

UAMS EM Journal Club
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Drs. Gage Brummer and Matt Saenz
Faculty Advisor: Dr. Carly Eastin

Evaluating the utility of CT angiography in gastrointestinal bleeding

Clinical Bottom Line:

CT angiography of the mesentery has high diagnostic value in localizing active bleeds >0.5 ml/min. In the setting of acute GI bleed, the following characteristics increase the likelihood that a CTA will reveal and locate an active lower GI bleed – those with tachycardia or hypotension, those requiring >3 blood transfusions in 24 hours, those with recent bowel-altering surgery or endoscopy, and those who are on antiplatelet agents. These findings are of low-quality, but could allow clinicians to better predict when CTA would help guide clinical management.

PICO Question:

In emergency department patients with acute GI bleed, does use of CTA in the workup of acute GI bleed lead identify bleed location and lead to fewer adverse events?

Background:

Acute hemorrhage of the gastrointestinal tract is a common and truly life-threatening emergent condition in the emergency department in some cases. Gastrointestinal bleeding events are both common and highly varied in their presentation, ranging from minimal bleeding that has already resolved to life-threatening hemorrhage such as erosion into mesenteric arteries, variceal bleeding, Dieulafoys Lesions, and mucosal compromise in patient with coagulopathy. Direct visualization of the GI mucosa via endoscopic methods including colonoscopy and EGD are the gold standard for diagnosis and often management of acute GI bleeds; however, the availability and increase in the resolution of computed tomography in recent decades has led to the increased use of CT angiography to try and identify the severity, location, and to help guide management through IR, endoscopic, or conservative management strategies. Unlike endoscopy, CT angiography does not require bowel prep, anesthesia or an on-site gastroenterologist to perform. In our emergency department, there is no guideline or protocol as to which patients presenting with GI bleed would benefit from the resource, time, and radiation-intensive procedure of CT angiography.

Trial 1:

Smith RS, Tan SWJ, Heath-Kalgutkar GA, Tran VH, Rajagopalan A, Buckenham T. Factors predicting positive CT mesenteric angiography results in lower gastrointestinal haemorrhage prior to consideration of intra-arterial angio-embolisation. *J Med Imaging Radiat Oncol.* 2021 Dec;65(7):841-845.

Pubmed link: <https://pubmed.ncbi.nlm.nih.gov/33779045/>

The Basics: CT angiography of the mesentery allows for the detection of 0.5 ml/min bleeds in the lower GI tract, can be performed quickly as it does not provide bowel preparation or a gastroenterologist to perform, and is widely available. If positive, it provides invaluable clinical data for interventional embolization of the bleed and accelerates treatment. However, this imaging exposes patients to radiation and costs time and resources. This study aims to identify which objective clinical factors are associated with detection of hemorrhage on CTA to help clinicians determine its utility in the setting of lower GI bleed.

Methods: Retrospective Cohort. All patients (n=717) who underwent CT mesenteric angiography at Monash Health (Victoria, Australia) for the calendar years 2011-2019 were included, which was 854 total scans. They compiled baseline data characteristics for each patient consisting of age, bowel resection/endoscopic intervention within the past 14 days, known bowel malignancy, anticoagulant/antiplatelet use, duration of symptoms, vital signs, transfusion requirements in the past 24 h and investigation results (recent hemoglobin levels, platelet count, international normalized ratio and creatinine levels). A positive scan was recorded if it demonstrated unequivocal contrast extravasation into the lumen of the bowel in the lower gastrointestinal tract. They performed univariate analysis to identify potentially significant predictors of a positive scan, and then created a multivariate model to identify which pretest patient characteristics increased the likelihood of a positive scan. All scans were dichotomized as positive or negative and all were included.

Results: The multivariate model yielded that recent bowel surgery or endoscopy, >3 unit transfusion requirement over 24 h prior to scan, antiplatelet medication use, HR >100 and SBP <100 were associated with a positive scan. The three characteristics whose odds ratio was statistically significant were:

1. Bowel surgery or endoscopic intervention in the 14 days prior to the scan – OR = 2.152 (1.352-3.497)
2. Antiplatelet use – OR = 2.025 (1.1437-2.854)
3. >3 units of blood in previous 24 hours – OR = 1.788 (1.026-3.113)

Limitations/Bias: This study is limited by its retrospective design, which exposes the conclusions to selection bias, transcription error and missing data. It is limited to a single institution, making generalizability to other patient populations difficult. These data could be strengthened by multi-center validation studies that are prospective.

Trial 2:

Article: He, B., Yang, J., Xiao, J., Gu, J., Chen, F., Wang, L., Zhao, C., Qian, J., & Gong, S. (2017). Diagnosis of lower gastrointestinal bleeding by multi-slice CT angiography: A meta-analysis. *European Journal of Radiology*, 93, 40–45. <https://doi.org/10.1016/j.ejrad.2017.05.020>

Basics: A meta-analysis aimed to assess the diagnostic efficacy of multi-slice spiral CT angiography (CTA) in cases of lower gastrointestinal bleeding.

Methods: Relevant clinical studies examining the diagnostic utility of CTA were systematically retrieved from databases including PubMed, Embase, and others up to September 2016. Inclusion criteria comprised studies published in English. Diagnostic meta-analysis was conducted using Meta-DiSc software, analyzing sensitivity, specificity, positive likelihood ratio (PLR), negative likelihood ratio (NLR), diagnostic odds ratio (DOR), and their corresponding 95% confidence intervals (CI). Heterogeneity was assessed using Cochran-Q test and I² statistic, with meta-regression utilized to investigate potential sources. A summary receiver operating characteristic (SROC) curve was generated.

Results: Fourteen articles, encompassing 549 patients with lower gastrointestinal bleeding, were included in the meta-analysis. Combined PLR, NLR, and DOR were calculated as 8.149, 0.158, and 56.213, respectively. Significant heterogeneity was observed across all estimations, yet the sources remained unidentified despite meta-regression analysis considering study design, location, CT slices, and sample size. Under the fixed effect model, the area under the curve (AUC) and Q index were determined as 0.9463 and 0.8856, respectively.

Limitations/Bias: Although the study concluded Multi-slice CTA demonstrates substantial diagnostic efficacy in cases of lower gastrointestinal bleeding, it failed to conduct a quality assessment of the individual studies within the pooled group of 14 articles as well as identify the source of significant heterogeneity within the analysis.