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VASCUPEDIA



Complications of atherectomy and how to manage them

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Disclosures

Speaker name:

Theodosios Bisdas

I have the following potential conflicts of interest to report:

- Consulting
 - Employment in industry
 - Stockholder of a healthcare company
 - Owner of a healthcare company
 - Other(s)
-
- I do not have any potential conflict of interest

Types of atherectomy



**ROTATIONAL
ATHERECTOMY**



**DIRECTIONAL
ATHERECTOMY**

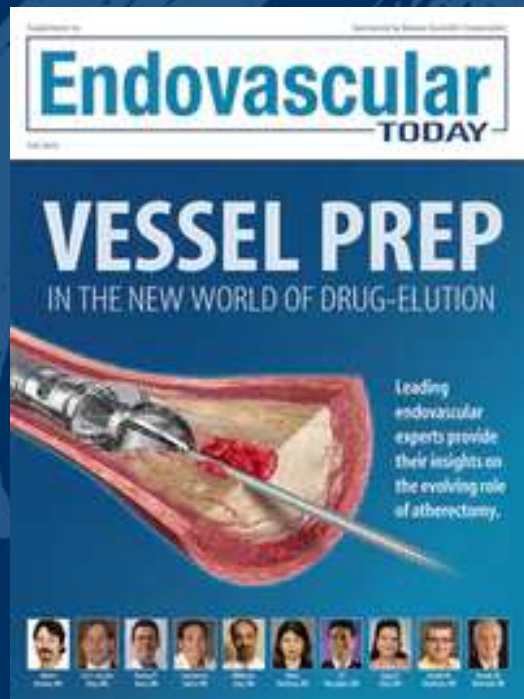


**LASER
ATHERECTOMY**



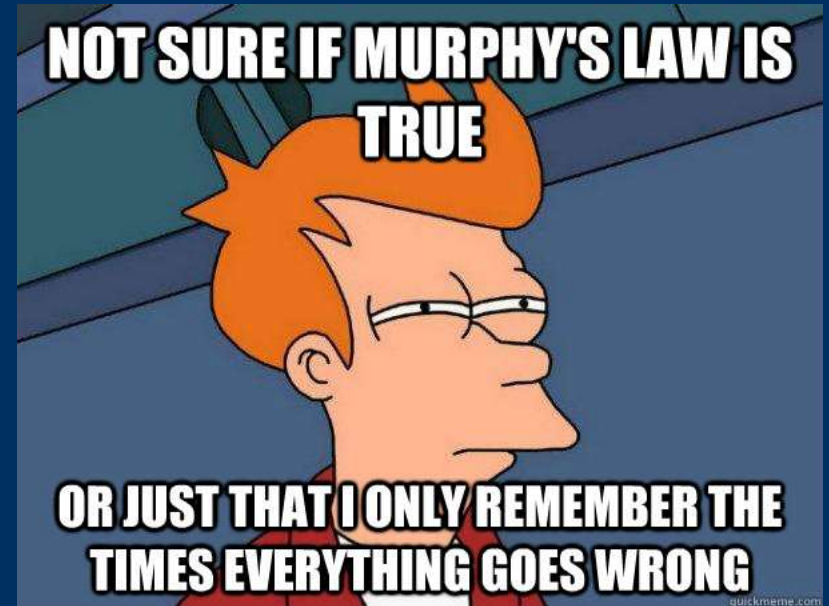
**ORBITAL
ATHERECTOMY**

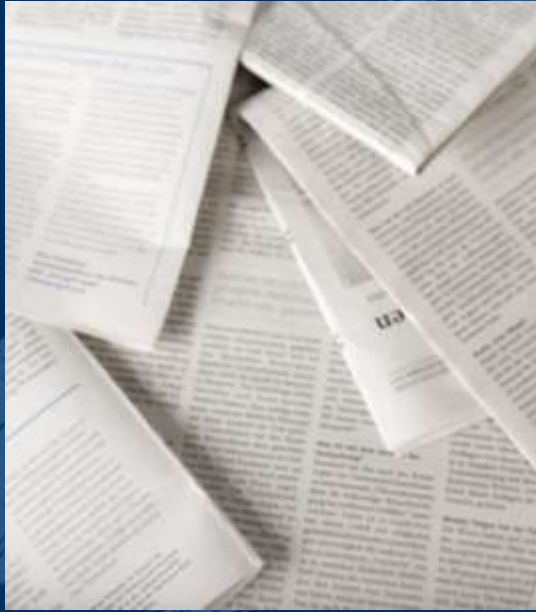
Atherectomy is a unique tool for **vessel prep**



- Lumen gain
- Compliance of the vessel wall
- Prevention of dissections

However, a lot of things can go wrong...





Complications in the literature

DIRECTIONAL ATHERECTOMY

PERFORATION

AV
FISTULA

EMBOLISM

ANEURYSM

Lower Extremity Revascularization Using Directional Atherectomy

12-Month Prospective Results from the DEFINITIVE LE Study

James H. Ramsey, MD,¹ Thomas Zeller, MD,¹ Krishna J. Rocha-Singh, MD,¹ Michael R. Jaff, DO,¹ Leonardo A. Garcia, MD,¹ on behalf of the DEFINITIVE LE Investigators

5%

N.R.

