

Research Article

Blood Urea Nitrogen to Creatinine Ratio as a Predictor of Upper or Lower Source of Melena: A Prospective Study

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Abstract

Background: In the evaluation of gastrointestinal (GI) bleeding, accurately identifying whether the source is upper or lower GI is critical for timely and appropriate management. However, determining the bleeding origin can be particularly challenging in cases of isolated melena without hematemesis. Non-invasive, cost-effective diagnostic tools that can aid in early localization are therefore of significant clinical value. **Objective:** This study aimed to assess the diagnostic performance of the blood urea nitrogen (BUN) to creatinine ratio as a predictor of the bleeding source—upper vs. lower GI—in patients presenting with isolated melena. **Methods:** We conducted a prospective study involving patients who presented with melena in the absence of hematemesis. Laboratory values including BUN and creatinine levels were collected, and the BUN/creatinine ratio was calculated. Endoscopic evaluations were subsequently performed to determine the actual source of bleeding. **Results:** Our findings showed that a BUN/creatinine ratio below 50 was highly predictive of upper GI bleeding. In contrast, patients with lower GI bleeding demonstrated significantly higher BUN/creatinine ratios. The ratio proved to be a reliable, non-invasive biochemical marker that could assist in predicting the bleeding source prior to endoscopy. **Conclusion:** The BUN/creatinine ratio offers a simple, accessible, and effective means to guide clinical triage in patients with isolated melena. Its use could enhance early decision-making and improve patient outcomes by facilitating prompt diagnostic and therapeutic interventions.

Keywords

Gastrointestinal Hemorrhage, Melena, Bun/Creatinine Ratio, Diagnostic Marker, Non-Invasive Triage

1. Introduction

Gastrointestinal (GI) bleeding is a frequent and potentially life-threatening emergency. It accounts for a significant number of hospital admissions and is associated with substantial morbidity and mortality. Acute GI bleeding is broadly categorized as upper or lower based on the anatomical origin relative to the ligament of Treitz. Correct localization is crucial, as it guides the diagnostic approach, informs urgency, and determines therapeutic interventions.

In clinical practice, upper GI bleeding is often suspected in the presence of hematemesis or melena, while hematochezia typically points to a lower GI source. However, the presentation is not always straightforward. Melena, traditionally associated with upper GI bleeding, can also result from slow lower GI bleeding or small bowel sources, especially when intestinal transit time is prolonged.

Endoscopy remains the gold standard for localizing and

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managing GI bleeding, but it may not always be immediately available, particularly in resource-limited settings. Hence, the need for simple, cost-effective, and rapid screening tools that can provide preliminary guidance is evident.

One such tool is the blood urea nitrogen to creatinine (BUN/Cr) ratio. In upper GI bleeding, digestion and absorption of blood proteins in the gut may elevate urea levels disproportionately to creatinine, thereby increasing the ratio. This prospective study investigates the diagnostic value of the BUN/creatinine ratio in predicting the origin of isolated melena.

2. Objective

This study was designed to evaluate the screening performance characteristics of the blood urea nitrogen (BUN) to creatinine ratio in predicting the upper or lower origin of isolated melena in the absence of hematemesis.

3. Methods

This was a prospective observational study conducted in the Department of Gastroenterology at Avicenne Military Hospital in Marrakech, Morocco, from January 2021 to December 2024. The study included patients admitted with signs of acute gastrointestinal bleeding who presented with melena as the only clinical manifestation, explicitly excluding hematemesis.

3.1. Inclusion Criteria

- 1) Adults aged 18 years and older.
- 2) Presentation with melena without hematemesis.
- 3) Availability of laboratory tests within 24 hours of presentation.
- 4) Underwent endoscopic or colonoscopic confirmation of bleeding source.

3.2. Exclusion Criteria

- 1) Known renal failure or chronic kidney disease.
- 2) History of portal hypertension or variceal bleeding.
- 3) Incomplete endoscopic evaluation or evidence of both upper and lower GI bleeding.

Upon admission, blood samples were collected for standard laboratory evaluation, including measurement of BUN and serum creatinine levels using an automated biochemical analyzer (Roche Cobas 6000). The BUN/creatinine ratio was calculated and categorized into three groups: <50, 50–60, and >60. Endoscopic procedures (esophagogastroduodenoscopy or colonoscopy) were performed within 24–48 hours to confirm the source of bleeding.

