

A Consistent Approach: Preparation and Insufflation Techniques and Issues of Patient Compliance in Virtual Colonoscopy

Introduction

As the role of virtual colonoscopy (CT colonography) as a screening modality for colon cancer grows, practitioners are confronted with a wide range of choices for bowel preparation and colon insufflation. Some of the available preparation methods include products and techniques originally developed for other screening modalities. Some of these systems can involve aggressive bowel preparation and can cause significant discomfort. For the practitioner, the question is clear: *Can patient compliance be improved through choices in bowel preparation and insufflation techniques without sacrificing image quality?*

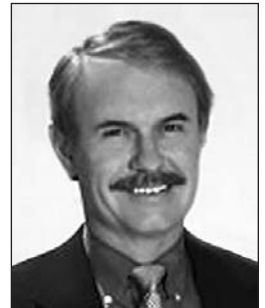
This question was recently put to Dr. Christopher Morgan, the on-site radiologist and Medical Director of Open Advanced MRI & CT in Tigard, OR. Dr. Morgan has 25 years of experience in CT and has performed over 350 virtual colonoscopies since 2002.

Since beginning his virtual colonoscopy practice, Dr. Morgan has prepared his patients for screening by using a low-residue diet in conjunction with mild laxation and fecal tagging. For colon insufflation, Dr. Morgan uses carbon dioxide administered with an automated device. In Dr. Morgan's opinion, using a dedicated set of products (see inset) specifically designed for virtual colonoscopy offers significant advantages to the practitioner.

Patient Preparation - Low-Residue Diet Plan

Since most bowel preparation regimes do not permit food, the day prior to a colon procedure can be difficult on patients. Patients often report that they are hungry and uncomfortable during prepping, and feel weak when they arrive at the procedure.

Sometimes, patients are not compliant with fasting requirements, and the procedure can be compromised as a result. A low-residue diet can help enhance patient comfort and satisfaction because patients can consume real food before their procedure, as opposed to clear liquids only. It can also help increase patient compliance, by making it easier to follow prepping requirements. NutraPrep is a patented, prepackaged kit of



Christopher Morgan MD
On-site Radiologist & Medical Director, Open Advanced MRI & CT Tigard, OR

Member
American College of Radiology
Oregon Medical Association

Materials and Methods

The Virtual Colonoscopy Product Set from E-Z-EM

- Low-residue Diet: NutraPrep®* Pre-procedure Meal Plan
- Mild Laxation: LoSo Prep™ Bowel Cleansing System
- Fecal Tagging: Tagitol V™ Radiopaque Marker
- Insufflation: PROTOCO₂L™ Automated CO₂ Insufflator

*US Pat. No. 6866873

low-residue foods (three complete meals, plus snacks and beverages) for the day prior to the patient's procedure. According to Dr. Morgan,

NutraPrep low-residue meal kit provides nutritious meals that do not interfere with the cleansing regime.

"NutraPrep provides patients with nutritious meals that do not interfere with the cleansing regime. Patients often report that the kits provide more than enough food." In his experience, though individual preferences may vary, everyone can find several items they enjoy.

Mild Laxation

Polyethylene glycol (PEG) is often used to prepare patients for optical colonoscopy and is frequently cited by patients as the single most daunting obstacle to compliance. Phospho-Soda®, another aggressive prep, is often used in virtual colonoscopy. According to Dr. Morgan, gentler laxation can help

Patients describe laxation with LoSo Prep as "very comfortable."

ensure patient compliance. For this reason he uses LoSo Prep in his facility because, "it is milder than most laxatives." LoSo Prep is a very low sodium (< 35 mg), low-volume (~8 oz) bowel cleansing system consisting of magnesium citrate combined with bisacodyl tablets and suppository. A number of Dr. Morgan's patients have described the laxation as "very comfortable." He pointed out that some patients have reported the need to get up occasionally

LoSo Prep with NutraPrep produces a clean, dry colon for the scan.

during the night but otherwise they sleep comfortably. In his facility's experience, "LoSo Prep, in conjunction with NutraPrep, is usually very effective and produces a clean, dry colon for the scan."

