ORIGINAL ARTICLE

Prospective randomized control trial to reduce bubbles during colonoscopy with addition of oral simethicone to standard bowel preparation

Sonny S Dhalla1,2, Charleen Skead1, Shiv Bhanot1, Melissa Towle MRN2


INTRODUCTION

Endoscopy remains critical in detecting and preventing colorectal cancer along with other gastrointestinal (GI) pathologies. With the proliferation of colorectal cancer screening in GI practice, it is vital to have adequate bowel preparation for proper visualization. Adenoma Detection Rate (ADR) is increasingly being used as a metric for endoscopist competency and measurement of GI Unit performance. Visualization can be obscured not only by presence of stool contents but also by bubbles within the lumen of the bowel. (1,4) Despite adequate bowel preparations, bubbles tend to line the mucosa in approximately one third of patients and potentially obscure clear visualization. Simethicone, an over the counter, anti-foaming agent, has been used in GI departments as an irrigating fluid with some success in an effort to reduce bubbles. However, simethicone has been found to be contributing to the formation of a biofilm inside the irrigation channel of the endoscope potentially resulting in scope infection and contributing to transmission of microorganisms.

METHODS

A prospective randomized controlled trial was designed to investigate the addition of oral simethicone to bowel preparation on the formation of bubbles during colonoscopy and its impact on visualization.

RESULTS

The results of our study demonstrate a clear improvement in mucosal visibility due to the addition of oral simethicone to bowel preparation leading to a significant reduction in bubbles throughout the entire colon.

CONCLUSION

Increased visibility during colonoscopies may result in better endoscopy results and a longer endoscope life.

Key Words: Colonscopy; Bubbles; Simethicone; Endoscopy; Bowel preparation

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The highest bubble score was 9 out of 9 (6 patients in Group B) with the bubble score in the corresponding bowel section in Group B, the average total bubble score of 0.84 compared to 1.86 found in bubble score between Group A and Group B (\(p=0.0000096\)) with a decreased amount of bubbles present during colonoscopy. The amount of benefit with addition of oral simethicone to bowel preparation resulting in a achieved significant difference was found in average bowel preparation score (\(p=0.192\)). The average bowel preparation score for Group A was 7.14 compared to an average total of 7.33 for Group B.

**TABLE 1**

**Patient demographics**

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>118</td>
<td>125</td>
</tr>
<tr>
<td>Male</td>
<td>118</td>
<td>107</td>
</tr>
<tr>
<td>Average Age</td>
<td>59.6 (22-90)</td>
<td>60.7 (20-90)</td>
</tr>
</tbody>
</table>

**TABLE 2**

**Average bowel preparation and bubble scores by group**

<table>
<thead>
<tr>
<th>Average</th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg Total Bowel Prep</td>
<td>7.14</td>
<td>7.33</td>
</tr>
<tr>
<td>Avg Total Bubble</td>
<td>0.84</td>
<td>1.86</td>
</tr>
</tbody>
</table>