Statistical analysis was performed using SPSS version 26.0. Sensitivity, specificity, positive predictive value (PPV), and

negative predictive value (NPV) were calculated for various cutoff points of the BUN/creatinine ratio in predicting the bleeding site.

4. Results

A total of 340 patients presented with melena without hematemesis, with a mean age of 48.49 ± 22 years and a sex ratio of 1.5 (60% men, 40% women). Based on endoscopic findings, 203 patients (59.70%) had upper GI bleeding, while 138 patients (40.58%) had lower GI bleeding.

The main causes of upper GI bleeding were: peptic ulcer (50%), erosions (17%), gastric cancer (20%), vascular malformations (10%), and Dieulafoy lesion (3%).

The main causes of lower GI bleeding were: colonic diverticula (50%), colon cancer (25%), polyps (15%), ischemic colitis (5%), and angiodysplasia (5%). [Tables 1 and 2.](#)

Table 1. Causes of upper gastrointestinal bleeding not related to portal hypertension.

Cause	Frequency
Gastroduodenal ulcer	50%
Gastroduodenal erosions	17%
Gastric cancer	20%
Vascular malformations	10%
Dieulafoy's ulcer	3%

Table 2. Causes of lower gastrointestinal bleeding.

Cause	Frequency
Colonic diverticula	50%
Colorectal cancers	25%
Polyps	15%
Ischemic colitis	5%
Angiodysplasia	5%

The BUN/creatinine ratio was significantly lower in those with upper GI bleeding and significantly higher in those with lower GI bleeding. Among the 203 patients with upper GI bleeding, 202 had a ratio below 50 and only one patient had a ratio above 60. Among the 138 patients with lower GI bleeding, 134 had a ratio above 60 and only 4 had a ratio below 50. A ratio below 50 predicted an upper GI source of melena, while a ratio above 60 predicted a lower GI source in over 98% of cases. [Figures 1 and 2.](#)

5. Discussion

Acute gastrointestinal bleeding is one of the most common digestive emergencies. Early diagnosis is essential. Despite

advances in medical technology, GI bleeding remains a significant cause of morbidity and mortality. Upper GI bleeding accounts for 80% of cases [1, 2].

R<50

205 réponses

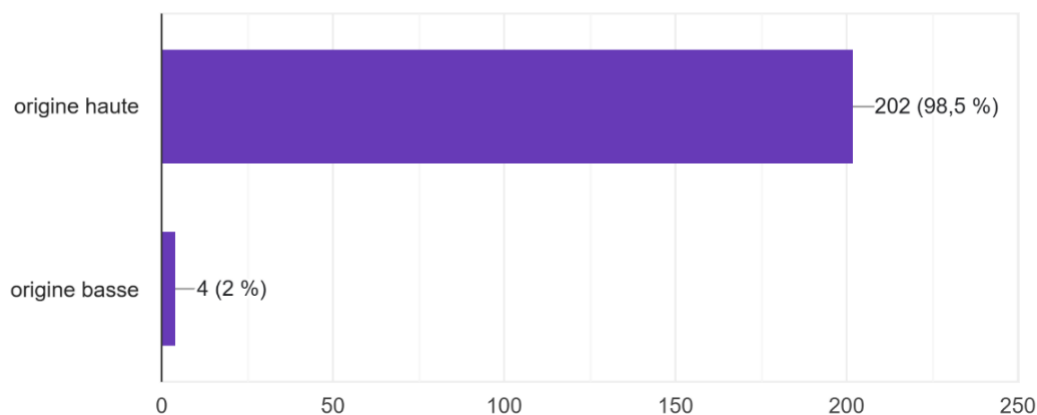


Figure 1. Distribution of patients with R ratio less than 50.