4%

0.4%

Effective Endovascular Treatment of Calcified Femoropopliteal Disease With Directional Atherectomy and Distal Embolic Protection: Final Results of the DEFINITIVE Ca⁺⁺ Trial

David Roberts,¹ MD, Khusrav Niazi,² MD, William Miller,³ MD, Prakash Krishnan,⁴ MD, Roger Gammon,⁵ MD, Theodore Schreiber,⁶ MD, Nicolas W. Shammas,⁷ MD, MS, and Daniel Clair,⁸ MD on behalf of the DEFINITIVE Ca⁺⁺ Investigators

2%

N.S.

2%

0%

Directional Atherectomy Followed by a Paclitaxel-Coated Balloon to Inhibit Restenosis and Maintain Vessel Patency: Twelve-Month Results from the DEFINITIVE AR Study

Thomas Zeller, MD,¹ Krishna J. Rocha-Singh, MD,¹ Michael R. Jaff, DO,¹ Erwin Messinger, MD,¹ Beatrice Mann-Vest, MD,¹ Marek Krzanosowski, MD,¹ Patrick Peeters, MD,¹ Dirk Schneider, MD,¹ Giovanni Torsello, MD,¹ Sebastian Sixt, MD,¹ Gunnar Tepe, MD,¹ on behalf of the DEFINITIVE AR Investigators

4%

6%

6%

0%

DIRECTIONAL ATHERECTOMY

Clinical Investigation

Journal of
ENDOVASCULAR
THERAPY

Journal of Endovascular Therapy
1-8
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DOI: 10.1177/1536602818680993
www.jet.tl.org
SAGE

Directional Atherectomy With Antirestenotic Therapy vs Drug-Coated Balloon Angioplasty Alone for Isolated Popliteal Artery Lesions

Konstantinos Stavroulakis, MD^{1,2}, Arne Schwandt, MD^{1,2},
Giovanni Torsello, MD, PhD^{1,2}, Arne Stachmann^{1,2}, Christiane Hericks^{1,2},
Michel J. Bosiers, MD^{1,2}, Efthymios Beropoulos, MD^{1,2}, Stefan Stahlhoff, MD^{1,2},
and Theodosios Bisdas, MD^{1,2}

Abstract

Purpose: To report a single-center study comparing drug-coated balloon (DCB) angioplasty vs directional atherectomy with antirestenotic therapy (DAART) for isolated lesions of the popliteal artery. **Methods:** Seventy-two patients were treated with either DCB angioplasty alone (n=31) or with DAART (n=41) for isolated popliteal artery stenotic disease between October 2009 and December 2015. The majority of patients presented with lifestyle-limiting claudication (74% vs 86%, respectively). Vessel calcification (29% vs 29%, respectively), mean lesion length (47 vs 42 mm, respectively), and number of runoff vessels were comparable between the groups. The primary outcome measure was primary patency; secondary outcomes were technical success (<30% residual stenosis or bailout stenting), secondary patency, and freedom from clinically driven target lesion revascularization (TLR). **Results:** The technical success rate following DCB was 84% vs 93% (p=0.24) after DAART. The 12-month primary patency rate was significantly higher in the DAART group (65% vs 82%; hazard ratio 2.64, 95% confidence interval 1.09 to 6.37, p=0.021), while freedom from TLR did not differ between the 2 treatment strategies (82% vs 94%, p=0.072). Secondary patency at 12 months was identical for both groups (96% vs 96%). Although not statistically significant, bailout stenting was more common after DCB angioplasty (16% vs 5% for DAART, p=0.13) and aneurysmal degeneration of the popliteal artery was seen more often after DAART (7% vs 0% for DCB alone, p=0.25). Popliteal artery injury was observed in 2 patients treated using DAART (5% vs 0% for DCB alone, p=0.5), whereas distal embolization rates were comparable between the groups (3% for DCB alone vs 5% for DAART, p=0.99). **Conclusion:** In this study, the use of DAART was associated with a higher primary patency rate compared with DCB angioplasty for isolated popliteal lesions. Nonetheless, both treatment options were associated with excellent 12-month secondary patency. Aneurysmal degeneration of the popliteal artery and increased bailout stenting could compromise the outcomes of DAART and DCB, respectively.

