International Journal of Gerontology 20 (2026) 61–66
https://doi.org/10.6890/IJGE.202601_20(1).0010

International Journal of Gerontology

journal homepage: http://www.sgecm.org.tw/ijge/

Original Article

Positive Computed Tomography Angiography in Elderly Patients with Gastrointestinal Bleeding in Emergency Room

Chak-Lam Cheung [a,b], Tse-Hao Chen [a,c *], Ruei-Hsi Chang [d]

[a] *Department of Emergency Medicine, MacKay Memorial Hospital, Taipei, Taiwan,* [b] *Master Program in Transdisciplinary Long-term Care and Management, National Yang Ming Chiao Tung University - Yangming Campus, Taipei, Taiwan,* [c] *Graduate Institute of Injury Prevention and Control, Taipei Medical University, Taipei, Taiwan,* [d] *Department of Biomedical Engineering, National Yang-Ming University School of Medicine, Taipei, Taiwan*

ARTICLE INFO

Accepted 16 May 2025

Keywords:
gastrointestinal hemorrhage,
computed tomography angiography,
aged

SUMMARY

Background: Acute gastrointestinal bleeding (GIB) represents a major challenge in elderly patients, and computed tomography angiography (CTA) can facilitate diagnostic tests for the detection of the source of GIB. We aimed to evaluate the outcomes of elderly patients with GIB who had positive CTA findings.
Methods: A 6-year retrospective review was conducted on elderly patients (aged ≥ 65 years) who underwent CTA for GIB. The patients were assigned to the positive and negative CTA groups. The clinical characteristics, treatment strategies, and outcomes were comparatively analyzed between the groups.
Results: Among 306 patients, 88 (28.8%) showed positive CTA findings. Blood transfusion (packed red blood cells [PRBC] > 4 U) and coagulopathy were statistically significantly different between the two groups. Treatment approaches varied based on the bleeding origin, with endoscopy, transarterial embolization (TAE), and conservative management being the primary modalities. Five (5.7%) patients in the CTA-positive group died despite receiving treatment, mostly due to late complications rather than due to uncontrolled bleeding.
Conclusion: Elderly patients with GIB who exhibited coagulopathy and required blood transfusion (PRBC > 4 U) are at an increased risk for positive CTA. The management strategies varied based on the bleeding origin. Despite the successful control of bleeding in most cases, mortality was primarily due to late complications, such as infections and organ failure, rather than due to persistent hemorrhage.

1. Introduction

Acute gastrointestinal (GI) bleeding (GIB) poses significant challenges in diagnosis and treatment opening to its potentially life-threatening nature. The overall mortality ranges from 8% to 16%, but can reach 40% depending on age, presence of comorbid disease, and the severity of hemorrhage.[1] Rapid identification of the source of bleeding is therefore crucial in strategizing the appropriate treatment. Several available diagnostic methods including endoscopy, technetium-99m (^{99m}TC)-labeled red blood cell (RBC) scintigraphy, computed tomography angiography (CTA), and catheter angiography (CA) can be used to confirm the source of GIB. Each of these approaches has its strengths and limitations, which makes it crucial to consider the various factors during the determination of the most suitable diagnostic and treatment plan.[2] The advent of CTA has demonstrated promise owing to its high scanning speed and the, better localization of the bleeding sources.[3] The American College of Gastroenterology suggests CTA as an initial diagnostic test in patients with ongoing hemodynamically significant bleeding.[4] Another study has suggested that CTA can serve as an effective first-line diagnostic test for the detection of the locations of GIB.[5]

GIB represents a major clinical challenge in elderly patients and, despite the improvement of related medical, endoscopic, and surgical treatments, it continues to be burdened by high mortality and disability rates that increase with increasing age.[6] Elderly patients with positive CTA (i.e., active extravasation of contrast material within bowel lumen, abnormal bowel mucosal enhancement, vascular malformation, abnormally enhancing polyp or diverticulum, or tumor) often require further interventions, which may include medical treatment, endoscopic hemostasis, CA with embolization, or surgery.[7] The present study aimed to determine the outcome of elderly patients with GIB who also have positive CTA.

