

ADVANCES IN ENDOSCOPY

Current Developments in Diagnostic and Therapeutic Endoscopy

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Insights Into Water Exchange Colonoscopy



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G&H What are the benefits of using water to assist colonoscopy rather than air?

FL Air insufflation, which is traditionally used in colonoscopy, is a well-known procedure. Clinicians also know the difficulty that air insufflation presents because it elongates the colon, which makes reaching the cecum more difficult and creates associated pain. Various techniques have been suggested over the years to ameliorate this problem. They have included withdrawing the endoscope to eliminate a loop in the colonoscope and having an assistant press on the abdomen to prevent the loop from forming. Sedation then came into use. More recently, emphasis has been placed on propofol because it can speed up the procedure; however, its use may require an anesthesiologist, which makes the procedure more costly.

The main benefit of using a water-aided method (water immersion or water exchange) is that it significantly lessens the incidence of colon lengthening and avoids looping. Colonoscopy is rendered easier to perform, the patient is less uncomfortable, and cecal intubation can be achieved at a much higher rate.

The water exchange method, but not the water immersion method, also results in a much cleaner colon compared with the air insufflation method. More polyps can be visualized, and studies show that the water exchange method in particular is associated with the least amount of pain and the highest proportion of polyps/adenomas identified.

G&H What differentiates water exchange colonoscopy from water immersion colonoscopy?

FL They are very similar. Water immersion came first and was initially described in the English literature in 1984. Its use was originally limited to colonoscopy in patients with sigmoid diverticulosis. Several years later, it became a reasonable option for unsedated colonoscopy in a practice that was not equipped to perform procedures using sedation.

Water immersion colonoscopy evolved into water exchange colonoscopy when it became apparent that water needed to be removed to, in turn, remove debris, particularly in patients whose colons were not well cleansed by bowel preparation. Excessive solid debris, however, can block the suction channel, and air insufflation is needed to bypass the debris. It was also found that removing water aided in colonoscopic navigation and helped reduce distention and patient discomfort. Pooled study data suggest that the detection rate of water exchange is significantly higher than that of water immersion and air insufflation.

Use of water exchange colonoscopy at the Veterans Administration in Sepulveda has resulted in improving successful cecal intubation from 80% to more than 95%. The frequency of inadequate bowel preparation was reduced from 12% to 2%, insertion pain was significantly reduced, and the adenoma detection rate (ADR) increased from 23% to 36%. These results led to randomized controlled trials (RCTs) to compare air insufflation, water immersion, and water exchange in collaboration with international colleagues.

G&H What has research found regarding adenoma detection with water exchange vs other options?

FL Three RCTs in 2017 evaluated the impact of water exchange on overall ADR after patients received a split-dose preparation. In the first study, water exchange was associated with a significantly higher overall ADR (18% vs 13% with air insufflation; $P < .001$). The second study found an ADR of 50% for water exchange, 38% for air insufflation, and 41% for water immersion. In the third RCT, water exchange achieved a significantly higher ADR compared with air insufflation in the whole colon (49% vs 40%; $P = .03$) and the right colon (24% vs 17%; $P = .04$).

The studies clearly demonstrate that water exchange is the best procedure in terms of adenoma detection. Another technique is performing a repeat colonoscopy with attention to the right colon. Studies have shown that water exchange reduces the adenoma miss rate. The reason may be because water exchange improves bowel cleanliness.

Network meta-analyses comparing different methods used to improve ADR—including use of a cap and Endocuff endoscopic attachments—found that water exchange had the highest odds ratio and the highest P score for adenoma, advanced adenoma, and sessile serrated adenoma/polyp detection rates.

G&H Which patients may benefit most from water exchange colonoscopy?

FL Patients who cannot easily obtain transportation to a hospital or other facility that provides colonoscopy under sedation or who do not have a companion who can assist them on the day of the procedure benefit most. Having sedation on demand is a good way to introduce nonsedated colonoscopy. This means that the patient can have nonsedated colonoscopy with the option of receiving sedation during the procedure should he or she become uncomfortable. Such an option, however, may still require the presence of a registered nurse during the procedure.

