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Was geht nicht ohne Skalpell ?

Hubert Baumann

Sektion Gefäßchirurgie

Klinik für Viszeral-, Gefäß- und Thoraxchirurgie

Die alleinige Zukunft ?

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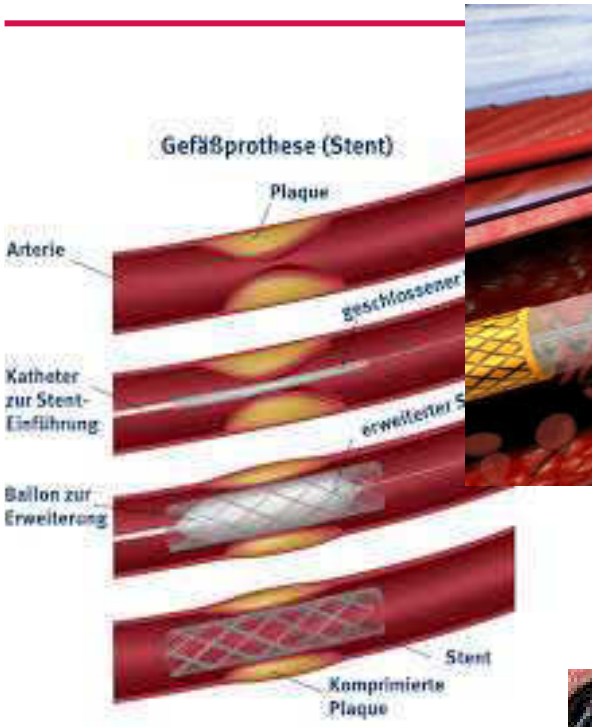

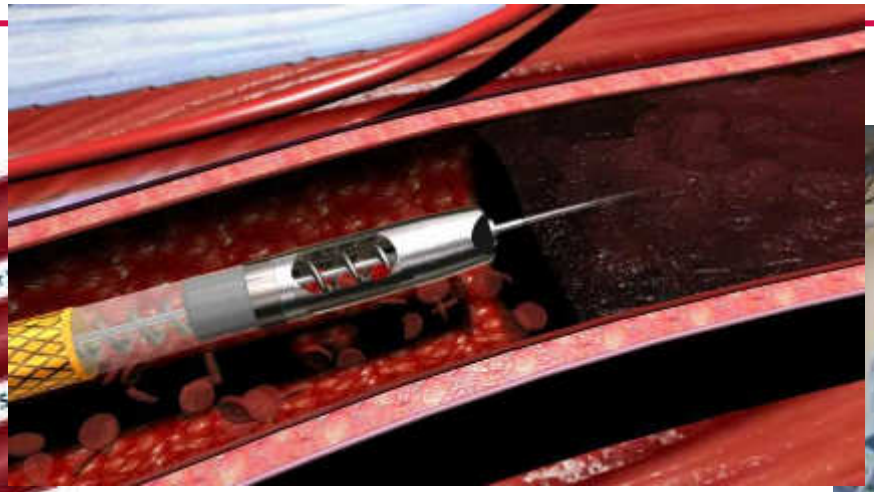

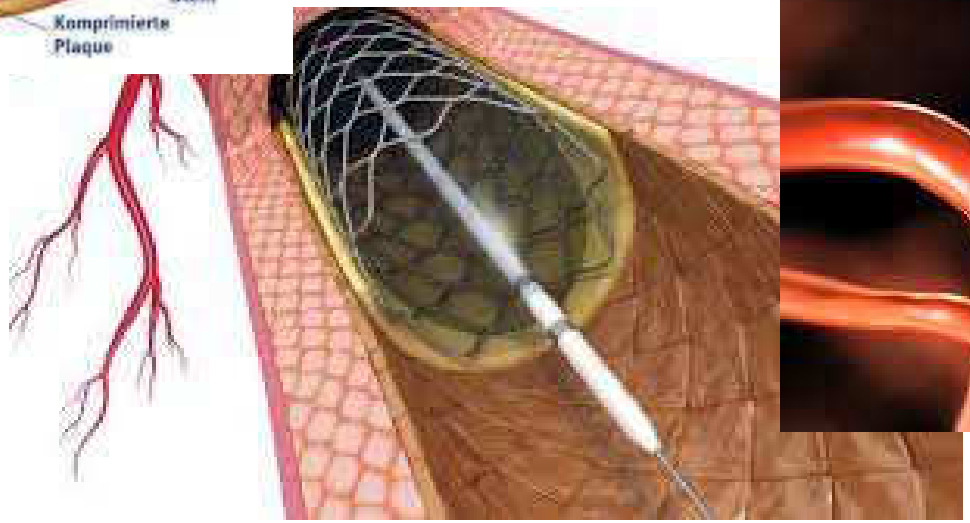

Open bypass and endovascular procedures among diabetic foot ulcer cases in the United States from 2001 to 2010

[illegible]

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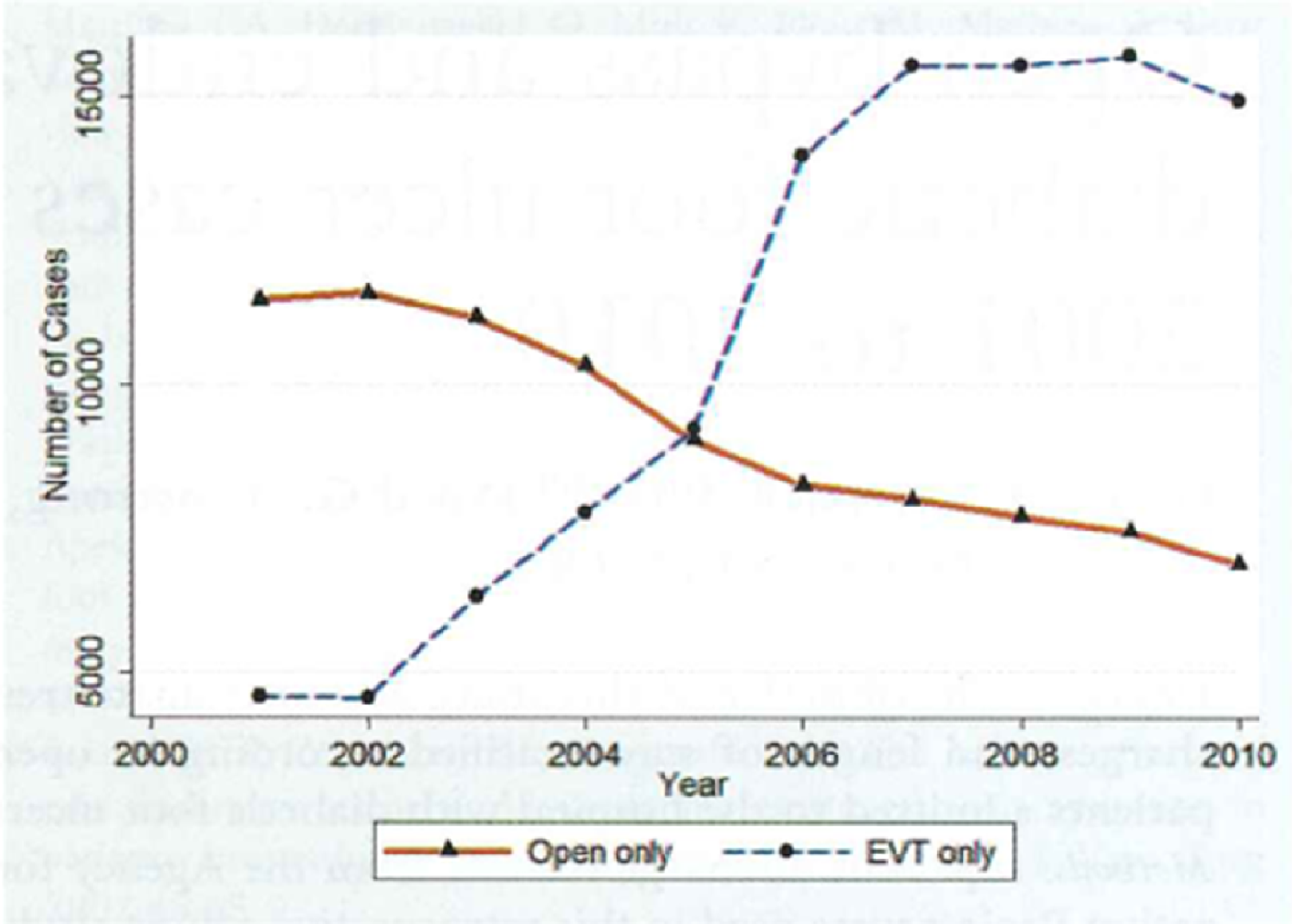

J VASC SURG, 2014 DOI: 10.1016/J.JVS.2014.04.071

Ist die offene chirurgische Therapie schon ein überflüssiges Verfahren in der Therapie der pAVK ?

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Aortoiliacale Erkrankung

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TASC A

Aortoiliacale Erkrankung

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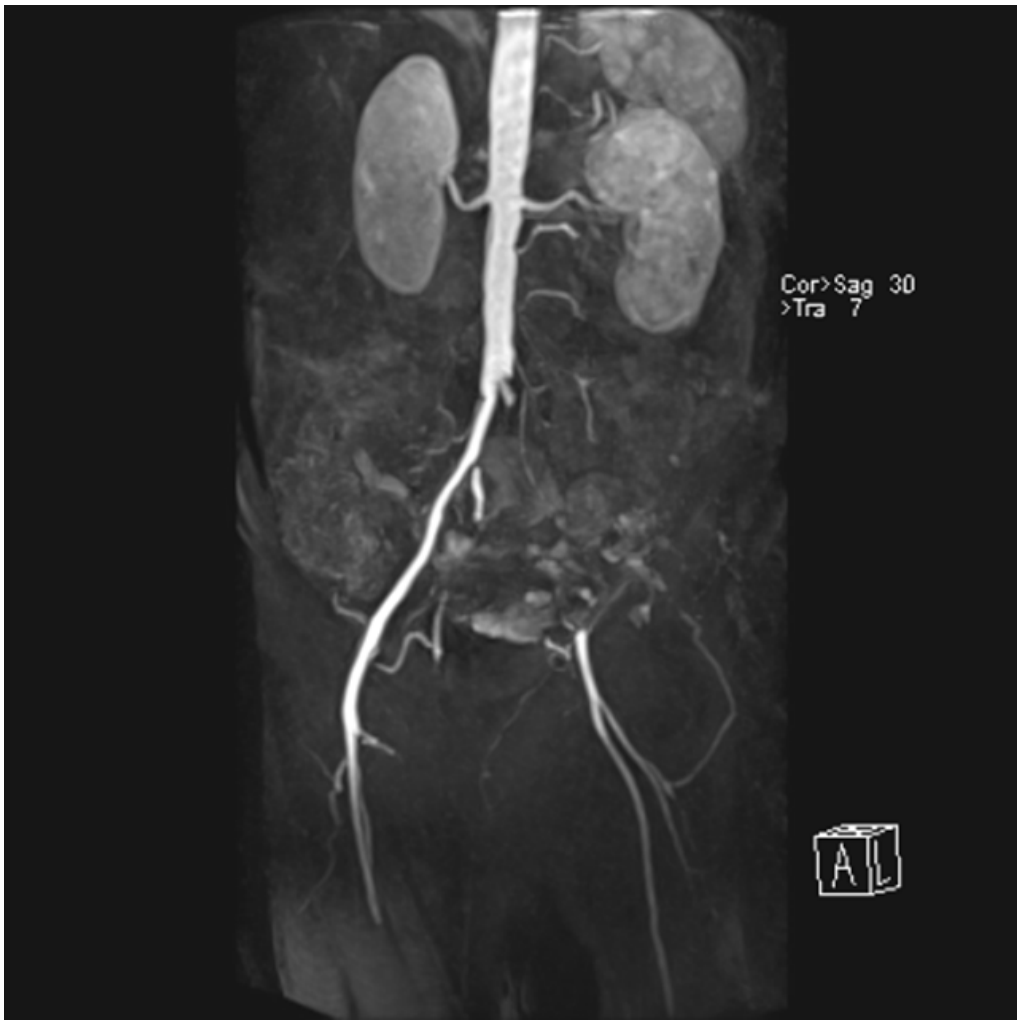
TASC D



TASC

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Inter-Society Consensus for the Management of Peripheral Arterial Disease

Collaboration of international vascular specialities involved in management of patients with peripheral disease.

guidelines last updated in 2007 **(TASC II)**

TASC

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Typ-A-Läsion -	Behandlung **interventionell**
Typ-B-Läsion -	Behandlung **eher interventionell** oder operativ
Typ-C-Läsion -	Behandlung **eher operativ** oder interventionell
Typ-D-Läsion -	Behandlung **operativ**

