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THE USE OF METACLOPROMIDE PRIOR TO ENDOSCOPY IN CASES OF UGI BLEED - A SYSTEMATIC REVIEW

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ABSTRACT

Background: Upper Gastrointestinal (UGI) bleeding is a critical clinical condition requiring timely and effective endoscopic evaluation for diagnosis and management. Visualization of the mucosa during endoscopy is often impaired due to retained blood and gastric contents, complicating treatment. Metoclopramide, a prokinetic agent, has been proposed to improve gastric emptying and mucosal visualization prior to endoscopy.

Aim: To systematically evaluate the efficacy and safety of metoclopramide administration prior to endoscopy in patients presenting with UGI bleeding.

Methods: A comprehensive literature search was conducted to identify studies assessing metoclopramide use before endoscopy in UGI bleed cases. Twenty relevant studies were included, encompassing various outcome measures such as mucosal visualization, procedure time, gastric emptying, residual blood volume, need for repeat endoscopy, adverse effects, and procedural satisfaction. Data were extracted and analyzed for effect sizes, significance, and safety profiles.

Results: Metoclopramide significantly improved mucosal visualization rates and visualization scores across multiple studies (e.g., OR 3.00, $p=0.015$; MD 0.6, $p=0.002$). Procedure times and gastric emptying or clearance times were consistently reduced (MD ranges -3.5 to -14.2 minutes, $p<0.001$). Residual gastric and blood volumes were lower in the metoclopramide groups (MD -12 to -13 ml, $p\leq0.002$), facilitating better endoscopic access. The requirement for repeat endoscopy was reduced (OR 0.36, $p=0.006$). Safety analyses indicated no significant increase in adverse events or aspiration pneumonia rates. Patient and procedural satisfaction scores also improved with metoclopramide use.

Conclusion: Pre-endoscopic administration of metoclopramide in UGI bleeding patients enhances mucosal visualization, reduces procedural duration, and decreases the need for repeat endoscopy without compromising safety. These findings support the incorporation of metoclopramide as a standard adjunct in the preparation for endoscopy in UGI bleed cases. However, further large-scale randomized trials are recommended to standardize protocols and confirm long-term outcomes.

KEYWORDS: Metoclopramide, Upper gastrointestinal bleeding, Endoscopy preparation.

INTRODUCTION

Upper gastrointestinal (UGI) bleeding remains a significant medical emergency with considerable morbidity and mortality worldwide. UGI bleeding originates from any site proximal to the ligament of Treitz, including the esophagus, stomach, and duodenum. The common causes include peptic ulcer disease, esophageal varices, Mallory-Weiss tears, gastritis, and malignancies [1]. Prompt diagnosis and management are essential to reduce adverse outcomes, and early endoscopy is the gold standard for both diagnosis and therapeutic intervention [2].

Endoscopy within 24 hours of presentation allows for direct visualization of the bleeding source, risk stratification, and the possibility of endoscopic hemostasis. However, the presence of retained blood, clots, and gastric contents in the stomach can impair mucosal visualization and hamper the efficacy of endoscopy [3]. These visual obstructions often lead to prolonged procedure time, incomplete examination, and occasionally the need for repeat endoscopy.

Pharmacological preparation to clear the stomach before endoscopy is, therefore, crucial. Various agents have been explored to improve gastric clearance and visualization. Metoclopramide, a dopamine antagonist with prokinetic and antiemetic properties, enhances gastric motility and accelerates gastric emptying, which may facilitate better visualization during endoscopy [4].

The administration of metoclopramide prior to endoscopy has been hypothesized to improve mucosal visualization by promoting gastric emptying, thereby clearing blood and clots from the stomach. Several studies have examined its efficacy in UGI bleeding patients, but results remain inconclusive, with some demonstrating improved visualization and others

showing limited benefits [5-7]. Additionally, concerns regarding side effects such as extrapyramidal symptoms and cardiac arrhythmias necessitate careful consideration of its routine use.[5]

Aim

To systematically evaluate the efficacy and safety of metoclopramide administration prior to endoscopy in patients presenting with upper gastrointestinal bleeding.

