

Utility of gastroscopy in the left lateral semi-recumbent position: A blood-free coup!



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ABSTRACT

Background and study aims The utility of esophagogastroduodenoscopy (EGD) in the left lateral semi-recumbent position in the setting of acute upper gastrointestinal bleeding (UGIB) with a persistent fundal pool of blood for adequate visualization and effective endotherapy has not been studied. This study aimed to evaluate the feasibility, efficacy, and safety of this position in such settings.

Patients and methods A prospective study of patients presenting with acute UGIB with an uncleared fundal pool of blood was conducted. All underwent EGD in the left lateral decubitus and secondary left lateral semi-recumbent positions. Outcomes in secondary position in terms of adequate visualization of the fundus, identification of new or additional sources of bleeding, and effectiveness of endotherapy were studied.

Results We screened 860 patients and included 44 patients (5.11%) with a persistent fundal pool of blood. Endoscopy in the primary position revealed the source of bleeding in 37 of 44 patients (84%). The source of the bleeding was not identified in seven of 44 patients (16%). Endoscopy in the secondary position showed clearance of fundal pool in all 44 patients (100%). A new source of bleeding was identified in all seven patients (100%) and an additional source could be identified in another five patients (13.6%). Endotherapy was performed in the secondary position for all 44 patients with 100% technical success and 94% clinical success.

Conclusions These data show that endotherapy in the left lateral semi-recumbent position is feasible, safe, and effective. It should be done when endoscopy in the left lateral decubitus position reveals a pool of blood in the fundus and there is inadequate visualization of the fundus.

Introduction

Upper gastrointestinal bleeding is a life-threatening condition with an annual incidence of 80 to 150 patients per 100,000 population with an estimated mortality rate of 2% to 15% [1,2] Endoscopic evaluation of the upper gastrointestinal tract remains the primary investigation modality for identification of the source of bleeding, with a sensitivity of 92% to 98% [3].

Furthermore, various endoscopic interventions have high efficacy in achieving homeostasis. Among various factors, efficacy depends on adequate visualization during esophagogastroduodenoscopy (EGD) for proper examination of the esophagus, stomach, and duodenum. Remotely collected blood in the fundus or actively collection of blood due to ongoing bleeding often precludes adequate evaluation and therapeutic measures. The American Society for Gastrointestinal Endoscopy (ASGE)

national survey showed that adequate visualization of the stomach was impaired in 5.6% of patients with acute upper gastrointestinal bleeding due to presence of fundal blood [4]. In a study by Stollman et al, 13% of patients with acute upper gastrointestinal bleeding had an uncleared fundal pool of blood precluding complete examination [5]. They also found an unfavorable outcome in these patients with recurrent upper gastrointestinal bleeding in 54% compared with 11% of controls. The objective of the present study was to evaluate the utility of EGD in the left lateral semi-recumbent position to clear fundic pool of blood and to determine the feasibility and efficacy of endotherapy in the same position. ► **Fig. 1** shows a schematic representation of a fundic pool of blood in the standard left lateral decubitus position and its clearance in the secondary left lateral semi-recumbent position.

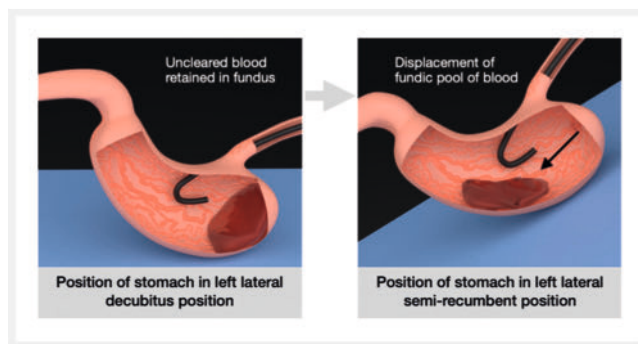
Patients and methods

This was a single-center prospective observational study. Ethics approval was obtained from the Institutional Ethics Committee (EC/OA63/2022). Patients were included after obtaining written informed consent. The study was conducted in compliance with the Declaration of Helsinki and good clinical practice.

