Pre-Gastroscopic Postural Intervention Combined with Mucosal Cleansing Agents: A Narrative Review

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Abstract: Gastroscopy remains the cornerstone for the diagnosis and therapeutic management of upper-gastrointestinal disorders and constitutes the principal modality for detecting gastric cancer and its premalignant lesions. Early detection is pivotal to improving survival. Intragastric foam and mucus consistently impair endoscopic visualisation, constituting a primary source of missed or delayed diagnosis of early gastric cancer and other mucosal lesions and thereby reducing the detection rate of clinically significant pathology. Residual bubbles and viscous secretions adhering to the gastric surface are the principal optical barriers encountered during routine gastroscopy. Adequate mucosal preparation that effectively eliminates these contaminants is therefore essential for maximising lesion detection. The combined administration of dimethicone powder and Pronase Granules has been shown to exert potent defoaming and mucolytic activity and is explicitly recommended in recent Chinese guidelines for digestive endoscopy as the preferred pre-procedural regimen for optimising gastric surface cleanliness. An unobstructed endoscopic view is therefore mandatory, particularly for the recognition of early gastric cancer. Accumulating evidence indicates that the combined administration of dimethicone powder and Pronase Granules, augmented by sequential postural manoeuvres, is emerging as a standard pre-treatment protocol for optimising gastric mucosal cleanliness. Systematic postural manoeuvres enable the dimethicone–pronase mixture to coat the entire gastric cavity uniformly, thereby enhancing mucosal cleanliness, shortening procedure time, and increasing the detection rate of early gastric cancer.

Keywords: Gastroscopy; Dimethicone; Pronase Granules; Postural Intervention

1. Introduction

China continues to have one of the highest gastric cancer incidence rates worldwide. According to the latest national cancer registry, 358,700 new cases and 260,400 deaths were attributed to gastric cancer in 2022, making it one of the top five causes of cancer-related mortality [1]. Early detection, diagnosis, and treatment are the most effective strategies for reducing the disease burden [2]. Gastroscopy allows direct, high-resolution inspection of the esophageal, gastric, and duodenal mucosa and permits targeted biopsy; it is therefore regarded internationally as the gold-standard screening modality for early gastric cancer. Recent Chinese guidelines on upper gastrointestinal malignancies emphasize that thorough pre-procedural preparation—including oral antifoaming and mucolytic agents—is essential to maximize the detection rate of early neoplastic lesions [3,4]. Nevertheless, a substantial proportion of patients still exhibit suboptimal mucosal cleanliness after standard pharmacological preparation. Consequently, adjunctive postural interventions have been introduced to enhance gastric cleansing by redistributing cleansing agents under gravity, thereby improving mucosal visualization and the identification of small lesions [5]. This review summarizes contemporary evidence on the combination of sequential body positioning and the administration of dimethicone and Pronase Granules to optimize gastric surface cleanliness before gastroscopy.

2. Pharmacology of Gastric Mucosal Cleansing Agents

Standard anti-foaming agents used before gastroscopy include dimethicone powder, simethicone suspension, dyclonine hydrochloride mucilage, and lidocaine

hydrochloride mucilage. Mucolytics routinely include pronase granules and N-acetylcysteine; chymotrypsin is occasionally used in certain regions but is not a standard mucolytic agent.

2.1 Dimethicone

Dimethicone reduces surface tension at the air–mucus interface, facilitating bubble rupture. Commercially available formulations include a powder and an oil-in-water emulsion [6]. Both are reconstituted in 30–50 mL of water and taken immediately before endoscopy. In a randomised study, premedication with the powder significantly improved the gastric mucosal visibility score (Likert scale) compared with placebo [7]. However, residual flocculent material may accumulate in the gastric fluid pool, obscuring the fundus [8]. Emulsion formulations exhibit superior dispersibility; a 6-mL dose administered immediately before sedated gastroscopy markedly reduced foam without inducing fluid turbidity [9]. Dimethicone also enhances visualization of the duodenal bulb and second portion [10].

2.2 Pronase Granules

Pronase is a highly purified proteolytic enzyme that cleaves mucin glycoproteins, thereby liquefying viscous gastric secretions. Its optimal activity occurs at 20–40 °C and pH 6–8; therefore, a dose of 20,000 units is dissolved with 1 g of sodium bicarbonate to raise the intragastric pH into the optimal range. This regimen is endorsed in the guidelines of the Japan Gastroenterological Endoscopy Society [11]. Liu et al. [12] conducted a meta-analysis on the mucolytic efficacy of pronase, which incorporated 31 randomized controlled trials (RCTs). Their findings indicated that administration of pronase improved endoscopic visualization and enhanced the detection rate of subtle lesions, while also shortening endoscopy duration. No significant difference in adverse events was observed between the pronase and control groups. Similarly, Burke et al. [13] reported in their meta-analysis that pre-endoscopic administration of pronase significantly improved gastric mucosal visibility, with no adverse events documented. Stability studies indicate that the pronase–simethicone–bicarbonate mixture should be administered within 1 hour of reconstitution; beyond 2 hours, enzymatic activity declines and cleansing efficacy deteriorates [14].