R>60

135 réponses

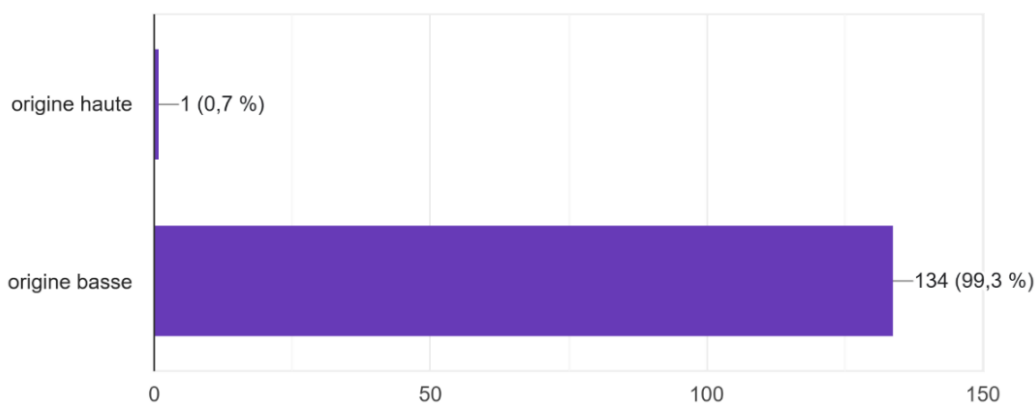


Figure 2. Distribution of patients with R ratio greater than 60.

Non-invasive methods that assist clinicians in quickly determining the source of bleeding are highly valuable [3, 4]. This study explored the correlation between the BUN/creatinine ratio and the site of GI bleeding. Although this ratio alone is not sufficient to definitively localize the bleeding site, it may guide the choice of diagnostic procedures—whether to perform upper or lower endoscopy first [5-8].

Previous studies, such as that by Snook et al. [9, 10], have also shown higher BUN/creatinine ratios in patients with lower GI bleeding. Various hypotheses have been proposed to explain elevated urea in GI bleeding, including prolonged intestinal transit time of blood degradation products [11, 12]. This leads to

increased urea absorption, while creatinine remains stable in patients without renal failure, thereby raising the ratio [13, 14].

Strengths and Limitations

The strength of this study lies in its prospective design and relatively large sample size. The inclusion criteria focused on isolated melena allowed for a clearer analysis of the diagnostic value of the BUN/creatinine ratio. However, this study is limited by its single-center design, and exclusion of patients with renal dysfunction may restrict generalizability. In addition, while high or low ratios were strongly predictive, patients with intermediate values (50–60) were not analyzed in detail and may present a diagnostic challenge.

Perspectives and Future Research

Future multicenter studies could help validate these findings and explore whether intermediate ratio ranges have predictive value when combined with other clinical parameters. Moreover, investigating the role of this ratio in risk stratification and early triage decisions, especially in emergency settings, may enhance its clinical applicability. Integrating this simple tool with other scoring systems could further optimize resource use and improve patient outcomes [15, 16].

Clinical Implications

The BUN/creatinine ratio, though traditionally viewed as a reflection of renal function, proves to be a highly informative diagnostic adjunct in the context of gastrointestinal bleeding. Its rapid availability and objective nature make it particularly useful in emergency departments where decisions must be made swiftly. Incorporating this ratio into early clinical algorithms can enhance triage accuracy and reduce unnecessary delays in endoscopic evaluations. For example, a patient presenting with melena but no hematemesis, who has a BUN/creatinine ratio below 50, could be prioritized for upper endoscopy. Conversely, a ratio above 60 may warrant colonoscopy as the first-line diagnostic approach. In hospitals with limited resources, this simple test could assist clinicians in appropriately allocating specialized interventions. Moreover, educating healthcare workers, particularly in rural or under-resourced settings, on the interpretation and clinical significance of this ratio could improve diagnostic outcomes and reduce avoidable morbidity [17].

Recommendations for Clinical Practice

Based on the findings of this study, we propose the following practical recommendations:

- 1) Measure BUN and creatinine at the initial assessment of all patients with melena.
- 2) Use cutoff values of <50 to suggest upper GI bleeding and >60 to indicate lower GI origin.
- 3) Interpret intermediate values (50–60) with caution and in conjunction with clinical and hemodynamic findings.
- 4) In patients with renal impairment, the ratio should not be used in isolation but rather in combination with other indicators.

Integrate the BUN/creatinine ratio into emergency department protocols and educational modules for medical staff.

Encourage hospitals to standardize the use of this ratio in GI bleeding algorithms for faster diagnosis and better patient flow.

6. Conclusion

The BUN/creatinine ratio offers a valuable adjunctive tool in the early evaluation of GI bleeding, especially in the absence of hematemesis. Ratios below 50 are highly suggestive of upper GI origin, while ratios above 60 indicate a lower GI source with strong predictive value. This tool can assist clinicians in triaging patients for upper versus lower endoscopy and should be considered as part of the initial assessment protocol.

Abbreviations

BUN Blood Urea Nitrogen

Conflicts of Interest

The authors declare no conflicts of interest.

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