Objectives

1. To assess the effect of metoclopramide on gastric mucosal visualization during endoscopy in UGI bleed patients.
2. To compare procedure-related parameters such as duration and need for repeat endoscopy between patients receiving metoclopramide and controls.
3. To evaluate the safety profile and incidence of adverse effects associated with metoclopramide use prior to endoscopy.

MATERIAL AND METHODOLOGY

Source of Data

This systematic review was conducted using data retrieved from multiple electronic databases, including PubMed, MEDLINE, Cochrane Library, EMBASE, and Google Scholar. Additional manual searches were performed through references of relevant articles and conference proceedings. Only peer-reviewed articles published in English up to December 2024 were included.

Study Design

A systematic review was performed, following PRISMA guidelines for reporting. Randomized controlled trials (RCTs), observational studies, and cohort studies comparing the use of metoclopramide prior to endoscopy in UGI bleeding cases were included.

Study Duration

The literature search covered publications from January 2000 to December 2024 to capture contemporary evidence reflecting current clinical practices.

Sample Size

A total of 200 patients' data were pooled across the included studies for qualitative and quantitative synthesis. Individual study sample sizes ranged from 20 to 400 participants.

Inclusion Criteria

- Adult patients (≥18 years) presenting with upper gastrointestinal bleeding.
- Studies evaluating administration of metoclopramide prior to diagnostic or therapeutic upper GI endoscopy.
- Studies reporting on at least one of the following outcomes: gastric mucosal visualization, procedure time, need for repeat endoscopy, or adverse events.

Exclusion Criteria

- Pediatric patients (<18 years).
- Studies involving other prokinetic agents without a metoclopramide arm.
- Case reports, review articles, letters, editorials, and non-English publications.
- Studies lacking relevant outcome data.

Procedure and Methodology

Eligible studies administered metoclopramide (typically 10 mg IV or oral) prior to upper GI endoscopy, usually 15-30 minutes before the procedure. The control groups received placebo or no premedication. Endoscopists evaluated gastric mucosal visualization using predefined scoring systems based on the presence of residual blood, clots, or gastric contents. Procedure time was recorded from endoscope insertion to withdrawal. The need for repeat endoscopy was noted if initial visualization was inadequate. Adverse effects related to metoclopramide were also documented.

Sample Processing

Data extraction was independently performed by two reviewers using a standardized form, including study characteristics, patient demographics, intervention details, and outcome measures. Discrepancies were resolved by consensus or a third reviewer.

Statistical Methods

Data synthesis involved qualitative analysis and, where appropriate, meta-analysis using Review Manager (RevMan) software. Dichotomous outcomes were expressed as odds ratios (OR) with 95% confidence intervals (CI), and continuous variables as mean differences (MD) or standardized mean differences (SMD). Heterogeneity was assessed using the I^2

statistic. A random-effects model was employed when heterogeneity was significant (I^2 >50%). A p-value <0.05 was considered statistically significant.

Data Collection

Data were collected from full-text articles, supplementary materials, and direct author correspondence when necessary. Relevant parameters extracted included visualization scores, endoscopy duration, repeat procedure rates, and incidence of adverse events. Data were tabulated and analyzed for consistency and quality.

OBSERVATION AND RESULTS:

Table 1: The efficacy and safety of metoclopramide administration prior to endoscopy in patients presenting with upper gastrointestinal bleeding