Keywords

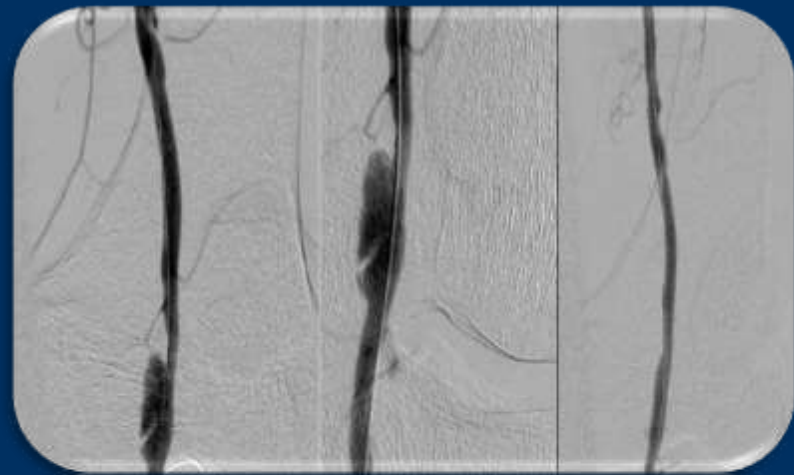
angioplasty, atherectomy, complications, drug-coated balloon, drug-eluting balloon, occlusion, popliteal artery, reintervention, stenosis, stent

Introduction

Despite the current advantages of endovascular therapy, its application in areas of high mechanical stress remains challenging. In case of popliteal artery disease, the mobility of the knee joint leads to additional dynamic forces within the vessel, which have been associated with accelerated restenosis and high rates of stent fractures and occlusions.^{1,2} Hence, the popliteal artery was long considered by many interventionalists as a “no stenting” zone. However, the

development of new-generation devices improved the results of stent therapy in this anatomical territory, but impaired arterial remodeling and interference with future surgical options are disadvantages.³⁻⁵ Additionally, in the absence of clear-cut solutions, in-stent restenosis (ISR) remains a challenging complication of infringuinal peripheral artery disease (PAD) treatment.⁶

The “leave nothing behind” strategies, namely, drug-coated balloon (DCB) angioplasty and combined directional atherectomy and antirestenotic therapy (DAART), can



**ANEURYSM FORMATION IN
THE POPLITEAL ARTERY:**

7%

ROTATIONAL ATHERECTOMY

PERFORATION

AV
FISTULA

EMBOLISM

ANEURYSM

0%

N.R.

0%

0%

ORIGINAL CONTRIBUTION

**Tissue Removal by Ultrasound Evaluation
(The TRUE Study): The Jetstream G2 System
Post-Market Peripheral Vascular IVUS Study**

Volume 23 - Issue 7 - July 2011

Rajwant Singh, MD, Deepak Kojal, MD, Susanna Sapunac, PhD, James Torrey, PA-C, Jigishu Dhabuwala, MD, Lisa Seigt, PA, Luis A Pires, MD, Thomas Davis, MD

NR

NR

1.4%

NR

Documents fully available on ScienceDirect

Cardiovascular Revascularization Medicine

Jetstream Atherectomy System treatment of femoropopliteal arteries: Results of the post-market JET Registry *30, 37-45*

William A. Gray^{1,2}, Lawrence A. Garcia³, Ali Amir⁴, Nicolas W. Shammas^{5,6}, For the JET Registry Investigators

¹ Department of Cardiology, Columbia University Medical Center, New York, NY, USA
² St. Elizabeth's Hospital Center, Tufts University School of Medicine, Boston, MA, USA
³ Reading Hospital in Medical Center, Lehigh Valley, PA, USA
⁴ Veterans Affairs Medical Center, Durham, NC, USA

NR

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1-9%

NR

**RETROSPECTIVE
STUDIES**

LASER ATHERECTOMY

PERFORATION

AV
FISTULA

EMBOLISM

ANEURYSM

J ENDOVASC THER
2006;16:666-675

◆ CLINICAL INVESTIGATION ◆

Excimer Laser Recanalization of Femoropopliteal Lesions and 1-Year Patency: Results of the CELLO Registry

Rajesh M. Dave, MD¹; Raghobam Patilola, MD²; Kenneth Kollmeyer, MD, PhD³; Frank Bunch, MD⁴; Barry S. Weinstock, MD⁵; Eric Dippel, MD⁶; Michael R. Jaff, DO⁷; Jeffrey Popma, MD⁸; and Neil Weissman, MD⁹ for the CELLO Investigators

NR

NR

0%

NR

Excimer Laser Assisted Angioplasty for Critical Limb Ischemia: Results of the LACI Belgium Study

M. Bosiers,^{1*} P. Peeters,² F.V. Elst,³ F. Vermassen,⁴ G. Maleux,⁵ I. Fourneau⁶ and H. Massin⁷

Departments of ¹Vascular Surgery, AZ St Blasius, Dendermonde, ²Cardiovascular and Thoracic Surgery, Imelde Hospital, Bovenloden, ³Vascular Surgery, St Jozef Hospital, Sint-Truiden, ⁴Vascular Surgery, UZ Gent, Gent, ⁵Center for Vascular Diseases, UZ Leuven, Leuven, and ⁶Vascular Surgery, St Joseph, Gilly, Belgium

NR

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NR

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**Scheinert et. al.
JEVT 2004**

