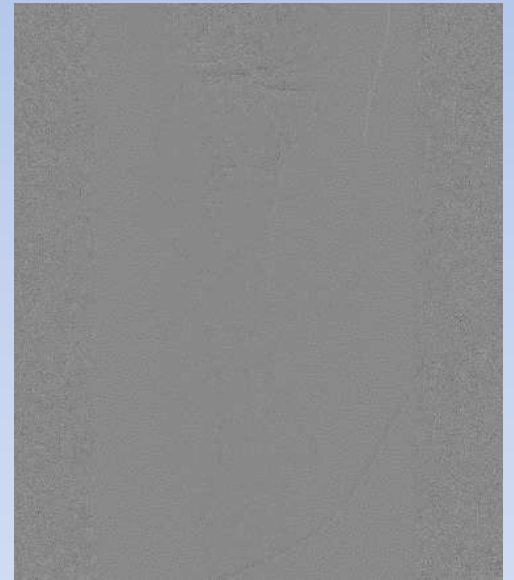
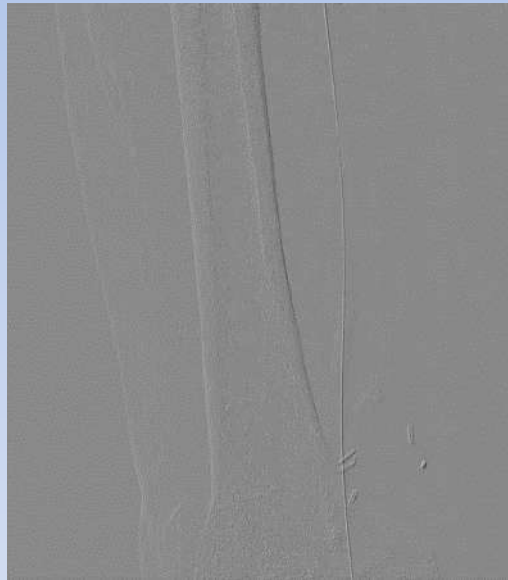
Initial angiography showed complete long segmental occlusion of SFA, popliteal artery and crural arteries



Lesion crossing through SFA and PTA with 4 F support catheter and 0.35 guidewire

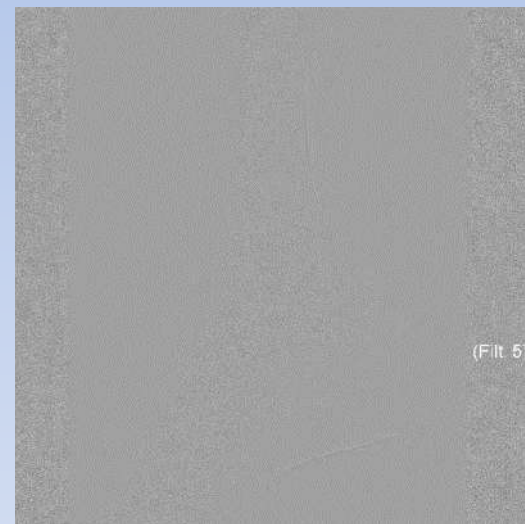
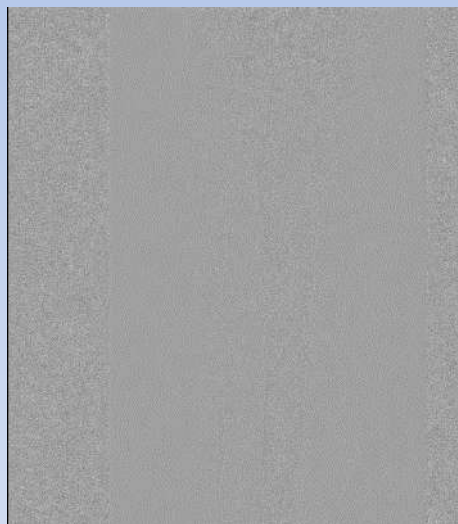
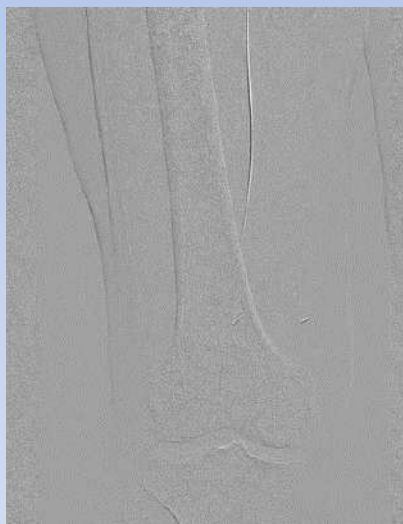


Baloon angioplasty with 5mm x 30 cm and 2.5mm x 25cm ; Sterling 0.018 OTW baloon



Control Angiography showed start of flow in SFA but not in popliteal artery and distally

2nd Round



Patient underwent thrombolysis for 24 hours (5 mg bolus injection and 0.5 mg/hour tPA and 300 units/h unfractionated heparin), initial angiography showed recanalization of SFA with still thrombus burden in popliteal artery and crural arteries