TASC

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Typ-A-Läsion -	Behandlung **interventionell**
Typ-B-Läsion -	Behandlung **eher interventionell** oder operativ
Typ-C-Läsion -	Behandlung **eher operativ** oder interventionell
Typ-D-Läsion -	Behandlung **operativ**

TASC

Aortoiliacal

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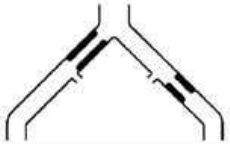
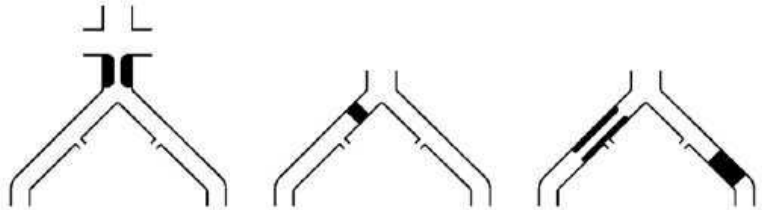
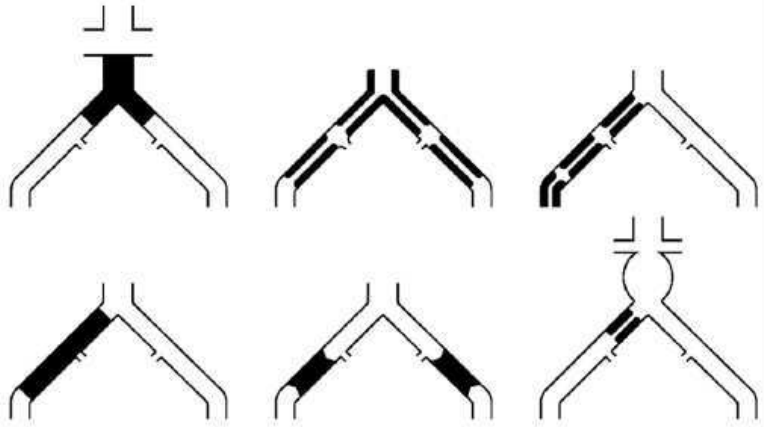
TASC A lesions • Unilateral or bilateral CIA stenoses • Unilateral or bilateral single short (≤3 cm) EIA stenosis	
TASC B lesions • Short (≤3 cm) stenosis of the infrarenal aorta • Unilateral CIA occlusion • Single or multiple stenosis totaling 3 to 10 cm involving the EIA not extending into the CFA • Unilateral EIA occlusion not involving the origins of the internal iliac or CFA	
TASC C lesions • Bilateral CIA occlusions • Bilateral EIA stenoses 3 to 10 cm long not extending into the CFA • Unilateral EIA stenosis extending into the CFA • Unilateral EIA occlusion involving the origins of the internal iliac and/or CFA • Heavily calcified unilateral EIA occlusion with or without involvement of the origins of the internal iliac and/or CFA	
TASC D lesions • Infrarenal aortoiliac occlusion • Diffuse disease involving the aorta and both iliac arteries • Diffuse multiple stenoses involving the unilateral CIA, EIA, and CFA • Unilateral occlusions of both CIA and EIA • Bilateral EIA occlusions • Iliac stenoses in patients with AAA not amenable to endograft placement	

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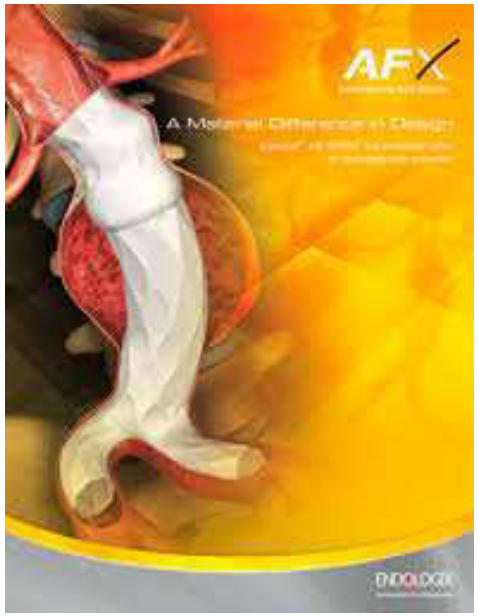
VESS6.

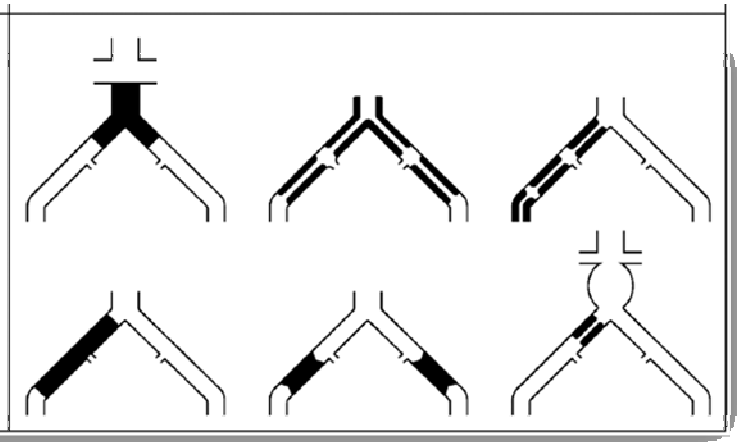
Multi-center Experience Using a Unibody Endograft for Treatment of Advanced (TASC D) Aortoiliac Occlusive Disease: An Endovascular Aortobifemoral Bypass

Thomas S. Maldonado[1], Omid Jazaeri[2], Mark Mewissen[3],



TASC D lesions

- Infrarenal aortoiliac occlusion
- Diffuse disease involving the aorta and both iliac arteries
- Diffuse multiple stenoses involving the unilateral CIA, EIA, and CFA
- Unilateral occlusions of both CIA and EIA
- Bilateral EIA occlusions
- Iliac stenoses in patients with AAA not amenable to endograft placement



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VESS6.

Multi-center Experience Using a Unibody Endograft for Treatment of Advanced (TASC D) Aortoiliac Occlusive Disease: An Endovascular Aortobifemoral Bypass

Thomas S. Maldonado[1], Omid Jazaeri[2], Mark Mewissen[3],

Table. Graft patency

Patency	*30 days*	*6 months*	*1 year*	*2 years*
Primary	62/63 (98.4%)	69/71 (97.2%)	44/47 (93.6%)	24/24 (100%)
Assisted primary	63/63 (100%)	71/71 (100%)	46/47 (97.8%)	24/24 (100%)
Secondary	63/63 (100%)	71/71 (100%)	47/47 (100%)	24/24 (100%)

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Adjunctive Procedures: 56 patients (57%)

	Number of Patients
	56 (64%)
Endovascular Procedures	51 (59%)
Aortic Stent	10 (11%)
Iliac Stent	53 (61%)
As extension	30
As relining	23
Surgical Procedures	34 (39%)
CFA Endarterectomy	30 (37%)
Right	23
Left	24
Bypass	6 (7%)

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Procedural Complications

	N=90	%
Groin Infection	6	7%
Respiratory Failure	4	4%
Groin Hematoma	3	3%
Rupture	4	4%
Dissection	4	4%
Thromboembolic Event*	3	3%
Iliac Injury	2	3%
Femoral Thrombosis	2	2%
Stroke	1	1%

30 Day Mortality* : 1%

32%

Open Surgery vs. Endovascular Intervention

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Keine vergleichenden groß angelegten Studien

Open Surgery vs. Endovascular Intervention

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Results of endovascular therapy and aortobifemoral grafting for TASC type **C** and **D** aortoiliac occlusive disease.
Hans SS, et al. Surgery. 2008; 144:583-590

40 endovascular
32 surgical revascularisation

Primary patency 48 months

Significantly better with surgery

Risk of more pulmonary complications

pAVK III links
55a, männlich

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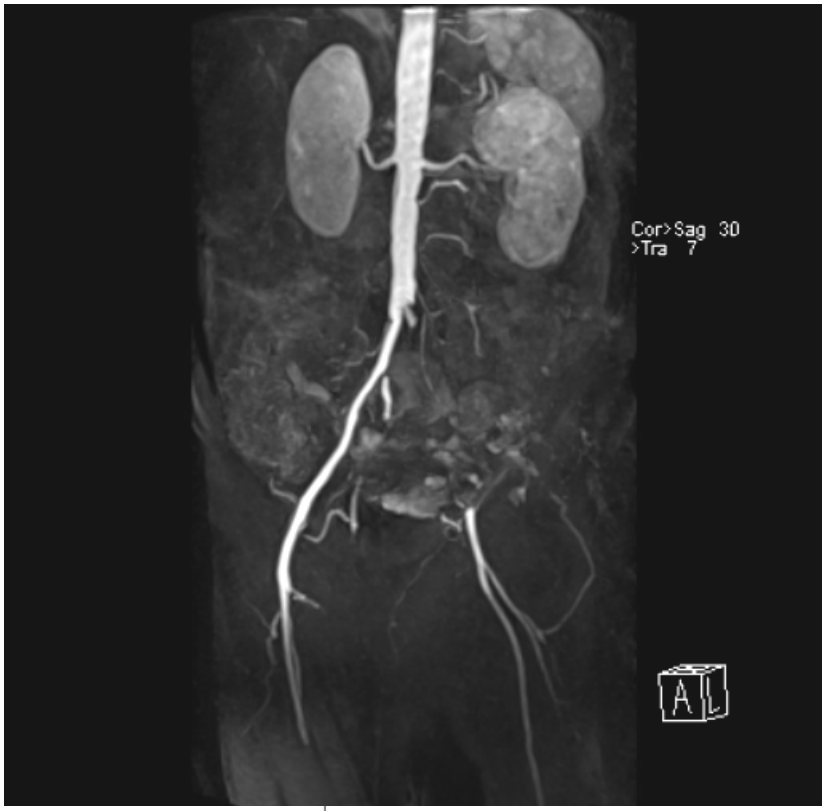

TASC D lesions

- Infrarenal aortoiliac occlusion
- Diffuse disease involving the aorta and both iliac arteries
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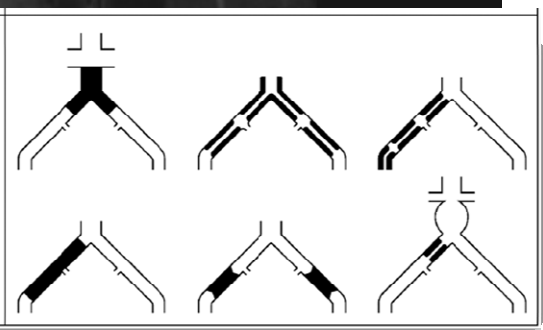

