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Articulation of Single-Use and Reusable Therapeutic Gastroscopes

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Introduction: Innovation in new therapeutic gastroscopes (TGs) has been relatively dormant after the discontinuation of the large-channel gastroscope (GIF-XTQ160) in the United States (US). This left a need for scopes that can safely and efficiently navigate and suction fluids and blood from the upper gastrointestinal tract. With a new single-use therapeutic gastroscope (SUTG) with a 4.2mm working channel (WC), this study sought to compare the potential navigation abilities of the pre-market SUTGs versus reusable therapeutic gastroscopes (RUTG).
Methods: The articulation of 2 RUTGs (3.7mm WC) with varying service histories were compared to 2 SUTGs (4.2mm WC) with and without the presence of tools (injection needle, biopsy forceps, and 10-Fr bipolar probe) in the WC. Each TG was clamped to a board and flexed forward and backwards where the maximum sustained angle was measured.
Results: The results indicate that on average, SUTGs have superior articulation compared to RUTGs for all tool states. SUTGs had increased retroflexion by 28.9% (168.5 vs. 237.0) without the presence of tools and over a 30% increase with tools (30.1% with injection needle, 28.7% with biopsy forceps, 35.0% with 10-Fr bipolar probe). SUTGs also had substantial improvement in forward flexion, with a 46.6% (78.5 vs 147.0) increase without tools and similar increase with the presence of tools (46.4% with injection needle, 47.8% with biopsy forceps, and 47.0% with 10-Fr bipolar probe).
Conclusion: With a new SUTG, it is important to understand performance differences. Overall, RUTGs have reduced articulation (backwards and forwards) from the manufacturer specifications which list the scopes retroflexion at 210 degrees (we found a max of 168.5) and forward at 90 degrees (we found a max of 78.5), likely due to daily deterioration during use and reprocessing while SUTGs have superior articulation to better access and treat critical patients (see Table 1).

Table 1. Articulation of Therapeutic Gastroscopes

Articulation of Therapeutic Gastroscopes (in degrees)						
	GIF-1TH190	aScope Gastro Large	Difference	GIF-1TH190	aScope Gastro Large	Difference
	Backwards Articulation (Retroflexion)			Forwards Articulation		
Tool	Avg (scope [1], scope [2])	Avg (scope [3], scope [4])		Avg (scope [3], scope [4])	Avg (scope [3], scope [4])	
None	**168.5** (162, 175)	**237.0** (232, 242)	**28.9%**	**78.5** (75, 82)	**147.0** (150, 144)	**46.6%**
Injection Needle	**163.5** (157, 170)	**234.0** (228, 240)	**30.1%**	**74.5** (74, 75)	**139.0** (148, 130)	**46.4%**
Biopsy Forceps	**165.5** (157, 174)	**232.0** (226, 238)	**28.7%**	**71.0** (62, 80)	**136.0** (143, 129)	**47.8%**
Gold Probe	**153.5** (147, 160)	**236.0** (231, 241)	**35.0%**	**70.0** (63, 77)	**132.0** (136, 128)	**47.0%**

[1]Olympus GIF-1TH190, 2016, Last Repair May 2018.
[2]Olympus GIF-1TH190, 2018, No Repairs.
[3]Ambu aScope Gastro Large, New.
[4]Ambu aScope Gastro Large, New.

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Number of Biopsies Taken for Celiac Disease Is Associated With Specialty and Centre: A Quality Review

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Introduction: Duodenal mucosal biopsy is the gold standard for the clinicopathological diagnosis of celiac disease. Given that the disease can be patchy, multiple endoscopic biopsy samples (minimum 2 from duodenal cap and 4 from mid to distal portion) are recommended for histopathology assessment to support or exclude the diagnosis. The aim was to assess the number of endoscopic duodenal biopsies obtained from patients with a clinical suspicion for celiac disease and explore factors associated with postulated biopsy number variability.
Methods: Retrospective review of all duodenal biopsy cases obtained in 2023 from adult patients (18 years of age and older) undergoing upper gastrointestinal (GI) endoscopy performed at 2 academic and 3 community hospitals by gastroenterologists and surgeons. Pathology assessment of all cases was completed at one academic hospital pathology laboratory and reported by one of several GI subspecialty pathologists. Individual pathology reports were reviewed for patient age, endoscopist (including specialist type), procedure location, clinical indication for endoscopic examination, duodenal biopsy number and biopsy location (duodenal cap; mid to distal portion), total duodenal biopsy number, and pathology diagnosis. Cases with neoplastic disease were also excluded from analysis. Statistical analysis included descriptive statistics and comparison of means through student t test and ANOVA.
Results: One thousand one hundred and sixty patients had duodenal biopsies performed during the study period. The mean age was 58.7 (17.7) years. Thirty-four individual endoscopists from 5 hospitals were part of the cohort; 48.4% of samples were submitted by surgeons. When all duodenal biopsies were considered, the mean number of biopsies taken were 3.42. Gastroenterologists submitted a higher mean number of biopsies than surgeons - 4.14 (1.35) versus 2.65 (1.35) ($P< 0.001$). Differences were also seen when hospitals were compared, with one hospital having the highest mean number at 4.11 (1.4) ranging down to the lowest at 2.5 (1.57) ($P< 0.001$). When only duodenal biopsies submitted with the question "rule out celiac disease" were considered (n=833 patients), results were similar.
Conclusion: This study shows that duodenal biopsy patterns are not meeting standards, even when specifically assessing for celiac disease, with differences seen between centres and specialties. Next steps will include targeted interventions to attempt to correct.