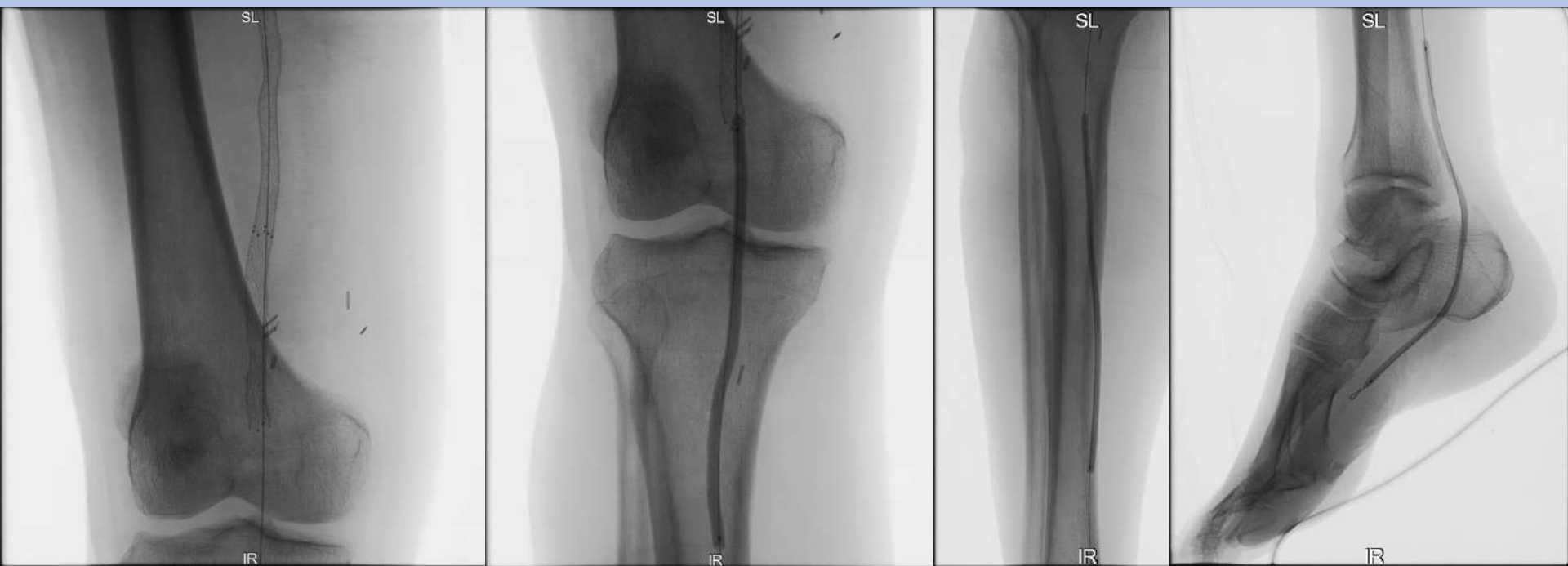


6mmx20cm self-expandable stent (Innova) and dilatation with 5mmx10cm balloon



Control angiography after SFA stenting

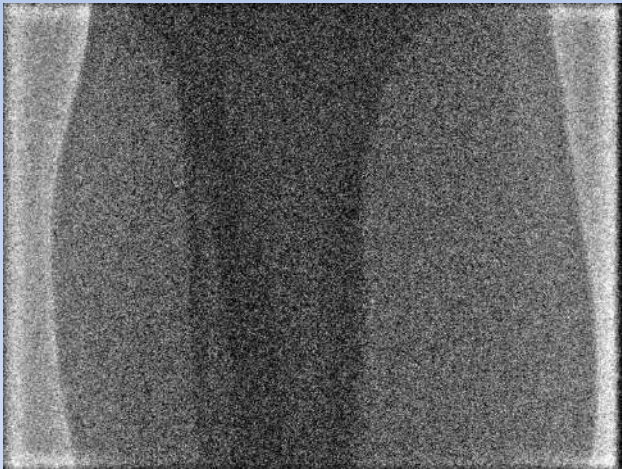




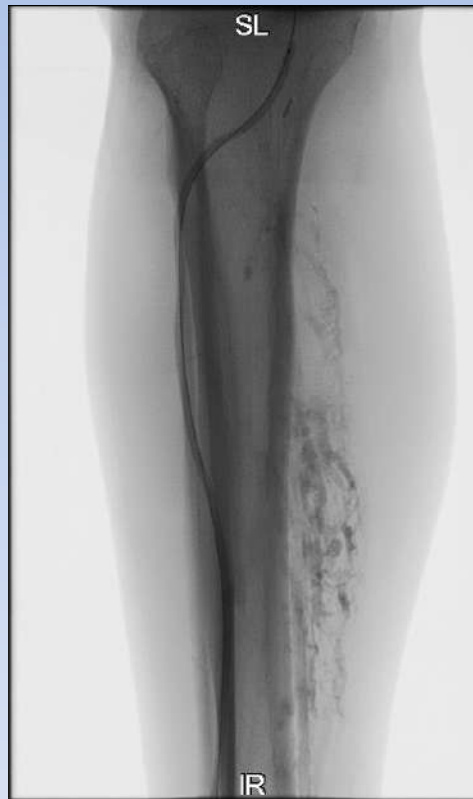
Further stenting in SFA (6mmx8cm) and balloon dilation of PTA (2.5mm x 12cm)