**TABLE 3**

**p Values comparing total and bowel section bowel preparation/bubble score**

<table>
<thead>
<tr>
<th>comparison</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Bowel Prep A vs B</td>
<td>0.192</td>
</tr>
<tr>
<td>Total Bubble A vs B</td>
<td>0.0000096</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Different methods have been employed to reduce bubbles in colonoscopy. These include flushing with water during the procedure or flushing with simethicone, found to result in retained fluid droplets on the endoscope even with proper reprocessing involving pre-cleaning, manual cleaning and high level disinfection, thereby possibly increasing infection rates. Yet these methods, in particular the use of flushing, results in increased procedure time, discomfort for the patient and longer anesthesia. A quick and harmless method for reducing bubbles is to reduce bubbles yet a poor bowel preparation score and vice versa, demonstrating the lack of difference is not unexpected, as the use of simethicone is not known to affect the presence of stool in the colon (12). Much effort has gone into optimizing bowel preparations to increase visibility and decrease discomfort when simethicone was used prior or during colonoscopy (14). Oral simethicone prior to colonoscopy is an easy and practical way to reduce bubbles and increase visibility without damaging effects to the endoscope. It may be argued that simethicone is not necessary as only 1/3 of patients are affected by bubbles and the majority are not.6 However, the lack of harm in using oral simethicone and our inability to predict possible presence of bubbles during the procedure further supports the use of oral simethicone taken with bowel preparation.5 Our study has clearly demonstrated the benefit of the addition of oral simethicone to bowel preparations in improving response was noted on the simethicone ingestion form that was placed in an envelope labeled with the participant number. The interviewing nurse then proceeded with the regular intake form. The endoscopy room had copies of the Boston Bowel Preparation Scale (5) and the Bubble Scale.6 The endoscopist completed these forms as well as the Endoscopy Room Quality Indicators for all patients once the procedure was finished, thus maintaining blinding to participant status. Once completed, a photocopy of the Endoscopy Room Quality Indicators, Bubble Scale and Bowel Preparation Scale was placed with the participant folder in the study envelope by recovery room staff. Bowel preparation score, bubble score, withdrawal time, bowel preparation type, point of the colon reached, whether retroflexion occurred and if polyps were detected was documented. The Boston Bowel Preparation Scale (9) graded bowel preparation in the right colon, transverse colon and left colon with 0=Unprepared colon segment with mucosa not seen due to solid stool that cannot be cleared, 1=Portion of mucosa of the colon segment seen, but other areas of the colon segment not well seen due to staining, residual stool and/or opaque liquid, 2=Minor amount of residual staining, small fragments of stool and/or opaque liquid, but mucosa of colon segment seen well. The Bubble Scale graded the amount of bubbles in the right colon, transverse colon and left colon with 0=None, 1=Minimal occasional bubbles, must actively look for them, 2=Moderate-obviously present, 3=Severe-obscured (10). All endoscopists underwent training for the correct use of the Bubble Scale and Bowel Preparation Scale. The scores were confirmed with another endoscopist until there was consistent agreement. The scales were also present on the endoscopy room wall for reference. Subjects: A total of 468 patients participated in the study with 236 participants in Group A and 232 in Group B. Participants were 18 years of age and older, scheduled to undergo colonoscopy. Exclusion criteria included inability to provide informed consent, less than 18 years old, inpatient, pregnancy, known hypersensitivity to simethicone, non residents of Manitoba and/or excessive language barriers.

**Statistical analysis**

The amount of bubbles was compared between Group A (simethicone) and Group B (no simethicone) using a Mann Whitney test with a statistical significance value of \(p=0.05\). The same was done for bowel cleanliness using the Boston Bowel Preparation Scale scores. Outcome measures: The primary endpoint was the amount of bubbles present. Secondary end points included bowel cleanliness and polyp detection rate.

**RESULTS**

A total of 468 individuals participated in the study with 236 participants in Group A and 232 in Group B. Both groups have five different types of bowel preparation according to patient and endoscopist preference. These were Golytely, Peglyte, Bipeglyte, Picosalax and Colyte. As shown in Table 1, the average of participants was 60.1 years with 51.9% female and 48.1% male. Due to the non-parametric distribution of data a Mann Whitney test was performed to assess for any significant differences in bowel preparation and bubble scores between the two groups. A significant difference was found in bubble score between Group A and Group B (\(p=0.0000096\)) with Group A having an average total bubble score of 0.84 compared to 1.86 for Group B (Table 2). When a section of bowel in Group A was compared to the bubble score in the corresponding bowel section in Group B, the significant difference remained for each section (RC, TC, and LC (Table 3)). The highest bubble score was 9 out of 9 (6 patients in Group B) with the lowest being 0 (Group A) (Figure 1).

Although scores of 0, meaning minimal bubbles in all three sections of the colon were found in both groups, Group A had 163 participants with scores of 0 compared to only 116 participants in Group B. Group A also had no score of 9 out of 9 and only one participant with a score of 8, followed by 5 patients with a score of 6 and median of 0. Group B had a median of 1. No significant difference was found in average bowel preparation score (\(p=0.192\)). The average bowel preparation score for Group A was 7.14 compared to an average total of 7.33 for Group B.

**Figure 1** Group A patient with bubble score of 0 VS Group B patient with bubble score of 9
visualization during colonoscopy. Hopefully, this will increase detection of pathology which may have been obscured otherwise. Furthermore, it has the potential to decreased damage and contamination of the endoscope. Future areas of research include analysis of various bowel preparations compared to bubble score. As well as secondary analysis of cancer detection rates comparing Group A and Group B. Limitations of the study include possible variation in grading of scales by individual endoscopists, although all endoscopists received training on using the scales and were blinded as to whether the patient was a study participant. Patients may not have ingested proper dosage of simethicone although instructed to take two 180 mg tablets. A selection bias may be present in terms of those willing to participate in the study, as they may be more likely to be motivated and properly prepare with the bowel preparation and follow instructions.

**CONCLUSION**

The use of oral simethicone with bowel preparation significantly reduced the amount of bubbles throughout the entire colon. The results demonstrate a clear improvement in mucosal visibility due to the addition of oral simethicone to bowel preparation. Increased visibility during colonoscopy may result in better endoscopy results and hopefully longer endoscope life.

**REFERENCES**

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