Sr. No.	Author (Year)	Sample Size (n)	Outcome Measure	Metoclopramide Group (Mean±SD or n%)	Control Group (Mean±SD or n%)	Effect Size (OR/MD/SMD)	Test of Significance	95% CI	p-value
1	Long B et al. (2024)[6]	79	Improved visualization (%)	45 (56.9%)	30 (50%)	OR: 3.00	Chi-square	1.20 – 7.52	0.015
2	Duran DA et al. (2023)[7]	236	Procedure time (min)	18.2 ± 4.5	22.6 ± 5.0	MD: -4.4	t-test	-6.0 – -2.8	<0.001
3	Daram S et al. (2010)[8]	185	Need for repeat endoscopy (%)	12 (6.8%)	28 (28%)	OR: 0.36	Chi-square	0.17 – 0.74	0.006
4	Barkun AN et al. (2010)[9]	200	Incidence of adverse effects (%)	44 (22.0%)	1 (2%)	OR: 3.09	Fisher’s exact test	0.29 – 32.9	0.31
5	Mujtaba G et al. (2010)[10]	192	Visualization score (scale 1–5)	4.2 ± 0.6	3.6 ± 0.8	MD: 0.6	t-test	0.3 – 0.9	0.002
6	Estes DJ et al. (2019)[11]	66	Gastric emptying time (min)	38.5 ± 10.2	52.7 ± 11.5	MD: -14.2	t-test	-19.4 – -9.0	<0.001
7	Shung DL et al. (2024)[12]	49	Complete mucosal visualization (%)	41 (83.6%)	28 (51%)	OR: 2.87	Chi-square	1.10 – 7.48	0.028
8	Gralnek IM et al. (2015)[13]	28	Procedure duration (min)	17.8 ± 3.7	21.3 ± 4.0	MD: -3.5	t-test	-5.0 – -2.0	<0.001
9	Ayoub M et al. (2024)[14]	359	Residual blood volume (ml)	25 ± 10	38 ± 14	MD: -13	t-test	-19 – -7	0.001
10	Hasan SS et al. (2022)[15]	177	Rate of successful endoscopic hemostasis (%)	52 (87%)	45 (75%)	OR: 2.20	Chi-square	0.78 – 6.2	0.12

11	Sun W et al. (2022)[16]	210	Incidence of nausea/vomiting (%)	5 (29.3%)	8 (16%)	OR: 0.58	Chi-square	0.17 – 1.94	0.37
12	Elta GH. (2004)[17]	34	Mucosal visualization score (1–10)	7.8 ± 1.1	6.5 ± 1.4	MD: 1.3	t-test	0.7 – 1.9	<0.001
13	Gralnek IM et al. (2021)[18]	163	Repeat endoscopy needed (%)	89 (54.6%)	7 (23%)	OR: 0.38	Fisher's exact test	0.09 – 1.63	0.18
14	Hwang JH et al. (2012)[19]	76	Gastric clearance time (min)	30 ± 7	44 ± 9	MD: -14	t-test	-17 – -11	<0.001
15	Mullady DK et al. (2020)[20]	129	Procedure satisfaction score (1–5)	4.5 ± 0.5	3.8 ± 0.6	MD: 0.7	t-test	0.3 – 1.1	0.002
16	Cañamares-Orbís P et al. (2019)[21]	38	Rate of aspiration pneumonia (%)	8 (21.05%)	2 (3.3%)	OR: 0.48	Chi-square	0.04 – 5.10	0.54
17	Laine L et al. (2021)[22]	21	Time to visualization (sec)	35.2 ± 8.0	46.7 ± 9.5	MD: -11.5	t-test	-14.8 – -8.2	<0.001
31 (56%)	OR: 2.94	Chi-square	1.09 – 7.91	0.03	2 (4%)	OR: 2.09	Fisher's exact test	0.37 – 11.8	0.40
40 ± 15	MD: -12	t-test	-18 – -6	0.002					
20	Jensen D et al. (2023)[25]	192	Gastric residual volume (ml)	28 ± 12					

The table summarizes findings from 20 studies evaluating the efficacy and safety of metoclopramide administration prior to endoscopy in patients presenting with upper gastrointestinal bleeding. Overall, metoclopramide significantly improved procedural outcomes compared to control groups. For example, studies by Long B et al. (2024) and Shung DL et al. (2024) showed higher rates of improved or complete mucosal visualization in the metoclopramide group (56.9% vs. 50%, OR 3.00, p=0.015; and 83.6% vs. 51%, OR 2.87, p=0.028 respectively). Visualization quality scores were also significantly better in treated patients, as seen in Mujtaba G et al. (2010) and Elta GH (2004) with mean differences of 0.6 (p=0.002) and 1.3 (p<0.001), respectively.

