

**Title:**

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DOI: 10.17235/reed.2025.11039/2024

Link: [PubMed \(Epub ahead of print\)](#)

Please cite this article as:

Pérez-Valenzuela Javier, Uribe Javier, Espino Alberto, Donoso Andrés, Latorre Gonzalo. Water or saline? Exploring mucus production and polyp detection in watter-assisted colonoscopy. Rev Esp Enferm Dig 2025. doi: 10.17235/reed.2025.11039/2024.

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## Water or saline? Exploring mucus production and polyp detection in water-assisted colonoscopy

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Abstract:

In recent years there has been a growing body of evidence on water-assisted colonoscopy (WAC). Water exchange (WE) colonoscopy, one of the WAC techniques, has demonstrated higher intubation rate, higher adenoma detection rate (ADR), and reduced patient discomfort compared to gas insufflation colonoscopy. In our clinical practice, we have observed increased mucus production in the rectosigmoid segments during withdrawal when WAC techniques are used with water infusion compared to saline infusion. This white, opaque mucus often requires further mucosal lavage and removal, which can be time-consuming and could decrease polyp detection rates. Since low ADR is correlated with the risk of interval colorectal cancer (CRC), further attempts to improve ADR are needed. Two recent studies have explored this phenomenon. In 2020 Rahyel et al. reported higher mucus production with room-temperature water compared to saline

infusion during colonoscopy insertion. In 2023 Cheng et al. randomized patients to colonoscopy with CO<sub>2</sub> insufflation or WE colonoscopy with warm water, 25% saline or 50% saline. Mucus production was highest in the water group, followed by the 25% saline, 50% saline, and CO<sub>2</sub> groups.

Keywords: Colonoscopy. Mucus. Polyps. Early detection of cancer.

Dear Editor,

In recent years there has been a growing body of evidence on water-assisted colonoscopy (WAC). Water exchange (WE) colonoscopy, one of the WAC techniques, has demonstrated higher intubation rate, higher adenoma detection rate (ADR), and reduced patient discomfort compared to gas insufflation colonoscopy (1). In our clinical practice, we have observed increased mucus production in the rectosigmoid segments during withdrawal when WAC techniques are used with water infusion compared to saline infusion (Figure 1). This white, opaque mucus often requires further mucosal lavage and removal, which can be time-consuming and could decrease polyp detection rates. Since low ADR is correlated with the risk of interval colorectal cancer (CRC), further attempts to improve ADR are needed.

Two recent studies have explored this phenomenon. In 2020 *Rahyel et al.* reported higher mucus production with room-temperature water compared to saline infusion during colonoscopy insertion (2). In 2023 *Cheng et al.* randomized patients to colonoscopy with CO<sub>2</sub> insufflation or WE colonoscopy with warm water, 25% saline or 50% saline (3). Mucus production was evaluated with the Left Colon Mucus Scale (LCMS) score, with the highest scores observed in the water group, followed by the 25% saline, 50% saline, and CO<sub>2</sub> groups.

The intestinal mucus barrier is the first line of defense for the intestinal epithelium, with Mucin2 as its primary component, which is synthesized and secreted by goblet cells. Under normal conditions, mucin2 is slowly secreted, followed by hydration and depolymerization to form a dense gel structure. Stimuli such as acetylcholine, histamine, prostaglandine, or ischemia-reperfusion stimulation can trigger rapid and increased mucin2 secretion (4). The mechanism by which water infusion induces rectosigmoid mucus secretion remains unclear. One possible explanation is the activation by mechanical stimulus of the Piezo 1 mechanoreceptor present in colonic goblet cells, which induces mucus production through increased mucin2 secretion (4). Saline infusion might modulate Piezo 1 activation due to difference in osmolality and changes in the cell volume. Additionally, hypertonic saline is capable of disrupting ionic bonds within the mucus gel, which reduces mucus viscosity (5), making it easily washable. Future research is needed to validate these hypotheses.

The results of these studies suggest that using saline infusion in WAC techniques may enhance its performance and potentially improve polyp detection. Future studies should focus on ADR impact using saline infusion during WE colonoscopy.

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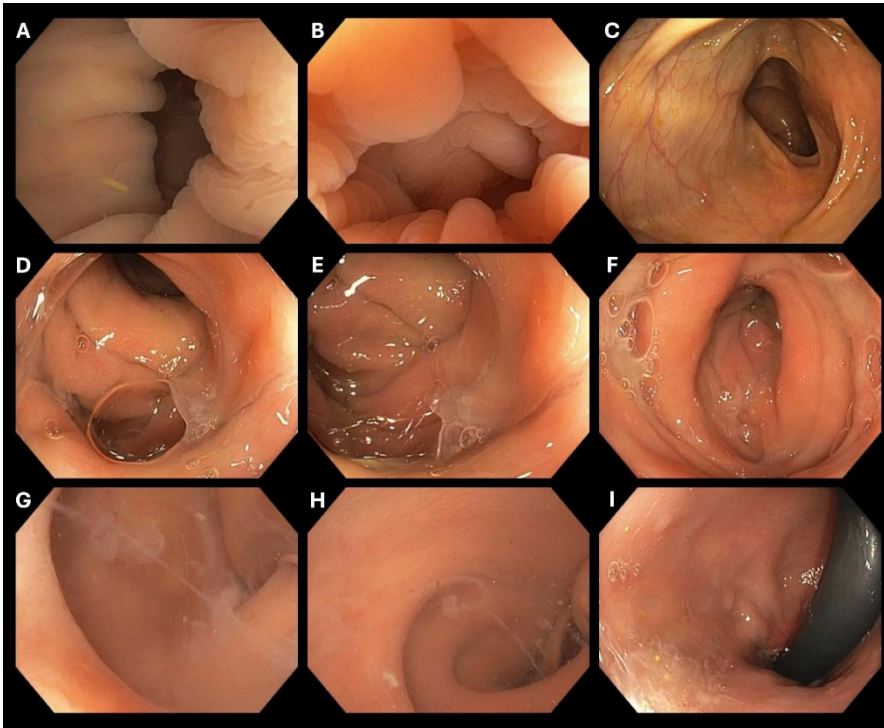


Figure 1. A-B: colonoscopy using water exchange technique with water infusion. C: right sided colonoscopy withdrawal. D-I: Colonoscopy withdrawal in rectosigmoid segments. White, opaque mucus is adhered to mucosal surface.