

Time to Angiography: A Predictor of Mesenteric Angiography Outcomes

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None.

Background

Gastrointestinal Bleeding

- Annual hospital admissions for GI bleeding in the United States have been estimated 150 per 100,000 with a **mortality rate** of **5%-10%**.
 - Occasionally, the bleeding is significant and requires prompt resuscitation, diagnostic imaging and treatment.
 - Upper GI bleeding
 - Esophagus to ligament of Treitz
 - Common causes include: ulcerative diseases, variceal diseases, malignancy, gastritis/esophagitis, vascular ectasias, trauma
 - Lower GI bleeding
 - Includes the gastrointestinal tract below the ligament of Treitz
 - Common causes included: diverticular disease, angiodysplasia, malignancy, infectious and inflammatory colitis, hemorrhoids and rectal ulcers
 - Diagnosis
 - Often involves **gastrointestinal scintigraphy** (sensitive up to **0.1ml/min**) or mesenteric CT angiography, followed by **conventional mesenteric angiography** (sensitive up to **1ml/min**), which can also be diagnostic and provide a means of treatment.
 - Our institution protocols gastrointestinal scintigraphy to help confirm active GI bleeding.
 - Healthcare Impact
 - Common practice is to perform mesenteric angiography as soon as possible after diagnostic confirmation of gastrointestinal bleeding.
 - Both gastrointestinal scintigraphy and mesenteric angiography require specific materials:
 - Tc-99m labeled RBCs, IR catheters and embolic agents
 - Hospital staff (technicians, nurses, physicians) in nuclear medicine and interventional radiology
 - It is both costly and time consuming to mobilize.
 - Ultimately, little evidence exists if expedited mobilization is justifiable based on time intervals and outcomes.

Purpose

- Goals

- Determine if there is a statistically significant association between the time interval to angiography and active extravasation in order to guide superselective treatment.
 - Determine if there is a statistically significant association between the time interval to angiography and clinical outcomes, including mortality.
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- Consequently, these associations will help determine if an expedited preparation of the angiography suite is justified.

Materials/Methods

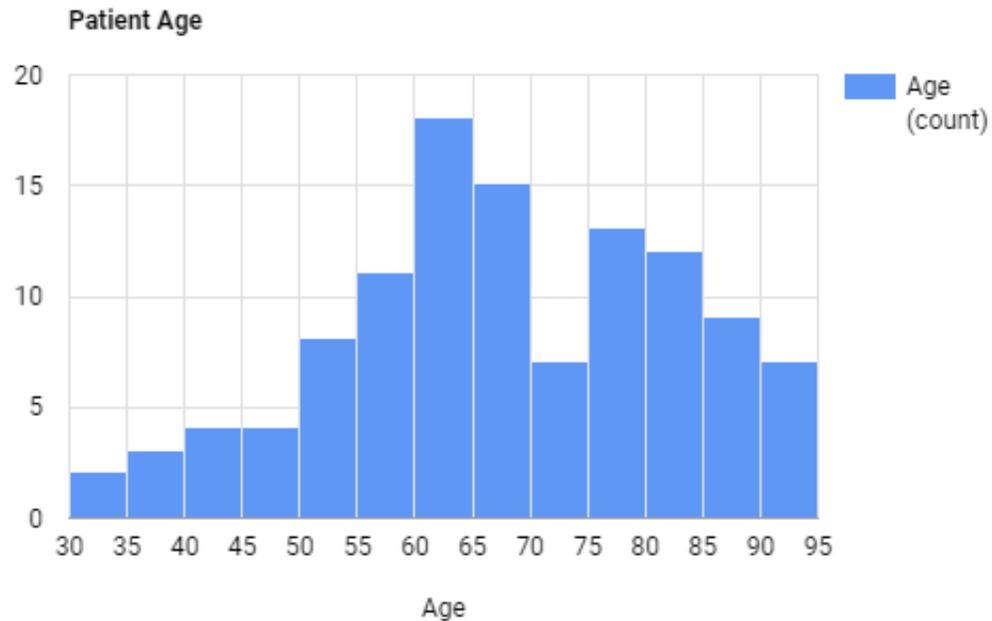
- EMR of 114 adult patients (mean age 67, range 27-94) who underwent gastrointestinal scintigraphy followed by mesenteric angiography for gastrointestinal bleeding in a 5 year period at a 2,000+ bed integrated multi-hospital healthcare system were reviewed.
 - Patient data recorded:
 - Basic demographics
 - Number of unstable vital signs (T>38.3, HR>100, Sys. BP <90, RR>20)
 - Associated gastrointestinal morbid diagnoses (previous gastrointestinal bleeding, diverticulosis, cirrhosis, coagulopathy, angiodysplasia, ulcerative disease and inflammatory bowel disease, etc.)
 - Presence of antiplatelet/anticoagulant medications
 - Pertinent lab values (hemoglobin, platelets, PT/INR, PTT)
 - Time intervals recorded:
 - GI bleeding onset (admission/documentated onset) to scintigraphy and subsequent angiography were recorded.
 - Patients were grouped in:
 - less than or greater than 24 hours to angiography
 - less than or greater than 6 hours from gastrointestinal scintigraphy to angiography.
 - Angiography outcomes recorded:
 - Technical success
 - Superselective embolization vs. Empiric/medical treatment
 - Immediate complications
 - # of blood transfusions (pre- and post- procedure)
 - 30-day re-bleeding rate
 - 30-day mortality rate