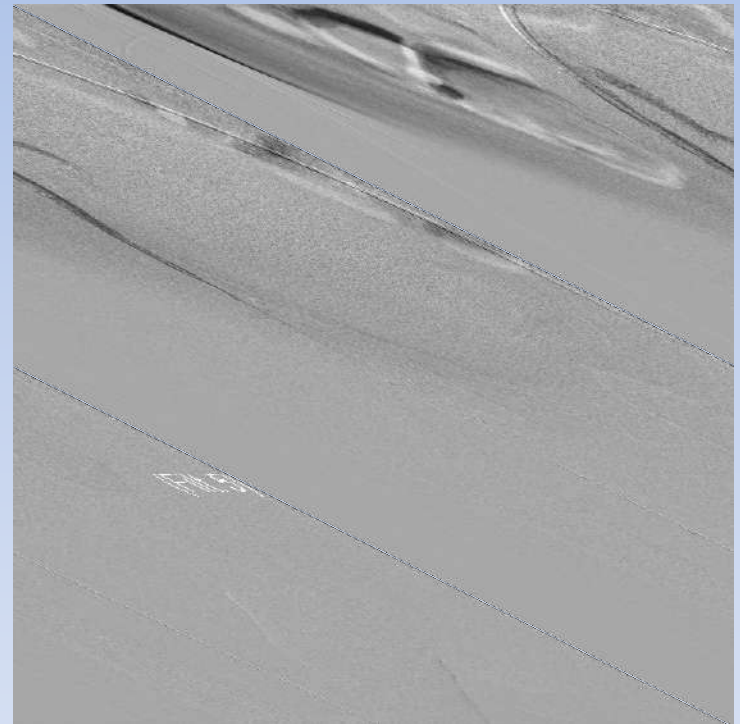


Acute thrombosis of SFA

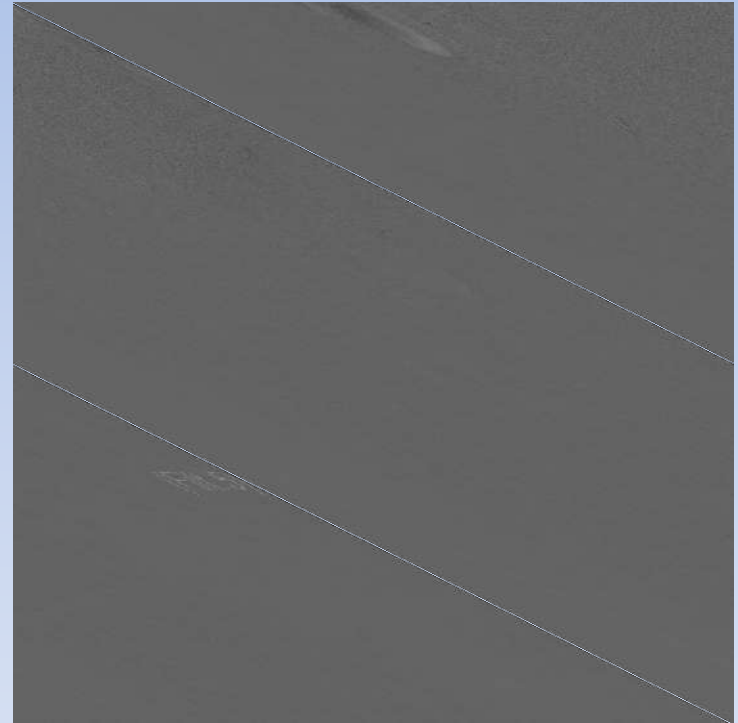


Recanalization of ATA attempted for opening an outflow (2.5mm x 15cm)