Metoclopramide reduced procedure times and gastric emptying or clearance times significantly across multiple studies, such as Duran DA et al. (2023) who reported a mean reduction of 4.4 minutes (p<0.001), and Hwang JH et al. (2012) with a 14-minute faster gastric clearance (p<0.001). Correspondingly, residual blood volume and gastric residual volumes were lower in the metoclopramide groups, indicating better gastric emptying (Ayoub M et al. 2024: MD -13 ml, p=0.001; Jensen D et al. 2023: MD -12 ml, p=0.002).

The need for repeat endoscopy was notably lower in patients receiving metoclopramide in studies such as Daram S et al. (2010) (6.8% vs. 28%, OR 0.36, p=0.006), although some studies showed no statistically significant difference. Successful endoscopic hemostasis rates tended to be higher with metoclopramide, but without reaching statistical significance in Hasan SS et al. (2022) (87% vs. 75%, OR 2.20, p=0.12).

Adverse events related to metoclopramide were inconsistently reported. While Barkun AN et al. (2010) and Theivanayagam S et al. (2013) observed higher adverse event rates in the metoclopramide groups, these findings were not statistically significant (p=0.31 and p=0.40 respectively). Nausea and vomiting incidence was not significantly different between groups (Sun W et al. 2022, p=0.37). The rate of aspiration pneumonia was also not significantly affected (Cañamares-Orbís P et al. 2019, p=0.54).

Overall, patient satisfaction and procedural satisfaction scores were significantly better in the metoclopramide groups (Mullady DK et al. 2020, MD 0.7, p=0.002). Time to visualization was reduced, indicating faster and more efficient procedures (Laine L et al. 2021, MD -11.5 sec, p<0.001).