TASC D

Verschluß der linken A. iliaca communis, interna und externa

pAVK III links
55a, männlich

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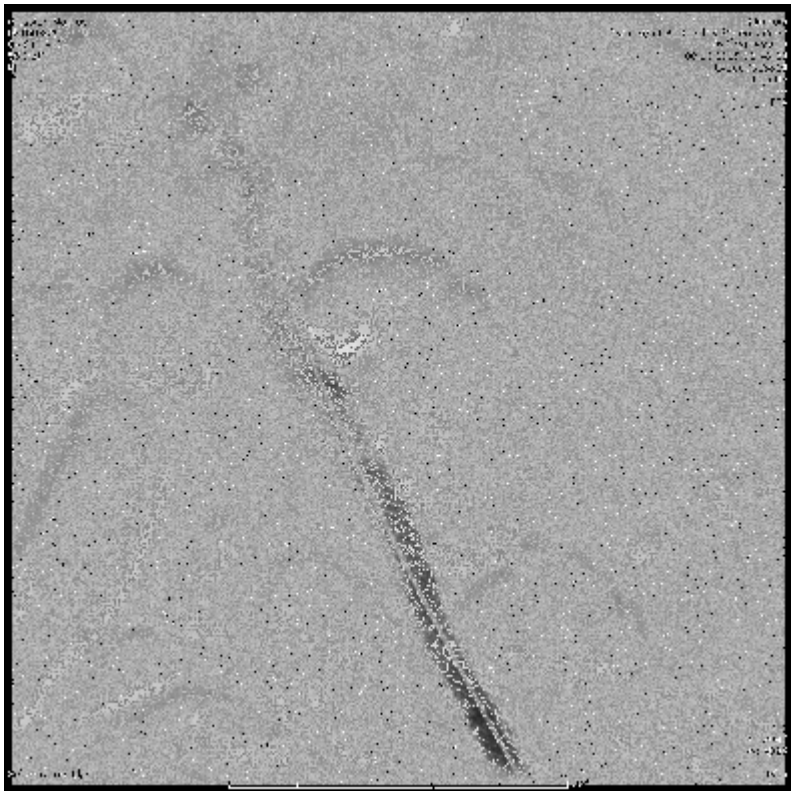
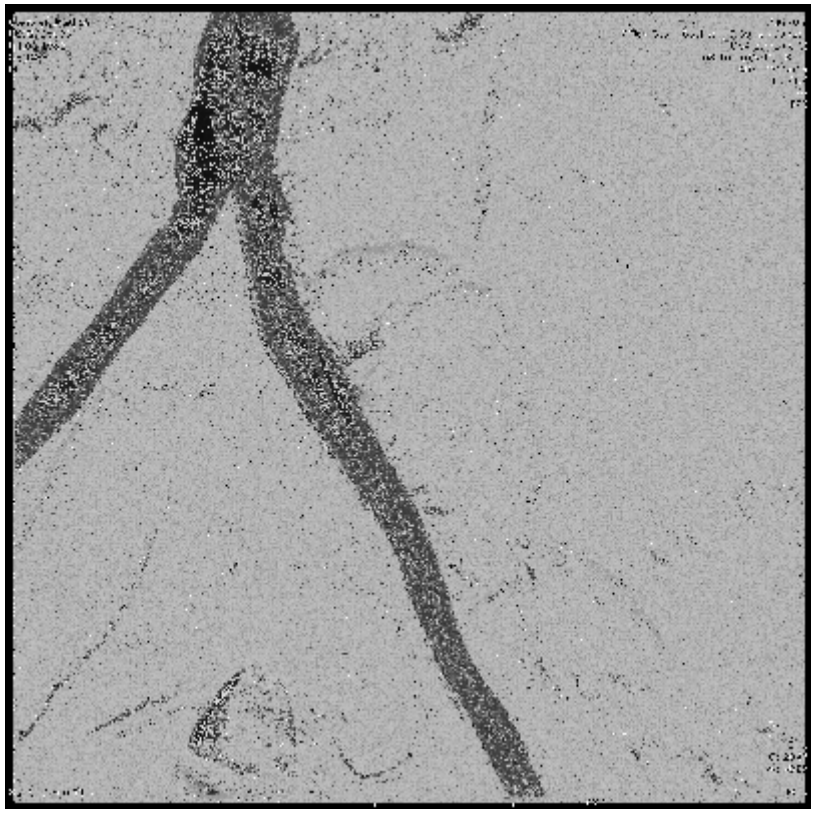


Lyse
Transluminale Angioplastie
3 Nitinol-Stents



pAVK III links
55a, männlich

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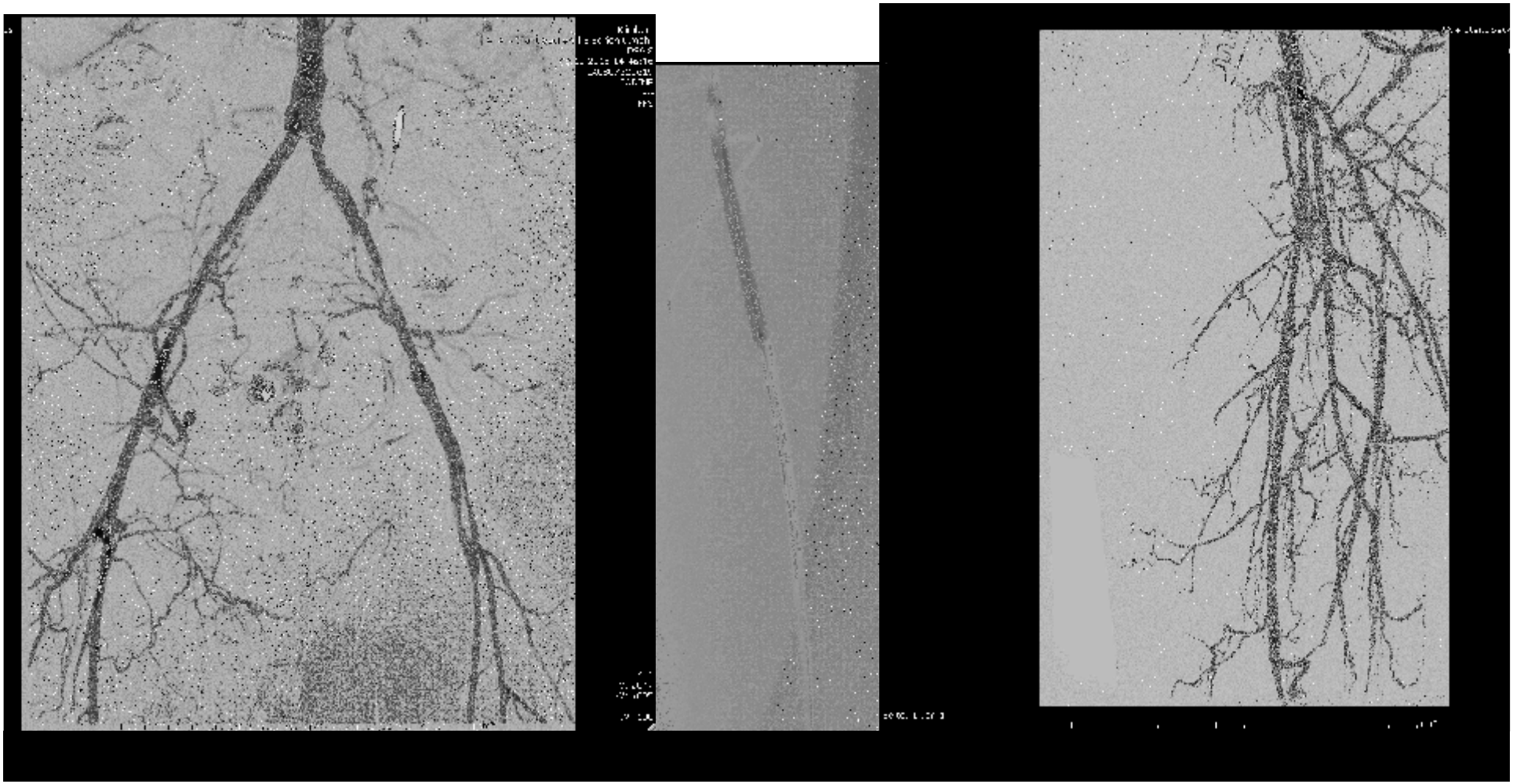
Thrombendarteriektomie mit Patchplastik AFC, ITA der A.fem.superficialis

HYBRID-OP



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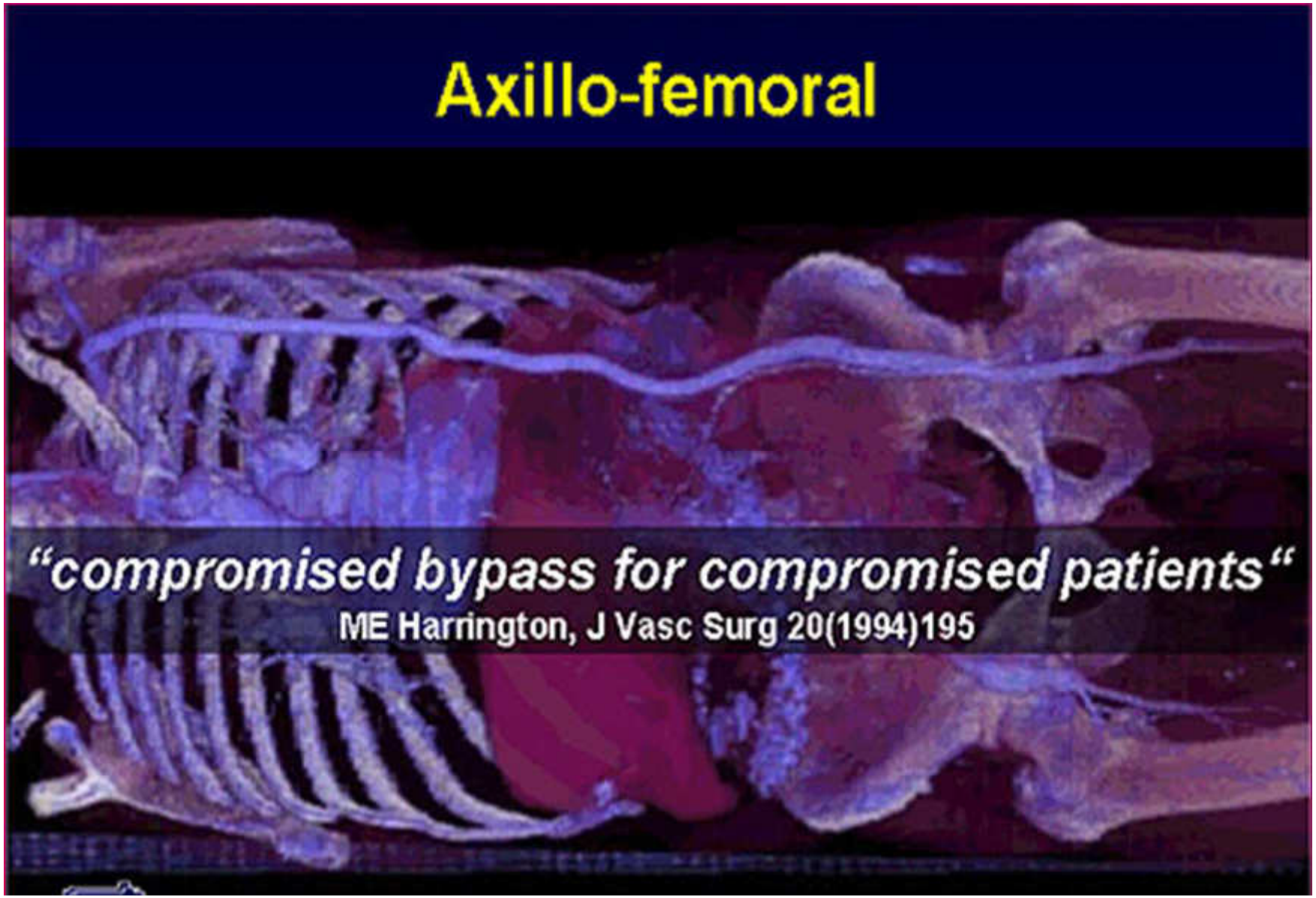
Axillo-femoral



Cross-over Bypass

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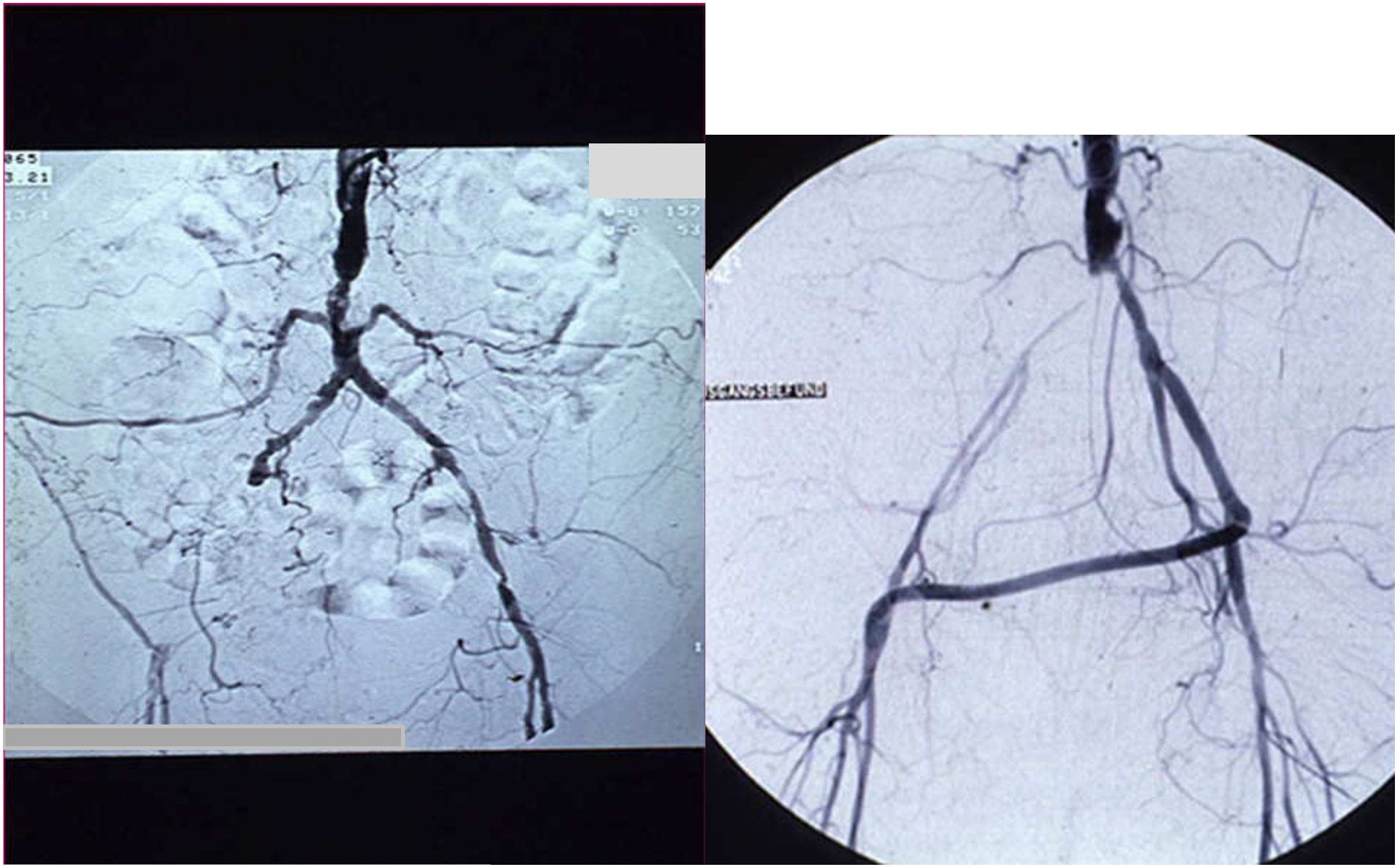