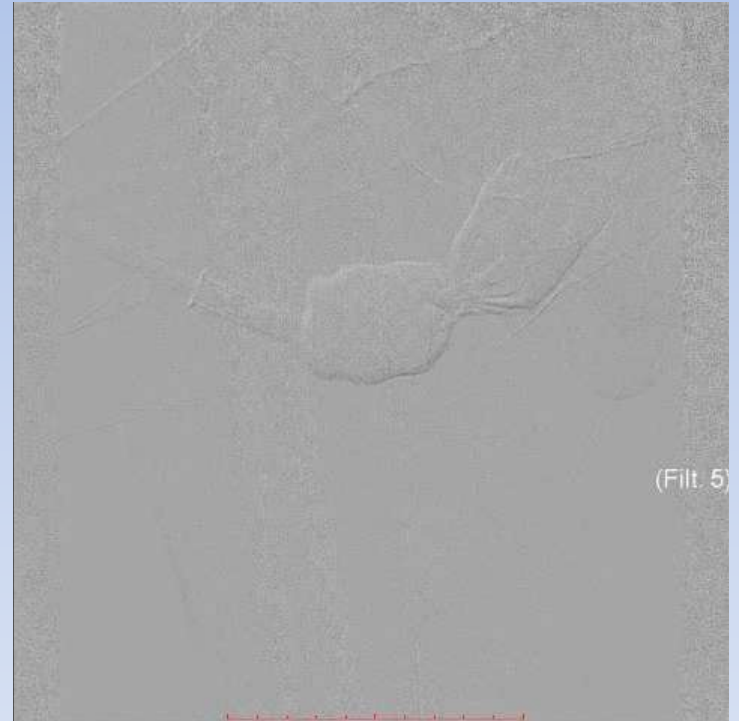


Increase in thrombus burden with loss of DFA flow



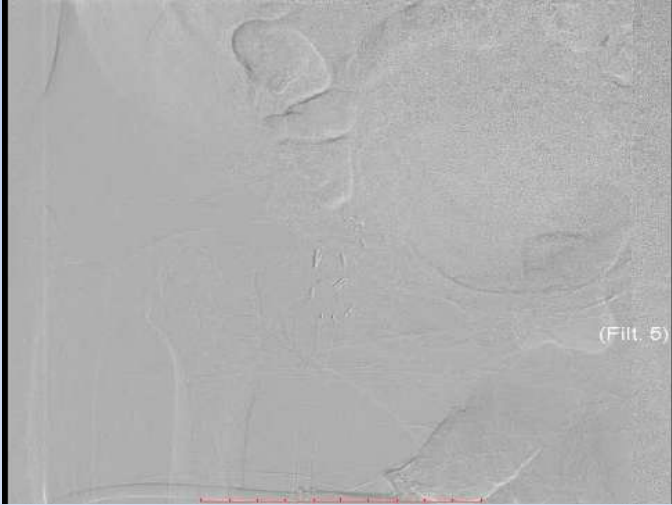
Thromboaspiration did not increase the flow and another session of thrombolysis was planned

3rd Round



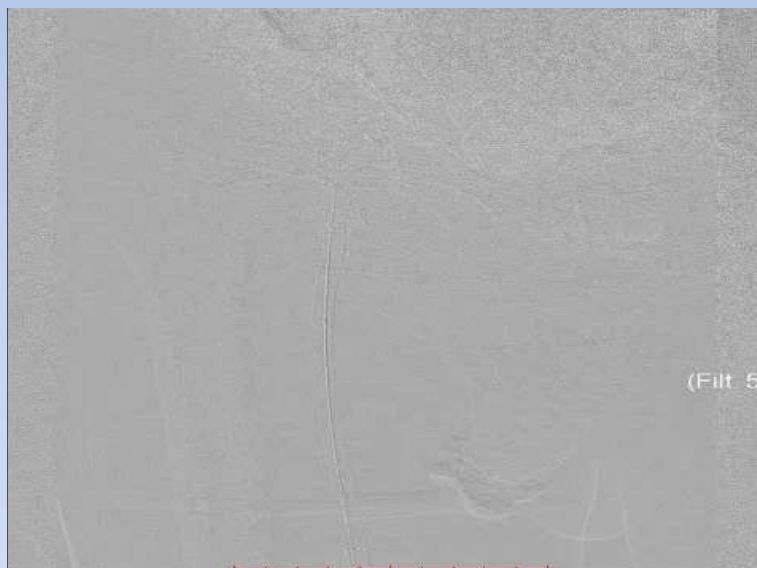


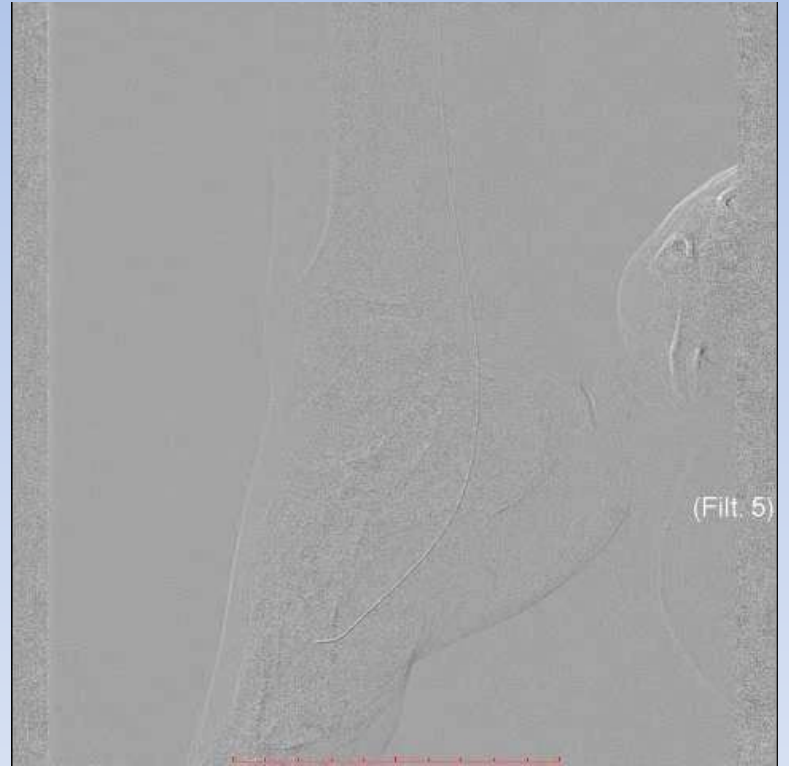
Thrombus fragmentation and thromboaspiration performed with guiding catheter (6F Mach 1)