2. Materials and methods

2.1. Study design

A retrospective review of medical records was performed for all elderly patients (age ≥ 65 years) with GIB who underwent CTA as the first-line diagnostic test to detect active bleeding and the location of GIB at the MacKay Memorial Hospital from January 2015 to December 2020.

For each of the elderly patients, the following data were recorded and analyzed: gender, unstable vital signs (SBP < 100 mmHg, heart rate > 100/min), and comorbidities (including diabetes mellitus [DM], hypertension, cardiovascular disease, cerebrovascular accident [CVA], chronic renal disease, chronic liver disease, chronic

* Corresponding author. Department of Emergency Medicine, MacKay Memorial Hospital, No. 92, Sec. 2, Zhongshan N. Rd., Taipei City 10449, Taiwan.
E-mail address: joichenid@gmail.com (T.-H. Chen)

pulmonary disease, and malignancy), diseases related to GIB (including peptic ulcer disease, gastroesophageal reflux disease [GERD], esophageal varices, inflammatory bowel disease, diverticulosis, angiodysplasia, and GI tract malignancy), the use of antiplatelet agent or anticoagulation agent, coagulopathy (INR > 1.5), blood transfusion (PRBC > 4 U within 24 h), treatment, and mortality.

Based on the CTA results, patients with positive findings (such as active extravasation of contrast material within the bowel lumen, abnormal bowel mucosal enhancement, vascular malformation, abnormally enhancing polyp or diverticulum, or tumor) were further assigned to the following four groups based on the source of bleeding: upper GI, small bowel, colon and rectal groups).

For patients in each group, the following parameters were recorded and analyzed: the treatment strategy, including conservative treatment (such as intravenous fluid replacement, proton pump inhibitor (PPI) injection, and tranexamic acid injection), endoscopic intervention, angiographic intervention (transarterial embolization, TAE), surgery, and mortality.

This study was approved by the MacKay Memorial Hospital Institutional Review Board (21MMHIS2009e), which waived off the requirement for informed consent.

2.2. Statistical analysis

Elderly patients were assigned to the positive and negative CTA groups. Continuous variables were presented as the mean and standard deviations, tested using the Mann-Whitney U-test; categorical variables were presented as the count and percentages, tested using Fisher's exact Tests. Two-sided analyses were performed and evaluated at the 0.05 level of significance. All statistical analyses were performed using IBM SPSS statistical software version 22 for Windows (IBM Corp., Armonk, New York, USA).

3. Results

A total of 306 elderly patients participated in this study. All patients underwent CTA as the first-line diagnostic test to detect any evidence of active bleeding and the source of GIB. Of these, 218 elderly patients with GIB were assigned to the negative CTA group and 88 to the positive CTA group (Figures 1 & 2). The positive rate of CTA in elderly patients with GIB was 28.0%. The patients' gender and clinical characteristics are shown in Table 1. No difference was noted in the gender between the two groups. Only 22 (10%) patients in the CTA-negative group and 4 (4.5%) in the CTA-positive group presented with hematemesis. Most of the patients in the CTA-negative group (206, 94.5%) and the CTA-positive group (85, 96.6%) presented with bloody stool. Moreover, 102 (46.8%) patients in the CTA-negative group and 50 (56.98%) in the CTA-positive group showed unstable vital signs. Furthermore, 146 (67%) patients in the CTA-negative group and 63 (71.6%) in the CTA-positive group had a history of hypertension. Also, 75 (34.4%) patients in the CTA-negative group and 34 (38.6%) in the CTA-positive group had a history of DM. In addition, 99 (45.4%) patients in the CTA-negative group and 48 (54.5%) in the CTA-positive group had a history of CVA. We also found that 13 (6%) patients in the CTA-negative group and 4 (4.5%) in the CTA-positive group had a history of chronic pulmonary disease; 42 (19.3%) in the CTA-negative group and 23 (26.1%) in the CTA-positive group had a history of chronic kidney disease; 38 (17.4%) patients in the CTA-negative group and 16 (18.2%) in the CTA-positive group had a history of CVA; 50 (22.9%) in the CTA-negative group and 11 (12.5%) in the CTA-positive group had a history of malignancy; 55 (25.2%) in the CTA-negative group and 28 (31.8%) in the CTA-positive group used an antiplatelet agent. Only 27 (12.4%) patients in the CTA-negative group and 15 (17%) in the CTA-positive group used an anticoagulation agent; 73 (33.5%) patients in the CTA-negative group and 47 (53.4%) in the CTA-positive group needed blood transfusion (PRBC > 4 U). Coagulopathy was detected in 7 (3.2%) patients of the CTA-negative group and 12 (13.6%) patients of the CTA-positive group.

