From prep to procedure: Impact of bowel preparation agents on outcomes in hospitalized patients

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Abstract

Purpose: Adequate bowel preparation is crucial for successful colonoscopy, preventing delays, missed findings, and higher costs. This study compared small-volume preparation (SVP) and large-volume preparation (LVP) in hospitalized patients.

Methods: A single-center, retrospective cohort study included 107 patients (SVP: 56, LVP: 51). Primary outcome: time from bowel preparation to colonoscopy. Secondary outcomes: time from admission to colonoscopy, need for additional cleansing, rate of morning colonoscopies, and hospital length of stay (LOS).

Results: Median time to colonoscopy was similar (SVP: 21.2 hours, LVP: 19.9 hours; p=0.99). Hospital LOS (SVP: 5.7 days, LVP: 7.1 days; p=0.74) and time from admission to colonoscopy (SVP: 3.6 days, LVP: 3.1 days; p=0.60) showed no significant difference. More LVP patients needed adjunctive laxatives (41% vs. 13%; p<0.001). No significant difference in morning colonoscopies (p=0.25) or additional preparation (p=0.29).

Conclusion: SVP and LVP had similar times to colonoscopy and LOS, but LVP required more adjunctive laxatives, indicating lower cleansing efficacy. Further studies are needed.

Keywords: colonoscopy preparation, formulary, hospital outcomes, pharmacy

Introduction

Adequate bowel preparation prior to colonoscopy is important to ensure diagnostic and/or therapeutic yield.[1] Inadequate preparation leads to possible complications, including delays in time to colonoscopy, missed pathologic findings, and other complications.[1–3] It is estimated that half of patients hospitalized undergoing a colonoscopy do not receive adequate bowel cleansing.[1] Two available bowel preparation agents exist, small-volume preparation (SVP) and large-volume preparation (LVP). Magnesium sulfate/potassium sulfate/sodium sulfate (Suprep®) is an SVP and polyethylene glycol-electrolyte solution (GoLYTELY®) is an LVP.[4,5]

There is limited evidence comparing outcomes between bowel preparation agents in hospitalized patients. Previous research has demonstrated a reduction in the time from bowel preparation to colonoscopy as well as related avoidable hospital bed days and potentially excess healthcare costs with the use of SVP compared to LVP.[1]

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Additionally, SVP has been shown to be associated with improved bowel cleansing quality compared to LVP.[6] The purpose of this research is to evaluate the difference in outcomes between SVP and LVP in adult hospitalized patients undergoing colonoscopy at a single center with both SVP and LVP on the hospital formulary.

Methods

Study Design

This was a single-center, retrospective cohort study of patients admitted between January 1, 2024 and September 30, 2024. Inclusion criteria included adult patients undergoing colonoscopy with active orders for SVP (magnesium sulfate/potassium sulfate/sodium sulfate (Suprep®)) or LVP (polyethylene glycol-electrolyte solution (GoLYTELY ®)). There were 107 patients included for analysis. The patients were divided into two groups based on bowel preparation received: SVP or LVP.

Outcomes

The primary outcome of this study was to evaluate the difference in time to colonoscopy after administration of bowel preparation between groups. Additional outcomes included time to colonoscopy from time of hospital admission, time to colonoscopy from time bowel preparation ordered, number of colonoscopies performed before noon, need for

additional bowel cleansing prior to colonoscopy, and hospital length of stay (LOS).

Study definitions

The time documented in the electronic medical record (EMR) by the nurse administering the bowel preparation agent was used for the time of initial administration of the agent. Although both SVP and LVP have to be given over several hours in multiple doses, the decision was made to standardize the time based on chart documentation to minimize inconsistencies in administration.[4,5] The time recorded in the procedure note by the gastroenterologist was used as the time of the colonoscopy. The time bowel preparation was ordered was extracted from the EMR. The use of adjunctive agents was used as a surrogate for inadequate bowel preparation or difficulty with tolerance. Adjunctive agents included repeat bowel preparation agents, bisacodyl, enemas, and suppositories.

Statistical Analysis

Descriptive statistics using the JASP statistical software (version 0.18.3.0) were completed. Frequencies are reported as the number of cases with the evaluated outcome divided by the total number of patients (N, %). Continuous data is reported as mean ± standard deviation (SD). When comparing outcomes in patients, continuous data was analyzed using t-test, and nominal data were analyzed using chi-square or Fisher's exact tests. All p-values < 0.05 are considered statistically significant.