Aorto-iliacale Region

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- **Endovaskuläre Therapie (PTA / Stent) mit guten Langzeitergebnissen** (z.T. 80% Offenheit nach 5 Jahren)
- **Bypasschirurgie mit besseren Ergebnissen aber höherer Morbidität** (Bsp. Y-Prothese)

Fazit:

Tendenz in Richtung **endovaskulärer Therapie**

Langstreckige Beckenarterienverschlüsse ggf. mit Aortenbeteiligung **(TASC D)** und

Pathologien der A. iliaca externa mit Audsdehnung zur Leiste –

gute Option für die offene Chirurgie

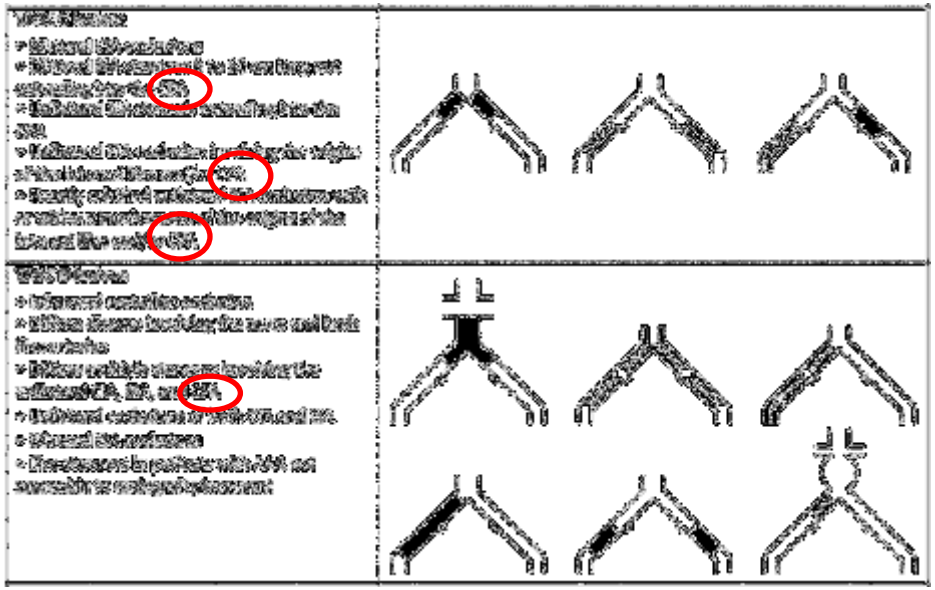
Leistenregion

Anatomische Situation:

Aufzweigung in die **A. profunda femoris**

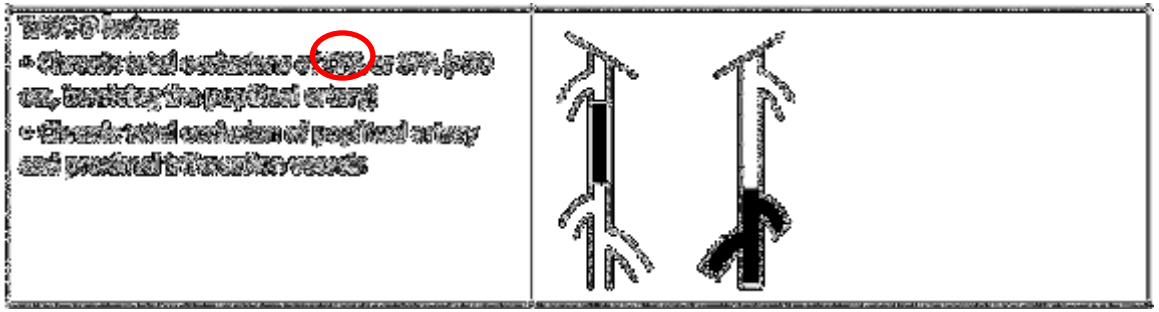
und **A. femoralis superficalis**

Hohe mechanische Belastung (Hüftbeugung)



TASC classification of aorto-iliacal lesions

TASC classification of femoral popliteal lesions



Leistenregion

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Fazit:

Nicht geeignet für interventionelle Maßnahmen!

Domäne der offenen Gefäßrekonstruktion

Bsp.: Thrombendarteriektomie
gute Offenheitsrate

Hybrid-OP

Kombination offener Verfahren mit endovaskulären Eingriffen
Mehretagenbeteiligung

Bsp.: Thrombendarteriektomie der Femoralisgabel und
interventionelle Verbesserung des Ein- und Ausstroms (PTA, Stent)

pAVK IV links
60a / männlich

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pAVK IV links
60a / männlich

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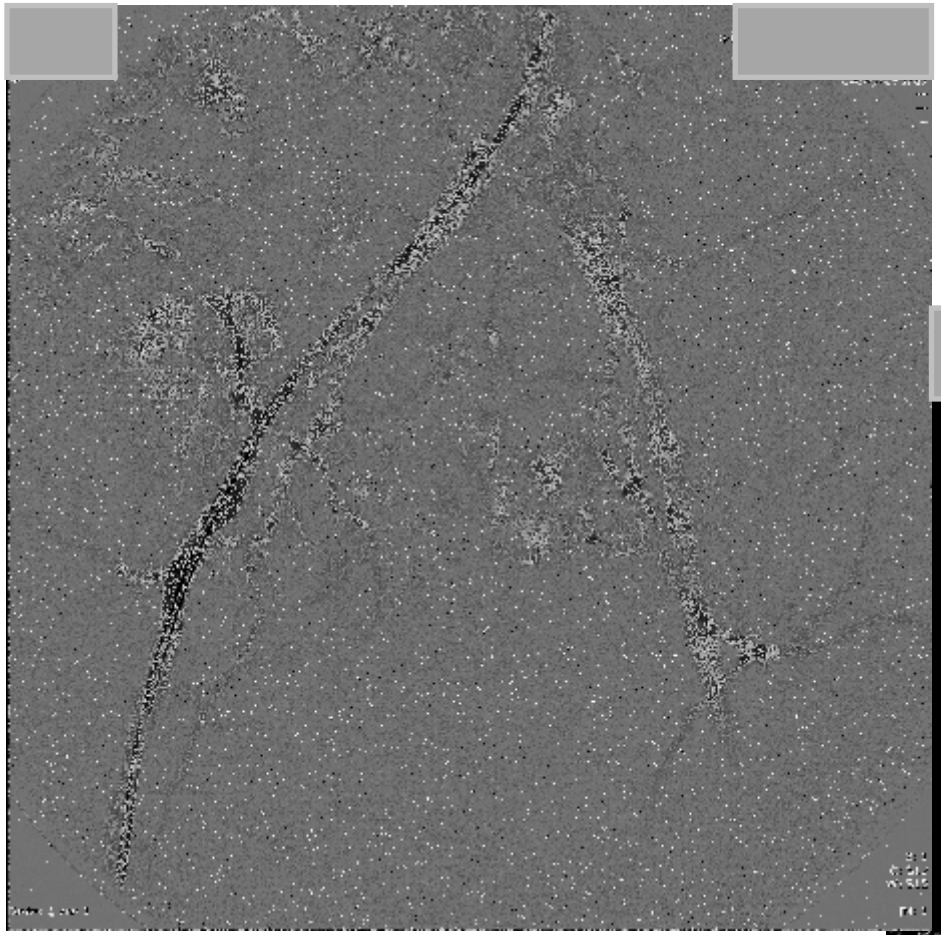
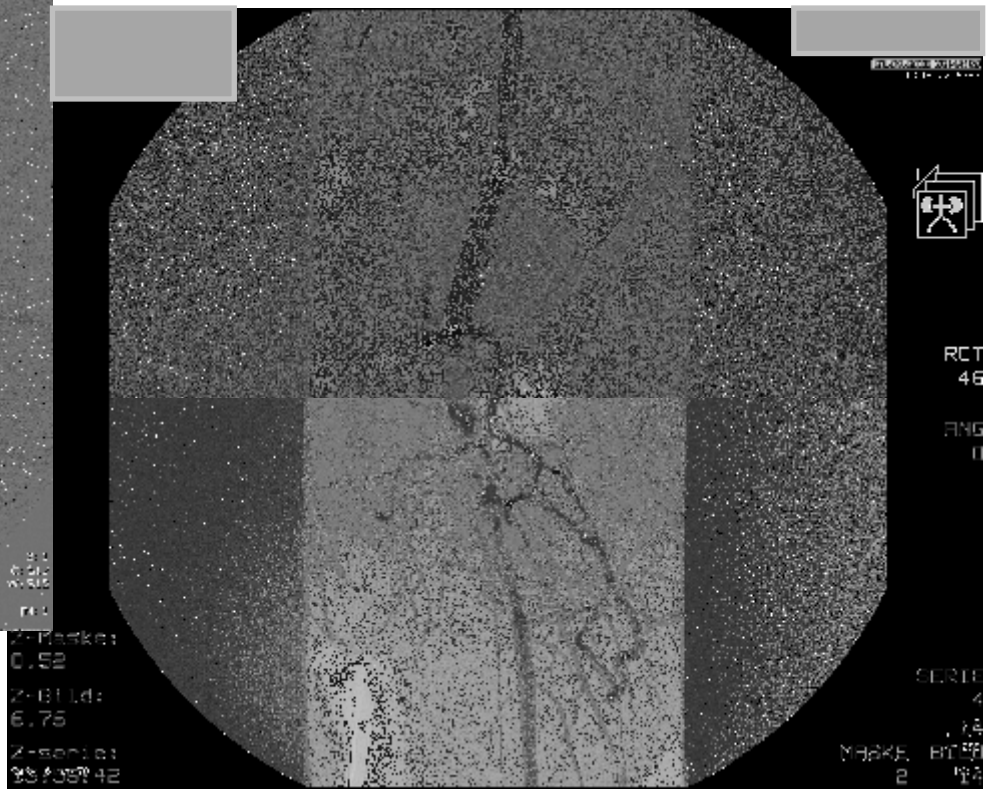