Also benefiting from water exchange colonoscopy are patients who are simply aware of the advantages and lower cost of this procedure without sedation. These patients may be busy professionals who do not want to endure up to 17 hours of a postoperative recuperation period following colonoscopy under sedation. Rather, a patient undergoing nonsedated water exchange colonoscopy can undergo the procedure in the morning and return to work or other usual activities in the afternoon.

Other patients who benefit from water exchange colonoscopy are veterans and patients with posttraumatic stress syndrome. Sedative medication can elicit very unpleasant flashbacks in such patients, which can be avoided with appropriate types of nonsedated procedures.

Chronic users of alcohol and narcotic pain medications can have paradoxical agitation when given conscious sedation, so these patients can benefit from nonsedated colonoscopy in the form of water exchange colonoscopy as well.

G&H Are there any special safety or patient selection concerns associated with water exchange colonoscopy?

FL The procedure is very safe, although water exchange still may not be suitable for patients who have contraindications to colonoscopy. Although perforation is a potential complication of polypectomy, this is independent of the use of the water exchange method. Water intoxication was a concern, but blood chemistry findings have shown no significant changes.

G&H What resources are available for clinicians regarding water exchange colonoscopy?

FL There are a number of YouTube-based tutorials contributed by experts in the field worldwide. The American Society for Gastrointestinal Endoscopy also provides videos that describe and explain the water exchange method. These can be accessed at [https://www.videogic.org/article/S2468-4481\(18\)30042-0/fulltext](https://www.videogic.org/article/S2468-4481(18)30042-0/fulltext) and [https://www.videogic.org/article/S2468-4481\(19\)30083-9/fulltext](https://www.videogic.org/article/S2468-4481(19)30083-9/fulltext).

G&H What innovations and applications are emerging in this area?

FL Artificial intelligence (AI) is an important innovation in gastrointestinal medicine and is beginning to be used in colonoscopy. AI can make up for limitations of the endoscopist in terms of accuracy and thoroughness of colonoscopy findings. AI can also result in false-positives and cause distractions owing to the presence of air bubbles and fecal residue. These flaws can be ameliorated in the setting of water exchange colonoscopy because the water exchange method can remove residual bubbles and fecal matter. The strength of AI to look for polyps combined with the strength of the water exchange method can compensate for the weakness of each in promoting polyp detection. This has been confirmed by video data from an RCT. Greater polyp detection and significantly fewer false-positives were seen in instances in which AI was used with water exchange colonoscopy. Prospective real-time studies are planned. Studies are now underway on the value of combining a cap and water exchange to see whether pain can be further reduced and whether ADR can be further improved.

G&H How has the COVID-19 pandemic impacted timely access to colonoscopies?

FL The number of colonoscopies performed has decreased owing to patient concerns about COVID-19 exposure during visits to health care facilities and nursing staff shortages because of sick leave, quarantine, and coverage redistribution. This has created a colonoscopy backlog that will outlast the pandemic and lead to an increase in colorectal cancer incidence. Thus, there is a need for rapid, safe resumption of endoscopy services. Although guidelines that support the resumption of endoscopic procedures address ways to ensure safety and minimize patient hesitation, they do not address specific colonoscopy techniques that can minimize the need for shrinking resources such as nursing staff. This issue can be addressed as follows. Water exchange combined with on-demand sedation for colonoscopy can reduce nursing staff utilization (reduced recovery time when patients complete the examination without sedation) in the context of the nursing shortage during the COVID-19 pandemic and the postpandemic recovery.

I would also like to note that, in the wake of the COVID-19 pandemic, I plan to develop tele-instruction resources on water exchange colonoscopy. I encourage readers to email me at felix.leung@va.gov if they are interested in helping to develop such resources.

Disclosures

Dr Leung has no relevant conflicts of interest to disclose.

Suggested Reading

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