Results

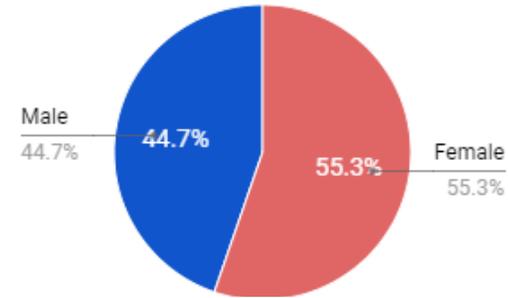
Patient Data

Patients (N): 114

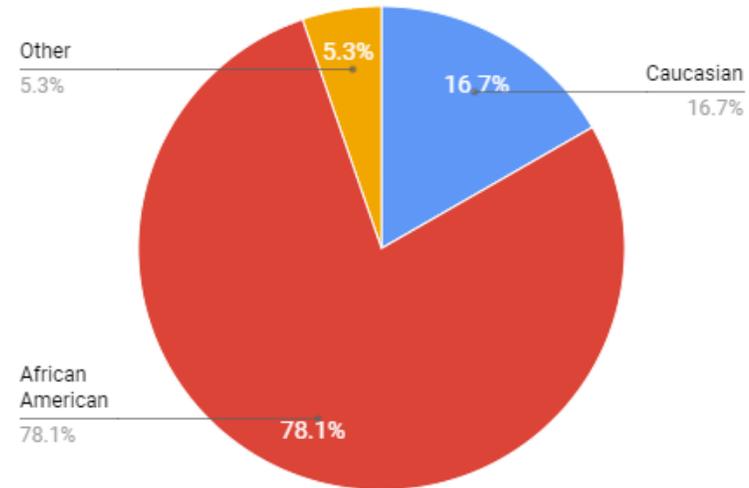
Age: Mean: 67
Min: 27
Max: 94



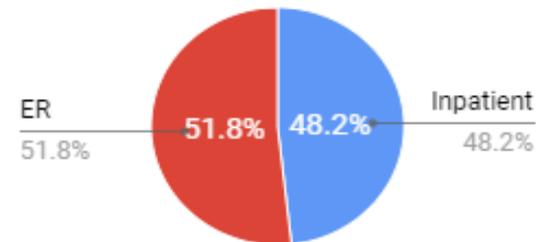
Gender



Race



ER or Inpatient?

