

CO₂ Insufflation or Warm Water Infusion for Unsedated Colonoscopy: A Randomized Controlled Trial in Patients with Chronic Constipation in China

The use of sedation in colonoscopy (either conscious or deep) has been a conventional practice over time. Although sedation reduces patient discomfort during the procedure, it is not without its own risks, and it increases the cost of the procedure. It can also increase procedure time, preprocedure preparation, and time spent in recovery. Patients having sedation require an escort and may have to restrict their usual activities postprocedure (eg, time off from work, no driving). Given all these factors, there is a clear role for unsedated colonoscopy.

Discomfort during colonoscopy is caused by stretch of the mucosal wall when distended with air. Colonoscopy in patients with chronic constipation has been associated with prolonged insertion time.^[1] In some instances, this may increase discomfort. Carbon dioxide (CO₂) insufflation has been shown to reduce the need for sedation and postprocedural discomfort.^[2] It is readily absorbed after insufflation thereby causing less abdominal distension. The use of water infusion during colonoscopy has also been developed as a technique to reduce patient discomfort and shorten cecal intubation times.^[3-6] Water acts as a lubricant between the scope and bowel mucosa allowing easier passage of the scope. Typically, a large amount of water is infused through the colon during insertion and suctioned during withdrawal (water immersion technique) or constantly exchanged during insertion (water exchange technique).

There have been a few randomized controlled trials comparing CO₂ insufflation and water-assisted colonoscopy with standard air insufflation for unsedated colonoscopy. A single center randomized controlled trial of these three techniques in 341 patients by Amato *et al.*, in 2013, showed a reduction in pain scores in the CO₂ and warm water infusion groups.^[7] Garborg *et al.* demonstrated in a randomized controlled trial comparing CO₂ insufflation with water exchange colonoscopy that there was no significant reduction in moderate or severe pain between the groups.^[8] Cecal intubation and adenoma detection rates were similar in both techniques.

In this edition of the Journal, Xu *et al.* have published a randomized controlled trial comparing the effects on pain of CO₂ insufflation and warm water irrigation with air insufflation in patients with chronic constipation in a

single center in China.^[9] The authors have observed that due to medical insurance payment practices in China, most patients opt for unsedated colonoscopy to minimize costs. Two hundred and eighty-seven patients undergoing unsedated colonoscopy were randomized to CO₂ insufflation, warm water irrigation, and air insufflation groups in equal ratios. In this study, warm water infusion was done with the simultaneous infusion of 37°C water and suction of residual feces.

The primary endpoint was the average real-time maximum insertion pain score, recorded on a 10-point visual analogue scale (VAS) by an unblinded nurse. VAS scores ranged from 0 (no pain), 1–2 (only discomfort) to 10 (severe pain). Secondary outcomes were postprocedure pain (maximum pain score postprocedure recalled by patient and recorded by a nurse blinded to the groups), cecal intubation and withdrawal time as well as total procedure time.

The authors demonstrated a significantly lower real-time maximum insertion pain score in the CO₂- (2.9 ± 2.1) and water-treated groups (2.7 ± 1.9) compared with air-treated group (5.7 ± 2.5). However, there was no significant difference ($P = 0.535$) between the CO₂ and water groups alone. Postprocedure pain scores at discharge again were significantly lower in the CO₂- (3.2 ± 2.4) and water-treated (2.7 ± 2.1) groups when compared with air-treated group (5.9 ± 2.7). The study also showed a significant correlation between real-time and recalled maximum pain scores that may reflect a minimization of recall bias.

Cecal intubation times were shorter in the CO₂-treated and water-treated groups (compared with air-treated group); however, there was no significant difference between both of those groups. The average total procedure time in minutes was shorter in the CO₂ (15.1 ± 1.8) and water (14.9 ± 1.7) groups compared with air (18.2 ± 3.1).

One of the strengths in this study is that pain was assessed both during and postprocedure, thereby lending validation to the reported pain scores. The cohort studied was also fairly distributed in terms of gender and no significant differences were identified in other baseline characteristics (age, and body mass index).

It was interesting to note, however, that although the percentage of patients reporting a “painless: Pain score 0” and “only discomfort: Pain score 1–2” colonoscopy was still just 47.9% with CO₂ and 48.4% with water, only one patient in the CO₂ group requested sedation. Approximately 85% of the patients in the air group reported pain scores over 2, yet again only two requested sedation. The authors allude to the financial burden of sedated colonoscopy and we suspect this may influence the patient’s opinion of pain/discomfort during the procedure.

A limitation of the study is that no patients were blinded and nurse assessors were only blinded in the postprocedure phase. This may have skewed VAS reporting during the colonoscopy. This trial was done in patients with chronic constipation but we would argue that constipation itself is not a good indication for colonoscopy, as reflected in the low yield of adenoma and no cases of colorectal cancer in the study. Finally, we note that the overall difference in procedure time between the CO₂ + water and air groups is only approximately 3 min, which in real terms may not be clinically significant particularly if a quicker, more painless colonoscopy may be achieved by using sedation.

Unsedated colonoscopy does have a role but as yet there is not enough robust evidence to advocate a switch away from sedation. Nevertheless, this study adds to a growing body of evidence favoring alternative insufflation modalities (water/CO₂) to reduce discomfort during colonoscopy. As endoscopists, we accept that patients may choose to have sedated or unsedated colonoscopies and must be able to adapt to utilizing evidence-based techniques that minimize discomfort, while ensuring that quality indicators of colonoscopy (e.g., adenoma detection rate, cecal intubation rate) continue to be met.

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