Carotid Artery Stenting via Transradial Access

L. Pintér, C. Cagiannos, Z. Ruzsa, Prof. R. Kolvenbach
Center for Vascular Surgery and Vascular Interventions
Augusta Hospital Düsseldorf, Germany
Laszlo Pinter MD
Carotid Stenting via Transradial Access

DISCLOSURE INFORMATION:
The following relationships exist related to this presentation:

None
Difficult Transfemoral Access for CAS

Anatomy and Pathology of the Aorto-iliac Vessels
Difficult Selective Cannulation of the Common Carotid Artery

Anatomy and Pathology of the Aortic Arch

Arch Types (Myla 1996)
Different Catheter Configurations

- Berenstein
- Vitek
- Judkins Right
- Simmons
- Amplatz

Berenstein: 4 – 5 F
Vitek, Sidewinder
Vertebral (VER) or Multipurpose or JR 4
Difficult Transfemoral Access for CAS

Groin Infection

Extreme Obesity
Alternative access

Transcervical

Transbrachial

Transradial
Transcervical access

IJV

CCA

flow-reversal cerebral protection
<table>
<thead>
<tr>
<th></th>
<th>Radialis (n=300)</th>
<th>Brachialis (n=300)</th>
<th>Femoralis (n=300)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Successful Cannulation</td>
<td>P&lt;0,001</td>
<td>279 (93%)</td>
<td>287 (95,7%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>299 (99,7%)</td>
<td></td>
</tr>
<tr>
<td>Successful PCI</td>
<td>P=0,347</td>
<td>91,7%</td>
<td>90,7%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90,7%</td>
<td></td>
</tr>
<tr>
<td>No. of catheters</td>
<td>1,3/Eingriff</td>
<td>1,3/Eingriff</td>
<td>1,3/Eingriff</td>
</tr>
<tr>
<td>Time of Intervention</td>
<td>40 ± 24 min</td>
<td>39 + 25 min</td>
<td>38 ± 24 min</td>
</tr>
<tr>
<td>Time of Fluoro</td>
<td>P=0,060</td>
<td>13 ± 11 min</td>
<td>12 ± 10 min</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11 ± 10 min</td>
<td></td>
</tr>
<tr>
<td>Complications</td>
<td>P=0,035</td>
<td>0%</td>
<td>2,3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2,0%</td>
<td></td>
</tr>
<tr>
<td>Time of Hospitalization</td>
<td>P=0,49</td>
<td>1,5 ± 2,5 Tage</td>
<td>1,8 ± 3,3 Tage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,8 ± 4,2 Tage</td>
<td></td>
</tr>
</tbody>
</table>

Transradial Access has significantly less Complications
The Radial Artery as Access-site

- Superficial
- Easy to find
- Bony base
- Easy to compress
- Median nerve far away
- No nerve-injury
- No large vein
- No AV-Fistula
- Double bloodsupply
- No hand ischaemia
Negative (normal) Allen’s Test
Preoperative Duplex scan of the Radial Artery
Size of the Radial Artery

Mean radial artery internal diameter (RAID):
- M: 3.1 +/- 0.6 mm
- F: 2.8 +/- 0.6 mm

Sheath outer diameter (SOD):
- 6Fr: 2.52 mm
- 7Fr: 2.85 mm
- 8Fr: 3.22 mm

Preoperative Diagnostic

- Duplex scan
- Angio-CT
- MR-Angio
Transradial Carotid Stenting via right Radial Artery

Right handed operator

Preservation of the left radial artery for an eventual CABG

Right sided lesion or left sided lesion + bovine arch – no passage through the aortic arch

„62% of the perioperative embolization occurs of the non treated carotid bloodsupply area – via transfemoral access“

(Hammer et al. JVS 2005;42:847-853)
Micropuncture set 21 G

0,018“ Nitinol Wire

„The first hit is the best one“
Spasmolytique Cocktail

- 200 ug Nitroglycerin
- 2,5 mg Verapamil
- 5000 IU NaHeparin
Position of the C-Arm