2.2%

NR

4%

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ORBITAL ATHERECTOMY

PERFORATION

AV
FISTULA

EMBOLISM

ANEURYSM

NR

NR

2%

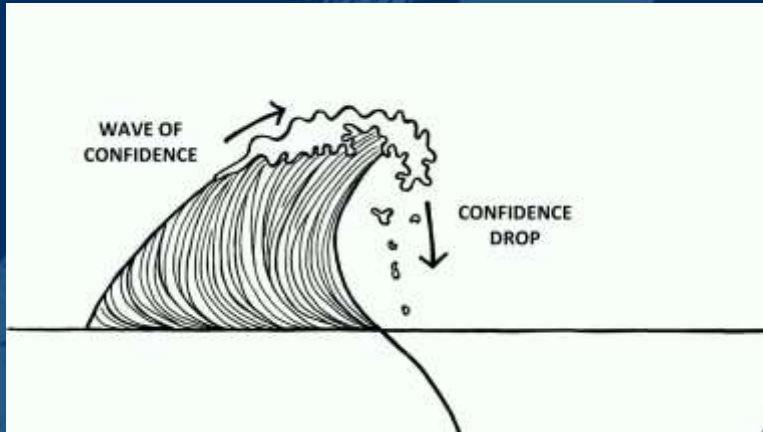
NR

PERIPHERAL VASCULAR DISEASE

The COMPLIANCE 360- ∞ Trial: A Randomized, Prospective, Multicenter, Pilot Study Comparing Acute and Long-Term Results of Orbital Atherectomy to Balloon Angioplasty for Calcified Femoropopliteal Disease

Volume 26 - Issue 8 - August 2014

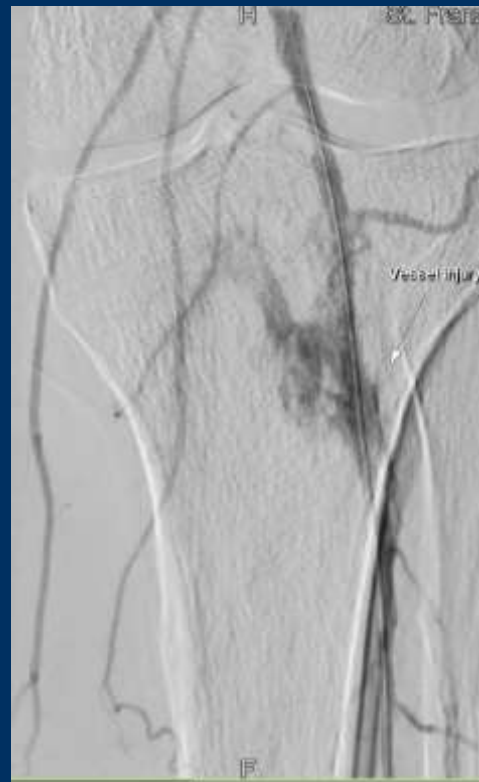
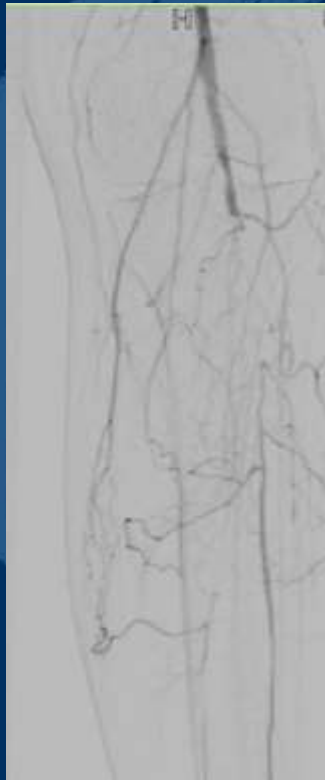
Raymond Dattilo, MD¹; Stevan I. Himmelstein, MD²; Robert F. Cuff, MD, RVT³