We screened all patients presenting with acute upper gastrointestinal bleeding at our center over a time period of 12 months (May 2022 to May 2023). Upper gastrointestinal bleeding was defined as presenting with hematemesis or melena. All patients underwent EGD within the first 12 to 24 hours of presentation and received intravenous metoclopramide 10 mg 30 to 60 minutes prior to the procedure. After identifying a fundal pool of blood, adequate attempts were made to clear it by flushing with a water jet and then suctioning out or by removing blood clots with a Roth net retriever. Patients with an uncleared fundal pool of blood (active bleeding from the fundus or collected blood or clots) despite these measures were included in the study. All patients with restricted skeletal mobility and pregnancy were excluded from the study.

Procedure

All procedures were performed by an expert endoscopist with more than 5 years of experience. Examination was performed with a Gastro-VideoScope (EG-3890TK, Pentax) in the endoscopy suite under standard anesthesia protocol. All those with active hematemesis, patients with comorbidities and unstable vital parameters were intubated; the remainder underwent the procedure under total intravenous anesthesia using propofol and ketamine. Initially the procedure was performed in the standard left lateral decubitus position and complete examination of all parts was attempted. In patients found to have an uncleared fundal pool of blood despite all endoscopic measures, the position was changed intraprocedurally from left lateral decubitus to left lateral semi-recumbent using the backrest of a Fowler stretcher trolley. Simultaneously the trolley height was lowered to bring the access point of the patient's mouth at a comfortable height as per the operating endoscopist. In intubated patients, utmost care was taken to prevent any displacement of the endotracheal tube. After swiftly changing the position, a pillow or head ring was used to support the head while



► **Fig. 1** Schematic diagram showing relative position of stomach and fundal pool of blood, both in left lateral decubitus and left lateral semi-recumbent position.

both hands lay by the side and the patient's legs were flexed at the hip and knee joints. ► **Fig. 2** demonstrates the position of the patient and trolley set up in both these positions. Adequacy of visualization of the fundus with displacement of the fundal pool of blood was recorded. All patients with a fundal and non-fundal source of bleeding were offered standard endoscopic hemostasis as per etiology. Feasibility and clinical success of endotherapy were noted in the secondary left lateral semi-recumbent position. Clinical and laboratory parameters along with blood transfusion details were documented. Clinical success of the procedure with resolution of hematemesis, serial hemoglobin measurement for any drop and blood transfusion requirement post-procedure were also documented. Data analysis was performed using SPSS software. Continuous variables were expressed as mean \pm SD or median if the data were skewed and categorical variables in percentages.