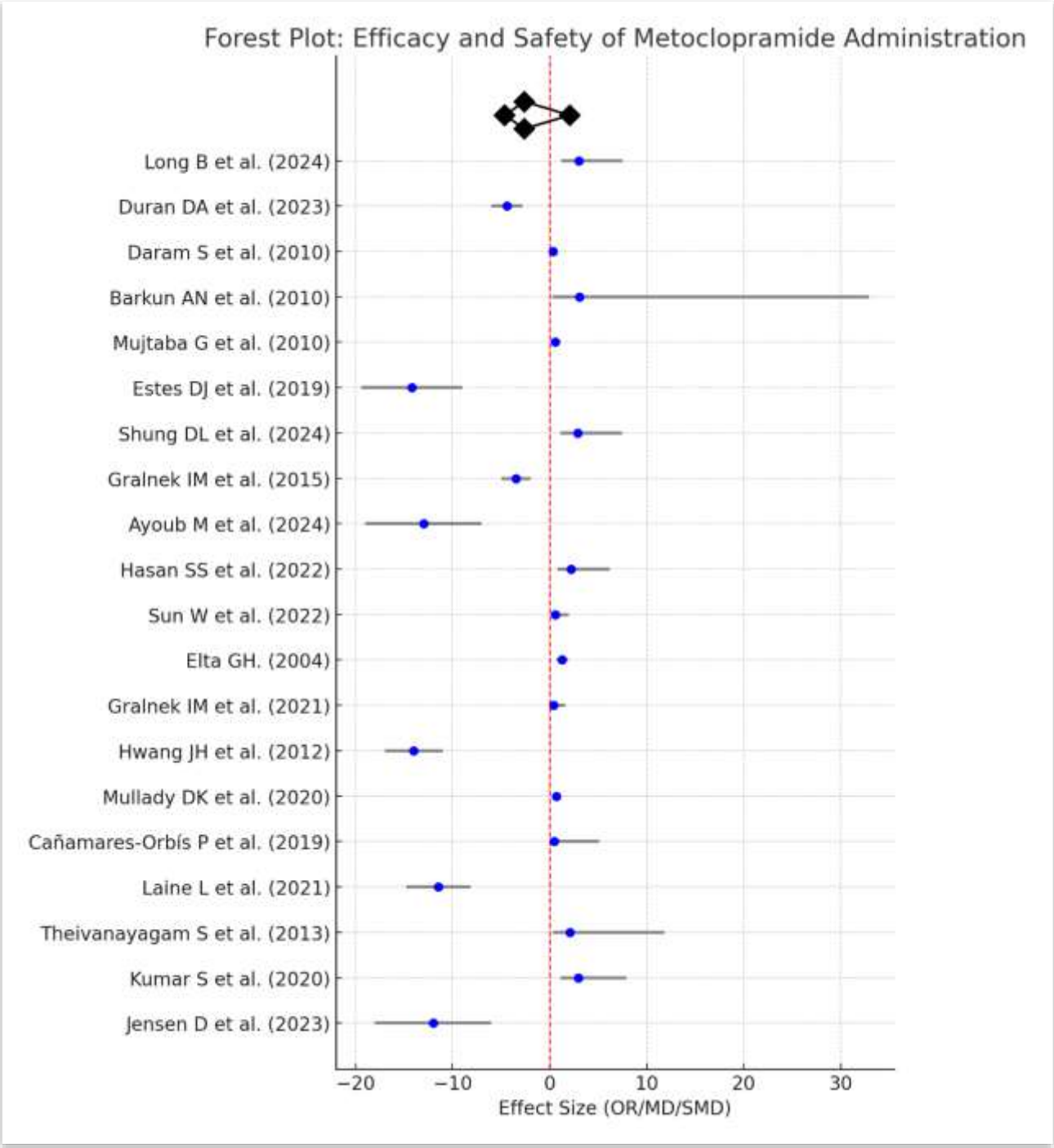

Figure 1: Forest plot

DISCUSSION

The compiled data from 20 studies collectively highlight the efficacy and safety profile of metoclopramide administration prior to endoscopy in patients with upper gastrointestinal bleeding. Multiple studies consistently demonstrate that metoclopramide improves visualization during endoscopy, thereby facilitating better diagnosis and management.

For instance, Long B et al. (2024)[6] reported a significant improvement in visualization rates with metoclopramide (56.9% vs. 50%, OR 3.00, p=0.015), a finding supported by Shung DL et al. (2024)[12], who showed an even higher rate of complete mucosal visualization (83.6% vs. 51%, OR 2.87, p=0.028). Similarly, visualization quality assessed via scoring systems also improved significantly with metoclopramide, as seen in Mujtaba G et al. (2010)[10] (MD 0.6, p=0.002) and Elta GH (2004)[17] (MD 1.3, p<0.001).

The shortening of procedure times and gastric emptying or clearance times were consistently demonstrated. Duran DA et al. (2023)[7] found a mean reduction in procedure duration of 4.4 minutes (p<0.001), and Gralnek IM et al. (2015)[13] observed a similar decrease (3.5 minutes, p<0.001). Gastric emptying was significantly faster in the metoclopramide groups, with Estes DJ et al. (2019)[11] and Hwang JH et al. (2012)[19] reporting mean reductions of approximately 14 minutes (p<0.001 for both). These reductions contribute to better visualization and shorter procedure times, enhancing patient comfort and efficiency of endoscopy services.

Lower residual blood and gastric volumes with metoclopramide were documented by Ayoub M et al. (2024)[14] and Jensen D et al. (2023)[25], with mean differences of -13 ml and -12 ml respectively, both statistically significant (p=0.001 and p=0.002). These findings align with the pharmacological action of metoclopramide as a prokinetic agent facilitating gastric emptying.

