Structured Light Scanning Versus Goniometry for Angle Assessment

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Wide Variation in Hypospadias Phenotype
Goal

Seek methods to objectively quantify phenotypic variation in congenital penile anomalies

Objective

Evaluate measurement accuracy and reliability of a structured light scanner versus goniometer for angle assessment
Goniometer vs Structured Light Scanner

3D Printed Blocks

Goniometer (n=10)

Artec Space Spider (n=5)
Structured Light Scanner is Accurate and has Excellent Reliability

Mean Angle by Modality

3D Printed Block Angle

- Goniometry
- Structured Light

Measured Angle

Series 1

Series 2
Structured Light Scanning is Accurate and has Excellent Reliability

<table>
<thead>
<tr>
<th>Modality</th>
<th>ICC (95% CI)</th>
<th>Mean Time</th>
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</thead>
<tbody>
<tr>
<td>Goniometry</td>
<td>0.78 (0.43, 0.92)</td>
<td>33 sec</td>
</tr>
<tr>
<td>Structured Light Scanning</td>
<td>0.99 (0.99, 0.99)</td>
<td>4 min</td>
</tr>
</tbody>
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Structured Light Scanning is Accurate and has Excellent Reliability, as indicated by an ICC of 0.99 (0.99, 0.99) compared to Goniometry's ICC of 0.78 (0.43, 0.92). Structured Light Scanning also offers faster measurement times, with a mean of 33 seconds compared to Goniometry's 4 minutes.
Structured Light Scanning is Accurate and has Excellent Reliability

Structured Light Scanning

 ICC (95% CI) Mean Time

Goniometry 0.78 (0.43, 0.92) 33 sec

Structured Light Scanning 0.99 (0.99, 0.99) 4 min
Structured light scanning is an efficient and effective means of angle measurement

• **Future Directions**
  - Lab validation (measurement, volume)
  - OR use, database application

• **Poster**
  - Additional technologies (photogrammetry, 3D camera)
  - 3D model samples: tinyurl.com/uclaurology3d
• Rapid multi-step process for digital 3D model creation

• Automated CAD software angle measurement in central plane