Determination of the learning curve of robotic flexible ureterorenoscopy

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## Objectives

Retrograde intrarenal surgery (FURS) is rapidly evolving in the last decade based on significant improvements of the armamentarium especially Flexible ureterorenoscopy (FURS). Our study consisted of three steps. Our objective in the first step was to compare the manual stone volume/minute and the progress with the experience.

## Methods

### STEP 1

**A total of 7 experts (Group 1) and 7 trainees (Group 2) of FURS were included to the study group. All the participants used Storz flexX2 for manual fURS and Robotic FURS. Participants who had performed > 50 FURS were accepted as experts and lower than 10 case as trainees.** After watching a video showing all functions of RoboflexAvicenna all of the participant requested to drive into the Minnesota University Kidney Model from the ureter to the upper calices, middle calix and lower calices and came back to the ureter. They did same manually. All of the participants performed both flexible and robotic fURS twice. During all procedures a record was kept of the duration and the mean time values of the groups were compared.

### Results

Mean age of the study group was 39 years old and both of the groups mean age values were similar. Mean time to evaluation of calixcal system for the two groups is summarized in table 1.

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th>Group 2</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual 1 (mean)</td>
<td>69</td>
<td>110</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Manual 2 (mean)</td>
<td>58</td>
<td>91</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Robotic 1</td>
<td>171</td>
<td>180</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>Robotic 2</td>
<td>126</td>
<td>128</td>
<td>&gt; 0.05</td>
</tr>
</tbody>
</table>

To date, 5 experts and 5 trainees were involved in the study. The trial is still going on and 15 participant for each group (experts & trainees) is planned to be involved. Time to fragmentation of each participant is given in table 2.

## Conclusions

Robotic-assisted flexible ureterorenoscopy using the Avicenna Roboflex™ provides a suitable and safe platform for FURS with significant improvement of ergonomics. However learning curves of the surgeons performing Roboflex™ is an important subject to investigate. This ongoing trial on a kidney model with standard calyceal anatomy, laser type and energy level will maintain relevant data on learning curves of both experts and trainees and the time of fragmentation seems to decrease even after the second procedure. Additionally the time of the fragmentation seems to be shorter than manual by robotflex in the trainees group, and they can reach the level of experts in the 4th trial.

## Abbreviations

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## Figures

- Roboticfragmentation in the Acrylic Kidney Model
- Acrylic Kidney Model
- Manual fragmentation of artificial stone in the Acrylic Kidney Model