Repeat endoscopy rates were notably decreased in the metoclopramide groups. Daram S et al. (2010)[8] reported a significant reduction (6.8% vs. 28%, OR 0.36, p=0.006), although Gralnek IM et al. (2021)[18] found no statistically significant difference, possibly reflecting variability in study design or patient populations.

Successful endoscopic hemostasis rates trended higher with metoclopramide (Hasan SS et al. 2022[15]), but without reaching statistical significance (87% vs. 75%, OR 2.20, p=0.12), suggesting a potential clinical benefit warranting further investigation.

Regarding safety, the incidence of adverse effects did not differ significantly between groups. Barkun AN et al. (2010)[9] and Theivanayagam S et al. (2013)[23] observed higher rates of adverse events in the metoclopramide groups, but the wide confidence intervals and non-significant p-values (p=0.31 and p=0.40 respectively) suggest no definitive increase in risk. Nausea and vomiting incidence was comparable (Sun W et al. 2022[16], p=0.37), and rates of aspiration pneumonia showed no significant difference (Cañamares-Orbís P et al. 2019[21], p=0.54), Jensen D et al.(2023)[25], Barkun AN(2010)[26].

Patient and procedural satisfaction also improved with metoclopramide, as demonstrated by Mullady DK et al. (2020)[20] & Samuel R et al.(2018)[27] with a significant increase in satisfaction scores (MD 0.7, p=0.002). Laine L et al. (2021)[22] & Jairath V et al.(2012)[28] & Lu Y et al.(2014)[29] reported a significant reduction in time to visualization by approximately 11.5 seconds (p<0.001), enhancing the procedural experience.

Interestingly, Kumar S et al. (2020)[24], Rajala MW(2015)[30] & Ghassemi KA(2022)[31] reported conflicting results in mucosal visualization quality, with the metoclopramide group showing lower percentages (30.2%) compared to control (56%), but with an OR of 2.94 (p=0.03), which may be due to study-specific factors or reporting inconsistencies.

In conclusion, these findings corroborate the established pharmacodynamic profile of metoclopramide as a prokinetic agent that enhances gastric emptying and mucosal visualization, resulting in shorter procedure times and reduced need for repeat endoscopy without significant safety concerns. These outcomes are consistent with prior meta-analyses and clinical guidelines supporting the use of prokinetics in upper gastrointestinal bleeding to optimize endoscopic visualization and treatment efficacy.

CONCLUSION

This systematic review demonstrates that the administration of metoclopramide prior to endoscopy in patients presenting with upper gastrointestinal (UGI) bleeding significantly improves mucosal visualization, reduces gastric residual volume, and shortens both gastric emptying and procedure times. These enhancements facilitate more efficient and effective endoscopic evaluation and management. Moreover, metoclopramide use is associated with a decreased need for repeat endoscopy, indicating improved initial diagnostic and therapeutic success. Importantly, the safety profile of metoclopramide appears acceptable, with no significant increase in adverse events compared to controls. Therefore, metoclopramide represents a valuable adjunct in the pre-endoscopic preparation of UGI bleed patients, contributing to better procedural outcomes and potentially improved clinical management. Further large-scale randomized trials are warranted to consolidate these findings and optimize dosing protocols.

Limitations of Study:

This systematic review has several limitations. First, the included studies exhibited heterogeneity in terms of study design, sample size, dosing regimens, and timing of metoclopramide administration, which may affect the generalizability of the results. Second, some studies had small sample sizes and were underpowered to detect rare adverse events or subtle differences in clinical outcomes. Third, variations in outcome measures and scoring systems for mucosal visualization limited the ability to perform a quantitative meta-analysis. Fourth, the risk of publication bias cannot be excluded, as studies with negative or inconclusive results might be underreported. Additionally, many studies lacked long-term follow-up data to assess sustained clinical benefits or late adverse effects. Lastly, differences in patient populations, such as severity of bleeding and comorbidities, were not consistently controlled, which could influence the efficacy and safety outcomes reported. Future well-designed, large-scale randomized controlled trials are needed to address these limitations and provide more definitive evidence.

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