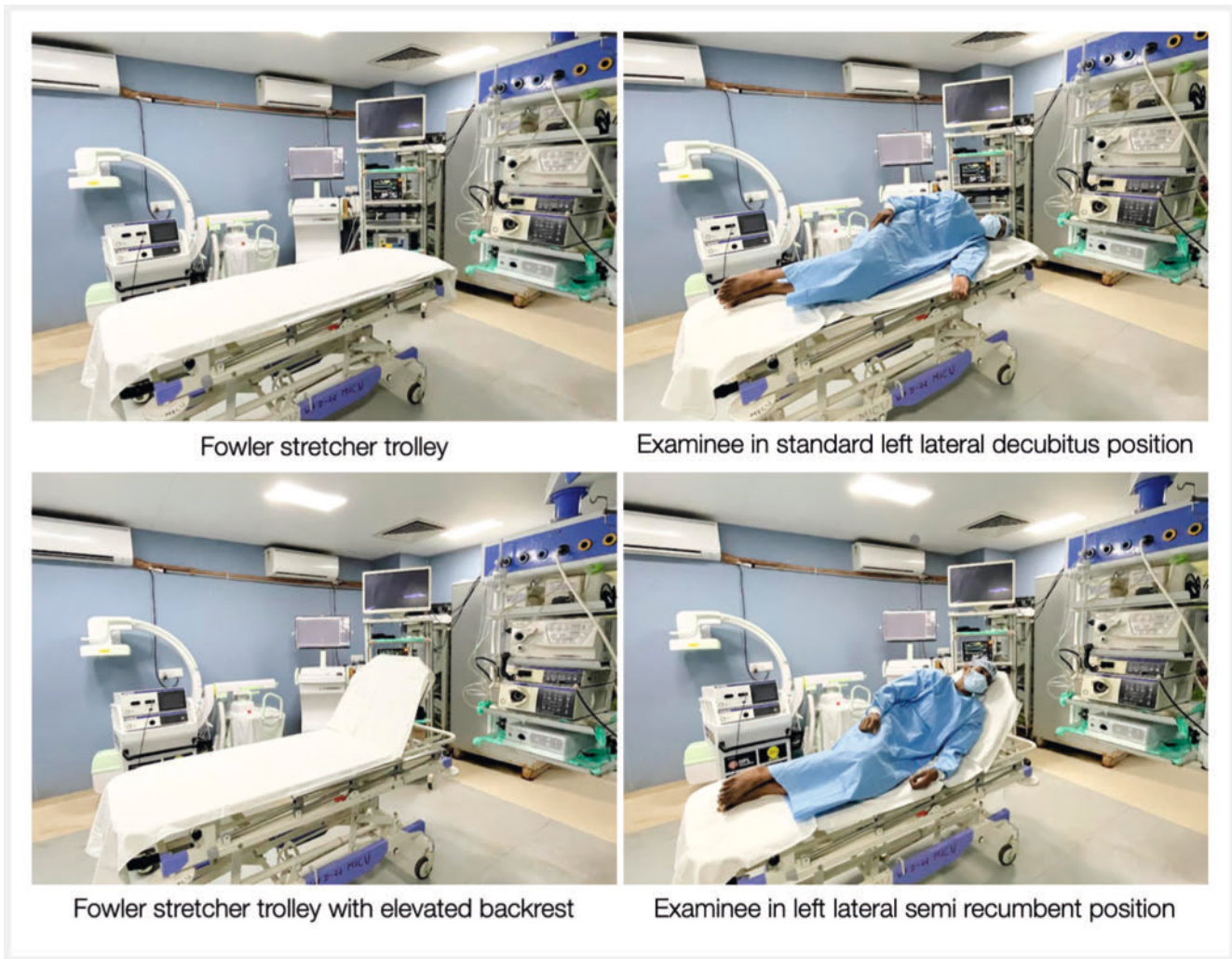
Outcomes

The primary outcome was the percentage of patients with adequate visualization of the fundus in the secondary left lateral semi-recumbent position. The percentage of patients with identification of source of bleeding in the fundus and technical success of endotherapy in the secondary position were assessed as secondary outcomes. The flowchart of study participants is as shown in ► **Fig. 3**.

Results

Patient baseline characteristics

Of 860 patients presenting with acute upper gastrointestinal bleeding, 44 patients (5.11%) met the inclusion criteria. Two pregnant patients and one with a fractured neck of the left femur were excluded from the study. Of the 44 patients, 35 (80%) were male and nine (20%) were female. The mean age of the patients was 51.0 years (SD = 13.9; range 18 to 77 years). Thirty-four patients (77%) had decompensated cirrhosis, six had diabetes mellitus, five had coronary artery disease, five had hypertension, four had chronic kidney disease, and one had obstructive airway disease. In total, 28 patients were intubated, including 12 with active hematemesis, 15 with unstable hemodynamics or encephalopathy, and nine with different comorbidities.



► Fig. 2 Fowler stretcher trolley setup and sample examinee posture in both left lateral decubitus and left lateral semi-recumbent position.

Endoscopy findings in the primary position (left lateral decubitus)

EGD done initially in the primary position i.e left lateral decubitus position for identification of the source of acute bleeding showed the findings as in ► Table 1. Additional findings such as portal hypertensive gastropathy, gastric antral vascular ectasia, and esophagitis were also identified, but because none were actively bleeding, they were not attributed as a source of acute upper gastrointestinal bleeding.

