Puncture-site complications in peripheral interventions

A prospective single-center registry

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Disclosure

Speaker`s name:
Marcus Thieme

I have to report the following potential conflicts of interest:

- 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
Introduction

→ Puncture site complications after diagnostic and therapeutic catheterizations are common

→ The incidence of pseudoaneurysms after diagnostic catheterization ranges from 0.05 to 2% and increases up to 6% after coronary or peripheral interventions 1) 2) 3)

The objective of this prospective registry is to examine the complication rate and the patient outcome for peripheral interventions and to identify risk factors for a poorer outcome

Methods

- All patients with any diagnostic or therapeutically peripheral intervention in our vascular center have been registered prospectively since September 2013.
- These patients were punctured by physicians and technicians.
- The data were collected during the intervention, the following day and before the discharge.
- The statistical analyzes were done with IBMS SPSS Statistics 22.
Methods

All patients were evaluated during angiography regarding the following parameters:

- Age, gender and body mass index, any anticoagulation
- Puncturer and his or her professional group
- Number of punctures and duration until sheath placement
- Calcification or anatomical characteristics of the target vessel
- Size of the sheath, target vessel and puncture direction
- Type and duration of the intervention, dose of heparin
- Type of vascular closure (system) and the performer
- Acute complications
Methods

All patients had a clinical follow-up and a duplex scan on the following day regarding

- Active bleeding, hematoma, AV-fistula, aneurysms, occlusion
- necessary therapies such as ultrasound-guided compression, thrombin injection or surgery
- patient`s outcome, e.g. prolongation of the hospitalization

3315 patients were evaluated for this interim analysis
## Results

### Baseline demographics

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean ± SD (n)</td>
<td>71.8 ± 10.9 (3315)</td>
</tr>
<tr>
<td>Male gender, % (n/N)</td>
<td>67.6% (2242/3315)</td>
</tr>
<tr>
<td>BMI</td>
<td>28.0 ± 5.3 (3176)</td>
</tr>
</tbody>
</table>

### Anticoagulation

- **ASS**: 1653; 50%
- **ASS and Clopidogrel**: 530; 16%
- **Cumarin**: 429; 13%
- **Cumarin and ASS**: 572; 18%
- **DOAK**: 109; 3%
Results

Baseline demographics

BMI 28.05 ± 5.1 (14-62)
## Results

### Baseline procedure data

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time to sheath placement</strong></td>
<td>75.2 s ± 99.5 sec</td>
</tr>
<tr>
<td></td>
<td>median 40.0 s</td>
</tr>
<tr>
<td><strong>Number of punctures</strong></td>
<td>1.3 ± 0.79</td>
</tr>
<tr>
<td><strong>Retrograde punctures</strong></td>
<td>88.5% (2935/3315)</td>
</tr>
<tr>
<td><strong>Transbrachial procedures</strong></td>
<td>6.1% (203/3315)</td>
</tr>
<tr>
<td><strong>Interventions</strong></td>
<td>66.6% (2208/3315)</td>
</tr>
<tr>
<td><strong>Local thrombolysis</strong></td>
<td>11.9% (395/3315)</td>
</tr>
<tr>
<td><strong>Duration of the procedure</strong></td>
<td>49.23 ± 31.1 min</td>
</tr>
</tbody>
</table>
Results
Results

Baseline procedure data

Use of vascular closure system
Results - complications

Acute puncture site bleedings in cathlab

- 2729; 82% No bleeding
- 520; 16% Small oozing hemorrhage*
- 60; 2% Active bleeding**

* All patients were treated successfully by compression bandage
** 3 patients were treated surgically, the other with compression bandage
Results - complications

Duplex results

- Normal: 2696; 81.75%
- Hematoma: 147; 4.46%
- Pseudoaneurysm: 455; 13.80%
- Vessel occlusion/stenosis: 118; 3.58%
- AV-fistula: 19; 0.58%
- Others: 10; 0.30%

Legend:
- Normal
- Hematoma
- Pseudoaneurysm
- Vessel occlusion/stenosis
- AV-fistula
Results - complications