Fecal Tagging

Fecal tagging effectively tags stool and residual fluid which helps make the differentiation between polyp and stool easier. Dr. Morgan firmly believes that fecal tagging helps enhance his diagnostic capabilities. "I do not know what I would do without fecal tagging," he stated. "We find that without fecal tagging, interpreting virtual colonoscopy would be much more laborious, time-consuming and nonspecific." In his experience, even after a good prep almost every patient has a small amount of fluid and/or fecal material up to 5 mm in diameter. If these particles were not tagged, "at a minimum I would be visually distracted by the tiny ones, while for the larger ones I would worry quite a bit that I was missing polyps." Dr.

"I do not know what I would do without fecal tagging."

Morgan went on to explain that without fecal tagging he would recommend more short interval follow-up CTCs and colonoscopies that would prove to be false positives. Patients would have to endure more exams and worry unnecessarily.

Tagitol V is a low-volume radiopaque marker that blends into stool as it forms. Patients consume a 20 mL dose with each of the low-residue meals (breakfast, lunch and dinner). According to Dr. Morgan, "We find Tagitol V is effective in tagging stool and residual fluid. The small volume of contrast patients drink is not a problem for any of them, which is a noticeable improvement over previous stool tagging methods."

Patients are provided with comprehensive instructions for prepping and are advised to call the facility if they have any questions. In this facility's experi-

Patient Instructions

All patients are given the following virtual colonoscopy preparation:

- NutraPrep - day prior to the procedure
- LoSo Prep - evening prior to the procedure, and morning of procedure
- Tagitol V - 3 doses, given with the NutraPrep breakfast, lunch, and dinner

ence, 50% of patients get their kits from the original referring physician's office, 40% have their kits mailed to them, and only 10% pick them up at the facility.

Tagitol V is effective in tagging stool and residual fluid. The small volume of contrast is a noticeable improvement over previous stool tagging methods.

Insufflation - Automated CO₂

Automated CO₂ insufflation helps ensure consistent, adequate colonic distention, while minimizing patient discomfort post-procedure. According to Dr. Morgan, "Automated CO₂ insufflation takes the guesswork and uncertainty out of getting routinely good to excellent distention of the colon. We use the PROTOCO₂L insufflator and have always had good results." Dr. Morgan noted that on the off-chance that the gas leaks out around the tip during insufflation, the tech can easily inflate the retention cuff and stop the leak. He added that, "The latest enhancements for the insufflator minimize the amount of CO₂ lost from the patient and give a better degree of distention with less overall discomfort to the patient."

"Automated CO₂ insufflation takes the guesswork and uncertainty out of getting routinely good to excellent distention of the colon."

PROTOCO₂L fully automates the insufflation process, freeing staff for other duties. In Dr. Morgan's case, "Now that we have the thin rectal tube, I trust the technologist to do the entire exam without my input. I use the time I would otherwise spend in the room looking at the case as it arrives at my workstation. We do on-the-spot readings for all patients and get any worrisome polyps removed right after the exam."

This facility's protocol for all patients involves scanning the patient in the supine position first, followed by prone, and then right lateral decubitus view. In Dr. Morgan's experience, the decubitus view usually

gives the best sigmoid distention and often is the best overall view. The city of Portland, near where his facility is located, has a higher percentage of obese patients than many other cities. This can present certain challenges as the anterior sigmoid and lower ascending colon plus the transverse colon are often hard to distend on the supine view and impossible to distend on the prone because of the sheer weight of the abdominal fat. Dr. Morgan stated that, "The decubitus view also gives me a third 'chance' to spot a polyp, and gravity sometimes swings one into view best in that position."

The Relationship with Gastroenterology

Local gastroenterologists work with Dr. Morgan's facility. They will perform same-day polypectomies, so patients are able to have polyps removed without having to undergo a second bowel prep. In addition, the gastroenterologists refer patients with failed colonoscopies for immediate virtual colonoscopies. This relationship between specialties helps minimize patient discomfort and inconvenience while helping to maximize productivity and efficiency in screening.