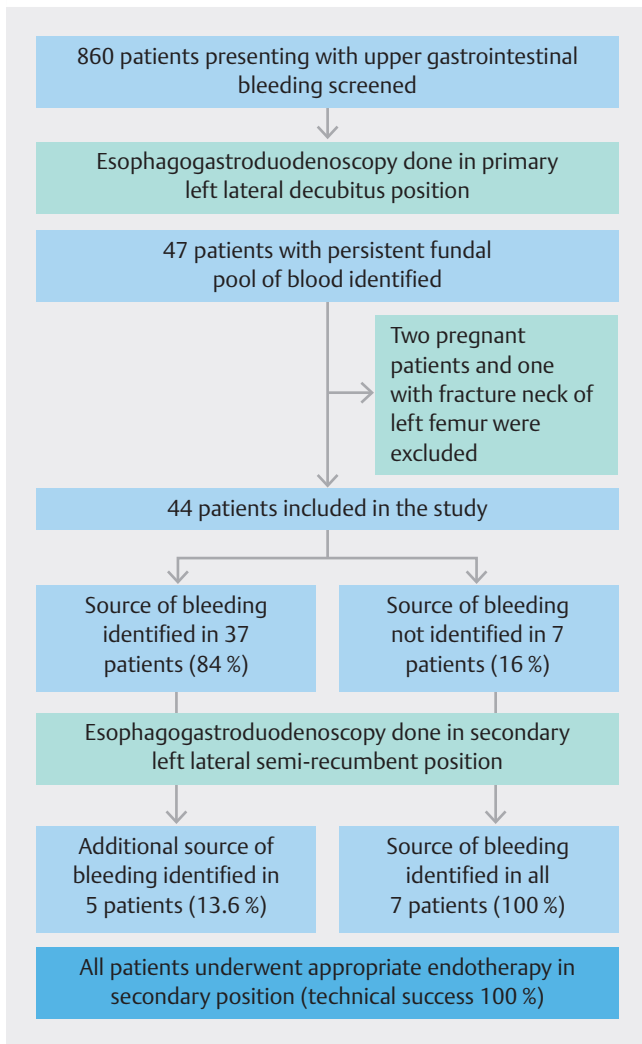
Endoscopy findings in the secondary position (left lateral semi-recumbent)

All patients with a fundic pool of blood underwent EGD in the secondary position. EGD was carried out in the left lateral semi-recumbent position to displace the fundal pool of blood and identify a new or additional fundal source of the bleeding. Findings in the secondary position are as shown in ► Table 2 and ► Table 3. ► Fig. 4 shows images of the fundus in retroflexed view in three patients in both primary and secondary positions.

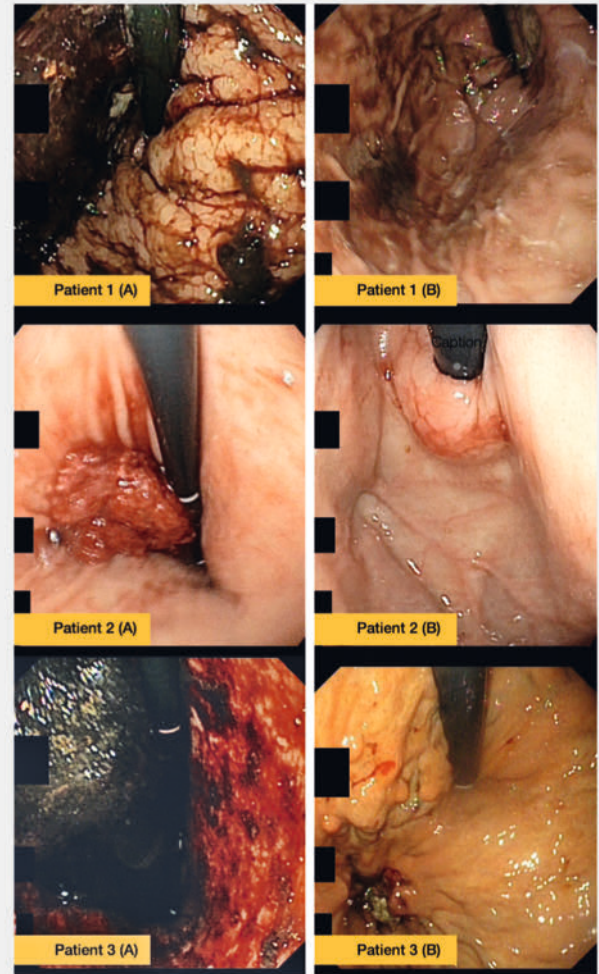
► Table 1 Source of bleeding identified on EGD in primary position with fundal pool of blood (n = 44).