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Does Taking More Endoscopic Images Impact Adenoma Detection? A Quality Improvement Initiative at Our Tertiary Hospital

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Introduction: Endoscopic photo documentation (EPD) is vital for quality control and communication between providers, patients, and family members. The European Society of Gastrointestinal Endoscopy recommends documentation of 9 anatomical landmarks during colonoscopy. American Gastroenterology Association recommends that the cecal landmarks (appendiceal orifice and ileocecal valve) should be photo documented. We aim to study the impact of education about endoscopic photo documentation on adenoma detection amongst trainees.
Methods: We carried out a retrospective study analyzing the data collected over a 4-month period (July to August 2023 noted as PRE-education and September and October 2023 noted as POST-education). We reviewed the data related to screening colonoscopies images including the landmarks and adenoma detection for 2 months noted as PRE-education data. Subsequently, all the 9 GI fellows at our tertiary hospital were educated on endoscopic photo documentation based on ESGE guidelines. Reference cards with images were distributed and posted on monitor screens in all procedure rooms. A review of colonoscopy data over the next 2 months noted as POST-education period. The data was analyzed using Chi square and independent t-test for categorical and quantitative data, respectively.
Results: Seven hundred and eighty-one colonoscopy procedures were recorded, with 339 PRE education and 442 POST education. The increase in the mean total number of images obtained was statistically significant (PRE 10.82 + 4.15 vs. POST 12.69 + 4.50, *P* value 0.0001). As compared between PRE and POST analysis, improvements were statistically significant in all, but 2 categories (cecum/appendiceal orifice and retroflexed view of rectum). Adenoma detection was analyzed for screening colonoscopies only (n=435, PRE: 208 and POST: 227). Mean age was comparable between the 2 groups (56.6 ±8.8 vs 56.1 ±9.0

S1041

The Impact of Hospital Size on the Outcomes of Patients Admitted with Esophageal Variceal Bleeding

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Introduction: Esophageal variceal bleeding (EBV) is a potentially serious complication of portal hypertension, often causing significant illness and death in patients with cirrhosis. Studies has shown that 25 to 40% of patients with esophageal varices will suffer severe bleeding. We aim to determine impact of bed size of the admitting institution in outcomes of patients presenting with (EBV).
Methods: We conducted a retrospective analysis of all adult patients admitted with a primary diagnosis of esophageal varices with bleeding (identified by ICD-10 codes) in 2020 that were included in the National Inpatient Sample database. Patients were divided into three groups based on bed size of the admitting institution. In-hospital mortality, length of hospital stay, and in-hospital complications were compared among groups. Multivariate logistic analysis was conducted to adjust for confounders.
Results: A total of 42,119 patients admitted with EBV in 2020 were identified. Of those, 17.2% were admitted to small bed size hospitals (SB), 28% to medium size bed hospitals (MB), and 54.8% to large bed size hospitals (LB). There was no statistically significant difference in age, gender, and race among groups. Majority of patients were white (SB 63.5%, MB 65.7%, LB 64.9%), male (SB 64.75, MB 62.4%, LB 61.7%), had Medicare (SB 37.3%, MB 36.7%, LB 36.9%), and were admitted to urban hospitals (SB 99.2 %, MB 97.5 %, LB 93.8 %). There was no significant difference in comorbidities between groups, except for EtOH use, significantly lower in the LB group. In-hospital mortality and length of hospital stay were significantly higher in the LB group. Regarding in-hospital complications, there was no significant difference in the incidence of SIRS, sepsis, cardiac arrest, need for pressor support, hepatic encephalopathy or need for tracheostomy between groups, but significantly higher incidence of shock, paralytic ileus, AKI, pleural effusion, venous thromboembolism, and requirement of ICU admission, mechanical ventilation, parenteral nutrition, and TIPS placement in the LB group was noticed.
Conclusion: In patients admitted for esophageal variceal bleeding, the mortality, length of stay, and incidence of most in-hospital complications is significantly higher in patients admitted to large bed size institutions compared to those admitted to smaller size hospitals, when adjusting for confounders. This could be related to more complex patients being referred to larger institutions seeking a higher level of care (see Table 1).

