The role of 2D and 3D fusion imaging for reconstruction of complex aortic pathologies

Dr. Giovanni F. Torsello, BA
Klinik für Strahlenheilkunde
Charité Campus Virchow-Klinikum
Disclosure

Speaker name:

.........Dr. Giovanni F. Torsello..................................................

I have the following potential conflicts of interest to report:

☐ Consulting

☐ Employment in industry

☐ Stockholder of a healthcare company

☐ Owner of a healthcare company: Vascupedia

☐ Other(s)

☐ I do not have any potential conflict of interest
Radiation-induced DNA damage

Operators performing Complex EVAR suffer increased DNA damage in circulating WBC

El-Sayed T et al.
Radiation Induced DNA Damage in Operators Performing Endovascular Aortic Repair.
Circulation 2017
Patient is brought to hybrid OR

1. Patient is brought to hybrid OR
2. 5-8 sec
3. ± 300 mGy Skindose (+ 50 mL Contrast)
4. Pt positioning

- Altered workflow, necessitating additional time, radiation and contrast (OR personnel?)
- Patient is positioned after obtaining the 3D dataset (arms)
2D3D Fusion workflow

1. Pt is brought to Hybrid OR and positioned

2. ± 10 mGy Skindose

- Similar workflow, no additional time, very little extra radiation
- Fusion „on the fly“
<table>
<thead>
<tr>
<th>Nr.</th>
<th>First Author</th>
<th>Year</th>
<th>N</th>
<th>2D3D / 3D3D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Carell</td>
<td>2010</td>
<td>11 fEVAR, EVAR</td>
<td>2D3D</td>
</tr>
<tr>
<td>2</td>
<td>Fukuda</td>
<td>2013</td>
<td>18 TEVAR</td>
<td>2D3D</td>
</tr>
<tr>
<td>3</td>
<td>Kauffmann</td>
<td>2015</td>
<td>16 f/bEVAR, EVAR</td>
<td>3D3D</td>
</tr>
<tr>
<td>4</td>
<td>Schulz</td>
<td>2015</td>
<td>18 TEVAR</td>
<td>both</td>
</tr>
<tr>
<td>5</td>
<td>Schulz</td>
<td>2016</td>
<td>101 EVAR</td>
<td>3D3D</td>
</tr>
<tr>
<td>6</td>
<td>Panuccio</td>
<td>2016</td>
<td>25 f/bEVAR, EVAR</td>
<td>2D3D</td>
</tr>
</tbody>
</table>
Fusion Imaging reduces radiation exposure

- 5/7 publications report radiation dose reduction 2,4-6
- True for both 2D3D 5 and 3D3D 4
- In 2/7, the fluoro time was reduced 4,5

<table>
<thead>
<tr>
<th>Nr.</th>
<th>First Author</th>
<th>Year</th>
<th>Fusion vs. Standard guidance</th>
<th>Method</th>
<th>Radiation dose</th>
<th>Fluoro time</th>
<th>2D3D / 3D3D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dijkstra</td>
<td>2011</td>
<td>40 vs 49</td>
<td>R</td>
<td>n.s.</td>
<td>n.s.</td>
<td>3D3D</td>
</tr>
<tr>
<td>2</td>
<td>Hertault</td>
<td>2014</td>
<td>96 vs 301</td>
<td>P</td>
<td>Significantly lower</td>
<td>n.s.</td>
<td>2D3D</td>
</tr>
<tr>
<td>3</td>
<td>Sailer</td>
<td>2014</td>
<td>31 vs 31</td>
<td>P</td>
<td>n.s.</td>
<td>n.s.</td>
<td>3D3D</td>
</tr>
<tr>
<td>4</td>
<td>McNally</td>
<td>2015</td>
<td>31 vs 41</td>
<td>R</td>
<td>Significantly lower</td>
<td>Significantly lower</td>
<td>3D3D</td>
</tr>
<tr>
<td>5</td>
<td>Stangenberg</td>
<td>2015</td>
<td>16 vs 16</td>
<td>R</td>
<td>Significantly lower</td>
<td>Significantly lower</td>
<td>2D3D</td>
</tr>
<tr>
<td>6</td>
<td>Dias</td>
<td>2015</td>
<td>103 vs 123</td>
<td>R</td>
<td>Significantly lower</td>
<td>n.s.</td>
<td>3D3D</td>
</tr>
</tbody>
</table>
Conclusions

Fusion imaging reduces radiation exposure

With progressing technology, we will be able to create vascular models without altering workflow or wasting time
Thank you!

Charité – Universitätsmedizin Berlin

St. Franziskus Hospital Münster
The role of 2D and 3D fusion imaging for reconstruction of complex aortic pathologies

Dr. Giovanni F. Torsello, BA
Klinik für Strahlenheilkunde
Charité Campus Virchow-Klinikum