For diseases related to GIB, 44 (20.2%) patients in the CTA-negative group and 15 (17%) in the CTA-positive group had a history of peptic ulcer disease; 17 (7.8%) patients in the CTA-negative group and 3 (3.4%) in the CTA-positive group had a history of GERD; 1 (0.5%) patient in the CTA-negative group and 1 (1.1%) in the CTA-positive group had a history of esophageal varices; 1 (0.5%) patient

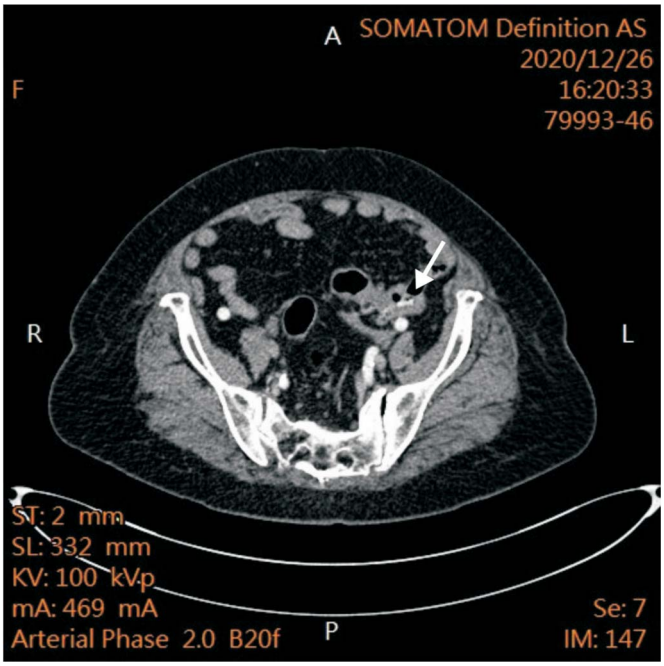

Figure 1. CTA revealed contrast extravasation within sigmoid colon during artery and delay phase.

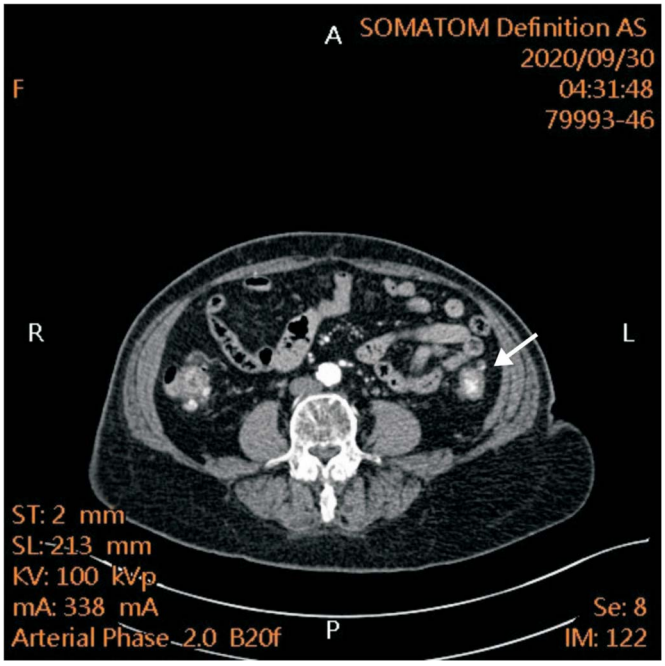

Figure 2. CTA revealed contrast extravastion in descending colon with some contrast within nearby diverticulum.