Table 1. Patient Comorbidities, In-hospital Complications, and In-hospital Mortality (all values expressed as percentages)

	Small bed size	Medium bed size	Large bed size	P value
Died while in the hospital	3.8	5.7	6.8	< 0.01
Lenght of stay > 5 days	34.3	37.9	44.2	< 0.01
Type 2 DM	31.8	33.1	31.9	0.57
Systolic heart failure	2.5	2.2	2.9	0.27
EtOH use	49.6	49.5	44.5	< 0.01
Tobacco use	1.2	0.6	0.8	0.23
Cannabis use	2.6	2.9	2.8	0.76
Opiate abuse	2.2	2.7	2.2	0.44
CKD stage IV	2.2	1.6	1.9	0.52
CKD stage V and ESRD	3.9	3.6	4.1	0.69
Chronic HBV	0.9	1.3	1.0	0.49
Chronic HCV	7.1	7.5	7.9	0.60
Hepatocellular carcinoma	4.6	4.5	5.2	0.37
MASLD/MASH	14.5	15.6	17.6	0.03
Alcoholic liver disease	61.9	61.3	59.0	0.11
IN-HOSPITAL COMPLICATIONS				
SIRS	1.1	2.0	4.3	0.21
Sepsis	0.5	1.1	2.5	0.04
Shock	1.6	2.9	6.8	< 0.01
Cardiac arrest	0.2	0.4	0.5	0.32
Pressor support	0.2	0.	1.1	0.03
Paralytic ileus	0.2	0.6	1.5	< 0.01
Parenteral nutrition	0.2	0.2	0.8	< 0.01
Mechanical ventilation	1.4	2.8	6.7	< 0.01
ICU admission	2.9	5.4	11.9	< 0.01
Acute Kidney Injury	4.9	8.3	18.4	< 0.01
Pleural effusion	4.1	5.0	7.0	< 0.01
Venous thromboembolism	2.4	2.2	3.5	< 0.01
Tracheostomy placement	0.1	0.	0.3	0.54
Hepatic encephalopathy	8.8	8.4	8.3	0.86
TIPS placement	0.9.01	2.2	2.7	< 0.01

S1042

Single-Use vs Reusable Therapeutic Gastroscope Suctioning Ability

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Introduction: Therapeutic gastroscopes (TGs) (≥ 3.7mm working channel (WC)) must be able to efficiently suction fluids and blood from the upper gastrointestinal tract to maximize patient safety. Innovation in this technology has remained relatively stagnant until recently with the creation of the first single-use (SU) TG with a 4.2mm WC. This study sought to compare the suctioning abilities of the SUTG versus reusable (RU) TGs currently being produced and available in the United States.
Methods: Two RUTGs (Olympus GIF-1TH190) and two SUTGs (Ambu aScope Gastro Large) were used to measure the time required to suction 500ml of a guar gum solution imitating the viscosities of blood (3.5 centipoise (cP)) and clotted blood (35 cP) with and without the presence of tools (10-Fr injection gold probe and resolution clip). One of the RUTGs (#1) was currently in use at a hospital and has been

serviced only by Olympus. The guar gum solution was mixed and tested before each trial with a NDJ-5S Rotary Viscometer to ensure consistency. For each trial, the endoscope distal tip was placed at the 100ml of the graduated cylinder. Before each trial, each TG suctioned 250 ml of fresh water and received a new biopsy valve.

Results: For all scenarios, both SUTGs suctioned 500ml of fluid more efficiently than the RUTGs. The full results can be found in Table 1. The RUTGs were not able to successfully suction 500ml of the 35 cP fluid with the 10-Fr gold probe inserted in the WC. A one-minute volume test was performed for all scopes with the 10-Fr gold probe at both 3.5 and 35 cP. In these scenarios, the SUTGs on average suctioned 11.5x more 3.5 cP solution than the RUTGs and 25.6x more 35 cP solution than the RUTGs.

Conclusion: This study indicates that the Ambu aScope Gastro Large's suctioning is more efficient and consistent than an industry leading RUTG, as seen by the substantial difference in time required to suction under the same parameters. This superiority may allow for increased patient outcomes and procedural efficiencies to occur given the faster evacuation times and in the case of the gold probe, allow for suctioning with the tool inserted. Although endoscope companies claim that reusable endoscopes will be "like new" after repairs (if done by the manufacturer, such as with Endoscope #1), the variability seen with the RUTGs highlights the need for further research with a larger sample of reusable scopes at different ages to better understand variability in reusable scopes.