3. Postural Intervention—Rationale and Mechanism

The stomach is a collapsible, J-shaped muscular reservoir with an irregular inner surface. In the conventional left lateral starting position, gravity causes the ingested dimethicone–pronase mixture to pool in the most dependent portion of the gastric body, forming a fluid collection that preferentially bathes the lower body and antrum. Conversely, the fundal dome, anterior wall, greater curvature, and gastric angle remain “high-lying” and are frequently under-exposed. These very areas are common reservoirs of viscous mucus and persistent foam, forming anatomical “blind spots” that impair mucosal inspection [15,16].

Postural maneuvers harness gravitational force to sequentially redistribute the solution across all gastric surfaces. By repositioning the patient through a series of standardized positions—left lateral, prone, right lateral, and supine—previously non-dependent segments become dependent and are bathed by the dimethicone–pronase mixture. This active redistribution maximizes mucosal contact time, promotes mechanical lavage, and optimizes both defoaming and mucolytic efficacy.

3.1 Positional Sequence and Clinical Benefits (Table 1)

The postural rotation protocol systematically repositions the patient to harness gravity for targeted delivery of the mucolytic–defoaming solution to all gastric regions in a predetermined sequence. Each position is maintained long enough to allow the dimethicone–pronase mixture to bathe a specific anatomical segment, ensuring sequential and comprehensive cleansing. The following sections detail the mechanisms and clinical benefits associated with each position.

3.1.1 Left lateral (initial immersion phase)

The dimethicone–pronase mixture is ingested while the patient is in the left lateral position. In this orientation, the solution initially distributes along the greater curvature and mid-to-distal gastric body, facilitating early dispersion of pronase to degrade viscous mucus and dimethicone to eliminate foam. Although the fundus remains relatively high-lying, this position serves as the starting point for subsequent

gravitational redistribution.

3.1.2 Prone (anterior wall & gastric angle phase)

A prone positioning (90° forward rotation) shifts the fluid anteriorly. The gastric angle—an predilection site for early carcinoma—is now fully submerged and cleansed.

3.1.3 Right-lateral (antral & posterior wall phase)

Final rotation directs the fluid into the antrum, pylorus and posterior wall, ensuring complete distal gastric preparation and optimal visualisation of bile reflux or peri-pyloric pathology.

Table 1. Postural Change Protocols and Outcomes

Study	Year	Take the medication before the examination.	Adopt a posture	Primary outcomes
Zhong Xiaoqin[17]	2020	Dimethicone powder	Alternating between left and right lateral positions	Improve field of view clarity
Liu Xiaoling[18]	2017	Dimethicone powder	Alternating between left and right lateral positions	Improve field of view clarity
Yu Xiaofan[5]	2023	streptoproteinase, dimethicone powder, dactron gel	Prone, Right lateral, Supine, Left lateral	improve visual acuity, shorten the examination time,
Shi Xueping[19]	2018	streptoproteinase, dimethicone powder	Right lateral position, supine, left lateral position	Improve field of view clarity and shorten the time for fine inspection
Cai Lihua[20]	2022	streptoproteinase, lanolin, sodium bicarbonate	Left lateral, supine, right lateral, prone	improve visual acuity, shorten the examination time, and improve patient satisfaction
Li Huamin[21]	2018	streptoproteinase, lanolin, sodium bicarbonate	Left lateral position, supine position, right lateral position,	improve visual acuity, shorten the examination time,

3.2 Posture Exercise Program and Its Effects (Table 2)

Compared with static positional maneuvers, the dynamic postural exercise protocol represents a more active intervention. Through a series of standardized, rhythmic movements, it generates multidirectional shear forces and turbulence of the dimethicone–pronase mixture within the gastric lumen. By combining physical motion with gravity, this approach increases mucosal contact area and is particularly beneficial for patients who cannot tolerate prolonged recumbency or who require enhanced gastric cleanliness beyond conventional positional rotation. Below, we describe the individual components of the most commonly used exercises and their targeted gastric regions.