Table 1
Clinical characteristics of participants.

Variable	Elderly patients with negative CTA (n = 218)	%	Elderly patients with positive CTA (n = 88)	%	p
Sex					0.827
M	112	51.4	44	50	
F	106	48.6	44	50	
Hematemesis	22	10.1	4	4.5	0.084
Bloody stool	206	94.5	85	96.6	0.556
Unstable vital sign	102	46.8	50	56.8	0.112
Hypertension	146	67	63	71.6	0.432
Diabetes mellitus	75	34.4	35	38.6	0.484
Cardiovascular disease	99	45.4	48	54.5	0.148
Cerebrovascular accident	38	17.4	16	18.2	0.876
Chronic renal disease	42	19.3	23	26.1	0.184
Chronic liver disease	18	8.3	7	8	0.930
Chronic pulmonary disease	13	6	4	4.5	0.426
Malignancy	50	22.9	11	12.5	0.039
Use of antiplatelet agent	55	25.2	28	31.8	0.257
Use of coagulation agent	27	12.4	15	17	0.409
Blood transfusion (PRBC > 4U)	73	33.5	47	53.4	0.001
Coagulopathy	7	3.2	12	13.6	0.001
Peptic ulcer disease	44	20.2	15	17	0.529
Gastroesophageal reflux disease (GERD)	17	7.8	3	3.4	0.122
Esophageal varices	1	0.5	1	1.1	0.493
Inflammatory bowel disease	1	0.5	0	0	0.712
Diverticulosis	17	7.8	9	10.2	0.490
Angiodysplasia	0	0	2	2.3	0.082
GI tract malignancy	24	11	2	2.3	0.007

Data are presented as number (%).
A p value < 0.05 was considered statistically significant.
CTA, computed tomography angiography; GERD, gastroesophageal reflux disease; GI, gastrointestinal; PRBC, packed red blood cells.

in the CTA-negative group and none in the CTA-positive group had a history of inflammatory bowel disease; 17 (7.8%) patients in the CTA-negative group and 9 (10.2%) in the CTA-positive group had a history of diverticulosis; 24 (11%) patients in the CTA-negative group and 2 (2.3%) in the CTA-positive group had a history of GI tract malignancy. No patient in the CTA-negative group and 2 (2.3%) in the CTA-positive group had a history of angiodysplasia.

For all elderly patients with GIB, the gender and clinical characteristics as well as the treatment imparted were analyzed. A statistically significant difference was noted between these two groups for malignancy (p = 0.039), blood transfusion (PRBC > 4 U) (p = 0.001), coagulopathy (p = 0.001), and GI tract malignancy (p = 0.007).

3.1. Positive CTA with upper GI origin

A total of 16 elderly patients presenting with a positive CTA had an upper GI origin (Table 2), and 9 (56.2%) patients were found to have a gastric ulcer with bleeding, while 7 (44.8%) patients showed duodenal ulcer with bleeding. All patients received pan-endoscopy after ER arrival. Nine (56.2%) patients who successfully received conservative treatment (i.e., tranexamic acid, PPI injection, and blood transfusion) after endoscopy showed confirmed gastric or duodenal ulcers with bleeding. Three (18.7%) patients underwent endoscopy (one with a significant amount of blood in the stomach, another with a gastric ulcer with active bleeding that could not be controlled by hemoclips, and another one with negative findings) presented with persistent bleeding. These patients were successfully treated with angiography and TAE. One (6.2%) patient underwent pan-endoscopy, which confirmed a gastric ulcer with bleeding and was accordingly treated with angiography and TAE. However, bleeding persisted despite these treatments, after which the patient was successfully treated with pan-endoscopy and epinephrine injection.

Table 2
Positive CTA with upper GI origin.

	CTA positive patients with upper GI origin (n = 16)
Pan-endoscopy	16 (100%)
Treatment post-pan-endoscopy	
Conservative treatment	9 (56.2%)
Endoscopic treatment	1 (6.2%)
Angiographic embolization	3 (18.7%)
Surgery	3 (18.7%)

Three (18.7%) patients with endoscopy-confirmed ulcers (one with a gastric ulcer and two with duodenal ulcers) and active bleeding underwent surgery (suture ligation) after failed angiography and TAE. One patient was successfully treated, while two patients expired — one due to sepsis and multiple organ failure and the other one due to respiratory failure — following surgery.