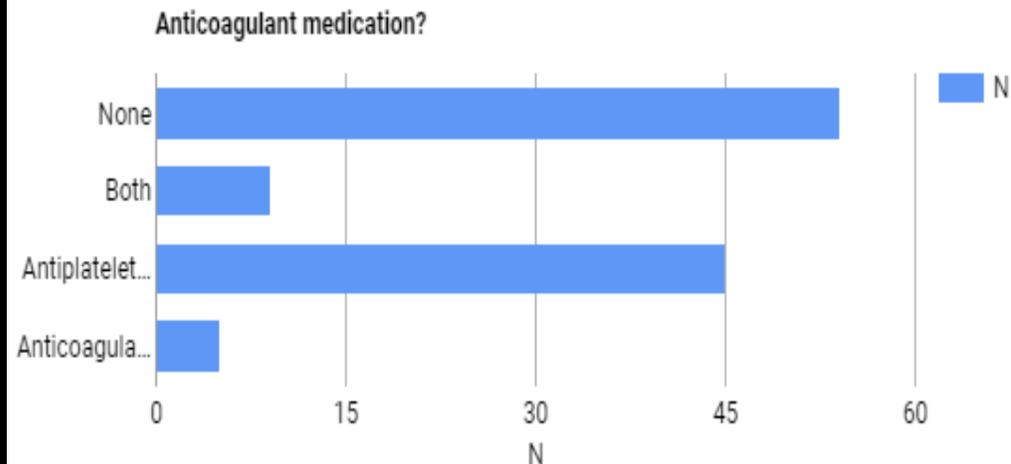
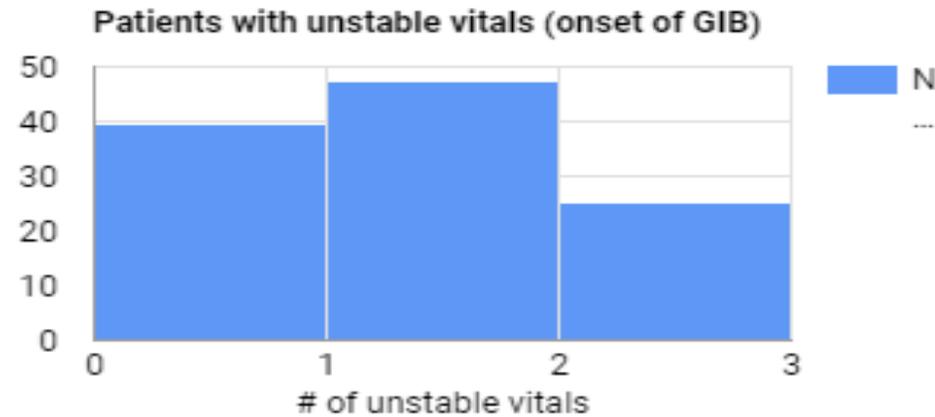
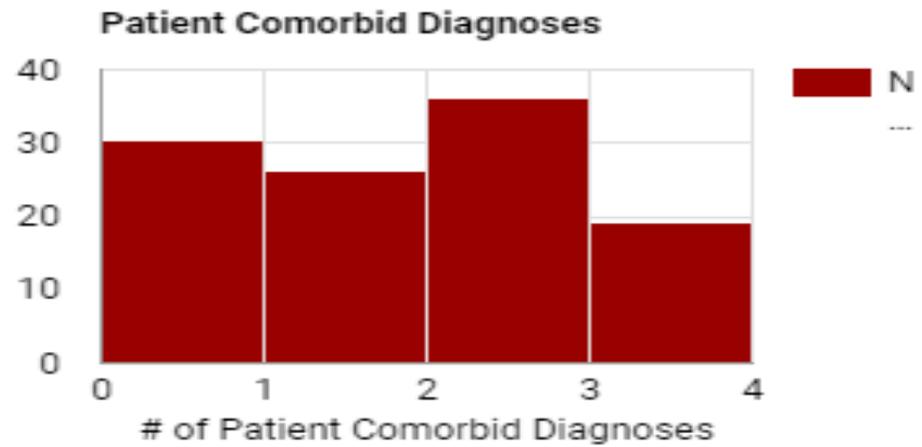


ER: 59
Inpatient: 55

Results

Patient Data

- Patient comorbid diagnoses
 - Mean: 1.40 ($s = 1.06$)
 - Min. 0, Max. 4
- Unstable vitals at presentation
 - Mean: 0.93 ($s = 0.82$)
 - Min. 0, Max. 3
- Patients on anticoagulant medication?
 - None: 54
 - Antiplatelet: 45
 - Anticoagulant: 5
 - Both: 9



Results

- Extravasation and GI scintigraphy results:
 - Positive extravasation:
 - 25 cases of extravasation on angiography.
 - Of the 25, GI scintigraphy was positive in 22 and negative in 3 patients.
 - Negative extravasation:
 - 89 cases negative for extravasation on angiography.
 - Of the 89, GI scintigraphy was positive in 75 patients and negative in 14 patients.
- Our retrospective study calculated a sensitivity and specificity of 88% and ~16%, respectively, for GI scintigraphy to detect (screen for) bleeding significant enough for extravasation on angiography. Accepted literature cites a similar, or better, sensitivity and specificity.