EGD findings	Patients N (%)
Total patients with identified source of bleeding	37 (84%)
Esophageal varices	29 (66%)
Gastric ulcers	4 (9.0%)
Duodenal ulcers	2 (4.5%)
Mallory Weiss tear	2 (4.5%)
Source not identified	7 (16%)

EGD, esophagogastroduodenoscopy.



► **Fig. 3** Flowchart of study participants.



► **Fig. 4** Corresponding images of gastric fundus in **a** primary left lateral decubitus and **b** secondary left lateral semi-recumbent position.

► **Table 2** EGD findings in left lateral semi-recumbent position.

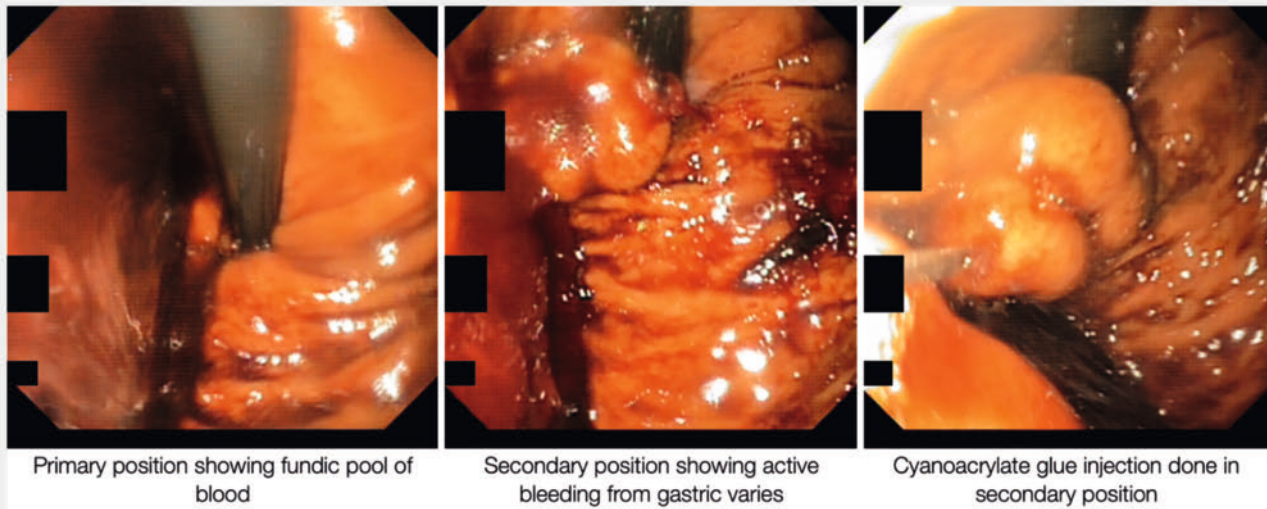
Outcome in secondary position	Number of patients
Adequate visualization of fundus in all patients (n = 44)	44 (100%)
Source of bleeding identified in those with non-identification of source in primary position (n = 7)	7 (100%)
Additional source of bleeding identified in those with identified source in primary position (n = 37)	5 (13.6%)

EGD, esophagogastroduodenoscopy.