Stenose der A.femoralis communis



pAVK IV links
60a / männlich

Hybrid-OP

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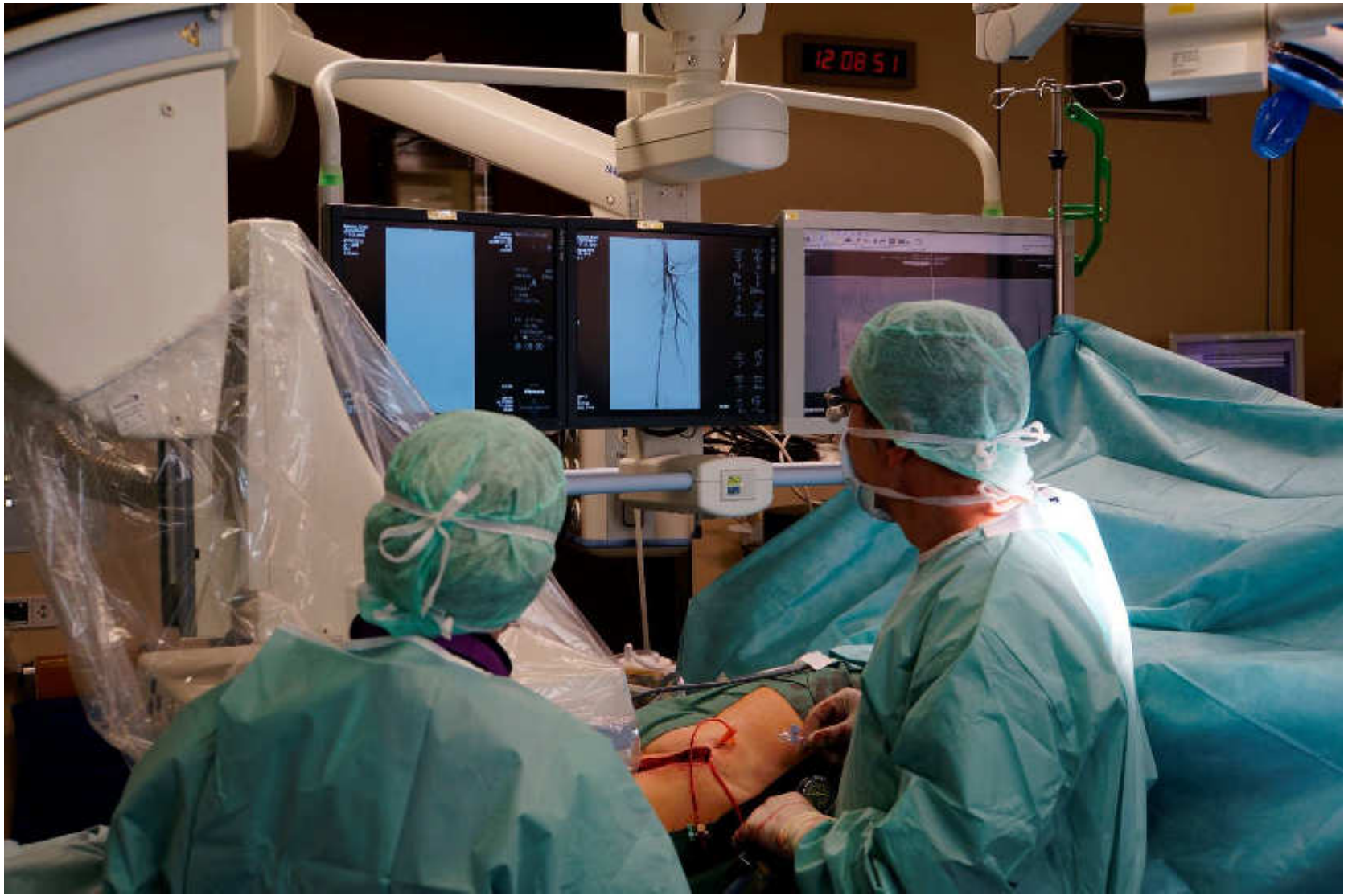

pAVK IV links
60a / männlich

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Thrombendarteriektomie
Patchplastik

pAVK IV links
60a / männlich

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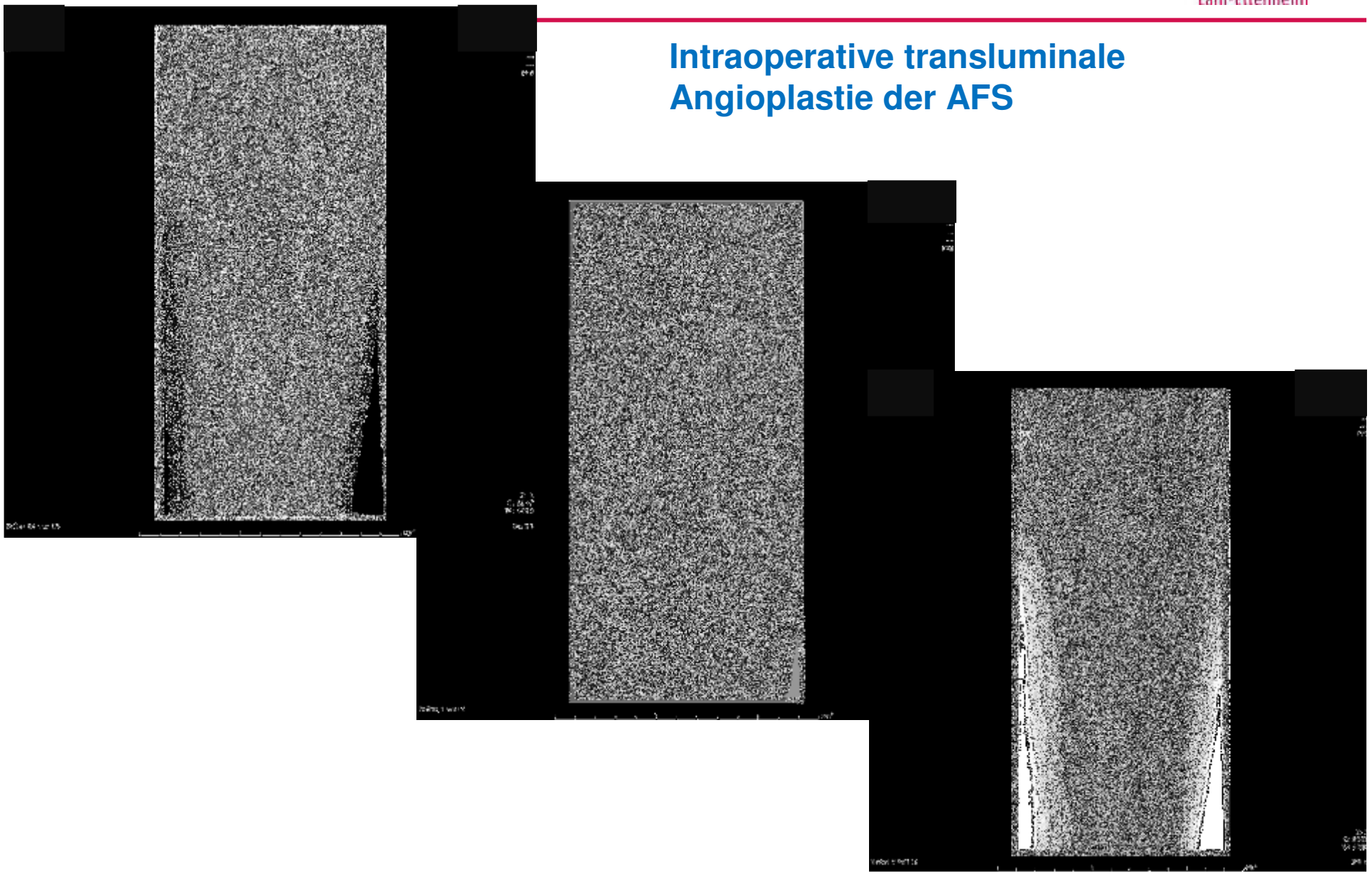
Intraoperative transluminale Angioplastie der AFS



Femoropopliteale Erkrankung

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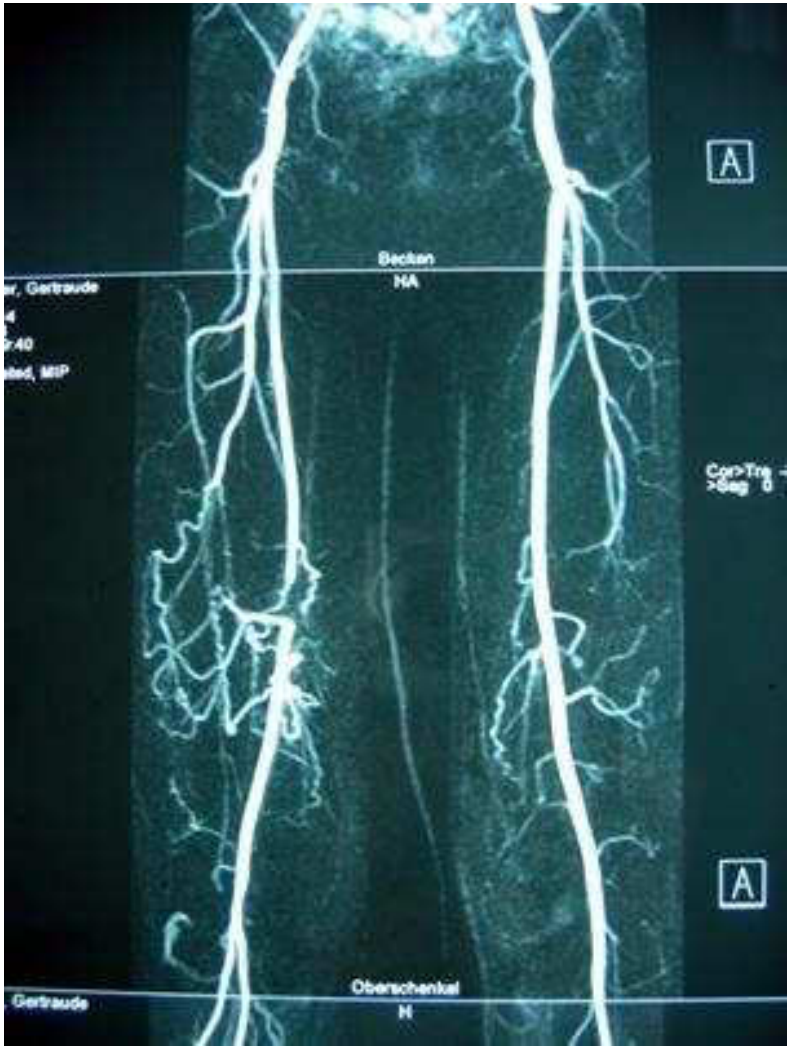
TASC A



TASC
Femoropopliteal

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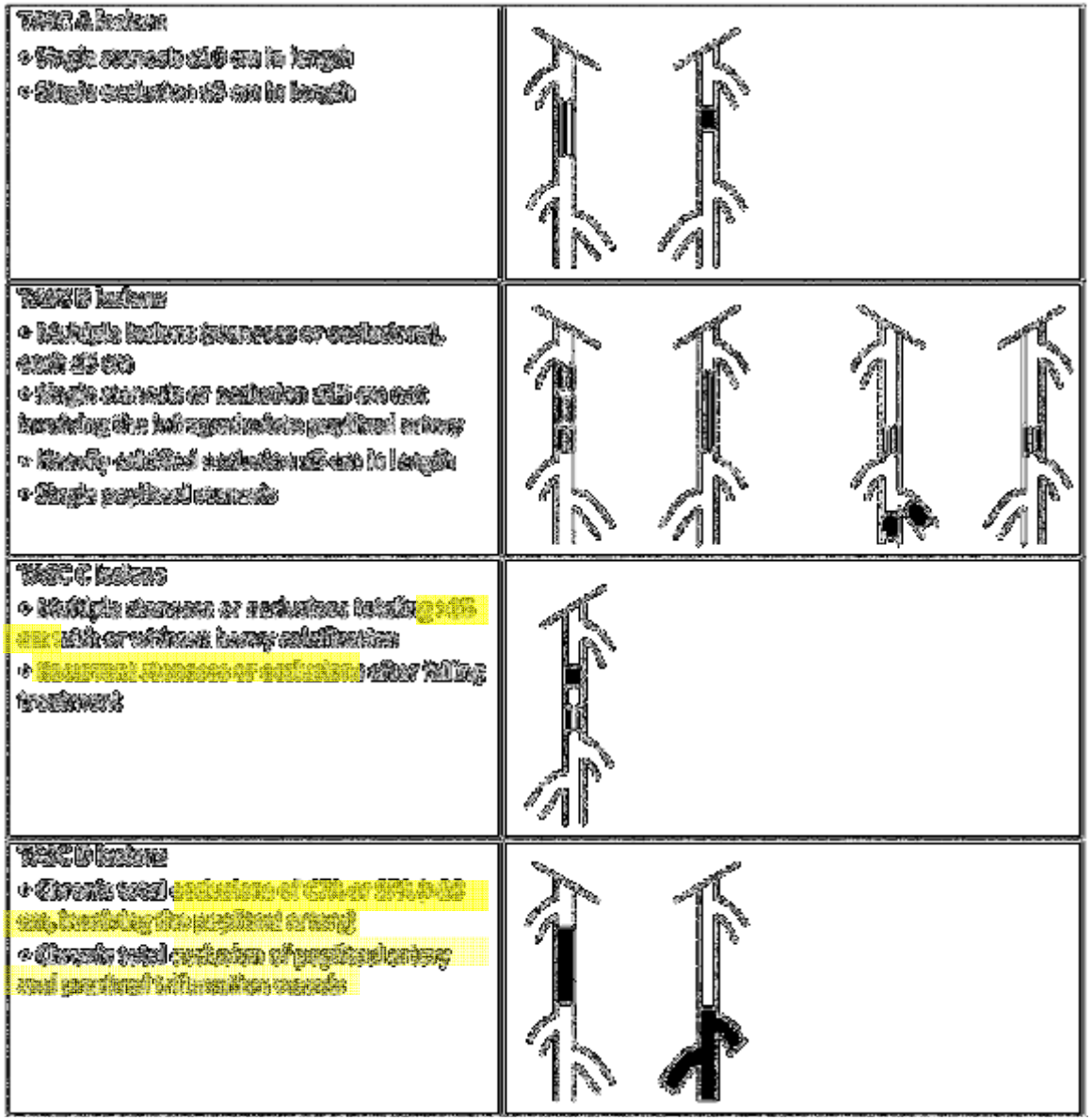

