A randomised comparison of Digital Subtraction Angiography and Kinetic Imaging

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Disclosure

Speaker name: Viktor Imre Óriás MD

I have the following potential conflicts of interest to report:

☐ Employment in industry: Kinepict Health Ltd.
Kinetic imaging vs DSA

Kinetic image, Contrast-Enhanced Image (CEI)

Raw series

Standard deviation

Mask

Subtracted series

Summation

sumDSA image
Visual comparison

sumDSA

CEI
Signal-to-noise ratio (SNR)

Signal = mean intensity difference
Noise = background standard deviation
Materials and methods

- Lower limb angiography (42 pts)
- SNR measurement (1902 ROIs)
- Visual comparison (232 image pairs, 3 vascular surgeons, 2 radiologists)

- Q1: Which image is more detailed?
- Q2: In which image are the structures more distinct?
- Q3: Which image is more useful diagnostically?
Images for visual comparison

- **Raw sumDSA** (rsDSA)

- **Siemens post-processed sumDSA** (ssDSA)
  rsDSA + Pixel Shift + image quality enhancers
  (Siemens Artis zee with Pure, Siemens Syngo workstation)

- **Kinetic or Contrast-Enhanced Image** (CEI)
## Results - SNR ratios

<table>
<thead>
<tr>
<th>Confidence interval</th>
<th>( \frac{\text{SNR(CEI)}}{\text{SNR(rsDSA)}} )</th>
<th>( \frac{\text{SNR(CEI)}}{\text{SNR(ssDSA)}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2.5%</td>
<td>1.34</td>
<td>0.78</td>
</tr>
<tr>
<td>&gt; 97.5%</td>
<td>7.68</td>
<td>5.53</td>
</tr>
<tr>
<td>median</td>
<td>3.26</td>
<td>2.28</td>
</tr>
</tbody>
</table>
## Results - Visual comparison

### Fleiss' kappa test

<table>
<thead>
<tr>
<th>Question</th>
<th>% agreement</th>
<th>% st.dev.</th>
<th>kappa</th>
<th>kappa p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 (more detailed)</td>
<td>75.8%</td>
<td>14.1%</td>
<td>0.0968</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Q2 (distinction of structures)</td>
<td>74.16%</td>
<td>14.22%</td>
<td>0.1263</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Q3 (diagnostical usability)</td>
<td>74.07%</td>
<td>14.24%</td>
<td>0.1265</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>
Conclusions

CEIs provide better image quality than DSA

Dose efficiency:
‘gold standard’ DSA quality - less X-ray or contrast dose
Thank you for your attention!

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