Table 1. Therapeutic gastroscope suction results

Suction Results Tool	Viscosity (cP)	GIF-1TH190 #1	GIF-1TH190 #2	aScope Gastro #1	aScope Gastro #2	GIF-1TH190 Average	aScope Gastro Large Average	Δ Average: Reusable vs. Single-use
Time to suction 500ml of fluid (mm:ss)								
None	3.5	00:37.3	00:59.3	00:21.9	00:23.5	00:48.3	00:22.7	00:25.6
	35	01:17.2	01:37.2	00:40.7	00:41.1	01:27.2	00:40.9	00:46.3
Resolution Clip	3.5	01:24.7	01:34.6	00:34.2	00:40.8	01:29.7	00:37.5	00:52.2
	35	06:34.8	06:52.5	01:44.5	01:52.4	06:43.6	01:48.5	04:55.2
Gold Probe*	3.5	16:03.5	NA	01:09.3	00:41.1	16:03.5	00:55.2	15:08.3
	35	NA	NA	04:35.8	04:31.3	NA	04:33.6	NA
60-second Flow Amount with 10 Fr Gold Probe (ml)								
Gold Probe	3.5	37	35	400	430	36	415	-379
	35	4	5	130	125	5	128	-123

*N/A indicates where the gastroscope was unable to suction 500ml of solution.

S1043

Therapeutic Potential of Thalidomide in AVM-Related Gastrointestinal Bleeding: A Systematic Review

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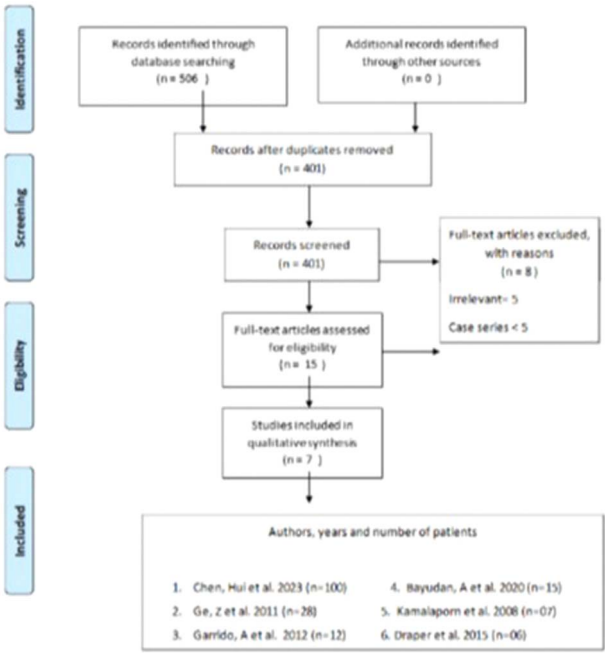
Introduction: The arteriovenous malformation (AVM) of the Gastrointestinal (GI) tract is the leading cause of occult GI bleeding and iron deficiency anemia, especially in older patients (> 50 years). Treatment of AVM-related GI bleeding could be challenging due to its location and recurrence. Different pharmacological and endoscopic treatment modalities are being utilized in this difficult-to-treat condition with limited success. We have conducted a systematic review to summarize and analyze the clinical efficacy of thalidomide in AVM-related GI bleeding.

Methods: We performed a literature search on four databases (PubMed, Embase, Scopus, and CINAHL) using MeSH terms "Angiodysplasia" AND "Thalidomide" from inception to 16 February 2024. After running the first and second screening of the data results by two independent authors in line with Preferred reporting items for systematic reviews and meta-analysis (PRISMA) guidelines. For our data generation and analysis, we selected two retrospective randomized control trials, two prospective randomized control trials, two case series (> 5 or more cases), and one open-labeled randomized control trial. (Figure 1).

Results: We selected seven studies. (Table 1). The total number of participants was 248. The median age was 63.5 years, and 35% (n=85) were males. The AVM was diagnosed by endoscopy/Colonoscopy or push enteroscopy. Primary outcomes and response rates were defined differently in all studies (Table 1). The highest response, 84%, in the form of blood transfusion reduction was reported by Bayudan et al. Similarly, in a randomized trial, Chen et al. Showed that 68.6% (n=35/51) of the participants getting 100 mg of thalidomide had reduced bleeding episodes; similarly, 51% (n=25/49) of patients who were treated with 50 mg of thalidomide also had decreased bleeding episodes. The lowest response rate in blood transfusion was reported by Kampalaporn et al. at 43%. As reported in most studies, common side effects were fatigue, constipation, rash, and neuropathy. Side effects did improve with a reduction in dose or cession of medication.

Conclusion: Thalidomide could potentially decrease bleeding episodes in recurrent GI bleeding from AVM.



[1043] **Figure 1.** Thalidomide role in Arteriovenous malformation related Gastrointestinal bleeding.