Results

Among 107 patients included for analysis, 56 (52%) received SVP, and 51 (48%) received LVP. A comparison of baseline characteristics is shown in Table 1. Patients receiving SVP were older (71.5 vs 64.0 years, p=0.01) and more likely to be hospitalized for a gastrointestinal (GI) bleed (61% vs. 37%, p=0.02). Overall, 42% of patients received same day esophagogastroduodenoscopy (EGD) and colonoscopy. Although not statistically significant, more patients receiving SVP received same day EGD and colonoscopy compared to LVP (50% vs. 33%, p = 0.08).

Table 1. Baseline characteristics

Characteristic	SVP (n = 56)	LVP (n = 51)	p-value
Age (years), median [IQR]	71.5 [59.8 – 79.0]	64.0 [43.5 – 73.5]	0.01
African American	36 (64)	33 (65)	0.96
Male	22 (39)	25 (49)	0.31
Weight (kg), median [IQR]	74.8 [60.6 – 96.4]	74.5 [64.6 – 90.9]	0.82
Comorbidities			
Diabetes	17 (30)	14 (27)	0.74
CKD	6 (11)	7 (14)	0.63
IBD	3 (5)	4 (8)	0.35
Baseline laboratory tests, median [IQR]			
Hemoglobin, mg/dL	8.1 [7.1 – 11.1]	9.6 [6.4 – 12.7]	0.18
Platelet count	284 [195 – 353]	278 [203 – 377]	0.88
Serum creatinine, mg/dL	1.12 [0.87 – 1.43]	1.2 [0.95 – 1.94]	0.38
BUN, mg/dL	18 [14 – 26]	20 [11 – 31]	0.97
Potassium, mmol/L	3.9 [3.8 – 4.2]	3.9 [3.7 – 4.2]	0.65
GI Bleed was reason for hospitalization	34 (61)	19 (37)	0.02
Indication for colonoscopy			
Rectal bleeding	38 (68)	19 (37)	0.004
Anemia	10 (18)	13 (25)	
Other*	8 (14)	19 (37)	
Same day EGD and colonoscopy	28 (50)	17 (33)	0.08
Documented constipation	8 (14)	10 (20)	0.46

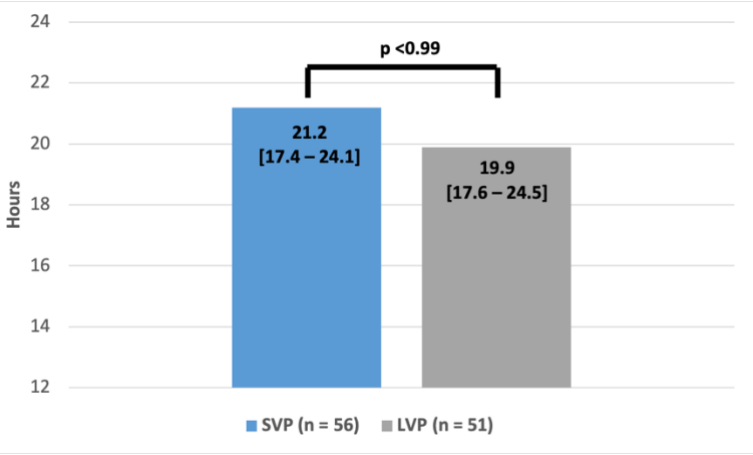
*Other included abnormal imaging, abdominal pain, diarrhea, and inflammatory bowel disease

All data reported as n (%) unless stated otherwise

Abbreviations: CKD, chronic kidney disease; EGD, esophagogastroduodenoscopy; GI, gastrointestinal; IBD, inflammatory bowel disease; IQR, interquartile range

For the primary outcome, there was no difference in time to colonoscopy after administration of bowel preparation between groups (21.2 vs 19.9 hours, p>0.99) (Figure 1). Additionally, there was no statistical difference between groups in time to colonoscopy from hospital admission (3.6 vs 3.1 days, p=0.6), time to colonoscopy from the time the bowel preparation was ordered (1.1 vs 1.0 days, p=0.68), or hospital length of stay (5.7 vs 7.1 days, p=0.74). Patients receiving LVP were more likely to require adjunctive laxatives prior to colonoscopy compared to SVP (p<0.001). (Table 2)

Figure 1. Primary outcome of time to colonoscopy after administration of bowel preparation



Abbreviations: LVP, large volume preparation; SVP, small volume preparation.

