A Proof of Concept Study of Colonglide™, a Water-Soluble Internal Colonic Lubricant to Facilitate the Performance of Colonoscopy

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Abstract

Introduction: Colonoscopy, a routine method to screen for colon polyps and colorectal cancer, carries a 0.05% risk of perforation. Anatomic factors including colon angulation, diverticular disease and prior pelvic surgery increase risk of perforation as well as abdominal pain and retention of air associated with the procedure. Oil-soluble lubricants have been shown to facilitate passage of the colonoscope. This study is the first open label trial of Colonglide™, a water-soluble lubricant designed to facilitate the performance of colonoscopy.

Methods: Thirty patients undergoing routine screening colonoscopy were studied. Three experienced gastroenterologists instilled two doses of 60 mL Colonglide™ each through the biopsy port of the colonoscope with additional doses as needed for angulated portions of the colon. Time to cecum, and the use and strength of external abdominal pressure were recorded. Three questionnaires were administered to the performing physicians to assess their impression of the effect of Colonglide™ on individual cases as well as their overall impression of the device. Qualitative analysis was performed.

Results: Facilitation of colonoscopy was reported in 17 of 30 cases (57%). Median time to cecum was 7 minutes, 11 subjects (37%) required a small amount of external abdominal pressure, 13 (43%) received medium pressure and 2 patients (7%) received a large amount of pressure. All three physicians reported satisfaction with the intervention. No side effects were reported.

Conclusion: Based on the results of this open-label, proof of concept clinical trial, Colonglide™ is safe to use and appears to facilitate the performance of colonoscopy.

Introduction

Screening colonoscopy is recommended by the US Preventive Services Task Force (USPSTF), the American College of Physicians (ACP), the American Cancer Society and other national and international organizations for the identification and removal of colon polyps [1-4]. Widespread use of colonoscopy as a screening tool has resulted in greater than a 50% estimated reduction in overall mortality colorectal cancer [5-7]. Currently, colonoscopy is recommended every ten years for subjects that are at average risk (no family history of colon cancer and no symptoms suggestive of disease of the colon, including rectal bleeding, altered bowel habits, or weight loss), beginning at the age of 50. Patients in higher risk groups are screened at an earlier age and at more frequent intervals [1-3]. Specific advantages of colonoscopy as a screening tool compared to other accepted screening methods include the highest rate of detection of both small and large colon polyps, and the ability the remove and biopsy lesions at the time of the procedure.

Although colonoscopy is generally a safe procedure, colonic perforation occurs in about 0.04-0.25% of procedures performed [8,9]. Mortality from colonic perforation is 6-7% [9]. The majority of patients with iatrogenic colonic perforation require laparoscopic repair [10]. Risk factors for colonic perforation that occur as a direct result of mechanical forces from the colonoscope include diverticular disease, previous abdominal or pelvic surgery, colonic tortuosity, narrowing, and angulation and severe colitis. Other risks for colonic perforation include removal of large sessile polyps and barotrauma from excessive air insufflation [10]. Patients undergoing colonoscopy may experience significant abdominal discomfort and risks for discomfort during and after colonoscopy. Risks for discomfort during and after colonoscopy are similar to those of colonic perforation [11].
These pre-existing factors also make the performance of colonoscopy more difficult and extend the length of time required to complete the examination. Advancement of the colonoscope is particularly challenging through portions of the colon that are narrowed, angulated, tortuous, or have severe diverticulosis. Several maneuvers are utilized to assist in safe passage of the colonoscope beyond these difficult areas. These include external abdominal pressure, performed by the nurse or support technician, change of position of the patient, and use of a smaller, more flexible colonoscope, such as a pediatric colonoscope [12]. Underwater colonoscopy has also been suggested by some investigators to facilitate colonoscope passage to the cecum, especially for trainees [13], but this technique is not commonly practiced.

Prior research suggests that oil-soluble lubricants placed within the colonic lumen can facilitate colonoscope passage [14]. Unfortunately, oil-soluble lubricants may produce oil residues within the biopsy channel of the colonoscope. These residues represent a foreign substance that could enhance bacterial adherence within the biopsy channel of the colonoscope. This, in turn, could result in increasing risk of transfer of pathogenic bacteria from one patient to another undergoing colonoscopy with the same colonoscope after cleaning [15]. At present, there are no published studies of a safe form of lubricant placed inside of the colon during colonoscopy to facilitate the performance of colonoscopy. Such a product has obvious potential benefits including enhanced patient safety and improved performance of colonoscopy.

