Complications of atherectomy and how to manage them

Theodosios Bisdas, MD, PhD
Director, Clinic for Vascular Surgery
Athens Heart Center, Athens Medical Center
Associate Professor for Vascular Surgery,
Westphalian Wilhelms University
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 AHERECTOMY

<table>
<thead>
<tr>
<th>Condition</th>
<th>LE</th>
<th>Ca++</th>
<th>AR</th>
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<tbody>
<tr>
<td>Perforation</td>
<td>5%</td>
<td>N.R.</td>
<td>4%</td>
</tr>
<tr>
<td>AV Fistula</td>
<td></td>
<td></td>
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<tr>
<td>Embolism</td>
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<tr>
<td>Aneurysm</td>
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</tbody>
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**Lower Extremity Revascularization Using Directional Atherectomy**

12-Month Prospective Results from the DEFINITIVE LE Study

James D. Keeley, MD; Tobias Zeller, MD; Krishna J. Rocha-Singh, MD; Michael R. Jaff, DO; Linda Forsters, MD; on behalf of the DEFINITIVE LE Investigators

- **DEFINITIVE-LE**
  - 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**

Jaye, J. J.; Khosrow Nasiri, W.; William Miller, W.; Prakash Krishnan, W.; Roger Gammon, W.; Theodore Schreiber, W.; Nicolas W. Shimmans, W.; and Daniel Clair, W. on behalf of the DEFINITIVE Ca++ Investigators

- **DEFINITIVE-Ca++**
  - 2%
  - N.S.
  - 2%
  - 0%

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

Thomas von Birgelen, MD; Marco Cristante, MD; Krishna J. Rocha-Singh, MD; Michael R. Jaff, DO; Erwin van der Giessen, MD; Anton de Zeeuw, MD; Marek Krzanowski, MD; Patrick Poeters, MD; David Mooney, MD; Giovanni Gielo, MD; Sebastian Sist, MD; Gunnar Pepe, MD; on behalf of the DEFINITIVE AR Investigators

- **DEFINITIVE-AR**
  - 4%
  - 6%
  - 6%
  - 0%
DIRECTIONAL ATHERECTOMY

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

Konstantinos Stavroulakis, MD,1,2, Anna Schwindt, MD,1,2, Giovanni Torrellas, MD, PhD,1,2, Arne Stachmann,1,2, Christiane Herckes,1,2, Michel J. Boisier, MD,1,2, Ethymnos Beropoulos, MD,1,2, Stefan Stahlof, MD,1,2, and Theodosios Bidas, 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: Twenty-six patients were treated with either DCB angioplasty alone (n=13) or with DAART (n=11) for isolated popliteal artery stenotic disease between October 2009 and December 2015. The majority of patients presented with lifestyle-limiting claudication (74% vs 63%, respectively). Vessel calcification (39% vs 39%, respectively), mean lesion length (47 vs 43 mm, respectively), and number of runoff vessels were comparable between the groups. The primary outcome measure was primary patency; secondary outcomes were technical success (<10% residual stenosis or balloon 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 1.64, 95% confidence interval 1.09 to 2.47, p=0.021), while freedom from TLR did not differ between the treatment groups (79% vs 94%, p=0.072). Secondary patency at 12 months was identical for both groups (93% vs 60%). Although not statistically significant, bailout stenting was more common after DCB angioplasty (14% vs 5% for DAART, p=0.13) and intimal hyperplasia 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 3% for DAART, p=0.99). Conclusions: 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. Anatomic 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 joint leads to additional dynamic forces within the vessel, which has been associated with accelerated atherosclerosis and high rates of aneurysm 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 imparted arterial remodeling and interference with future surgical options are disadvantages.3,4 Additionally, the dilemma of clear-cut solutions, in-stent restenosis (ISR) remains a challenging complication of infragenual peripheral artery disease (PAD) treatment.5

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%
<table>
<thead>
<tr>
<th>ROTATIONAL ATHERECTIONOMY</th>
<th>PERFORATION</th>
<th>AV FISTULA</th>
<th>EMBOLISM</th>
<th>ANEURYSM</th>
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</thead>
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<tr>
<td></td>
<td>0%</td>
<td>N.R.</td>
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<td>0%</td>
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<td>RETROSPECTIVE STUDIES</td>
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<td>1.4%</td>
<td>NR</td>
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<tr>
<td></td>
<td>NR</td>
<td>NR</td>
<td>1.9%</td>
<td>NR</td>
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### LASER ATERECTOMY

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<tr>
<td>1-Year Patency:</td>
<td>NR</td>
<td>NR</td>
<td>0%</td>
<td>NR</td>
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</tbody>
</table>

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

Rajesh M. Dave, MD; Raghotham Patlola, MD; Kenneth Kollmeyer, MD, PhD; Frank Bunch, MD; Barry S. Weinstock, MD; Eric Dippel, MD; Michael R. Jaff, DO; Jeffrey Popma, MD; and Neil Weissman, MD for the CELLO Investigators

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

M. Bosiers, MD; P. Peeters, MD; F. Verstraeten, MD; G. Maleux, MD; E. Dippel, MD; and H. Massin, MD

Departments of 1Vascular Surgery, AZ Sint-Jan, Bruges, 2Cardiovascular and Thoracic Surgery, Imelda Hospital, Herentals, 3Vascular Surgery, St. Josef Hospital, Sint-Truiden, 4Vascular Surgery, UZ Gent, Gent, 5Center for Vascular Diseases, UZ Leuven, Leuven, and 6Vascular Surgery, St Joseph, Ghent, Belgium

**Scheinert et. al.**

JEVT 2004

|                        | 2.2%         | NR         | 4%       | NR       |
### ORBITAL AHERECTOMY

<table>
<thead>
<tr>
<th>PERFORATION</th>
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<tbody>
<tr>
<td>NR</td>
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**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, MD; Stevan I. Himmelstein, MD; Robert F. Cuff, MD, RVT
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

ASPIRATION THROUGH DEDICATED CATHETERS
Indigo, Rotarex

USE OF DISTAL PROTECTION DEVICES
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
www.vascupedia.com
Complications of atherectomy and how to manage them

Theodosios Bisdas, MD, PhD
Director, Clinic for Vascular Surgery
Athens Heart Center, Athens Medical Center
Associate Professor for Vascular Surgery, Westphalian Wilhelms University