Laser technologies
- latest developments

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Disclosure

Speaker name: Dr. Matthias Ulrich

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
Laser Ablation Technique

- Endovenous laser treatment for varicose veins using an optical fiber inserted into the vein
  - great saphenous vein
  - small saphenous vein
  - sidebranches
- using LASER light – infrared portion of the spectrum
Procedure / Steps

Percutaneous duplex ultrasound guided access to the distal

- great saphenous vein
or
- small saphenous vein
Procedure / Steps

- GSV entered at the knee or SSV mid portion of calf
- guide wire passed through the needle into the vein
- remove the needle and insert Introducer sheath over a guide wire
- removal of the guidewire and insertion of the Laser fiber
- or sheathless with introducer needle (16G or 14G)
- placement of the fiber tip distal to saphenous vein junction
- Tumescent anesthesia
Wavelength and Fiber

- 1998 first try $\lambda$ 980 nm and 810 nm bare fiber

- 2005 $\lambda$ 1470 nm bare fiber

- 2008 $\lambda$ 1470 nm radial fiber
- 2010 $\lambda$ 1470 nm radial slim 2 ring fiber

- 2017 $\lambda$ 1940 nm radial 2 ring fiber
- 2017 swift fiber 1,57 nm
Advantage of radial fiber

Radial emitting $\rightarrow$ Homogenous laser fiber circumferential energy emission

360°

Energy delivery during Pull Back
(1470nm, 10 watt 70-80J/cm)
Wavelength and Fiber

$\lambda$ 980 nm and 810 nm
$450^\circ\text{C}$

$\lambda$ 1470 nm
$120^\circ\text{C}$

$\lambda$ 1940 nm
Endovenous laser ablation of great and small saphenous vein incompetence with a 1470-nm laser and radial fiber

Giorgio Spreafico, MD, Andrea Piccioli, MD, Enrico Bernardi, MD,PhD, Enzo Giraldi, MD,Patrizia Pavei, MD, Riccardo Borgoni, Professor of Statistics, Attilio Nosadini, MD, and Ugo Baccaglini Professor of Surgery at Padua, Pieve di Soligo, and Milan, Italy

Study Design

- Prospective cohort study
- Patients recruited between May 2008 and December 2011
- 381 consecutive patients (317 GSV and 62 SSV)
- 372 patients completed 12-month follow up
Results

- 100% occlusion rate (GSV and SSV) mean 22 months follow up (min 12 max 48 months)

- Laser in continuous mode, with a power of 5 to 6 W
Secondary outcome: post-operative pain

- 2/3 of the patients had no pain
- More than 2/3 of the patients didn’t use any pain killer
- Pain is often referred to the site of phlebectomy
New Devices

- Slim Fiber 2 rings BioLitec (Leonardo mini)

4 French = 1,3 mm = 400 µm
Standard Fiber / head diameter: 1,85 mm

Swift Fiber / head diameter: 1,57 mm

Slim Fiber / head diameter: 1,09 mm
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Wavelength and Fiber

40 times higher absorption in water compared to devices with 1470 nm

λ 980 nm and 810 nm  λ 1470 nm  λ 1940 nm
1940 NM AND 2RING STUDY: 100 PTS
29.02. 2016.-27.03.2017

FOLLOW-UP:
10 DAYS – 93%
3 (2-19) MONTHS MEDIAN – 97%

Prof. Uldis Maurins, Riga
1940 NM STUDY

• N = 100 limbs
• 100 pts: 71 female, 29 male
• 100 GSV
• Compression: 0%
• Anticoagulation: 0%
1940 NM STUDY

- Post-operative variables -

• Closure rates:
  - 10 days – 100%
  - 90 days – 100%

• Occlusion distance from DV (cm):
  - 10 days – 0.1 ± 0.2
  - 90 days – 0.5 ± 0.5

• VCSS:
  - Before – 4.7 ± 2.7
  - 90 days – 1.2 ± 1.7

• EHIT II – 1, DVT – 0
1940 NM STUDY
- Post-operative variables -

Resorption of target vein

- Mean diameter (cm)
  - before EVLA 0.6 ± 0.2
  - 10 days after EVLA 0.4 ± 0.1
  - 3 months after EVLA 0.2 ± 0.2

Complete resorption at 3 months in 33%

Prof. Uldis Maurins, Riga
During the study carbonization of laser fibers tips was not observed
Pain Scores, over 10 days

VAS 0-10

Prof. Uldis Maurins, Riga
New Wavelength 1940

• Absorption of 1940 nm in water 40 times higher than 1470 nm

• However:
  – Similar occlusion rates
  – Similar complications rates
  – No difference in pain post op
New Wavelength 1940 nm

- But:
  - Lower treatment power – 8W instead of 10W
  - Similar or higher LEED and EFE
  - No more risk of fibres carbonisation
    - Possibility to use pull back device STANDARTISATION!!!!
  - Faster resorption of treated vein segments
    - Possibility to treat also very superficial vein segments
Benefit for patients

Almost free of complications

Homogenous photothermal destruction of the vein wall

Safety (pilotbeam)

Individual therapy for different types of veins
Thank you
Laser technologies - latest developments

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