3.2. Positive CTA with small bowel origin

A total of 14 elderly patients presenting with a positive CTA had a small bowel origin (Table 3), 12 (85.7%) patients underwent angiography following a positive CTA finding; 8 (57.1%) patients showed positive angiographic findings and were successfully treated with TAE; and 4 (28.5%) patients had negative angiography findings. Three (21.4%) patients received conservative treatment, and their bleeding was successfully managed. One of these patients' bleeding subsided, but later developed consciousness impairment, sepsis, and, ultimately, passed away. One (7.1%) patient experienced persistent bleeding and was treated with jejunoscopy with argon plasma coagulation (APC); 2 (14.2%) patients did not undergo angiography after a positive CTA finding. One patient was successfully treated via

conservative management. Another patient experienced persistent bleeding and ultimately passed away despite receiving conservative treatment.

3.3. Positive CTA with colon origin

A total of 30 elderly patients presenting with a positive CTA had a colon origin; 14 (46.6%) patients had ascending colon origin, 4 (13.3%) had transverse colon origin, 5 (16.7%) had descending colon origin, 7 (23.3%) had with sigmoid colon origin) (Table 4). Moreover, 6 (20%) patients were successfully treated via conservative management; 21 (70%) underwent angiography after a positive CTA finding; 18 (60%) had positive angiography findings and their bleeding was successfully controlled by TAE. Furthermore, 3 (10%) patients who had negative angiographic findings, were successfully managed via conservative treatment. Two (6.6%) patients experienced persistent bleeding after positive CTA, which was successfully controlled by colonoscopy with hemoclips, and 1 (3.3%) patient was diagnosed with colon cancer and underwent radical colon resection.

3.4. Positive CTA with rectal origin

A total of 27 elderly patients presenting with a positive CTA were identified to have a rectal origin of bleeding (Table 5). Among these, 22 (81.4%) patients were successfully treated via conservative management, including tranexamic acid, PPI injection, blood transfusion, and foley balloon tamponade. One patient died after the bleeding subsided due to respiratory failure, while another (3.7%) patient experienced persistent bleeding, which was successfully controlled by angiography and TAE. In 2 (7.4%) patients, bleeding was successfully managed with colonoscopic treatment, specifically with hemoclips and APC respectively. In addition, 2 (7.4%) patients required surgical intervention, specifically suture ligation, to control the persistent bleeding.

3.5. Mortality

Five (5.7%) patients in the CTA-positive group with GIB died despite receiving various treatments (Table 6). Among them, two patients had an upper GI origin, two had a small bowel origin, and one had a rectal origin. Only one elderly patient with a small bowel origin died due to persistent bleeding. Two patients with upper GI origin died from sepsis and multiple organ failure. Another patient with a small bowel origin expired due to consciousness impairment and sepsis. The remaining patient, with rectal origin, died from respiratory failure.

4. Discussion

GIB in the elderly is associated with higher rates of morbidity and mortality when compared to that in the young. The aging process, an increased rate of comorbidity, and greater medication use contribute to the development of bleeding lesions and have an adverse impact on the outcome of GIB in the elderly.[8] Some risk factors are more commonly found in elderly patients, such as the use of antiplatelet and anticoagulation agents, concurrent comorbidity including DM, hypertension, heart disease, CVA, chronic renal disease, chronic liver disease, chronic pulmonary disease, malignancy, diseases related to GIB include peptic ulcer disease, GERD, esophageal varices, inflammatory bowel disease, diverticulosis, angiodysplasia, and GI tract malignancy could be associated with an increased risk of GIB.[6]

An initial assessment of elderly patients with GIB including history taking, physical examination, laboratory evaluation, and hemodynamic resuscitation should be performed simultaneously. Significant GIB has generally been considered as bleeding requiring transfusion of at least 4 U of blood within 24 h or inducing signs of hemodynamic instability and shock (systolic BP < 100 mmHg, heart rate > 100/min).[8]

Table 3
Positive CTA with small bowel origin.