A Few Thoughts About Data Interpretation

Dr. Morgan believes that specialized training is necessary before incorporating virtual colonoscopy into any practice. He agrees with many of his colleagues that an experienced reader, one having viewed at least 100-150 exams, helps ensure test accuracy. Before beginning his virtual colonoscopy practice, Dr. Morgan attended a CME-accredited course that included a hands-on workshop featuring the innerviewGI™ colon module in the Vitrea®2 workstation. This equipment features interactive 2D, multiplanar, transparent wall, 3D endoluminal "fly-through", and combined 2D and 3D displays. After successfully completing the course, Dr. Morgan felt comfortable enough with these systems to have several installed in his facility. It currently takes him 15 minutes, on average, to read a typical case.

A Case Study Example

Patient History: A health-conscious, 59-year-old female came in for colon cancer screening. Though she understood the importance of screening for people her age, she was somewhat intimidated by the prospect of a traditional colonoscopy and was not sure if she would have sought optical screening if the virtual exam wasn't available.

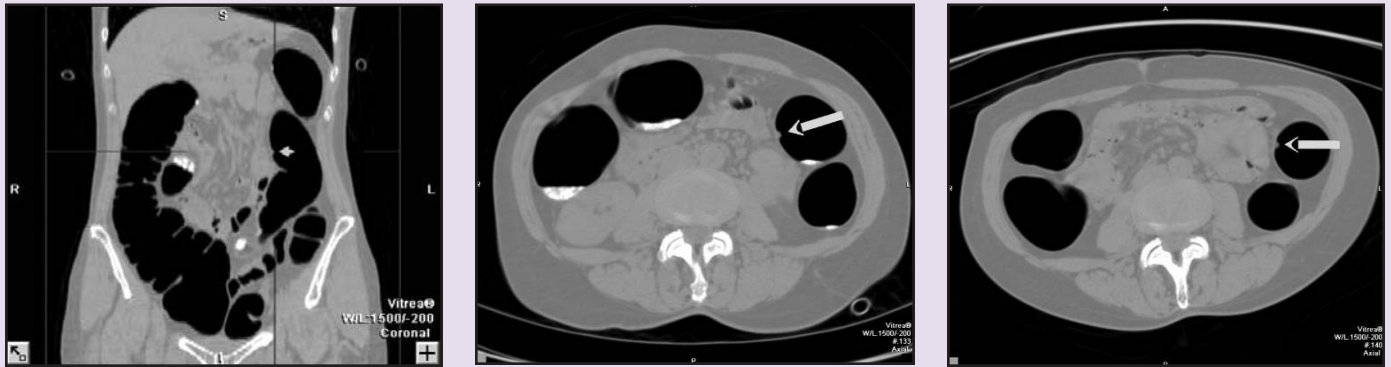


Figure 1. These images show a roughly 6-7 mm polyp on the ascending loop of the splenic flexure which proved to be adenomatous with no dysplasia. Tagged residual stool and fluid are clearly visible, as is the uniform distention of the colon.

Results: By virtue of this exam a single, benign polyp (Figure 1) was discovered and removed on the same day. There were no extracolonic findings and the patient is doing well and is happy she had the exam. Dr. Morgan plans to rescan her in five years.

Commenting on the overall quality of the images, Dr. Morgan stated that there was “uniform tagging of stool” and “no question that this density was a polyp rather than adherent stool.” He also pointed out that the degree of insufflation was “excellent” in both prone and supine positions.

Conclusion

Dr. Morgan is quite satisfied with the virtual colonoscopy product set available from E-Z-EM. In his facility's experience, the combination of the pre-procedure meal plan and milder laxative helps produce a clean, dry colon for scanning while improving patient satisfaction and compliance. He believes that fecal tagging helps reduce the number of unnecessary follow-up exams and helps improve his overall diagnostic accuracy. He is pleased with the quality and consistency of colonic distention achieved using the automated CO₂ insufflator.

E-Z-EM, INC. Global Headquarters

1111 Marcus Avenue, Suite LL26
Lake Success, NY 11042 USA
PHONE: 516-333-8230
TOLL FREE: 1-800-544-4624 (US only)
FAX: 516-302-2919
www.ezem.com

E-Z-EM Ltd. International Office

Avonbury Business Park
Howes Lane, Bicester
OX26 2UA, United Kingdom
Orderline: 0800 18 17 33 (UK only)
Phone: +44 (0) 1869 366900
Fax: +44 (0) 1869 366999
Email: information@ezem.co.uk