Inter-Society Consensus for the Management of Peripheral Arterial Disease (TASC) classification of femoral popliteal lesions.
CFA, common femoral artery
SFA, superficial femoral artery

12-month primary patency rates of contemporary endovascular device therapie for femoro-popliteal occlusive disease in 6.024 patients: Beyond balloon angioplasty

Marmagkiolis, K. et al. Cathet Cardiovasc Intervent 2014; 84: 555–564

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TABLE IV. Total Number of Studies and Patients Involved in the Study

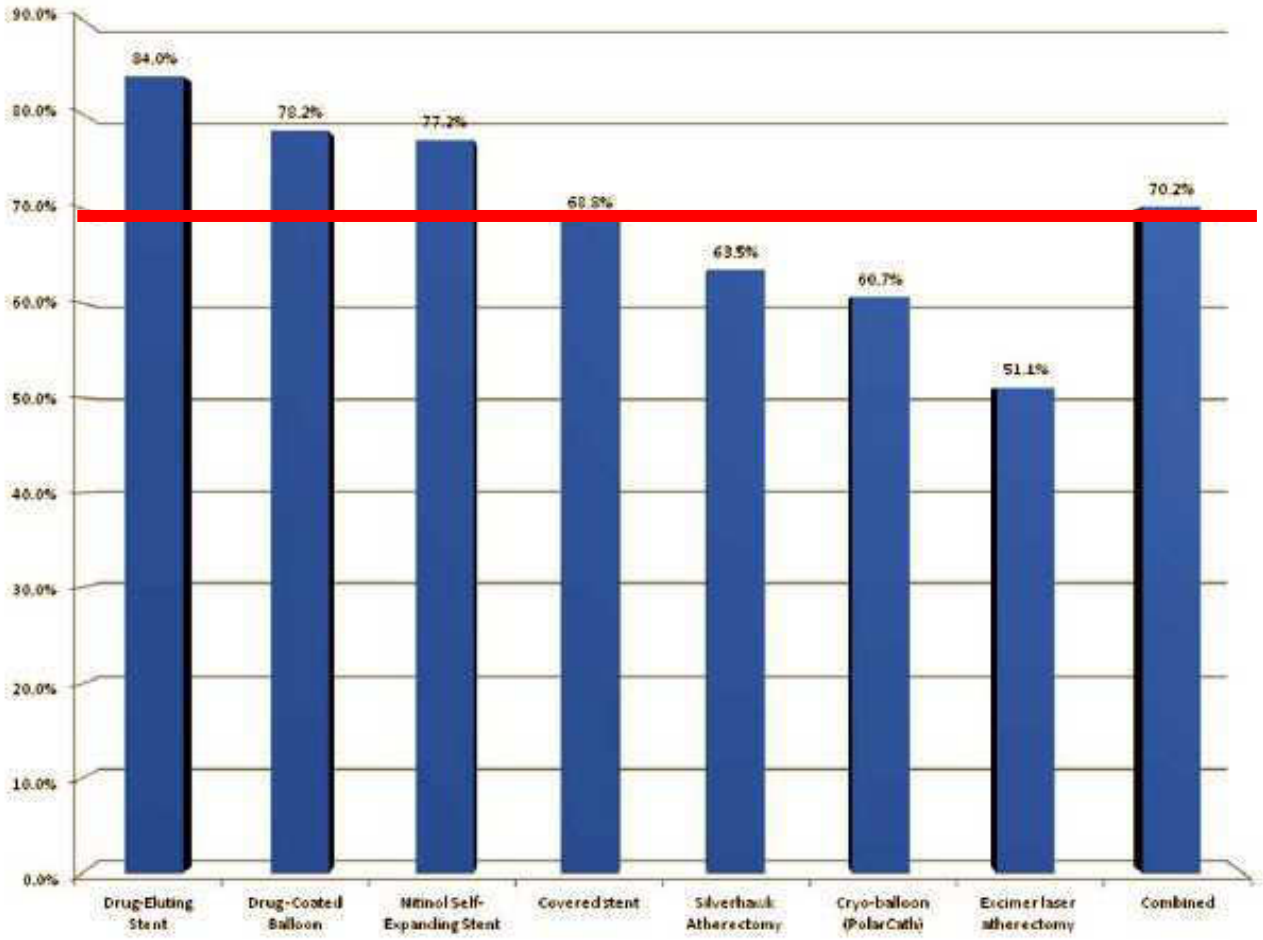
Endovascular modality	Number of studies	Total number of patients	Average 12-month primary patency	Average lesion length (mm)
Nitinol self-expanding stent	25	2,829	77.2%	143.87
Covered stent	14	992	68.8%	162
Drug-eluting stent	3	938	84.0%	97.72
Drug-coated balloon	3	164	78.2%	102.6
Cryo-balloon (PolarCath)	3	130	60.7%	48.07
Excimer laser atherectomy	3	265	51.1%	151.24
Silverhawk atherectomy	6	533	63.5%	99.25
Combined	4	173	70.2%	125.1
Total	61	6,024	74.35%	106.93

Average 12-month primary patency rates and average treated length.

Alle Verfahren

Durchschnitt: 9,7 bis 15,1 cm

Alle Verfahren - femoropopliteal



Primary patency

70%

12 Monate

Marmagkiolis, K. et al. Cathet Cardiovasc Intervent 2014; 84: 555–564

Bypassoperation – Vene

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Lahr-Ettenheim

primäre Offenheit nach 5 Jahren

•Archie	(N=157)	P1 83%
•Stierli	(N=64)	P1 83%
•Schweiger	(N=772)	(P1/P3)/II 85%
•Schweiger	(N=76)	(P1/P3)/IV 56%

Systematisches Review

ORTENAU KLINIKUM Lahr-Ettenheim

824 Artikel gesichtet – 25 eingeschlossen; N=3.804
(6 RCT mit N= 904)

VSM ist PTFE überlegen

in jedem Intervall

PP60	**69% vs. 49%**	

Nur RCT (Level 1)

PP60	**74% vs. 39%**	
PP24	**80% vs. 69%**	

Klinkert P et al. Eur J Vasc Endovasc Surg 2004;27:357-362

REVIEW ARTICLES

Richard P. Cambria, MD, Section Editor

ORTENAU KLINIKUM
Lahr-Ettenheim

J Vasc Surg 2013;57:242-253

A meta-analysis of endovascular versus surgical reconstruction of femoropopliteal arterial disease

George A. Antoniou, MD, PhD,[a] Nichol
Miltos K. Lazarides, MD, EBSQvasc,[b] S
Ferdinand Serracino-Inglott, MD, MSc,
David Murray, MD, FRCS,[a] *Manchester,*

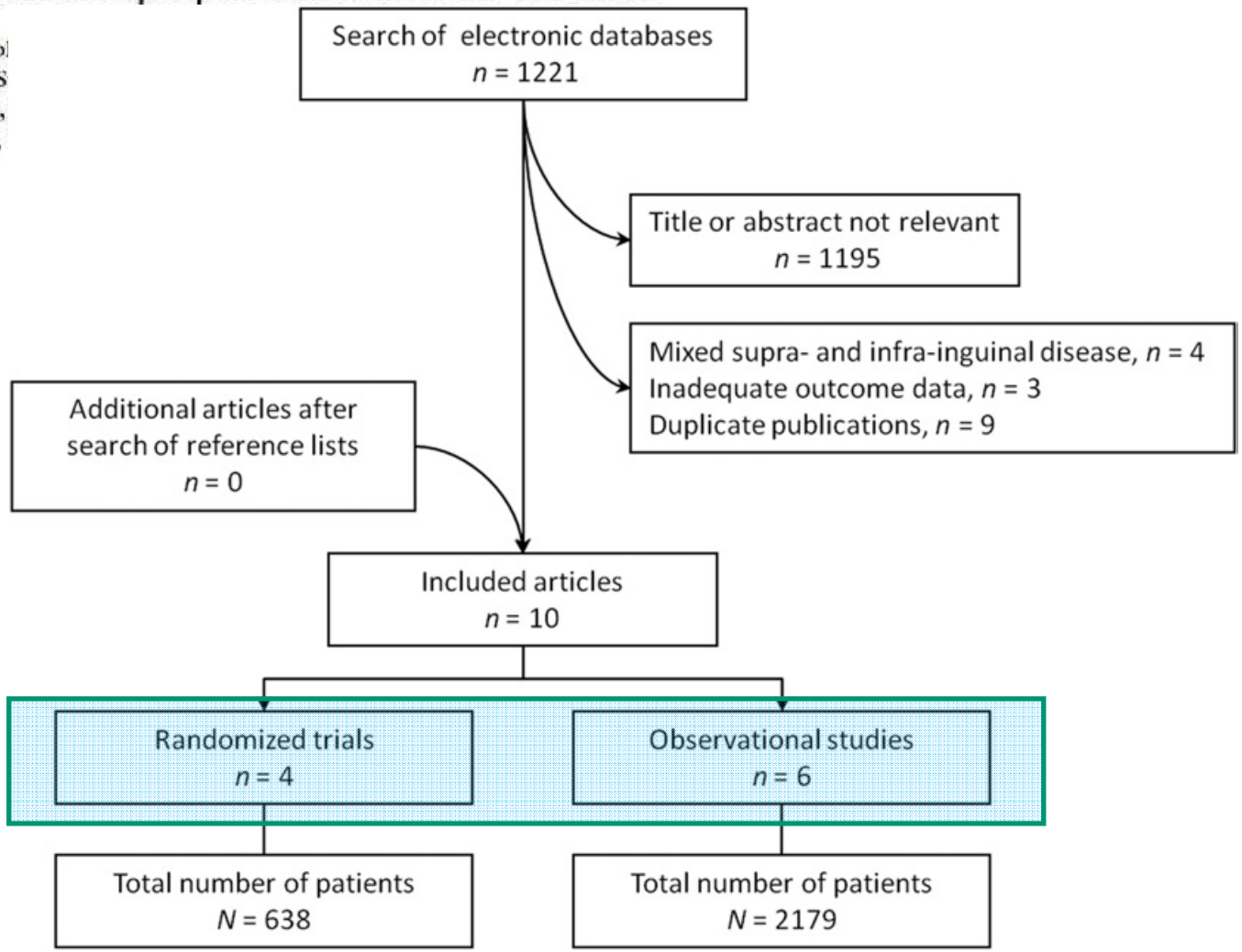

Table I. Study characteristics

Author (year)	No. of patients	Study quality (Jada/NOS)	Open procedure	Endovascular procedure	Clinical criteria for inclusion
Randomized studies					
Lepäntalo (2009)	44	1	Prosthetic femoropopliteal AK bypass	SFA endograft	Claudication or critical ischemia
Kedora (2006)	86	1	Prosthetic femoropopliteal AK bypass	SFA endograft	Claudication or critical ischemia
BASIL trial (2005)	452	3	Infra-inguinal bypass	Femoropopliteal angioplasty	Critical ischemia
BASIC trial (2004)	56	2	Femoropopliteal bypass	Femoropopliteal angioplasty ± stenting	Claudication
Observational studies					
Scali (2011)	345	6	Femoropopliteal bypass	SFA angioplasty + stenting	Claudication or critical ischemia
Korhonen (2011)	858	5	Femoropopliteal bypass	Femoropopliteal angioplasty ± stenting	Critical ischemia
Choong (2009)	464	4	Infra-inguinal bypass	Femoropopliteal angioplasty	Critical ischemia
Sultan (2009)	309	5	Infra-inguinal bypass	Femoropopliteal angioplasty ± stenting	Critical ischemia
Dosluoglu (2008)	95	7	Prosthetic femoropopliteal AK bypass	Femoropopliteal angioplasty ± stenting	Claudication or critical ischemia
Blair (1989)	108	5	Femoropopliteal/distal bypass	Femoropopliteal angioplasty	Critical ischemia

AK, Above knee; *ND*, not defined; *NOS*, Newcastle-Ottawa score; *NR*, not reported; *SFA*, superficial femoral artery; *TASC*, TransAtlantic Inter-Society

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REVIEW ARTICLES
Richard P. Cambria, MD, Section Editor

A meta-analysis of endovascular versus surgical reconstruction of femoropopliteal arterial disease

George A. Antoniou, MD, PhD,[a] Nicholas Chalmers, FRCR,[b] George S. Georgiadis, MD,[c] Minos K. Lazarides, MD, ERSQvasc,[c] Stavros A. Antoniou, MD,[d] Ferdinand Serracino-Inglott, MD, MSc, FRCS,[e] I. Vincent Smyth, ChM, FCRS,[e] and David Murray, MD, FRCS,[a] *Manchester, United Kingdom; Alexandroupolis, Greece; and Marburg, Germany*

REVIEW ARTICLES

Richard P. Cambria, MD, Section Editor

A meta-analysis of endovascular versus surgical reconstruction of femoropopliteal arterial disease

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High-level evidence demonstrating the superiority of one method over the other is lacking.