	CTA positive patients with small origin (n = 14)
Angiography	
Positive angiographic finding	12 (85.7%)
Treatment post-positive angiography	8 (57.1%)
Transarterial embolization (TAE)	
Negative angiographic finding	8 (57.1%)
Treatment post-negative angiography	4 (28.5%)
Conservative treatment	3 (21.4%)
Endoscopic treatment	1 (7.1%)
No angiography	2 (14.2%)
Conservative treatment	2 (14.2%)

Table 4
Positive CTA with colon origin.

	CTA positive patients with colon origin (n = 30)
Conservative treatment without angiography	6 (20%)
Angiography	21 (70%)
Positive angiographic finding	18 (60%)
Treatment post-positive angiography	
Transarterial embolization (TAE)	18 (60%)
Negative angiographic finding	
Treatment post-negative angiography	3 (10%)
Colonoscopic with hemoclips	2 (6.6%)
Surgery	1 (3.3%)

Table 5
Positive CTA with rectal origin.

	CTA positive patients with rectal origin (n = 27)
Conservative treatment without angiography	22 (81.4%)
Angiography	
Positive angiographic finding	1 (3.7%)
Treatment post-positive angiography	1 (3.7%)
Transarterial embolization (TAE)	1 (3.7%)
Endoscopy treatment	2 (7.4%)
Surgery	2 (7.4%)

Table 6
Mortality of elderly CTA positive patients.

	CTA positive patients with GIB (n = 88)
Mortality	5 (5.7%)
Origin of GIB	
Upper GI origin	2
Small bowel origin	2
Colon origin	0
Rectal origin	1
Cause of death	
Persistent bleeding	1
Late complication after bleeding subsided sepsis and multiple organ failure	2
Consciousness impairment and sepsis	1
Respiratory failure	1

Multiple diagnostic modalities are available to localize the source of GIB. However, endoscopy is not consistently available on a 24-h basis in the emergency department and may not be suitable for all patients. Technetium-99m (99mTc)-labeled RBC scintigraphy is time-consuming and requires multiple imaging phases over an extended period to detect slow or intermittent bleeding, which makes it less ideal for acutely unstable patients who require rapid diagnosis and intervention.[9] Catheter-directed angiography, while capable of identifying and treating active bleeding, requires specialized personnel and equipment. Furthermore, the time required to perform the procedure may delay other critical interventions in patients experiencing active hemorrhage.[10]

CTA has become increasingly utilized in the evaluation of acute GI bleeding. When compared to other diagnostic modalities, CTA provides superior localization of the bleeding sites and fast results, although it may have a higher upfront cost and radiation dose. However, its rapid and precise diagnosis can reduce the need for additional procedures, which can potentially lower the overall costs in acute settings.[11]

The positive rate of CTA in patients with GIB varies across studies, ranging from approximately 9.8% to 61.3%, indicating variability in the detection of active bleeding based on different study parameters and patient characteristics.[12,13] However, the positive rate of CTA, specifically in elderly patients with GI bleeding has not been well addressed in the recent studies. In the present study, the positive rate of CTA in elderly patients with GI bleeding was 28%, which is higher than that recorded in the overall patient group with GI bleeding.

Elderly patients with GIB who underwent CTA as the first-line diagnostic test were assessed and their gender and clinical characteristics were analyzed. Only malignancy ($p = 0.039$), blood transfusion (PRBC > 4 U) ($p = 0.001$), coagulopathy ($p = 0.001$), and GI tract malignancy ($p = 0.007$) displayed statistically significant differences between these two groups. Elderly patients with malignancy and GI tract malignancy were more frequently detected among those who experienced GIB with a negative CTA finding. In contrast, blood transfusion and coagulopathy were more frequently observed in elderly patients who experienced GIB with a positive CTA finding. Elderly patients presenting to the emergency room with GIB who exhibited coagulopathy on blood tests and required more than 4 U of PRBC within 24 h are at an increased risk for a positive CTA indicating active GIB. Emergency physicians must be vigilant in these cases. Prompt consultation with a gastroenterologist, general surgeon, or radiologist is therefore essential, along with considering admission and appropriate treatment strategies.

