Simulation Study Comparing the Effectiveness of the Gynecare Morcellex, the MOREsolution, and the Rotocut G1 Tissue Morcellators

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Introduction
Laparoscopic surgery has revolutionized many surgical procedures. The demonstrated benefits over traditional “open” surgical approaches are numerous and include less tissue trauma, fewer intraoperative complications, reduced postoperative pain, shorter postoperative recovery times, decreased incidence of postoperative adhesions as well as cost savings.⁴ Laparoscopic procedures are typically performed using several incisions, referred to as “ports,” ranging in sizes from 5-20mm. Given the small size of these ports, the volume of tissue to be removed can be a limiting factor and can be a reason for converting from a laparoscopic approach to a conventional open surgical approach.²

The electronic tissue morcellator was first introduced in 1993 and since then has been used to remove tissue specimens during laparoscopic surgery.⁴ Morcellation can however be a very costly part of surgery. An optimal morcellator should result in a decrease in operation time, reduce operator effort, have sufficient cutting power to remove larger masses, eliminate damage to other tissues and organs, and be cost effective.³⁵ Although there have been many advances in morcellation to simplify tissue extraction, an ideal morcellator has not been developed. The objective of this study is to evaluate three different Food and Drug Administration approved tissue morcellators currently available and to examine their efficacy and ease of use in a simulation setting.

Objectives
1. Evaluate length of surgical task: Each participant will be asked to apply the Gynecare Merccotex, the Rotocut G1 or the MOREsolution tissue morcellator to a 500 gram specimen of beef tongue through a laparoscopic box trainer.
2. Evaluate efficiency of surgical task: Each participant will be evaluated in terms of the number of fragments obtained and the number of fragments with length greater than 10 centimeters.
3. Evaluate ease of use of morcellator: Each participant will grade the morcellator for ease of use on a five-point scale.

Methods & Approach
This study was set up as an observational simulation study followed by a survey of the participants. After obtaining informed consent, the participants provided demographic information including age, year, gender in medical school, previous surgical experience, future specialty goals, left or right handedness, experience playing a musical instrument, and experience playing video games. The participants were given instructions on how to operate the morcellators and randomized into one of six groups, each group compromised one of the different permutations of ordering the three morcellators.

Each participant used the Gynecare Merccotex, the MOREsolution, and Rotocut G1 morcellators to morcellate a 250 gram beef tongue tissue model through a laparoscopic training box (Image 2). Total morcellation time, number of tissue fragments, and number of fragments greater than ten centimeters for all trials with each morcellator were recorded. At the conclusion of the study the participants graded each tissue morcellator on ease of use on a five-point scale.

Results

<table>
<thead>
<tr>
<th>Table 1. Summary of Participant Demographic Data</th>
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<tbody>
<tr>
<td>Number of Participants</td>
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<tr>
<td>Male Participants</td>
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<tr>
<td>Female Participants</td>
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<tr>
<td>Mean Age</td>
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<td>Mean Year in Medical School</td>
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<tr>
<td>Students with Previous Surgical Experience</td>
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<tr>
<td>Students who Played Video Games</td>
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<td>Students Who Played a Musical Instrument</td>
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<td>Right Handed Students</td>
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<td>Left Handed Students</td>
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<td>Ambidextrous Students</td>
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![Image 2. Simulation design set-up](Image 2)

Morcellation ease of use did not differ significantly by morcellator between morcellator G and R (3.32 ± 1.345 vs. 3.462 ± 1.0670) or morcellator MS (3.615 ± 1.0228) or morcellator R (3.462 ± 1.0670). Error bars represent ± standard deviation of the mean. Friedman’s test.

![Image 3. Mean Ease of Use by Morcellator](Image 3)

Conclusions
• Our results suggest that the newly FDA approved MOREsolution morcellator is an effective instrument for tissue morcellation as compared to the Gynecare Merccotex and the Rotocut G1.
• The MOREsolution tissue morcellator demonstrated faster tissue morcellation times and produced a higher number of long tissue fragments compared to the Rotocut G1.
• No significant differences were found in the total number of fragments obtained or survey participant opinion on the ease of use of the three morcellators.
• No statistically significant differences of demographic data were detected between the three tissue morcellators.
• These results suggest that the MOREsolution morcellator could save time in the operating room with tissue extraction. With time in an operation room being very costly, reducing the total time of each procedure is clinically very important, especially as greater national attention is being placed upon reducing healthcare costs.
• This study highlights the need for further studies, most importantly, how this data translates into a randomized clinical trial in actual patients.

Acknowledgments
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References