► **Table 3** Details of identified sources of bleeding, identified only in left lateral semi-recumbent position (n = 12).

EGD findings	Number of patients (N = 12)
Gastric varices (gastroesophageal varices Type1)	3
Gastric varices (gastroesophageal varices Type2)	2
Gastric varices (isolated gastric varices Type 1)	3
Dieulafoy lesion in cardia	2
Cameron ulcers	1
Fundic growth	1

EGD, esophagogastroduodenoscopy.



► **Fig. 5** Corresponding images of gastric fundus shown in primary (left lateral decubitus) and secondary (left lateral semi-recumbent) position with successful endotherapy done in the secondary position.

Outcome of endoscopy in the secondary position

After changing patient position to left lateral semi-recumbent, the fundal pool of blood was displaced in all 44 patients (100%), making adequate visualization feasible. A new or additional source of bleeding could be identified in 12 patients (27%). The source of the bleeding could be identified in all seven patients (100%) who did not have a source localized in the primary position. In addition, a second source of bleeding could also be identified in five of 37 patients (13.6%) who already had one localized in the primary position. The source of the bleeding identified in the secondary position was localized to gastric fundus (10/12) and gastric cardia (2/12). Of these patients, active bleeding in the form of sputter and ooze was seen in 10 patients (6 gastric varices, 2 Dieulafoy lesion, 1 Cameron ulcer, 1 fundic growth). Appropriate endotherapy (cyanoacrylate glue injection in 6 and Hemoclip application in 4 patients) was successfully done in the secondary position with 100% technical success. Two patients with Type 1 gastroesophageal varices without bleeding from gastric varix underwent esophageal variceal band ligation. ► **Fig. 5** shows gastric varices in both positions and successful cyanoacrylate glue injection in the secondary position.

There was no secondary source of bleeding in 32 patients after adequate examination of the fundus. Among them, 14 patients had active bleeding (9 esophageal varices, 2 gastric varices and duodenal ulcers each and one Mallory Weiss tear) leading to continuous collection of blood in the fundus. Changing position in this group of patients led to continuous shifting of blood out of the fundus due to gravity, thus facilitating proper visualization. The rest of the 18 patients had collected blood and clots in the fundus which were effectively displaced with a change in position. Appropriate endotherapy in all 32 patients was carried out in the left lateral semi-recumbent position, with 100% technical success.

The mean hospital stay for 44 patients was 5.6 days (SD= 2.4; range 3 to 12). The mean number of packed blood transfused was 2.4 units (SD= 1.2; range 1 to 6). Of 44 patients, three (6.8%) had recurrence of gastrointestinal bleeding. In one patient, a second session of endotherapy controlled the bleeding source, whereas another two patients required balloon-occluded retrograde transvenous obliteration and digital subtraction angiography with coil embolization after failure of two sessions of endotherapy. Overall mortality during the index presentation was seen in two of 44 patients (4.5%), although there was no bleeding or aspiration-related mortality.

Discussion

In our study 44 patients (5.11% of total patients presenting with acute upper gastrointestinal bleeding) had a fundal pool of blood leading to incomplete examination. A similar study based on a national ASGE survey of acute upper gastrointestinal bleeding reported inadequate examination in 5.6% of patients due to presence of fundic blood [4]. Dagradi et al also reported inadequate removal of blood in 5.4% of patients with acute upper gastrointestinal bleeding [6]. In the study by Cotton et al, excessive blood in the stomach precluded adequate examination in 4% of patients [7]. Our data also show a similar proportion of patients, whereas the study by Stollman et al. shows a higher rate of 13% having an uncleared fundal pool, which as attributed to limited healthcare access.