Colonglide™ is a new combination of water-soluble lubricant ingredients that is installed into the colon through the biopsy port of the colonoscope routinely during the performance of colonoscopy, with additional instillations in areas that are difficult to advance the colonoscope. Due to its lubricating properties, Colonglide™ reduces the amount of resistance produced by movement of the colonoscope within the colonic lumen. In theory, its use would facilitate the performance of the procedure, provide additional safety for passage of the colonoscope, and reduce the requirement to perform external pressure of the abdomen during colonoscopy. This is a report of the second open-label study of Colonglide™ that resulted in the receipt of 510K status for the product from the Food and Drug Administration [16].

**Methods**

**Study Design**

Three gastroenterologists, all experienced at the performance of colonoscopy, conducted the study.

**Sample Selection**

Ten subjects were to be studied by each physician. All study subjects were undergoing colonoscopy as an average risk screening test for colon polyps and colon cancer.

**Administration of Colonglide™**

During the performance of each colonoscopy, 60 mL of Colonglide™ was instilled in the biopsy channel at the rectosigmoid junction and 60 mL was instilled in the proximal sigmoid colon. These volumes and locations of instillation were optimized from preliminary evaluations by the Principle Investigator. In addition, examining physicians were encouraged to give additional doses of Colonglide™, as needed, to assist with advancing the colonoscope past difficult areas of the colon. The use of these additional doses was noted.

**Quantitative Analysis**

Quantitative data consisted of the measurement of time to cecal intubation, and use of external abdominal pressure required for the procedure.

**Qualitative Analysis**

Qualitative analysis was performed after completion of three questionnaires to measure subjective assessment of the intervention by the physicians performing colonoscopy. Questionnaires were developed by the principle investigator using recommended techniques used in clinical research. These include focusing questions to generate specific information, ease of understanding, use of open and close ended questions and non-linking of individual questions [17]. Three clinical gastroenterologists were enlisted for preliminary use of the questionnaires. Physicians were encouraged to provide objective assessments for the questionnaires. The first questionnaire was completed after each procedure. The second questionnaire was completed after the fifth and tenth procedure and the third questionnaire was completed after finalization of all procedures. Questionnaires contain specific information about the timing and difficulty of procedure and the individual physician’s assessment of the effect of the intervention on the performance of the procedures and their satisfaction with the intervention.

These Questionnaires are shown in Appendix. Adverse events occurring during colonoscopy were recorded. All patients were called by the study coordinators within 72 hours of performance of their colonoscopy with the use of Colonglide™. During the contact call, an open-ended conversation was performed during which patients were queried regarding their general state of health and questioned whether they experienced any side effects from Colonglide™ or their colonoscopy. The study was approved by the NorthShore University HealthSystem Institutional Review Board.

**Results**

Completion rate for the colonoscopies performed during the study was 100%. Follow up calls were completed in all study patients.

**Facilitation of the Procedure**

The intervention was determined to facilitate the performance of colonoscopy in 17 of 30 (57%) of cases (see Figures 1 and 2). Two physicians reported a 50% facilitation rate and one physician reported a 70% facilitation rate. In ten cases (33.3%) the physicians were unable to tell if the intervention facilitated the procedure and in 3 cases (10%) the intervention was reported to have not facilitated the procedure. All three physicians stated that overall, the intervention facilitated the performance of colonoscopy.

**Use of External Pressure**

External pressure was applied in the majority of patients (26/30 or 87%). A small amount of pressure was required in 11 subjects (37%), medium pressure in 13 (43%) and a large amount of pressure was required in 2 patients (7%).
Additional Doses of Colonglide™ Used

Doses greater than 120 mL were applied in five of the colonoscopies performed (17% of cases). In two of these cases, 180 mL was utilized and 150 mL was utilized in three cases. In four out of these five cases (80%), the intervention was reported to facilitate the performance of the procedure.

Time to Reach the Cecum

The median time to reach the cecum was 7 minutes (range: 3-14 minutes). Five cases (17%) took longer than 10 minutes for cecal intubation.