Personal experience - Troubleshooting

Complication #1

Perforation



Management Perforation

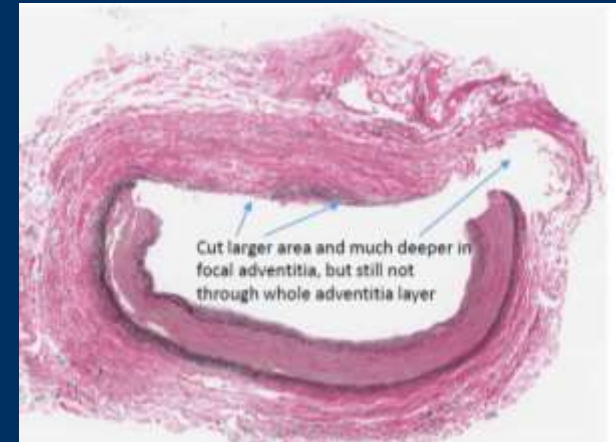


Prolonged PTA



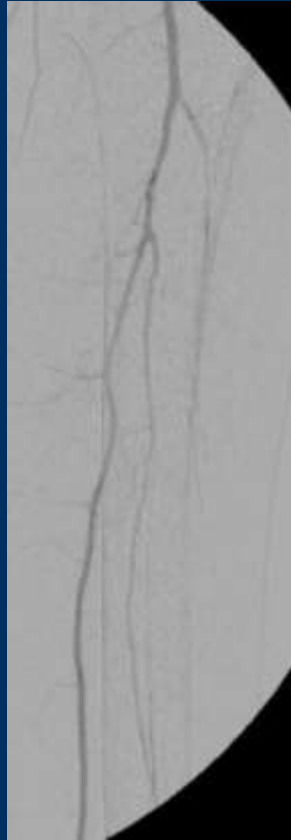
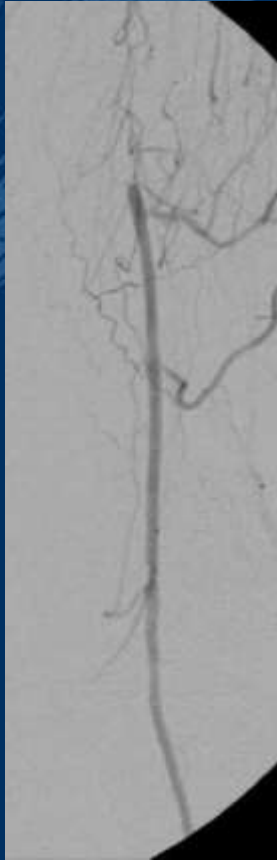
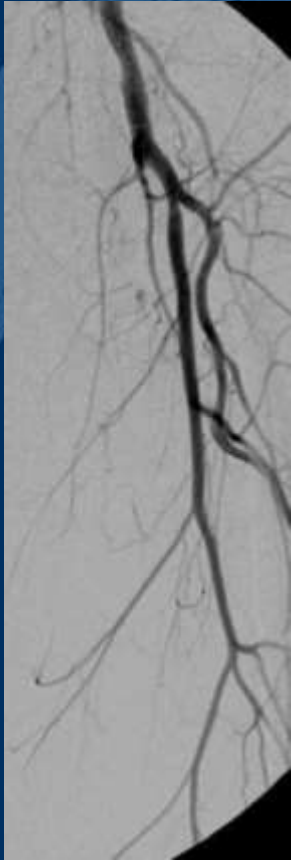
Balloon-expandable
stent-graft

DO NOT USE PTX



Complication #2

Embolization



Management Embolization



**MANUAL
ASPIRATION**
5F-110cm in 8F
sheath

This panel shows an angiogram of a blood vessel. A red circular callout is overlaid on the left side, containing text about manual aspiration. The background image shows a network of vessels with some darker areas, likely representing emboli.



**ASPIRATION
THROUGH
DEDICATED
CATHETERS**
Indigo, Rotarex

This panel shows an angiogram of a blood vessel. A red circular callout is overlaid in the center, containing text about aspiration through dedicated catheters. The background image shows a vessel with a catheter tip positioned for aspiration.

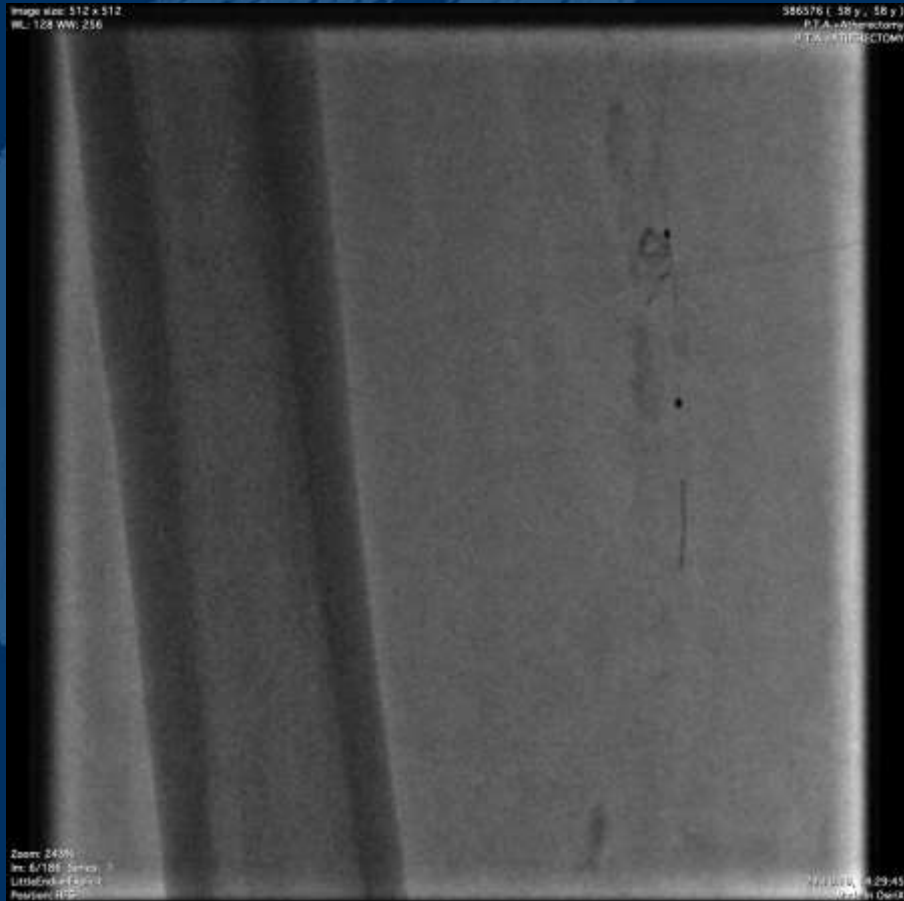


**USE OF
DISTAL
PROTECTION
DEVICES**

This panel shows an angiogram of a blood vessel. A red circular callout is overlaid on the right side, containing text about the use of distal protection devices. The background image shows a vessel with a device in place to protect against embolization.