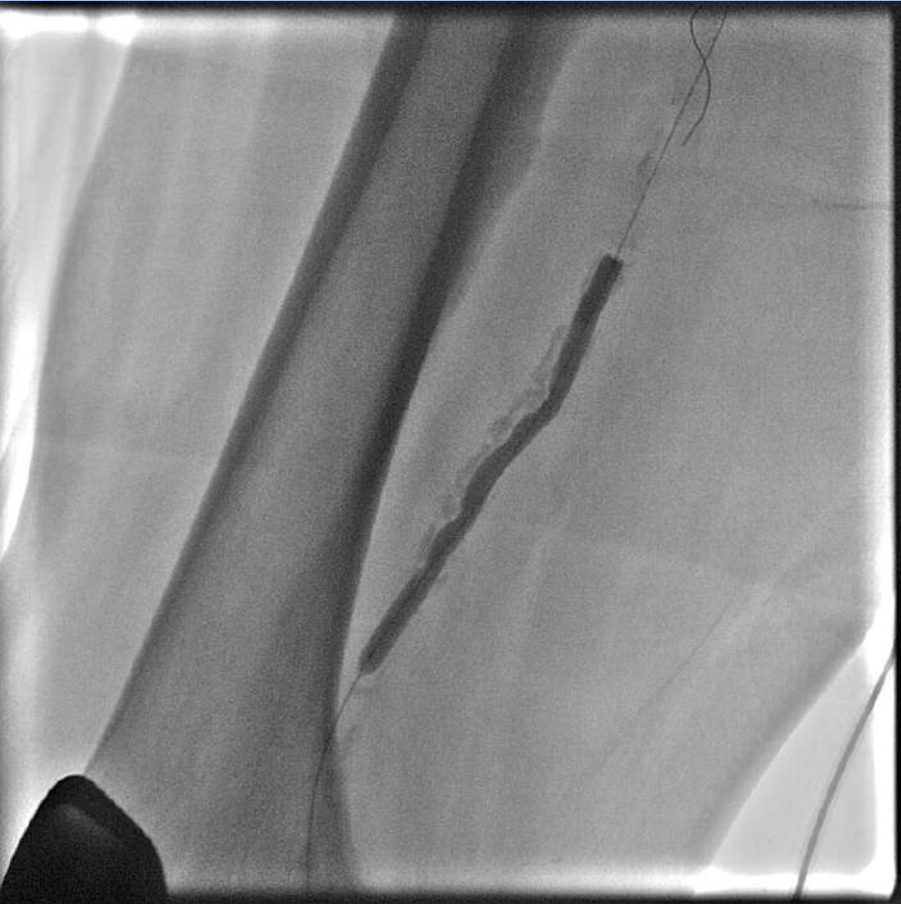
After retrograde access from PTA, simultaneous balloon angioplasty performed from antegrade and retrograde paths.