An endovascular first approach may be advisable in patients with significant comorbidity, whereas for fit patients with a longer-term perspective a bypass procedure may be offered as a first-line interventional treatment.

ORIGINAL ARTICLE
Scandinavian Journal of Surgery 102: 227–233, 2013

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Comparison Of Above-The-Knee Prosthetic Femoro-Popliteal Bypass Versus Percutaneous Transluminal Angioplasty And Stenting For Treatment Of Occlusive Superficial Femoral Artery Disease

H. Linnakoski[1], I. Uurto[1,2], V. Suominen[1,2], D. Vakhitov[1,2], J. Salenius[1,2]

[1] Tampere University Medical School, Tampere, Finland

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131 Patienten mit SFA Läsionen

69 Prozeduren operativ
74 Prozeduren endovaskulär

96% PTFE / 4% Vene
100% Stents (91%-Nitinol)

ORIGINAL ARTICLE
Scandinavian Journal of Surgery 102: 227–233, 2013

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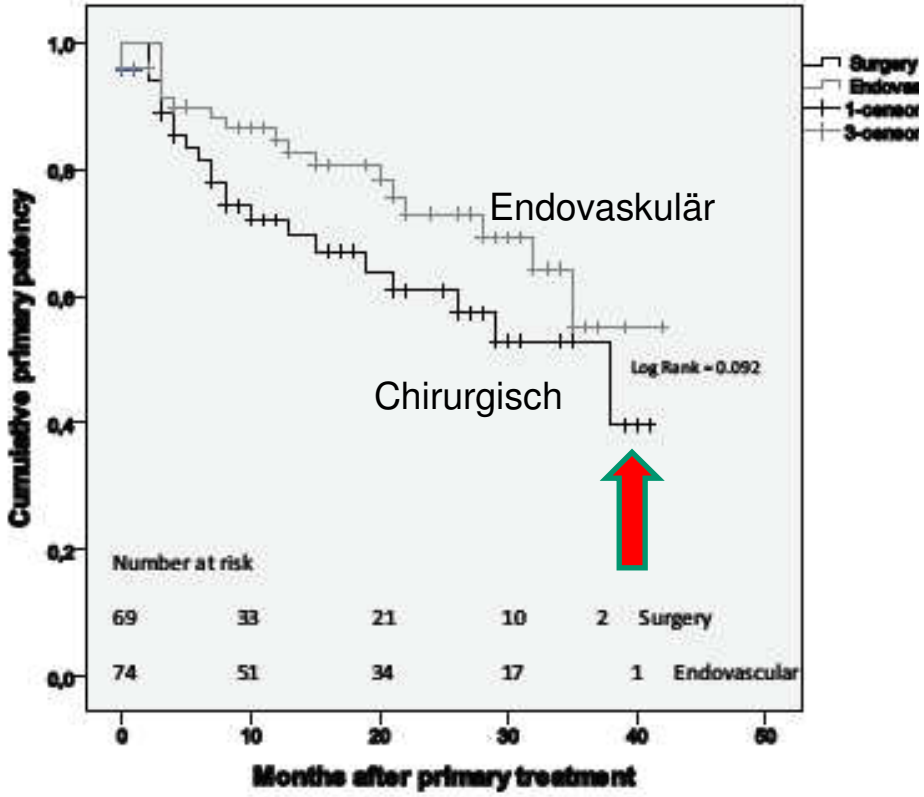
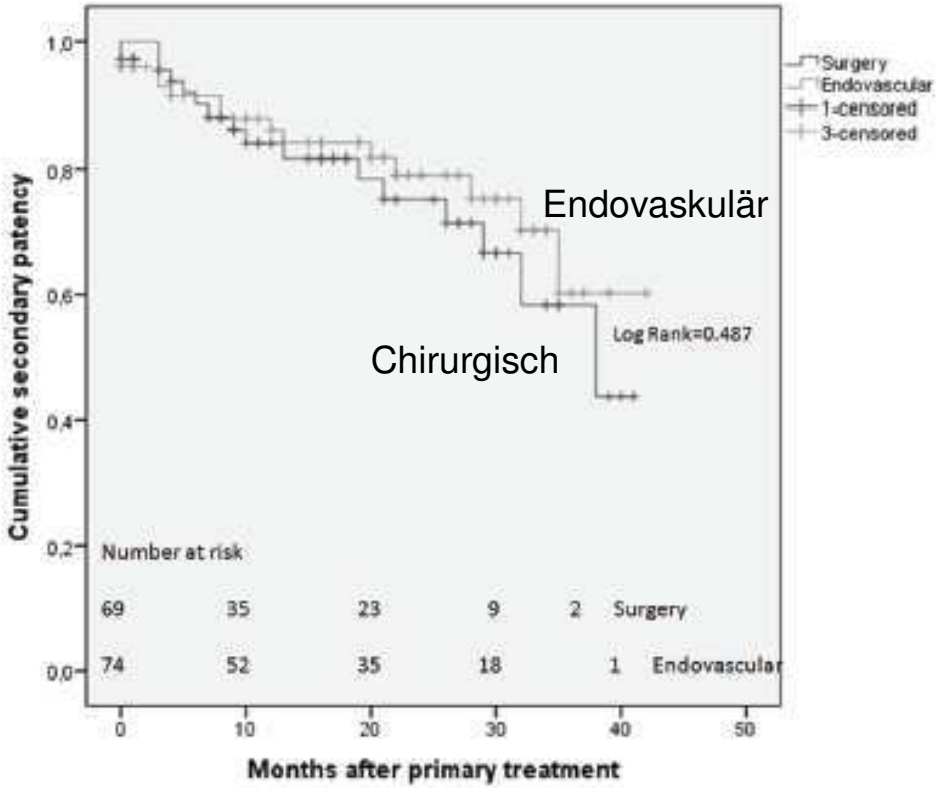
Primäre Patency



Sekundäre Patency



Trend, keine Signifikanz

Comparison Of Above-The-Knee Prosthetic Femoro-Popliteal Bypass Versus Percutaneous Transluminal Angioplasty And Stenting For Treatment Of Occlusive Superficial Femoral Artery Disease

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ORIGINAL ARTICLE
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	Bypass operations, n = 69 (%)	Endovascular procedures, n = 74 (%)	p-value
TASC II classification (1)			
A	0 (0)	13 (18)	<0.001
B	1 (1)	46 (62)	<0.001
C	22 (32)	15 (20)	0.74
D	46 (67)	0 (0)	<0.001

Postoperative / Postinterventionelle Medikation

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	Bypass operations, n = 69 (%)	Endovascular procedures, n = 74 (%)	p-value
Acetosalicylic acid	51 (74)	55 (74)	0.955
Warfarin	14 (20)	7 (10)	0.067
Clopidogrel	8 (12)	61 (83)	<0.001
Statin medication	29 (42)	34 (46)	0.637

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Duale Funktionshemmung

6%

66%

Risk of Bleeding With Single, Dual, or Triple Therapy With Warfarin, Aspirin, and Clopidogrel in Patients With Atrial Fibrillation

Arch Intern Med. 2010;170(16):1433-1441

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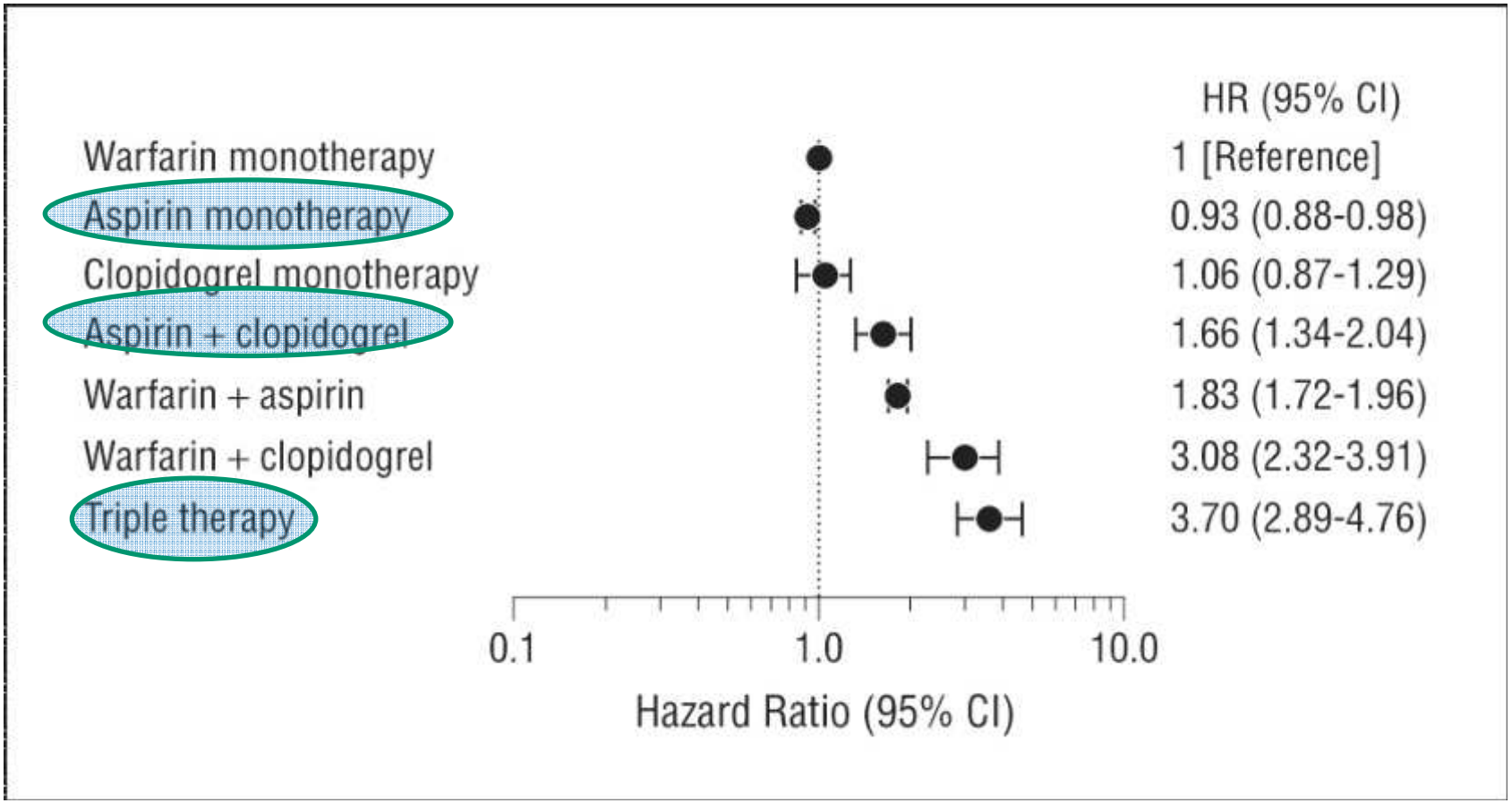

Hazard ratios (HRs) for the risk of nonfatal (n = 12 191) and fatal (n = 1381) bleeding associated with the use of warfarin, aspirin, clopidogrel, and combinations of these drugs. CI indicates confidence interval

Schlechtere Voraussetzungen für die Operation nach vorausgegangener endovaskulärer Therapie ??!!