EXAMPLE

DISTAL PROTECTION DEVICE



Complication #3

Aneurysm formation

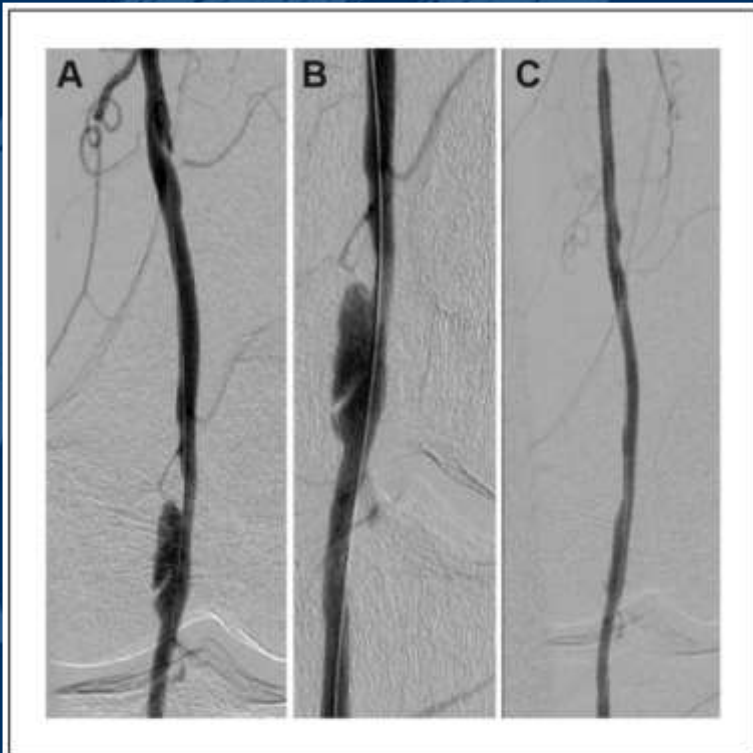
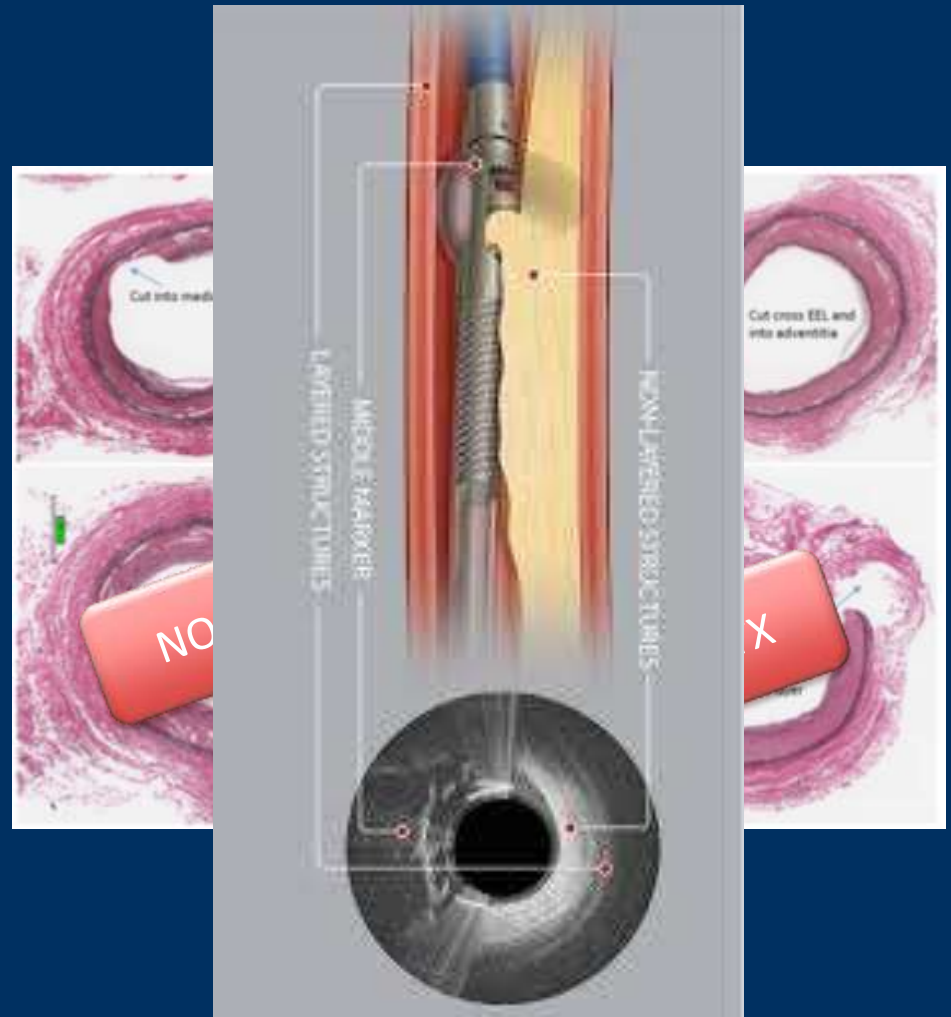
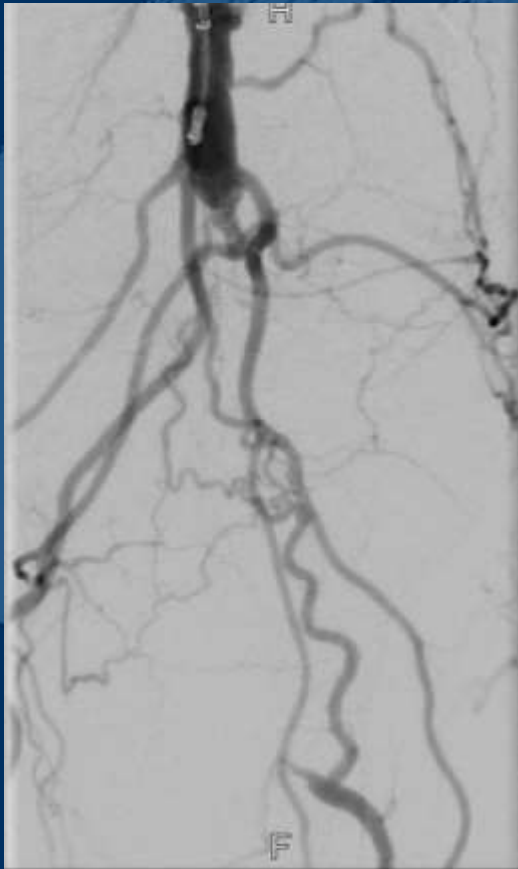