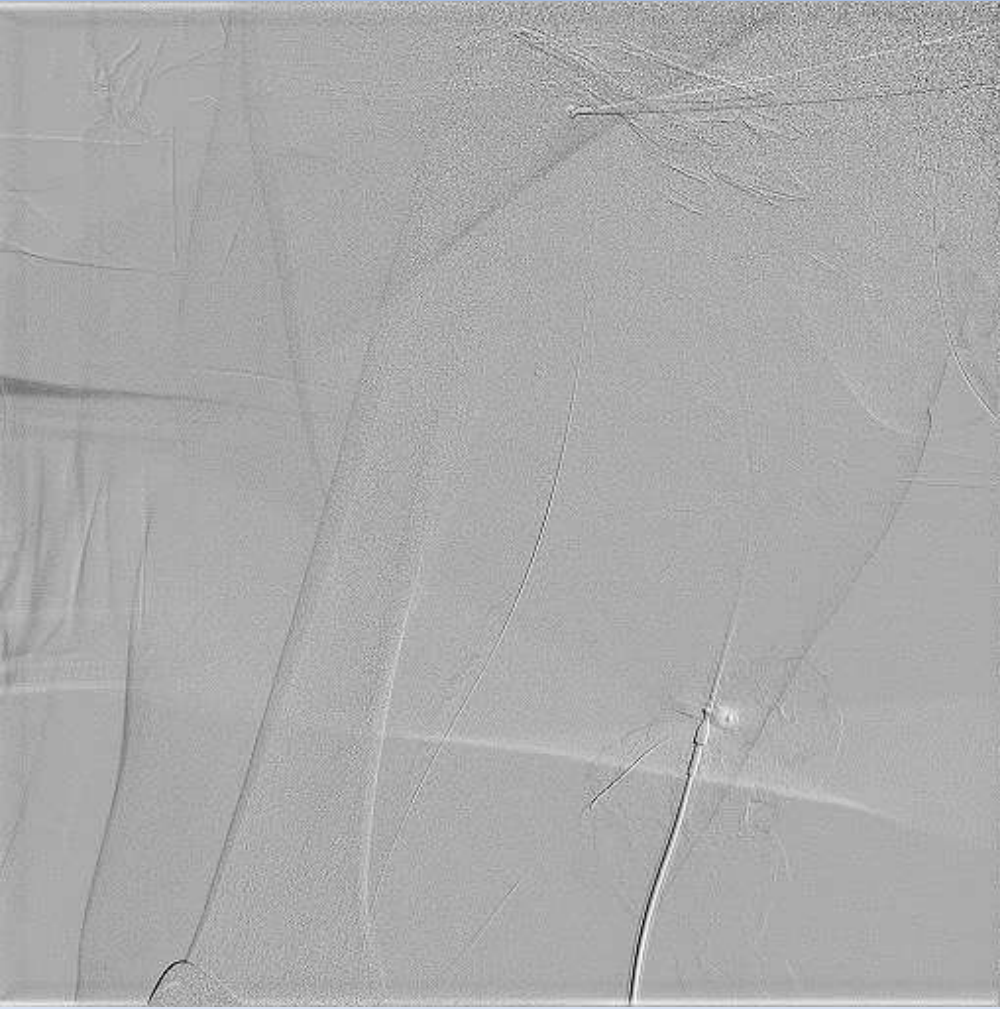


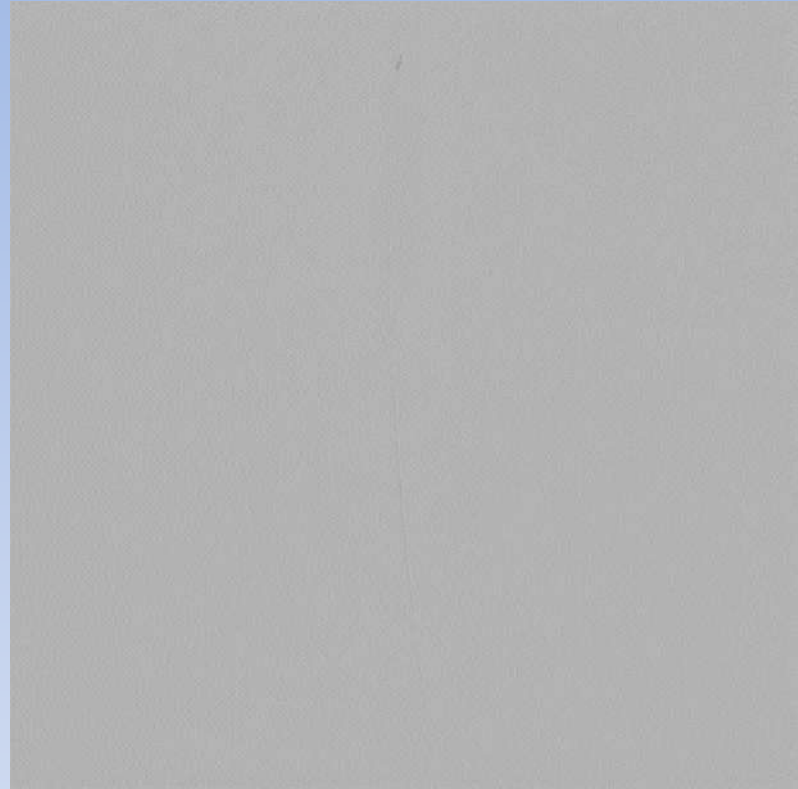
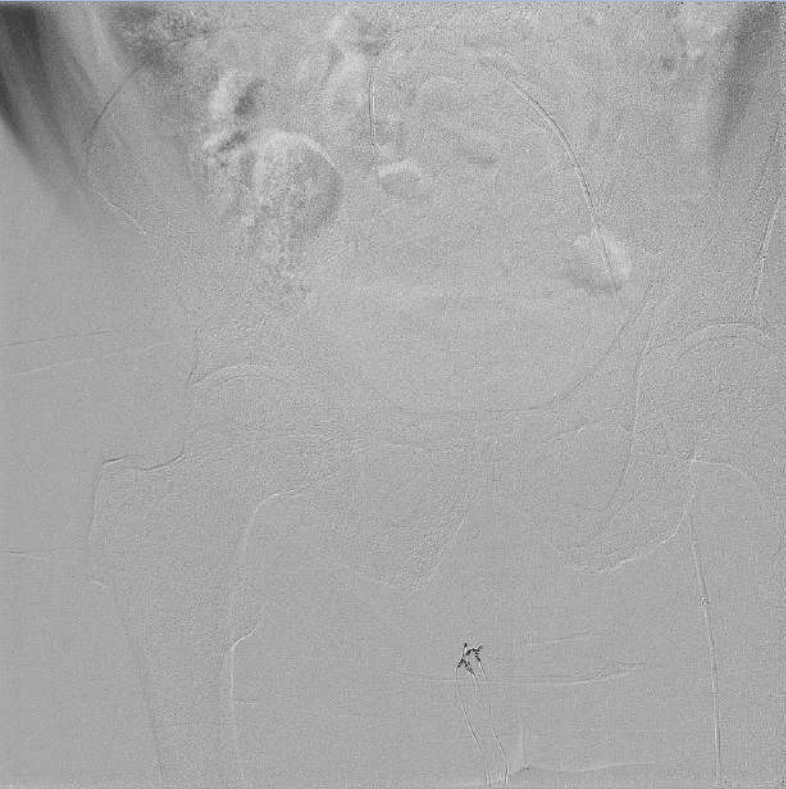