For positive CTA elderly patients with an upper GI origin, early pan-endoscopic evaluation is indicated for all patients. If the pan-endoscopy shows a gastric or duodenal ulcer with bleeding, PPI injection or endoscopic hemostasis (e.g., epinephrine injection, APC, or clipping) is considered the first choice of treatment. If the pan-endoscopy reveals a significant amount of blood in the stomach, bleeders cannot be located, bleeding cannot be controlled by clipping, or if the patient presents with persistent bleeding, angiography is indicated. During angiography, TAE can be performed in case of the detection of extravasation. Surgery is the treatment of choice if endoscopy, angiography, and TAE fail to control the bleeding.

For positive CTA elderly patients with small bowel origin, angiography played a crucial role in management. The majority of patients underwent angiography, and those with positive findings were effectively treated with TAE. However, in cases where angiography was negative, conservative treatment was often deemed sufficient.

Among positive CTA elderly patients with colonic bleeding, angiography, and TAE were the primary treatment modalities, with a high success rate. Conservative treatment was successful in only a small subset of patients, emphasizing the need for interventional management in colonic bleeding cases. Unlike upper GI bleeding, colonic bleeding demonstrated a lower requirement for surgery, and most cases could be managed non-surgically. Colonoscopy with hemoclips was effective in a few cases with persistent bleeding, demonstrating its role as a useful alternative to TAE in case of negative angiographic findings.

Positive CTA elderly patients with rectal origin were predominantly managed conservatively, and most patients responded well to non-invasive treatment options, including that with Foley balloon tamponade. This finding suggests that rectal bleeding may be more amenable to conservative approaches when compared to other GI bleeding sources. However, persistent bleeding required escalation to angiographic or endoscopic intervention. Surgical intervention was rarely needed but was found to be effective. Mortality was lower in rectal bleeding cases, with only one patient succumbing to respiratory failure after the bleeding subsided, suggesting a better prognosis compared to other bleeding origins.

Five positive CTA (5.7%) patients with GIB (2 [2.3%] in the upper GI group, 2 [2.3%] in the small bowel group, and 1 [1.1%] in the rectal group) died during hospitalization despite having received treatment. The observed mortality rates align with those from previous studies, which reported a 6–10% mortality rate for upper GIB and a 4–10% mortality rate for lower GIB.[14] Only one elderly patient with small bowel bleeding died due to persistent hemorrhage. However, more patients succumbed to late complications after the bleeding had subsided. While initial bleeding control is essential, clinicians must consider the underlying conditions, such as infections and systemic complications, which can significantly impact patient outcomes.

4.1. Study limitations

The main limitation of this study is the small sample size, particularly in certain subgroups. In addition, there is no standardized guideline for managing patients with GIB. Emergency physicians arranged CTA for elderly patients based solely on their clinical judgment, rather than by following a standardized guideline. Each emergency physician applied different judgment standards, which possibly led to a selection bias among patients and potentially resulted in either inappropriate or insufficient testing. Similarly, blood transfusions for elderly patients with GIB were based on the emergency physicians' clinical judgment. Emergency physicians may have arranged blood transfusions based on the severity of bleeding or the patients' hemoglobin levels. This finding affected the necessity of both CTA and blood transfusion. CTAs were interpreted by different board-certified radiologists. The interpretation of CTA may be influenced by interobserver variability, as different radiologists may have varying levels of experience and expertise. Interobserver variability contributes to inconsistencies in the evaluation of CTA results, which possibly influence the clinical outcomes and the overall management of the patient.

Another limitation of this study is that no further multivariate analysis was conducted to adjust for confounders such as coagulopathy, transfusion, or malignancy. The lack of adjustment for these confounders could result in biased or misleading findings, considering that these factors possibly independently affected the outcomes of interest.

5. Conclusion

Elderly patients presenting to the emergency room with GIB,

who exhibited coagulopathy on blood tests and require more than 4 U of packed RBCs (PRBC) within 24 h are most likely to have positive CTA. CTA should be considered early in these patients to facilitate definitive management.

