In vitro evaluation of a novel pediatric flexible cystoscope - A practical comparison of endoscopes for pediatric lower urinary tract evaluation

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Disclosure

- Scientific advisor: Bard, Olympus/ACMI, Cook
Background

- Cystoscopic evaluation of the pediatric lower urinary tract presents unique anatomic challenges
  - Urethral size
  - Lower urinary tract reconstructions
  - Ability to tolerate cystoscopic evaluation (need for anesthesia)
- There is no well-established flexible cystoscope designed specifically for the pediatric population
Background

- Neoflex pediatric flexible cystoscope (Neoscope, USA)
  - Single-use flexible cystoscope designed for pediatric population
  - FDA-approved
  - No formal comparison to other endoscopes widely used in pediatric urology
Purpose/methods

- Compare parameters of endoscopes for pediatric cystoscopy
  - Gyrus ACMI MRA-715A semirigid ureteroscope (Olympus, USA)
  - Adult flexible cystoscope (Karl-Storz, Germany)
  - Flex-X²S flexible ureteroscope (Karl-Storz, Germany)
  - Neoflex pediatric flexible cystoscope (Neoscope, USA)

- Multiple technical factors
  - Basic construction/functional parameters
  - Resolution and color
Resolution and color

1951 USAF test pattern

Gretag-Macbeth color check
Neoflex pediatric flexible cystoscope
# Basic endoscope parameters

<table>
<thead>
<tr>
<th></th>
<th>Gyrus ACMI</th>
<th>Adult cysto</th>
<th>Flex-X(^2)S</th>
<th>Neoflex</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length (mm)</strong></td>
<td>150</td>
<td>370</td>
<td>670</td>
<td>170</td>
</tr>
<tr>
<td><strong>Shaft diameter (Fr)</strong></td>
<td>9.2</td>
<td>15</td>
<td>7.5</td>
<td>8.6</td>
</tr>
<tr>
<td><strong>Working channel (Fr)</strong></td>
<td>5.4</td>
<td>6.9</td>
<td>3.6</td>
<td>3.6</td>
</tr>
<tr>
<td><strong>Field of view (degrees)</strong></td>
<td>40</td>
<td>80</td>
<td>75</td>
<td>85</td>
</tr>
<tr>
<td><strong>Deflection: empty Degrees, down/up/total</strong></td>
<td>-</td>
<td>80/85/165</td>
<td>140/136/275</td>
<td>150/140/290</td>
</tr>
<tr>
<td><strong>Def, 0.035” guidewire Degrees, down/up/total</strong></td>
<td>-</td>
<td>60/80/140</td>
<td>70/85/155</td>
<td>90/95/180</td>
</tr>
</tbody>
</table>
Optics (tested at 10, 20, 50 mm)

<table>
<thead>
<tr>
<th></th>
<th>Gyrus ACMI</th>
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<th>Flex-$X^{2S}$</th>
<th>Neoflex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution (20 mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1951 USAF test pattern</td>
<td>2.248</td>
<td>1.403</td>
<td>1.319</td>
<td>2.956</td>
</tr>
<tr>
<td>Color (20 mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gretag-Macbeth color check</td>
<td>2.0</td>
<td>1.9</td>
<td>1.8</td>
<td>1.2</td>
</tr>
</tbody>
</table>
Summary

- Neoflex pediatric flexible cystoscope (Neoscope, USA) has favorable parameters for pediatric cystoscopy
  - Made for children with pediatric-appropriate design parameters
  - Flexible, single-use format
  - Better field of view/deflection/resolution
  - Can connect to laptop via dongle or to typical endoscope tower
- Further study
  - Clinical trial, identify ideal use/setting
  - Cost analysis
  - Potential office/floor use
  - Collaboration: victor.kucherov@jefferson.edu