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Surgical implications of early failed endovascular intervention of the superficial femoral artery

Charles S. Jeds, MD, John W. York, MD, Corey A. Kalbaugh, MS, David L. Cull, MD, Eugene M. Langan III, MD, and Spence M. Taylor, MD, Greenville, SC

J Vasc Surg 2008;47:562

Keine schlechteren Voraussetzungen für die Operation nach vorausgegangener endovaskulärer Therapie !??

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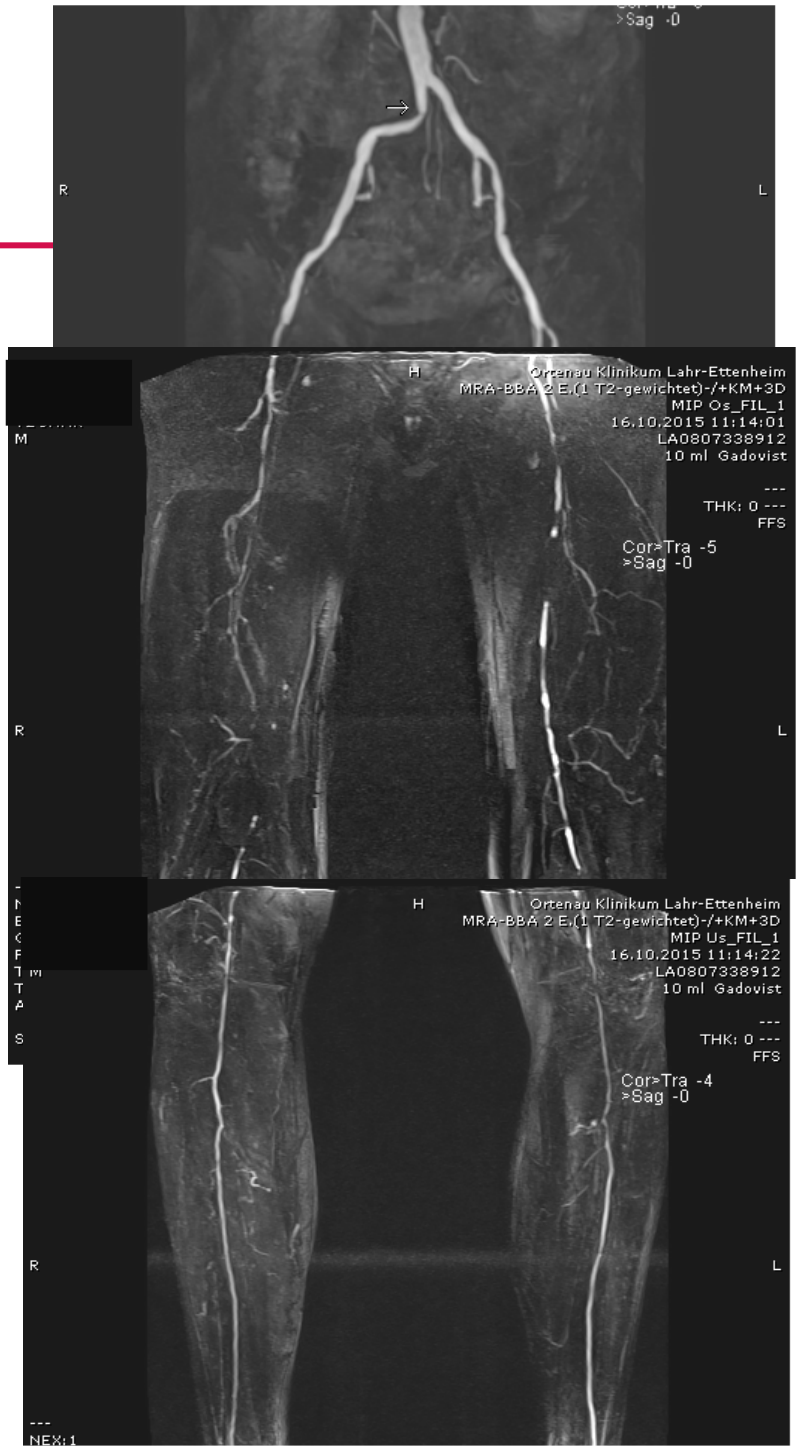
N: 276

- **Endovaskuläre Therapie der A. femoralis superficialis**
- **Angiographie vor und nach Frühverschluß (< 200 Tage)**
- **Early failure, N: 24 / 21 (angiographiert)**
- **6 von 21 zeigten einen veränderten Anschluß**

ca. 30% mit verschlechterten Bedingungen für eine operative Therapie



TASC C

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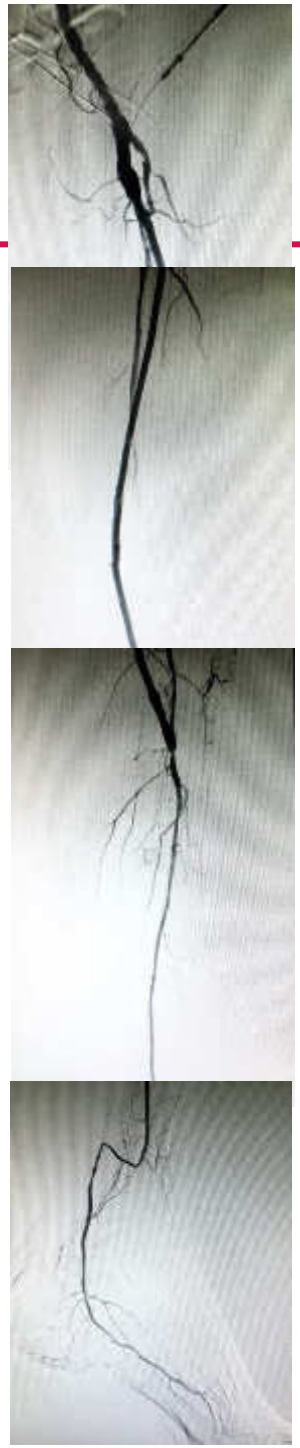
pAVK 4 links
72a , männlich
guter AZ



TASC D

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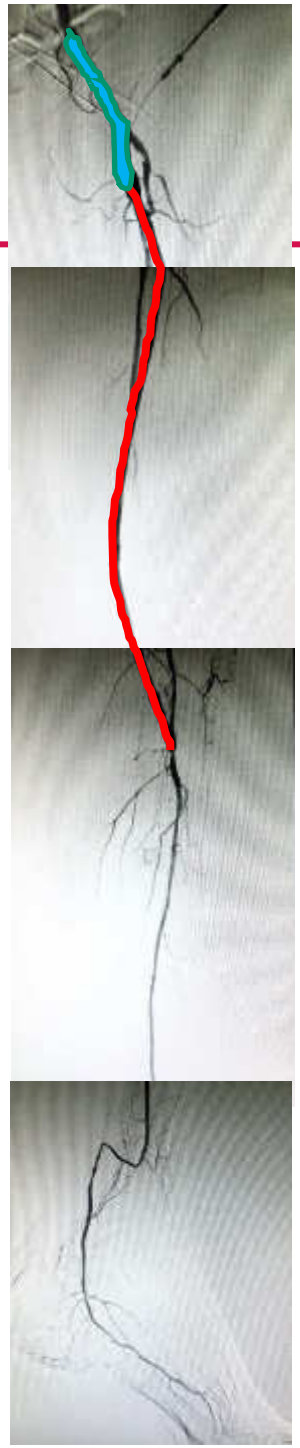
Femoro-cruraler Venenbypass
auf die A. fibularis



TASC C

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Thrombendarteriektomie der A. iliaca externa, A. femoralis communis und superficialis, Dacron-Patchplastik

Femoro-cruraler Venenbypass auf die A. fibularis

Femoro-poplitealer Gefäßabschnitt

A. femoralis superficialis

Endovaskulär

PTA, Drug eluting balloon, Drug eluting stent etc.

reduzierte Evidenzlage, Rezidivstenosen bis zu 20 – 30% im ersten Jahr

offene Gefäßchirurgie

Goldstandart:	Venenbypässe (supra- und infragenual)
Probleme:	Fehlende Venen (20-40%)
	heparinbeschichtete Prothesen
	erhöhte Morbidität

Femoro-poplitealer Gefäßabschnitt

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Fazit:

Tendenz zur endovaskulären Methode ohne eindeutige Evidenz

Infrapopliteale Region

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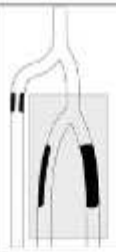
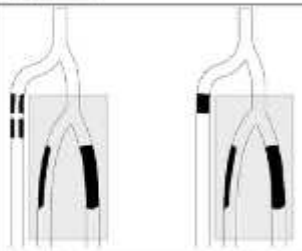
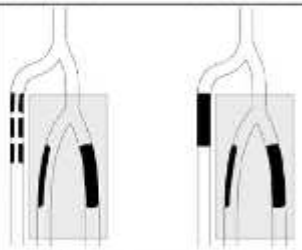
TASC infragenual

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.	

The TASC Steering Committee* et al.
J Endovasc Ther **2015**

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Therapieindikation nur bei kritischer Ischämie

Problem: Fehlen randomisierter Studien

BASIL-Studie: Kein Nachweis einer Überlegenheit der operativen oder der endovaskulären Verfahren

Empfehlung: Lebenserwartung > 2 Jahre Bypasschirurgie
< 2 Jahre Endovaskulär

(Einschränkung aus 2000)

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Fazit:

Endovaskuläre Therapie in vielen Fällen bevorzugt

Zusammenfassung

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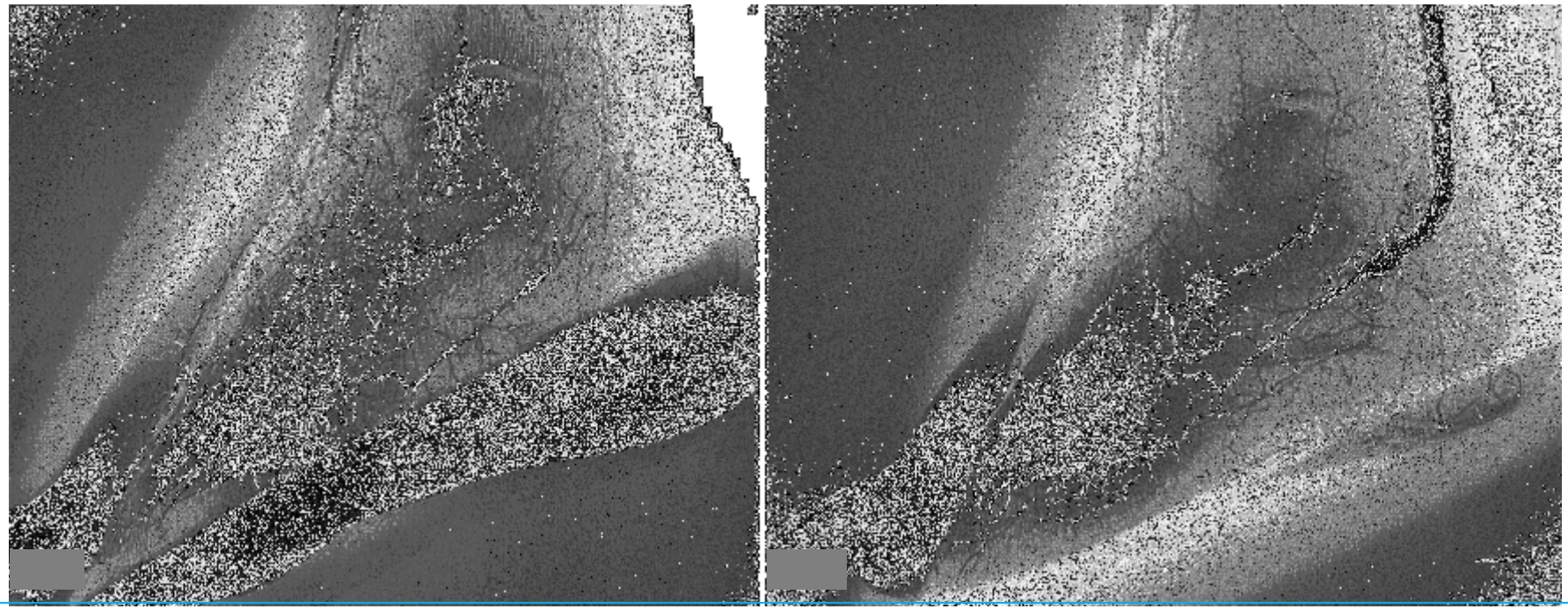
Die Beste Therapie für langstreckige Läsionen der Extremitätenarterien bleibt die Bypasschirurgie !



Zukunft der Gefäßchirurgie:
Kombination des „Skalpells“ mit endovaskulären Techniken
HYBRID - OP