Management strategies vary based on the source of bleeding. Upper GI bleeding often requires a combination of endoscopic intervention, TAE, and, in refractory cases, surgical intervention. Small bowel and colonic bleeding were effectively managed with angiography and TAE, while rectal bleeding displayed better outcomes with conservative management.

In the present study, despite successful bleeding control in most cases, mortality was primarily due to late complications such as infections and organ failure rather than persistent hemorrhage.

Declaration of conflict of interest

The authors have no conflict of interest, financial or otherwise to declare.

References

1. Martí M, Artigas JM, Garzón G, Alvarez-Sala R, Soto JA. Acute lower intestinal bleeding: feasibility and diagnostic performance of CT angiography. *Radiology.* 2012;262:109–116. doi:10.1148/radiol.11110326
2. Sun H, Jin Z, Li X, et al. Detection and localization of active gastrointestinal bleeding with multidetector row computed tomography angiography: a five-year prospective study in one medical center. *J Clin Gastroenterol.* 2012;46:31–41. doi:10.1097/MCG.0b013e31823337ee
3. He B, Yang J, Xiao J, et al. Accuracy of computed tomographic enterography for obscure gastrointestinal bleeding: a diagnostic meta-analysis. *Acad Radiol.* 2018;25:196–201. doi:10.1016/j.acra.2017.09.001
4. Sengupta N, Feuerstein JD, Jairath V, et al. Management of patients with acute lower gastrointestinal bleeding: an updated ACG guideline. *Am J Gastroenterol.* 2023;118:208–231. doi:10.14309/ajg.0000000000002130
5. Shukla PA, Zybulewski A, Kolber MK, Berkowitz E, Silberzweig J, Hayim M. No catheter angiography is needed in patients with an obscure acute gastrointestinal bleed and negative CTA. *Clin Imaging.* 2017;43:106–109. doi:10.1016/j.clinimag.2017.02.006
6. Lenti MV, Pasina L, Cococcia S, et al. Mortality rate and risk factors for gastrointestinal bleeding in elderly patients. *Eur J Intern Med.* 2019;61:54–61. doi:10.1016/j.ejim.2018.11.003
7. Whitehurst BD. Lower gastrointestinal bleeding. *Surg Clin North Am*. 2018;98:1059–1072. doi:10.1016/j.suc.2018.06.007
8. Valek V, Husty J. Quality improvement guidelines for transcatheter embolization for acute gastrointestinal nonvariceal hemorrhage. *Cardiovasc Intervent Radiol.* 2013;36:608–612. doi:10.1007/s00270-012-0462-5
9. Jacobson AF, Cerqueira MD. Prognostic significance of late imaging results in technetium-99m-labeled red blood cell gastrointestinal bleeding studies with early negative images. *J Nucl Med*. 1992;33:202–207.
10. Lai HY, Wu KT, Liu Y, Zeng ZF, Zhang B. Angiography and transcatheter arterial embolization for non-variceal gastrointestinal bleeding. *Scand J Gastroenterol*. 2020;55:931–940. doi:10.1080/00365521.2020.1790650
11. Feuerstein JD, Ketwaroo G, Tewani SK, et al. Localizing acute lower gastrointestinal hemorrhage: CT angiography versus tagged RBC scintigraphy. *AJR Am J Roentgenol*. 2016;207:578–584. doi:10.2214/AJR.15.15714
12. Spiritos Z, Horton A, Parish A, et al. Clinical predictors of a positive CT angiogram study used for the evaluation of acute gastrointestinal hemorrhage. *Dig Dis Sci*. 2023;68:181–186. doi:10.1007/s10620-022-07514-8
13. Sbeit W, Basheer M, Shahin A, et al. Clinical predictors of gastrointestinal bleeding source before computed tomography angiography. *J Clin Med*. 2023;12:7696. doi:10.3390/jcm12247696
14. Tariq SH, Mekhjian G. Gastrointestinal bleeding in older adults. *Clin Geriatr Med*. 2007;23:769–784. doi:10.1016/j.cger.2007.07.002