More Polyps Are Seen on Screening Colonoscopy With Water Infusion in Lieu of Air Insufflation (Water Method) Compared With Usual Air Insufflation

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Abstract

This paper is a retrospective, uni-institutional analysis that compares the polyp detection rate of water infusion versus conventional air insufflation colonoscopy. The queried database consisted of two groups based on the method of endoscopy used. There were 683 patients in the air group (1/2000-6/2006) and 495 in the water group (6/2006-6/2009). There were significantly more patients with at least one polyp in the water group compared to the air group. Similarly, there were more >9mm polyps. Overall adenoma detection rate was significantly higher in the water group. Water colonoscopy improves bowel preparation, which may contribute to higher polyp/adenoma detection.

Narrative

An effective colonoscopy should have a high cecal intubation rate to detect the presence of colonic polyps. Different methods may increase the adenoma detection rate (ADR) of screening and surveillance colonoscopy. These include tandem examination,[1] narrow band imaging,[2] high definition white light endoscopy,[3] and chromoendoscopy.[4]

Current literature suggests that colonoscopy is effective in preventing left-sided colon cancer but does not offer significant benefits in protection against right-sided colon cancer.[5] Presumptive biological differences of the different portions of the colon may explain this failure. Currently, missed lesions account for 4% of missed cases.[6]

This paper describes warm water infusion in lieu of air insufflation for screening/surveillance colonoscopy and compares the polyp detection rate of water infusion to that of conventional air insufflation.

With conventional colonoscopy, insufflated air distends the colon to facilitate insertion. Water at room temperature irrigates and removes adherent and residual stool in the lumen to improve visualization. With the water method, the air button is turned off at insertion, warm water (37^{o}C) is infused using a blunt needle adaptor inserted into the biopsy channel and an irrigation pump to distend the colon and facilitate scope insertion until the cecum is reached.[7] When air pockets or dirty water are encountered, suction is performed before more clean water is infused to facilitate scope advancement. For both air and water techniques, residual water and stool are suctioned on scope withdrawal, air is insufflated to distend the colon for proper examination and removal of lesions or biopsies. In contrast to air insufflation, water infusion only distends the colon locally and the infused water tends to pool with gravity and, therefore, does not lengthen the entire colon. Gentle finger pal-

pation of the right lower quadrant may be seen as a gentle bulge of the water-filled colon and can confirm cecal intubation. With adequate distension of the cecum, the appendix opening can be seen under water, which is subsequently confirmed by air insufflation and suctioning of the residual fluid. On withdrawal, all of the residual water is suctioned to facilitate examination of the mucosa. Even for poor bowel preparation, repeat exchange of dirty water with clean water improves visualization. The amount of water used varies between 200 ml for excellent bowel prep to two liters for patients with poor bowel prep. Indeed, water infusion method is the only technique that is directly controlled by the colonoscopist, which can improve bowel preparation, which may improve outcomes.

One of the goals of screening/surveillance colonoscopy is the detection and removal of precancerous lesions in the colon. The US Multi-Society Task Force on colorectal cancer screening recommended a minimum ADR of 25% in male patients and 15% in female patients[8].

Several controlled randomized trials (RCT) evaluate the water technique in colonoscopy. In patients undergoing screening/surveillance colonoscopy with minimal sedation, the authors showed that the water method has a high cecal intubation rate and is associated with better patient tolerance and lower medication requirement.[9] When offered sedation on-demand, significantly more patients completed the colonoscopy without sedation using the water method.[10]

One abstract suggests an increased polyp detection rate with deep sedation compared to routine conscious sedation, presumptively owing to improved patient comfort and, therefore, a more thorough exam.[11] Historically, most reports based on database analysis focus on polyp detection rather than adenoma detection because the final pathology reports are not incorporated into endoscopic databases.

The authors retrospectively reviewed uni-institutional data collected over ten years from a single endoscopist to determine if water colonoscopy improves polyp/adenoma detection compared with air colonoscopy in screening/surveillance patients. The results of colonoscopy were entered onto a database (GI Trac, Akron Systems). Conventional air insufflation colonoscopy was used for screening colonoscopy between January 2000 to June 2006, and the water method was used from June 2006 to June 2009. The information extracted included the total number, the size, and the location – proximal included the cecum to the transverse colon and distal the splenic flexure to the rectum. Pathology data were retrieved from another VA database (Computerized Patient Record System or CPRS).

A total of 1189 patients underwent screening/surveillance colonoscopy during this period; 11 patients with incomplete pathology data were excluded from the analysis. In the remaining 1178 patients, 683 patients had air colonoscopy and 495 patients had water colonoscopy. There were no significant differences between the age, gender, and the Body Mass Index (BMI) of the patients between the two groups. There was a significant difference in the percentage of patients found to have at least one polyp (45.1% for air and 62.4% for the water group, $p<0.0001$). In addition, there was also a significant difference in the number of polyps >9 mm (8.6% vs. 17.2 % respectively). In a subsequent analysis, pathology of the removed polyps was compared. There were 183 patients (26.8%) in the air group and the 173 patients (34.9%) in the water group with proven adenomas. The difference was significant, $p<0.0031$.

The limitations of this study are the retrospective nature and being a non-randomized study. Other confounding factors, such as change to better endoscopic equipment over the past years and an improvement in the bowel preparation, could have influenced the polyp/adenoma detection rate. A number of factors may have contributed to missed lesions at the time of colonoscopy secondary to poor visualization, such as incomplete clearance of stool, colon spasm limiting colonic distension, difficult polyp location, etc.

In conclusion, the water method may improve polyp detection in screening colonoscopy. In patients with good bowel preparation the magnification through water in a less distended colon aids in identifying small polyps. Decreased distension shortens the colon and facilitates cecal intubation. RCTs have shown that the water method is associated with less abdominal pain and discomfort during examination, which minimizes sedation requirements. In patients with poor bowel preparation, irrigation and suction remove residual stool, improving polyp detection.

Appendix

The following commentary was provided by Dr. Surinder K. Mann during a live demonstration of water colonoscopy at the Colorectal Cancer Symposium.

A discussion of the option about availability of unsedated water infusion colonoscopy was carried out in a pre-colonoscopy setting. When the patient arrived today, time out procedures confirmed the patient's identity using a wrist band with name, date of birth, and social security number. Before colonoscope insertion, the air was turned to the off position. The colonoscope tip was inserted into the rectum, and water was infused into the rectum. The lumen was found, and the scope was advanced in a spiral fashion. The colon preparation was poor in this patient; clean water was exchanged for dirty water, and residual air was suctioned at the rectosigmoid junction and descending colon. Diverticula were more clearly seen with water infusion as a diverticulum is filled and dilated with water. At the splenic flexure, a soft loop was formed and advanced into the transverse colon. Air was encountered in the proximal transverse colon and mid-ascending colon, which must be suctioned and replaced with water. On average the left colon will be infused with 300 cc to 500 cc of water. Reaching the cecum usually requires roughly 1000 cc of water. For redundant colon, the application of transabdominal pressure or repositioning the patient may aid scope advancement. At the cecum, the appendix will be visualized with good preparation. Right lower quadrant finger pressure protrudes into the colon and indicates cecal proximity. In this patient, the colon preparation was poor, but

cecal intubation was achieved using right lower quadrant finger pressure as an aid. Subsequently, the air was engaged and the dirty water was removed. Visualization of the appendix reconfirmed cecal intubation, which required roughly 1500 cc of water in this case. The scope was withdrawn while residual water was suctioned. Colonic insufflations revealed good preparation – the direct result of this unsedated water infusion colonoscopy, which changed a poor colon preparation into a good one.

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