Responses to Physician Opinion Questionnaires

I. Satisfaction with the intervention (choices were unsatisfied, satisfied or very satisfied).

Two physicians were satisfied with the intervention and one physician was very satisfied with the intervention.

II. Recommendation to other gastroenterologists: All three physicians stated “yes”.

III. Positive comments:

a. “Appeared to make some procedures easier.”

b. “Patient was felt to have tolerated procedure with limited sedation better because of the lubricant”.

c. “Made more difficult colonoscopies easier”.

d. “Made the procedure more effective”

e. “Helps the scope reach the cecum with less resistance in the sigmoid colon”.

f. “Facilitated passage of scope, ease of use and safe”.

g. “Helpful in narrow, angulated sigmoid colon”

I. Dislikes with the intervention:

a. “Increased liquid at times got on the outside of the colonoscope and was slippery”

b. “Sometimes the intervention forms a film over the scope lens with the volume used”
Follow-up Phone Calls to Patients

All patients felt well at the time of their follow up phone call at 72 hours after the procedure. None had gastrointestinal complaints. No problems associated with the use of Colonglde were identified.

Discussion

Colonoscopy is a generally safe procedure that has been widely accepted as a screening tool for colon polyps and colorectal cancer [1-3]. There are a variety of complications that have been associated with the performance of colonoscopy. The most serious of these are the development of perforation, which occurs in about 0.04-0.25% of procedures performed [8,9]. Colonic perforation during colonoscopy is often due to mechanical forces exerted by the colonoscopy in patients with predisposing anatomic risk factors. These risk factors associated with perforation may also result in abdominal pain, retention of air and increase recovery time following the procedure. Factors associated with both of these complications include the presence of severe diverticulosis, prior pelvic surgery, adhesive disease affecting the colon redundancy of the colon and narrowed angulated portions of the colon [11,12]. The presence of these anatomic factors requires a variety of well accepted maneuvers for advancement of the colonoscope. Development of new methods to navigate through difficult portions of the colon will add to the safety and tolerability of the procedure.

This proof of concept study, resulted in the receipt of 510 K status for Colonglide™, a new water-soluble lubricant that is instilled within the colon [16]. The study shows that Colonglide™ is well tolerated by patients. Although the prospective data collected for this open-label study was primarily based on qualitative analysis of subjective impressions of the physicians using Colonglide™ while performing colonoscopy, this intervention appeared to improve the performance of colonoscopy in 57% of the cases performed.

Additional subjective data, based on qualitative evaluation of the product, included statements by the performing colonoscopists that the product facilitated the passage of the colonoscope, particularly in narrow, angulated portions of the colon. Other findings of interest included the average time to reach the cecum of seven minutes and the use of large amounts of external pressure to move the scope to the cecum in only 7% of the cases. Because this was an open-label trial, the actual effect of using internal lubrication on the time to reach the cecum could not be determined. Nonetheless, the preforming physicians had the impression that Colonglide™ facilitated the performance of colonoscopy in the majority of cases, thus suggesting that the product may shorten the time to reach the cecum. In the future, a randomized, double blinded study is recommended to confirm the positive effects observed in the preliminary evaluation of this device.

Conclusions

This study was intended as a proof of concept for this device to facilitate the performance of colonoscopy. Randomized, placebo-controlled trials will be required to prove the efficacy of Colonglide™ in the future. In the meantime, this study demonstrates that this method can be used safely in patients undergoing colonoscopy. The initial data suggests that the product has the potential to improve the safety and efficacy of colonoscopy, including cecal intubation time. The product may be especially useful in patients with more challenging colonic anatomy who are at higher risk for abdominal pain, increased doses of procedural sedation and colonic perforation.

Acknowledgements

Funding for this study was provided by CR Pharmaceuticals. The author wishes to thank Dr. Eric Veygelwel, Dr. Pithao Nguyen and Dr. Bruce Greenberg for assistance with preliminary use of the questionnaires.

Conflicts of Interest

Dr. Ehrenpreis is the inventor and part owner of Colonglide™. He is a consultant for CR Pharmaceuticals, the sponsor of the study. He serves on the Advisory Board for Pfizer Corporation.

References