Results

- Procedural results:

- 33 embolization interventions were performed out of 114 mesenteric angiograms.
 - Technical success: 32/33 (extravasation ceased during one procedure; therefore, an "unsuccessful" embolization)
 - Complications: 3 cases of persistent GIB after embolization; 1 case of splenic pseudoaneurysm (later treated with coil embolization)
 - Superselective embolization was performed 25/33 of the intervention cases with extravasation as a precursor finding in 24/25 of the superselective cases.
 - Remaining interventions 8/33 were mainly prophylactic gastroduodenal artery embolization or embolization of gastrointestinal/splenic varices.

- Statistical analysis:

- Superselective treatment was significantly associated with **less re-bleeding** (OR 6.3 95% CI:1.1-36.0, P=0.037) when excluding patients with numerous transfusions (e.g. gastrointestinal GVHD).
- Any embolization treatment was associated with using **less blood transfusions** compared to medical management (OR 2.3 95% CI:1.01-5.26, P=0.047).

Results: Time Interval

- Means:
 - Time to angiography *Highly variable/dependent on clinical scenario
 - Mean: 57.79hr ($s = 61.72$); min: 3.95hr, max: 431.8hr
 - Time from GI scintigraphy to angiography
 - Mean: 20.38hr ($s = 40.66$); min: 1.22hr, max: 286.13hr
- Angiography with active extravasation
 - Time to angiography (from admission or documented onset)
 - Mean: 42.49hr ($s = 30.3$); min: 3.95hr, max: 106.05hr
 - Time from GI scintigraphy to angiography
 - Mean: 7.84hr ($s = 13.8$); min: 2hr, max: 70.19 (*mean: 5.24hr ($s = 4.9$) if outlier excluded)
- Angiography with negative extravasation
 - Time to angiography (from admission or documented onset)
 - Mean: 62.13hr ($s = 67.56$); min: 6.71hr, max: 431.8hr
 - Time from GI scintigraphy to angiography
 - Mean: 23.9hr ($s = 44.88$); min: 1.22hr, max: 286.13

Results: Time Interval

- Statistical analysis:

- Time intervals:

- Angiography performed **within 6 hours** from GI scintigraphy was more likely to demonstrate extravasation (OR 4.06 95% CI:1.48-11.13, P=0.0065).
 - Angiography performed within 24 hours from admission or documented onset of GIB was **not statistically** associated with active contrast extravasation.

- Time interval and superselective treatment:

- Superselective embolization was statistically associated with angiography performed **within 6 hours** from GI scintigraphy (OR 7.71 95% CI:1.25-47.75, P=0.028).
 - In addition, the presence of extravasation on angiography was **SIGNIFICANTLY** more likely to be followed by superselective embolization (OR 159.8 95% CI:6.94-3,677.71, P=0.0015).

- Outcomes:

- Re-bleeding was less likely in patients who underwent angiography within 24 hours of admission (OR 3.77 (95% CI:1.05-13.56, P=0.042).
 - Angiography performed more than 30 hours from the onset of GIB was statistically significant for predicting mortality (OR 12.27 95% CI:1.48-101.66, P = 0.02).

Conclusion

- Angiography performed within 6 hours of positive GI scintigraphy is more likely to demonstrate extravasation and guide superselective treatment which is associated with better clinical outcomes.
- 30-day mortality is more likely when angiography occurred 30 or more hours from the onset of GI bleeding, but this association probably reflects the difficulty stabilizing critically ill patients for intervention.
- *Limitations:*
 - EMR policies regarding the recording of blood transfusions changed during the study's timeline, older records may not be as accurate.
 - Mesenteric angiography performed without a preceding GI scintigraphy scan were not included.
 - Regarding mortality, a few patients transferred to nursing or hospice care were lost to follow up within 30-days and were not included as mortality.