Complete clearance of blood and clots is an essential prerequisite for effective endoscopic evaluation. Among various modalities, use of prokinetics and gastric lavage have been widely studied. Prokinetics such as erythromycin and metoclopramide have shown to increase gastric emptying and improve visualization in acute upper gastrointestinal bleeding. Erythromycin use has been associated with adequate visualization, less

need for second look endoscopy, and shorter hospital stay but without any benefit in blood transfusion requirement, endoscopy duration, or need for emergency surgery [8, 9]. In our hospital, erythromycin is not given routinely due to unavailability and adverse effects. Rather, IV metoclopramide 10 mg was used in all patients 30 to 60 minutes prior to the procedure. NGT lavage has shown a shorter time to endoscopy but without any benefit in mortality reduction, length of hospital stay, surgery, or transfusion requirement [10, 11, 12]. In the absence of any clinical benefit and as recommended, our patients did not receive NGT lavage prior to the procedure. Apart from these, flushing with water and suctioning out blood or retrieval of clots are other methods used to clear collected fundic blood. However, the dependent position of the fundus in the left lateral decubitus position acts as a hindrance, with continuous pooling into the fundus in those with active bleeding. In addition, in patients with remotely collected blood, en bloc or piecemeal retrieval increases the procedure duration and risk of aspiration. Moreover, larger-channel gastroscopes and flushing pumps may not be available at every peripheral center. Hence, intragastric displacement of pooled content by changing the position of the fundus into non-dependent position can be adapted primarily or after failure of endoscopic clearance to achieve desired visualization.

The standard position for EGD is left lateral decubitus and rarely the supine position in patients with neurological or mobility issues [13]. This is the first study to evaluate the utility of a non-standard left lateral semi-recumbent position to improve visualization of the stomach by displacing the uncleared fundal pool. We found 100% technical success with complete fundus visualization. Fundic sources of bleeding were identified in 27% of patients, whereas in the rest, the fundus was not found to be a secondary source. We also achieved 100% technical success with endotherapy for all fundic and non-fundal sources of bleeding in this secondary position. Further, it was noticed that even for endotherapy in the lower esophagus and gastroesophageal junction (endoscopic variceal ligation and Hemoclip application), the semi-recumbent position was helpful. In the presence of active bleeding from the lower esophagus, it displaced blood instantly into the stomach as a result of gravity, hence maintaining a clear field of vision.

In the study by Stollman et al., an uncleared fundal pool was shown to affect overall clinical outcomes, with 54% of patients having recurrent upper gastrointestinal bleeding during the index hospitalization [5]. Dagradi et al. also reported recurrent bleeding in 20% of patients with inadequate endoscopic examination [6]. In our study with complete visualization by use of a secondary position, the clinical success rate was 94% after index endoscopy with a rebleeding rate of 6%. Other studies have also shown rebleeding rates of 10% to 15% [14, 15, 16] for variceal and 10% to 20% [17, 18] for non-variceal bleeding with endotherapy, which is more comparable to our mixed cohort. This shows the impact of the left lateral semi-recumbent position in achieving single-session complete examination, which in turn impacts overall clinical outcome.

The limitations of this study are the small sample size from a single center. With respect to NGT lavage, there was non-uni-

formity because we had many referred patients from other peripheral centers. Although none received lavage at our center prior to the procedure, one-third of patients already had NGT drainage in place before presenting to us.

Because the visibility of the fundus is comparable in both the positions, routine examination of all patients in the left lateral semi-recumbent position may not be of any additional yield. We adapted this position only in the cohort of patients with an uncleared fundal pool of blood. Even in these patients, it is prudent to complete a thorough examination of rest of the part before switching to the secondary position, unless an active source of bleeding is visible in the fundus or cardia and urgent endotherapy is impaired due to actively collecting blood.

Conclusions

In conclusion, this study provide evidence that by changing position during EGD from left lateral decubitus to left lateral semi-recumbent, complete examination and endoscopic hemostasis is feasible with high technical and clinical success rates. Further randomized studies combining various modalities to improve endoscopic visualization are necessary. Also, the utility of this non-standard position for other indications such as endoscopic resection of lesions in the cardia and fundus needs to be explored.

Conflict of Interest

The authors declare that they have no conflict of interest.

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