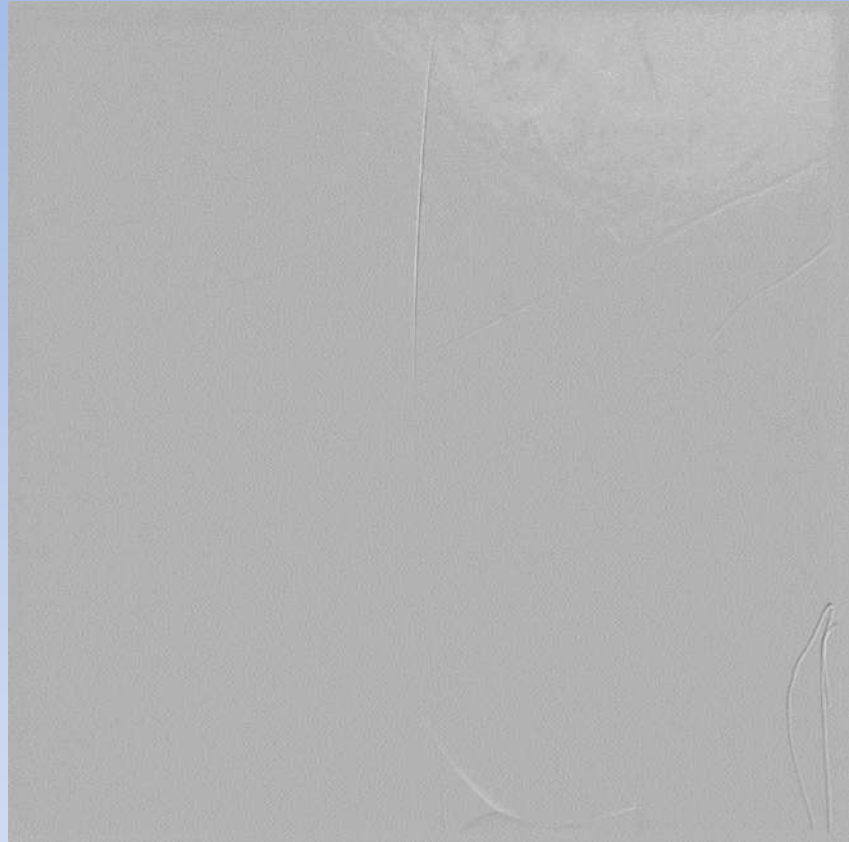
- **72 yaş erkek**
- **Her iki ayakta iyileşmeyen yara, Rutherford 4**
- **DM, KKY**

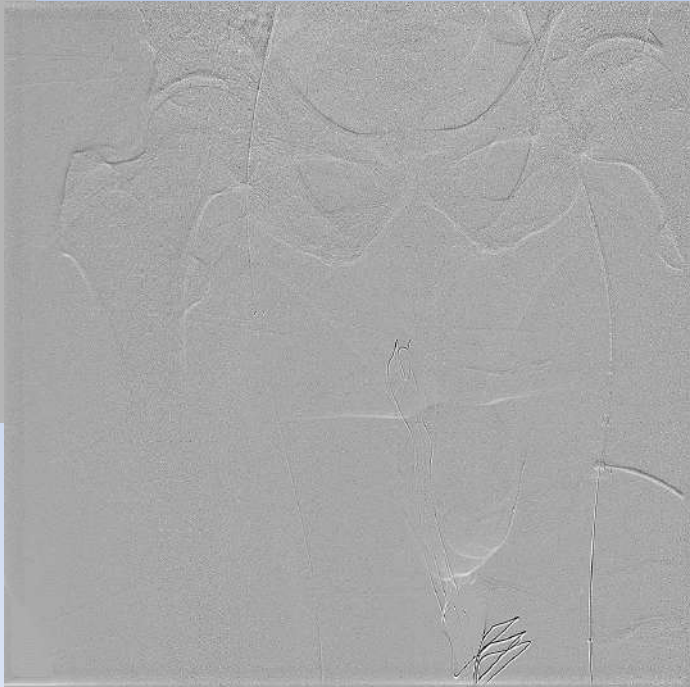
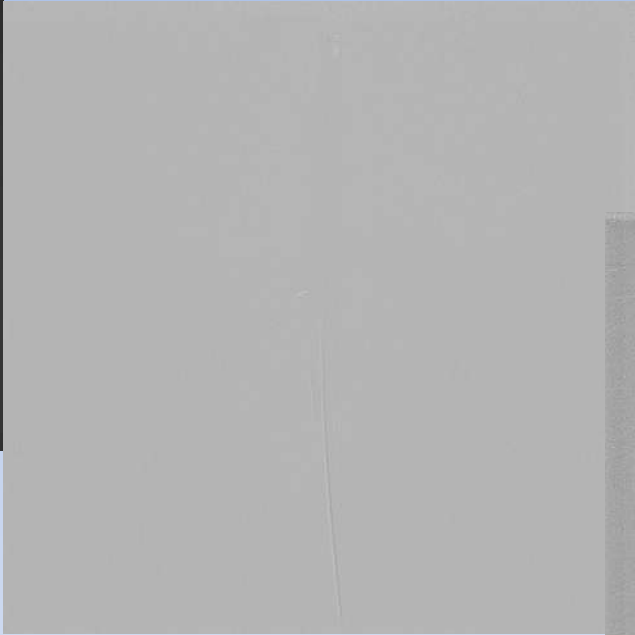