Correlation between vascular closure system and complications

<table>
<thead>
<tr>
<th></th>
<th>Angioseal</th>
<th>Angioseal and CB</th>
<th>Manuell and CB</th>
<th>Femostop</th>
<th>Proglide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vessel occlusion</td>
<td>0%</td>
<td>0.50%</td>
<td>0.80%</td>
<td>0%</td>
<td>2%</td>
</tr>
<tr>
<td>AV-fistula</td>
<td>0%</td>
<td>0.10%</td>
<td>0.60%</td>
<td>0.80%</td>
<td>0%</td>
</tr>
<tr>
<td>pseudoaneurysm</td>
<td>2.60%</td>
<td>3.40%</td>
<td>3.80%</td>
<td>7.20%</td>
<td>0%</td>
</tr>
<tr>
<td>hematoma</td>
<td>10.30%</td>
<td>13.90%</td>
<td>13.90%</td>
<td>16.80%</td>
<td>9.80%</td>
</tr>
<tr>
<td>normal</td>
<td>86.70%</td>
<td>81.60%</td>
<td>80.70%</td>
<td>75.20%</td>
<td>87.80%</td>
</tr>
</tbody>
</table>
Results - complications

Correlation between complications and sheath size

<table>
<thead>
<tr>
<th>Sheath Size</th>
<th>Other</th>
<th>AV-fistula</th>
<th>Pseudoaneurysm</th>
<th>Hematoma</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>4F</td>
<td>0%</td>
<td>0,10%</td>
<td>1,50%</td>
<td>7,80%</td>
<td>90,10%</td>
</tr>
<tr>
<td>6F</td>
<td>0,80%</td>
<td>0,40%</td>
<td>4,10%</td>
<td>15,30%</td>
<td>79%</td>
</tr>
<tr>
<td>7F</td>
<td>0%</td>
<td>0%</td>
<td>4,70%</td>
<td>20,30%</td>
<td>75%</td>
</tr>
<tr>
<td>8F</td>
<td>1,30%</td>
<td>1,30%</td>
<td>6,30%</td>
<td>16,50%</td>
<td>74,70%</td>
</tr>
<tr>
<td>9F or more</td>
<td>5,20%</td>
<td>0%</td>
<td>10,50%</td>
<td>15,80%</td>
<td>68,40%</td>
</tr>
</tbody>
</table>

4F sheath: 78,7% no heparin
6F and more: 93,2% 5000 IU or more heparin
Results - complications

Correlation between complications and heparin dose
Results - complications

Correlation between complications and access site

- Normal
- Hematoma
- Pseudoaneurysm
- AV-fistula
- Other
- Prolongation of hospital stay
- Death
Results - complications

Correlation between complications/ outcome and profession of puncturer

<table>
<thead>
<tr>
<th></th>
<th>physicians</th>
<th>technicians</th>
<th>physicians</th>
<th>technicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>death</td>
<td></td>
<td></td>
<td>0,10%</td>
<td>0,00%</td>
</tr>
<tr>
<td>prolongation of hospital stay</td>
<td></td>
<td></td>
<td>4,60%</td>
<td>4,50%</td>
</tr>
<tr>
<td>other</td>
<td>0,60%</td>
<td>1,00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AV-fistula</td>
<td>0,30%</td>
<td>0,30%</td>
<td></td>
<td></td>
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<td>3,60%</td>
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<tr>
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<td>13,80%</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>normal</td>
<td>81,40%</td>
<td>82,20%</td>
<td>95,10%</td>
<td>95,50%</td>
</tr>
</tbody>
</table>
Conclusions

• More than 95% of our patients treated had a normal course of hospitalization after angiography or peripheral intervention

• The rate of pseudoaneurysms increased with the size of the sheath and the dose of heparin and with transbrachial access

• There was no difference in outcome and complication rate comparing physicians and technicians

• New techniques, such as the use of 4F systems for interventions or ultrasound-assisted puncture should be evaluated in randomized trials with regard to lower complication rates
Thank you for your attention!

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