MP16-14: Evaluation of a novel portable cystoscopy device: The “GoScope”

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Background and Objective

Portable cystoscopy with the use of technology could provide rapid cystoscopy in resource-limited settings. Ergonomics in surgery is a growing field of interest and so this study aimed to provide an ergonomic assessment of a 3D-printed, phone-mounted cystoscopy device, the “GoScope”.

Methodology

Design & 3D Printing

Development of the GoScope was conducted in amelioration cycles of measurements and sketches, computer-aided design (CAD), printing, testing and re-design.

![Flow diagram figure]

Figure 1: Image of GoScope fixed to iPhone 7 and rigid cystoscopy equipment, with Uro-Scopic trainer used for the cystoscopy task and video monitor.

Study Design

Prospective RCT, comparing the ergonomics of the GoScope with traditional rigid cystoscopy equipment in a simulated cystoscopy task. Novices with no prior cystoscopy experience were recruited. Both groups received didactic teaching.

![Flow diagram figure]

Figure 2: Study protocol flow diagram.  Figure 3: GoScope in use.

Performance & outcome measures

Subjective ergonomic assessment:

- Modified Surgery Task Load Index (SURG-TLX).

Objective surgery assessment:

- Electromyography (EMG) of the trapezius muscle.

Expert opinion:

- EMG measurements & modified SURG-TLX.
- Feasibility of the device for use in clinical practice.

Results

<table>
<thead>
<tr>
<th>Question</th>
<th>Control (n=14)</th>
<th>GoScope (n=14)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean EMG range</td>
<td>846.5</td>
<td>991.1</td>
<td>0.04*</td>
</tr>
</tbody>
</table>

Table 1: Mean Electromyography (EMG) data given in analogue digital conversion (ADC) output. Unpaired t test of EMG amplitude ranges of control and GoScope arm.

<table>
<thead>
<tr>
<th>Question</th>
<th>Control (n=14)</th>
<th>GoScope (n=14)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>The device felt comfortable to hold and use</td>
<td>3.429</td>
<td>3.071</td>
<td>0.34</td>
</tr>
<tr>
<td>The device required significant time to get used to</td>
<td>3.000</td>
<td>2.286</td>
<td>0.13</td>
</tr>
<tr>
<td>The device got in the way while performing the task</td>
<td>2.357</td>
<td>2.571</td>
<td>0.63</td>
</tr>
</tbody>
</table>

Table 2: Subjective questionnaire data. Ease of use questionnaire section responses of control and experimental arm. No other sections of the questionnaire (pain/discomfort, mental demand, physical demand, task complexity, distractions, degree of difficulty) showed a statistically significant difference in response scores.

<table>
<thead>
<tr>
<th>Question</th>
<th>Control (n=14)</th>
<th>Expert (n=12)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>The device got in the way while performing the task</td>
<td>2.571</td>
<td>3.583</td>
<td>0.02*</td>
</tr>
<tr>
<td>Degree of difficulty</td>
<td>5.357</td>
<td>3.000</td>
<td>0.005*</td>
</tr>
</tbody>
</table>

Table 3: Expert questionnaire response compared to experimental (GoScope) arm. No other sections reached statistical significance nor did EMG data.

Conclusions

- There is a desire among clinicians to incorporate portable technology devices such as mobile phones in urological practice.
- This study has shown promise for the potential future use of the GoScope in providing rapid and portable cystoscopy with the use of widely available technology.
- However, the ergonomics of the device may not be optimal, and further improvements of the device would address this, using feedback from urologists.

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