Table 2. Comparison of outcomes between bowel preparation agents

Outcomes	SVP (n = 56)	LVP (n = 51)	p-value
Time to colonoscopy from hospital admission (days)	3.6 [2.2 – 5.4]	3.1 [2.1 – 4.9]	0.60
Time to colonoscopy from time bowel prep ordered (days)	1.1 [0.9-1.7]	1.0 [0.9-1.5]	0.68
Hospital LOS (days)	5.7 [3.8 – 9.1]	7.1 [3.0 – 11.1]	0.74
Colonoscopy before noon	29 (52)	32 (63)	0.25
Adjunctive laxatives given prior to colonoscopy	7 (13)	21 (41)	<0.001

Abbreviations: LOS, length of stay; LVP, large volume preparation; SVP, small volume preparation.

All nominal data represented as n (%) unless stated otherwise. All continuous, non-parametric data represented as median (IQR).

Discussion

Several studies have supported that low-volume sulfate-based preparations, such as Suprep®, improve both patient tolerability and preparation quality.[1–3,7] However, there has been limited evidence on colonoscopy outcomes. Although our findings suggest that there is no significant difference in time to colonoscopy between hospitalized patients receiving SVP versus LVP, our study highlights a key distinction—patients receiving LVP were significantly more likely to require adjunctive laxatives before colonoscopy, reinforcing existing evidence that SVP may offer superior efficacy in bowel cleansing compared to LVP.[1]

Despite potential differences in bowel cleansing efficacy, our study found no statistically significant impact of bowel preparation type on hospital LOS or time from hospital admission to colonoscopy. One explanation for this discrepancy may be selection bias, as gastroenterologists may have knowingly chosen SVP over LVP for patients who have had a history of inadequate bowel preparation or difficulty with LVP or in patients with planned same day EGD and colonoscopy. Additionally, during chart review, some gastroenterologists even indicated in their notes that they chose to divide the SVP over two days instead of four hours apart for a patient who historically had difficulty with completing bowel preparation. Our study documented the time that the first bowel preparation dose was given and did not account for bowel preparation timing regimens. This could have confounded our results, as a 2015 meta-analysis of bowel preparation dosing regimens found that split-dose preparations, which aim to give roughly half the colonoscopy preparation dose the day before colonoscopy and half on the day of the colonoscopy, provided significantly better colon cleansing than day-before preparations.[8] Our study also cannot confirm that patients were adherent with their bowel preparation or consumed each dose in its entirety from documentation in the EMR alone. Lastly, our results also could have been confounded by the high proportion of patients undergoing same-day EGD and colonoscopy, which could have affected overall procedural timing.

The inclusion of both SVP and LVP on the hospital formulary significantly enhances flexibility in patient care. The decision between SVP and LVP is influenced by multiple factors, including patient tolerability, bowel cleansing efficacy, potential adverse effects, cost, and provider preference. At the study institution, providers are increasingly favoring SVP over LVP due to data suggesting superior bowel cleansing, better patient tolerance, and potentially improved outcomes, including LOS.[1,2] While there was no statistical difference in hospital LOS, patients who received SVP had one day shorter LOS, which is clinically significant given the value of available hospital beds and decreasing LOS for the system. Although our study cannot clearly establish SVP is directly tied to shorter hospital LOS, it is an important recognition of the possible benefit of having both SVP and LVP on hospital formulary. While benefits exist, it is notable that the acquisition cost of SVP is twice that of LVP, which must be considered when evaluating the use of both agents on the hospital formulary. Our review did not fully validate the hypothesis that SVP is superior to LVP, highlighting the need to carefully consider the implications of using both agents for patient and hospital outcomes.

This study is limited as a retrospective single-center study with reliance on chart documentation for outcomes, including time to colonoscopy and administration of bowel preparation agents. Given the limitations of a retrospective study and findings contrary to previously published studies, additional prospective studies with true randomization are needed to confirm if any differences in outcomes exist between agents.[1] Future research studies should also explore whether bowel preparation type affects other clinical outcomes, such as polyp detection rates, need for repeat procedures, and patient-reported satisfaction. Additionally, cost-effectiveness analyses could help determine the economic implications of preferentially using SVP over LVP in all hospitalized patients.

Conclusion

While both SVP and LVP resulted in similar time to colonoscopy, the increased use of adjunctive laxatives in the LVP group suggests that SVP may offer superior bowel cleansing efficacy. These findings support the growing body of evidence favoring SVP in hospitalized patients to optimize procedural success and patient outcomes. Given the retrospective nature of this study, future prospective trials are warranted to further investigate the clinical outcomes resulting from bowel preparation choice, including bowel preparation adequacy, colonoscopy quality indicators, and patient tolerability and satisfaction.

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