PREDICTIVE VALUE OF PLASMA UREA: CREATININE RATIO IN PATIENTS PRESENTING WITH MELAENA

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ABSTRACT

The usefulness of plasma urea:creatinine ratio in predicting the site of bleeding was studied in 40 patients admitted with melaena. Patients presenting with frank haematemesis and those in whom the site of bleeding could not be ascertained were excluded from the study. In 26 patients the source of bleeding was above the ligament of Trietz, while in 14 the source was below this level. In 22 of 26 (84.6%) patients with upper gastrointestinal bleeding, the urea:creatinine ratio was more than 36. In only 2 of 14 patients with lower gastrointestinal bleeding the ratio was similarly raised ($p < 0.001$). Our study suggests that urea:creatinine ratio of 36 or more has a positive predictive value for upper gastrointestinal bleeding.

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KEYWORDS : Creatinine; Diagnosis; Gastrointestinal hemorrhage; Urea.

Introduction

When patients present with melaena, the first problem faced by the clinician is identifying the site of bleeding. While most patients, if not all, presenting with haematemesis have an upper gastrointestinal bleed, the same is not true of patients with melaena. This is because the colour of blood in stool depends on how long the blood remains in the gastrointestinal tract and not on the site of bleeding [1]. The plasma urea:creatinine ratio (U:C ratio) has been reported to be significantly higher in patients with upper gastrointestinal bleeding [1]. The purpose of the present study was to prospectively evaluate this hypothesis and a U:C ratio of 36 was used as the discriminatory level [2,3].

Material and Methods

Patients presenting with melaena, red stools, and those with a strongly positive test for occult blood in stool were included in this study. Patients with frank haematemesis, and those presenting with history of melaena of more than 48 hours duration were not included. Similarly, patients with hepatic, renal or haematological disorders were also excluded. Forty six patients satisfied

these criteria. Six patients were excluded as the source of bleeding could not be established. Thus, 40 patients were finally available for analysis.

Blood samples for plasma urea and creatinine estimation were taken at admission in all patients. Urea and creatinine were both estimated by the kinetic method and reported in milligrams per decilitre (mg/dL). The range of normal values for urea and creatinine in our laboratory are 16-40 mg/dL and 0.6-1.6 mg/dL respectively. Within this normal range, the average of maximal and minimal U:C ratios was approximately 36, and hence this was chosen as the discriminatory level. In addition, a second calculation with 30 as the discriminatory level was carried out for comparison.

The site of bleeding was confirmed by the use of upper gastrointestinal endoscopy, colonoscopy or sigmoidoscopy, barium studies (meal/follow-through/enema), scintigraphy and surgery. Upper gastrointestinal endoscopy was done in all patients within 12-24 hours of admission. Other investigations were done if indicated. Some of the patients underwent more than one type of investigation. The conventional level of the ligament of Treitz for discriminating upper from lower gastrointestinal bleeding was followed.

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Results

There were 37 males and 3 females, with a mean age of 34.5 years (range 24 to 63 years). Details of the diagnoses in the 40 patients is shown in Table 1. There were 26 patients with upper gastrointestinal bleeding, while in the remaining 14 the site of bleeding was in the lower gastrointestinal tract. The U:C ratio was calculated in each patient and correlated with the final diagnosis. The U:C ratio was 36 or more in 24 patients and less than 36 in 16. Of the 24 patients with a U:C ratio of 36 or more, 22 could be confirmed to have upper gastrointestinal bleeding. Only 2 patients with U:C ratio more than 36 were found to have lower gastrointestinal bleeding. In those patients in whom the U:C ratio was less than 36 (16 patients), the source of bleeding was above the ligament of Treitz in 4 patients (Table 2). A U:C ratio cut-off value of 36 thus had a positive predictive value of 84.6 per cent for upper gastrointestinal bleeding (22 out of 26 patients with a confirmed diagnosis of upper gastrointestinal bleeding).

TABLE 1
Cause of bleeding (n=40)

Diagnosis	No of patients
Above ligament of Treitz (n=26)	
Duodenal ulcer	7
Gastric ulcer	5
Erosive gastritis	4
Gastric carcinoma	4
Oesophagitis	2
Duodenitis	2
Gastric leiomyoma	1
Post-ERCP	1
Below ligament of Treitz (n=14)	
Ulcerative colitis	3
Colonic carcinoma	3
Jejunal diverticula	2
Non-specific colitis	2
Rectal carcinoma	2
Ischaemic colitis	1
Vascular malformation	1

Discussion

In patients presenting with altered blood in stools, the clinician must decide on the appropriate

TABLE 2

Correlation between U:C ratio and source of bleeding for a cut-off level of 36

U:C ratio	Site of bleeding		Total
	Upper gastrointestinal tract	Lower gastrointestinal tract	
≥ 36	22	2	24
< 36	4	12	16
Total	26	14	40

diagnostic strategy to be followed. If endoscopic facilities are available it would be useful to know whether upper or lower gastrointestinal endoscopy is likely to prove more productive. In this context, a simple test capable of giving the highest number of 'true' test results is desirable [4]. With this in mind, the hypothesis put forward by Snook et al [5] was tested in our series of 40 patients. Snook and co-workers in their study of 100 cases found that the plasma U:C ratio was significantly higher in patients with upper gastrointestinal bleeding than in those with lower gastrointestinal bleeding.

There has been some controversy regarding the cause of raised plasma urea concentration in patients with gastrointestinal bleeding. While Pumphrey et al [6] felt that a raised urea level indicated considerable haemorrhage in the intestines, others have disagreed [7,8]. It has been postulated that the urea level increases proportionate to the transit time of blood in the intestinal lumen and not to the amount of blood in the lumen [7]. This has been shown in an experimental study by Kikai and Matsuoka [9]. The reason why the U:C ratio goes up is that while the urea level rises, due to absorption of break down products of blood from the intestinal lumen, the creatinine level is unchanged. In the absence of renal impairment creatinine levels remain well within normal limits thus leading to a rise in the U:C ratio. The discriminatory value of U:C ratio indicative of upper gastrointestinal bleeding has been reported to vary between 30 to 100 [1,5]. We decided to use a U:C ratio of 36 as the cut-off level based on the work of Richards et al and Peterson et al [2,3]. This is based on the normal values of urea and creatinine in our laboratory (quoted above) where reporting is done in mg/dL. In an attempt to further substantiate our

chosen discriminatory level we did an additional calculation with a U:C ratio of 30 as the demarcating value.

When a cut-off value of 30 was used all the patients with upper gastrointestinal bleeding fell into the more than 30 group. However, 6/14 lower gastrointestinal bleeders were also seen to fall in this group, thereby giving a false positive predictability of 42.8 per cent. This rendered a U:C ratio of 30 unreliable for the safe prediction of the site of gastrointestinal bleeding.

In our series, a correlation between U:C ratio of 36 or more with the occurrence of upper gastrointestinal bleeding has been studied. Based on our results it is concluded that such a relationship exists. While the U:C ratio does not help in making a diagnosis of the site of bleeding by itself, it helps in the selection of further investigations. Since this test can be done in most peripheral hospitals, it can help in proper referral of selected patients for appropriate endoscopy. If the results reported in this paper can be reproduced in a larger series of patients, this test can well be used as an initial screening test in patients with altered blood in stools.

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