Table 2. Posture Exercises and Outcome Measures

Study	Year	Take the medication before the examination.	Adopt a positional approach	Primary outcomes
Zhang Lina[22]	2023	Silicone oil and streptoproteinase in La Liga	Bowing, stretching, side-stepping, and twisting	improving visual acuity, shortening the examination time and improving the anxiety of patients
Chen Guangyi[23]	2022	Streptoproteinase, Saponin Oil Powder	Bowing, stretching, side-stepping, and twisting	Improve the visual clarity, shorten the examination time and improve the efficiency of gastroscopy
Golden Wave[16]	2019	streptopeptidase, sodium bicarbonate	Bend forward, raise and extend arms, side bends, and waist rotation	improving visual acuity, reducing the amount of irrigation, shortening the examination time, improving the detection rate of microlesions

3.2.1 Forward bending

With hands at the sides, the patient bends forward over a 4-second count, propelling the solution toward the cardia and proximal gastric body.

3.2.2 Backward extension

The patient raises both arms overhead and gently arches the trunk backward for 4 seconds, promoting fluid redistribution along the fundus and greater curvature through diaphragmatic displacement.

3.2.3 Lateral trunk flexion

With arms relaxed, the patient performs left and right lateral bending for 4 seconds each, enhancing fluid agitation and improving contact with the lesser curvature and gastric angle.

3.2.4 Torso rotation

With arms hanging loosely, the patient performs four slow, full circular rotations of the torso, facilitating homogeneous distribution of the solution throughout the gastric lumen prior to endoscopy.

4. Conclusion

Gastroscopy remains the most sensitive modality for early gastric cancer detection. However, its diagnostic yield depends critically on luminal clarity. After ingestion of antifoaming and mucolytic agents, patients are conventionally maintained in a seated position until endoscope insertion. Due to gastric anatomy, gravity preferentially channels the solution along the greater curvature toward the antrum and pylorus, leaving the fundal dome and lesser curvature inadequately coated [24]. Residual mucus and microbubbles in these relatively dry regions degrade optical quality and prolong inspection time. Evidence from systematic reviews indicates that mucosal visibility is influenced by solution volume, timing of administration, and delivery method; however, the impact of post-dosing body movement remains poorly defined [25]. Collectively, prospective studies demonstrate that brief, sequential positional changes—particularly when dosing is suboptimal—redistribute the fluid film across the entire gastric surface without requiring additional resources, thereby enhancing the efficacy of the agents and improving image clarity [26]. Controlled positional rotation or active calisthenics consistently yield higher visibility scores and shorter procedure durations compared with static positioning. These findings support the integration of gravity-assisted maneuvers into routine pre-endoscopic protocols to optimize mucosal cleansing and diagnostic efficiency

5. Discussion

Gastroscopy is a cornerstone of upper gastrointestinal evaluation, yet its diagnostic accuracy is frequently compromised by residual mucus and foam adherent to the mucosal surface. These substances obscure endoscopic visualization and may contribute to missed or delayed diagnoses of early neoplasia. While small amounts of mucus and foam are physiologically present in the esophagus, stomach, and duodenum, their volume often increases during endoscopy due to mechanical stimulation, particularly in patients with active inflammation, ulceration, or hypersecretory states. This exacerbates luminal opacification and degrades image quality.

To address this challenge, combining pharmacologic agents—such as dimethicone and pronase—with gravity-assisted positional strategies has emerged as a practical approach to enhance mucosal cleansing. Both passive repositioning (e.g., sequential lateral–prone–supine maneuvers) and active postural exercises (e.g., trunk flexion and rotation) have been shown to significantly improve mucosal visibility and reduce procedure duration compared with static positioning. In clinical practice, tailored implementation of these maneuvers by nursing or endoscopy staff—guided by patient tolerance, body habitus, and procedural context—can optimize gastric preparation without additional cost or complexity.

Nevertheless, current evidence has notable limitations. First, our review identified a predominance of studies conducted in China, with heterogeneity in agent formulations, dosing regimens, and outcome assessments. Second, most trials were single-center and underpowered, increasing the risk of bias and limiting generalizability. Third, publication bias remains a concern, as studies reporting positive effects are more likely to be published. Importantly, existing protocols are primarily validated in average-risk, ambulatory populations. Special populations—including elderly individuals, those with obesity, and patients with cardiopulmonary compromise—may not tolerate standard maneuvers and

require individualized, safety-adapted approaches.

Future research should prioritize large-scale, multicenter, double-blind randomized controlled trials to: (1) define the optimal sequence, duration, and timing of positional interventions; (2) compare the efficacy of passive versus active strategies; and (3) establish standardized, yet adaptable, pre-endoscopic protocols that integrate pharmacologic and gravitational principles. Such efforts will facilitate the development of evidence-based guidelines to consistently enhance gastric mucosal visualization and, ultimately, improve the quality and diagnostic yield of gastroscopy—particularly in resource-limited settings such as those in China.

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