Figure 3. (A, B) Degeneration of the popliteal artery following directional atherectomy and drug-coated balloon angioplasty treated with (C) stent-graft deployment.



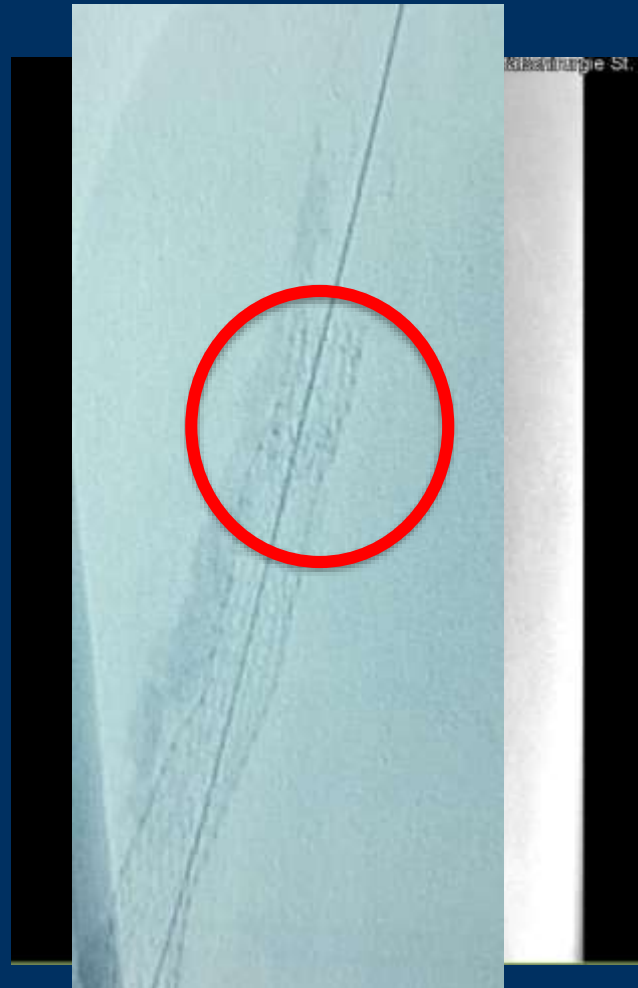
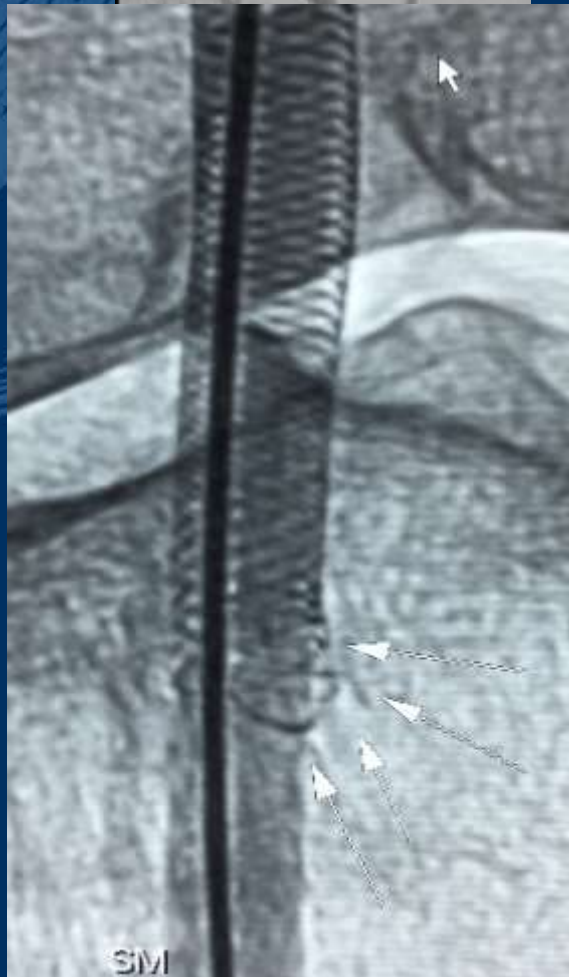
Complication #4