AP

40° RAO
Catheter configuration right ICA

IMA
Simmons 1 Contra
Terumo GW Supracore GW Amplatz GW
Choice ES buddy-wire
Catheter configuration

left ICA

Berenstein
JB1
Simmons2

Terumo  GW
Supracoare GW
Amplatz GW

Choice ES
buddy-wire
Kinkresistent Sheath and Flexible Stent

Embolic Protection System
FilterWire EZ
Accunet
Angioguard Rx

Zilver Cook 5Fr
Carotid Wallstent 6Fr
Precise 6Fr
immediate,

full

mobilization
1. Carotid stenting using radial artery access.
   Castriota F, Cremonesi A, Manetti R, Lamarra M, Noera G
   J Endovasc Surg
   1999;6:385-386

   Yoo BS, Lee SH, Kim JY, Lee HH, Ko JY, Lee BK, Hwang SO, Choe KH, Yoon J
   Catheter Cardiovasc Interv
   Jun 2002 (Vol. 56, Issue 2, Pages 243-5)

3. Transradial stenting of the cervical internal carotid artery: technical case report.
   Levy EI, Kim SH, Bendok BR, Qureshi AI, Guterman LR, Hopkins LN
   Neurosurgery
   Aug 2003 (Vol. 53, Issue 2, Pages 448-51; discussion 451-2)

   Wu CJ, Hung WC, Chen SM, Yang CH, Chen CJ, Cheng CI, Chen YH, Yip HK
   Catheter Cardiovasc Interv
   Sep 2005 (Vol. 66, Issue 1, Pages 21-6)

   J Cardiovasc Surg
   2006;47(Suppl1):5(Abstract)

   Folmar J, Sachar R, Mann T
   Catheter Cardiovasc Interv
   Feb 2007 (Vol. 69, Issue 3, Pages 355-61)

8. Report on initial experience with transradial access for carotid artery stenting.
   Pinter L, Cagiannos C, Ruzsa Z, Bakoyannis C, Kolvenbach R
   J Vasc Surg
   Jun 2007 (Vol. 45, Issue 6, Pages 1136-41)
### TRA CAS
March 2006 – Sept. 2007  N=27
Center for Vascular Surgery and Endovascular Interventions Augusta Hospital Düsseldorf

- **Age** 72 y (62-84y)  
  - M:18  
  - F:9

- **Symptomatic** 11/27
- **Asymptomatic** 16/27

- **Side of the treated lesion**
  - right 18/27
  - left 9/27
  - bovine 4/27

- **Arch Morphology**
  - Typ I 20/27
  - Typ II 7/27
  - bovine 4/27
Technical Success

- 24/27
- Spasm 1x
- Failed Cannulation of the left CCA 2x

(Typ I Aortic Arch)
Results

- Stroke/TIA: 0/27
- AMI: 0/27
- Op. for Haematoma: 0/27
- Occlusion of the Radial Artery: 2/27
- Pain requiring analgesia: 2/27
- Mobilisation in 2 Hours postint.: 27/27
- Procedure time: 61 min (35-90 min)
Our first Experience with TRA CAS

- Safe Access-site with a high Rate of Success and a minimal Rate of Complications

- Less Risk of Embolisation in Stenting of the right ICA, or left ICA in case of a bovine-arch – no need for Manipulations in the Aortic Arch

- Ideal in case of high Dose-Anticoagulation - no need for Closure Devices

- High Rate of Patient Satisfaction – immediate Mobilisation, minimal Pain, Safe
Difficulties with TRA CAS

- Selective Cannulation of the left CCA is sometimes very difficult or impossible
- Spasm – relatively small Vessel-diameter
- Learning curve
- Instrumentation
Fig 2. Algorithm for use of transradial access when performing carotid artery stenting (CAS). CTA, Computed tomographic angiography; MRA, magnetic resonance angiography; RAID, radial artery internal diameter; CEA, carotid endarterectomy.