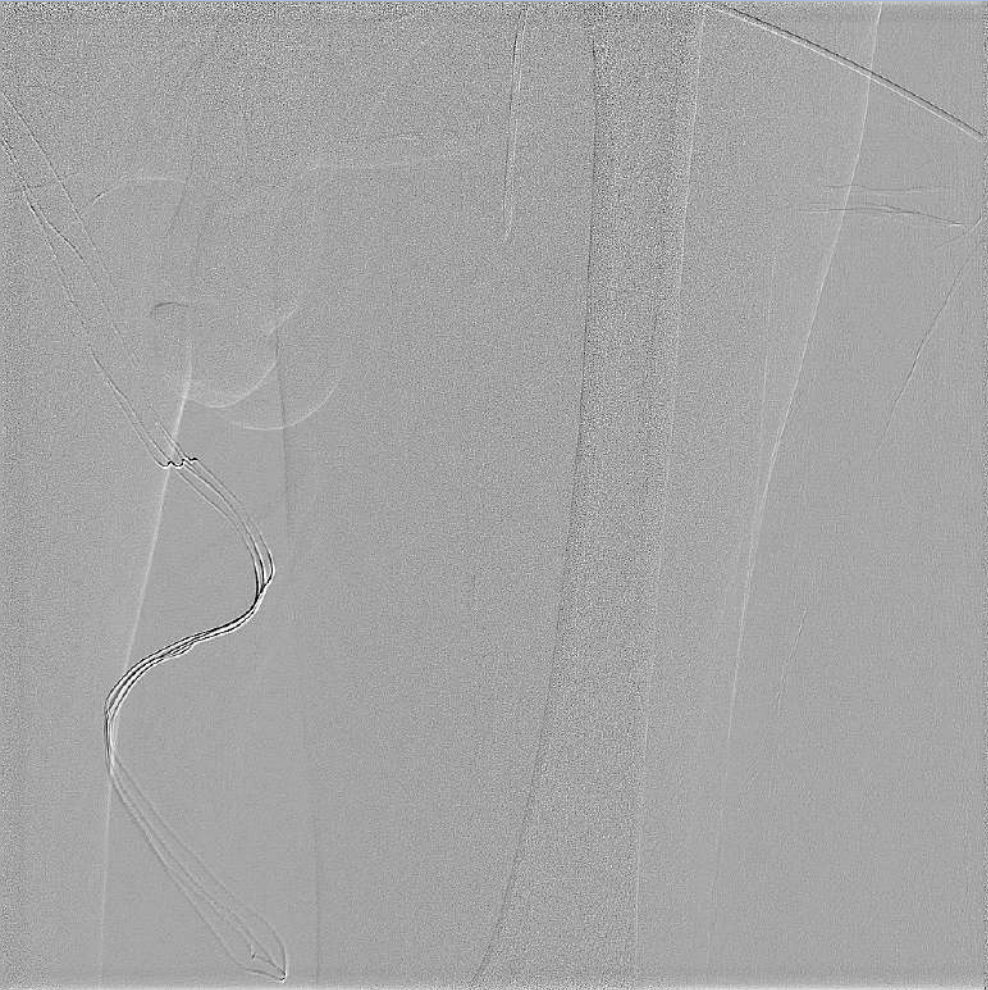


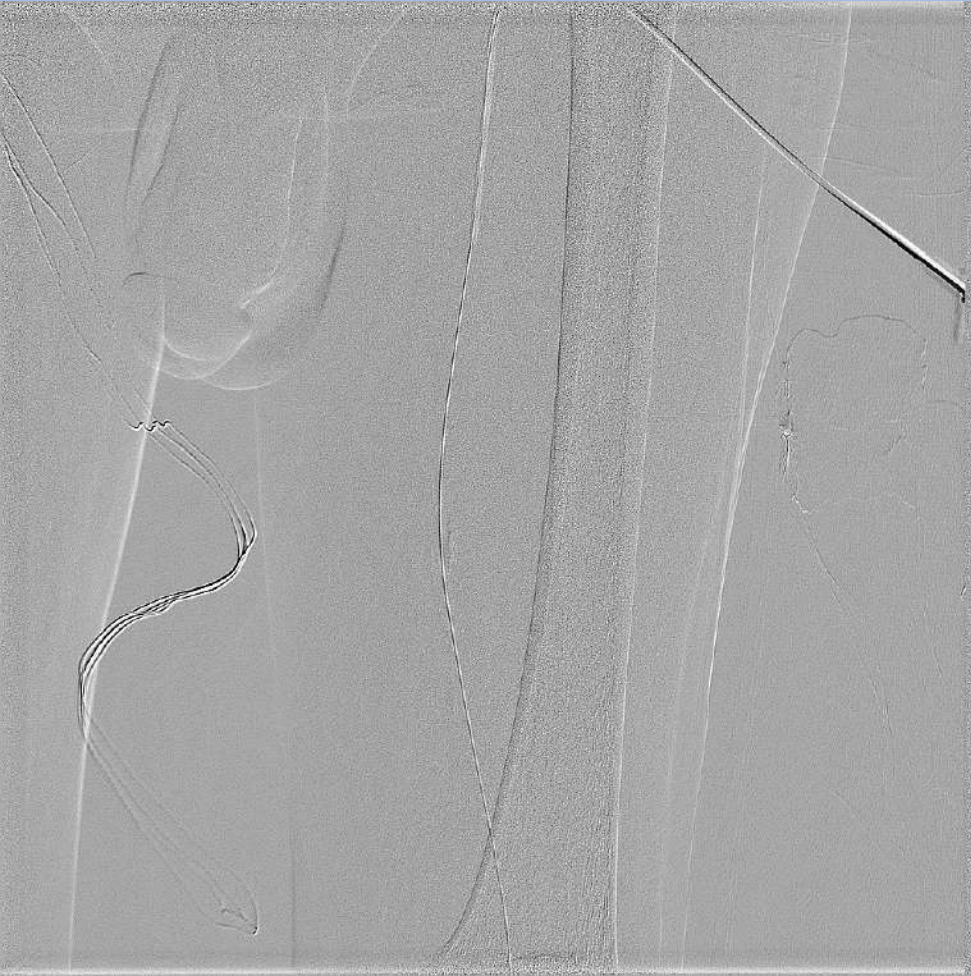






- **73 yaş erkek**
- **HT, DM**
- **Rutherford 4**





- 2022.9.22