AV Fistula



Complication #5

Stent fracture with DA



Complication #6

Nosecone fracture

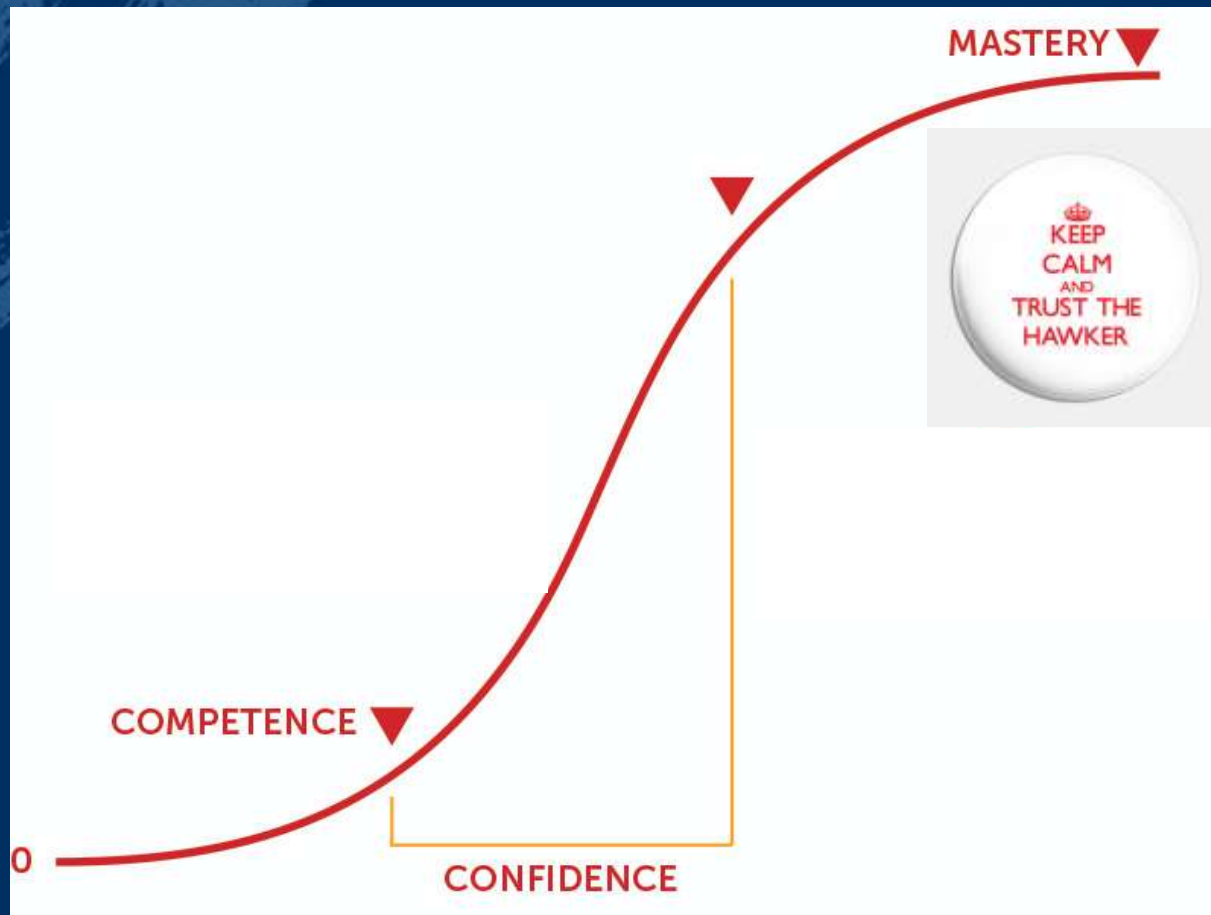


Courtesy: Dr. Stavroulakis, Muenster, Germany

Conclusions

- The complication rate after atherectomy are low but still respectable
- Use of distal protection device in almost all cases is mandatory
- Do not perform atherectomy in thrombotic lesions
- The aim of atherectomy is lumen gain (30% residual stenosis)
- All relevant devices for the management of the complications must be available

The **learning curve** of atherectomy is the most important factor!



More information
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