Urea Breath Testing to Detect *Helicobacter pylori* in Patients with Peptic Ulcer Bleeding During Proton Pump Inhibitor Treatment

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ABSTRACT

This was a descriptive study carried out from January to December 2021, at Quanzhou First Hospital, an affiliated hospital of Fujian Medical University, to investigate the efficacy of the urea breath test in detecting *Helicobacter pylori* infection in patients with peptic ulcer bleeding affected with proton pump inhibitors. A total of 77 patients with peptic ulcer bleeding, who underwent urea breath testing after active bleeding, were divided into two groups. The *Helicobacter pylori* infection positivity rate in patients with peptic ulcer bleeding was 66.2%. The time from bleeding to detection and from admission to detection was not significantly different between the *Helicobacter pylori*-positive and -negative groups (p=0.840 and 0.285, respectively). Even with high-dose proton pump inhibitor treatment, a urea breath test can be performed after peptic ulcer bleeding ceases and results in an acceptable positivity rate. There was no significant difference in the accuracy of *Helicobacter pylori* detection between the time from bleeding to testing and from admission to testing.

Key Words: *Peptic ulcer, Helicobacter pylori, Upper gastrointestinal bleeding, Urea breath test, Proton pump inhibitor.*

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Although the diagnosis of peptic ulcer bleeding (PUB) is becoming more timely, determine a positive *Helicobacter pylori* (*H. pylori*) test in hospitalised patients with PUB is delayed for various reasons. In 19% of the patients with PUB, *H. pylori* was not tested within 60 days of the first gastroscopy.[1] Delayed retreatment can significantly increase the risk of upper gastrointestinal bleeding (UGIB) timing-dependent after failed initial *H. pylori* eradication; therefore, early retreatment should be considered.[2] However, studies on the relationship between the time from bleeding to UBT, *the H. pylori* positivity rate are lacking. This study explored whether UBT can be used to determine a positive *H. pylori* test in patients with PUB undergoing proton pump inhibitors (PPI) treatment.

A total of 77 patients with PUB, who all received PPI and underwent UBT between January and December 2021, were eligible for the study, divided into *H. pylori*-positive (n=51) and negative (n=26) groups. Quanzhou First Hospital, an affiliated hospital of Fujian Medical University, reviewed and approved this study.

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Inclusion criteria were age over 18 years; symptoms such as haematemesis, melaena, dizziness, and fatigue; and gastric, duodenal, or compound ulcers confirmed by gastroscopy by a gastroenterologist within 24 hours in the Emergency Department. Exclusion criteria were patients with audiovisual impairment who could not undergo examination, patients with mental illnesses, antibiotic use within one month of admission, use of bismuth and traditional Chinese medicine within one month of admission, cirrhotic patients, and a history of gastric surgery, gastric malignancy, acute gastric mucosal lesions, Mallory-Weiss tears, Dieulafoy ulcer, and lower gastrointestinal haemorrhage. Each patient's detailed medical history was collected. The time of *H. pylori* detection was recorded as the time from bleeding to detection and the time from admission to detection. The UBT was performed by a formally trained physician after the PUB ceased. A ^{14}C breath test tester (HUBT-20A2, Shenzhen Zhonghe Headway Bio-Sci & Tech Co., Ltd.) was used for UBT. A ^{14}C-urea capsule dose of 0.75 µCi/tablet was provided by Shenzhen Zhonghe Headway Bio-Sci & Tech Co., Ltd. All patients fasted for >8 h and swallowed one ^{14}C-urea capsule at the prescribed time. They, then waited for 15 min and blew continuously for 1–3 min. They stopped blowing when the indicator in the air collection card changed from orange-red to yellow and if the indicator was not completely discoloured for more than 3 min. Before measurement, a blank card was used to adjust the background parameters. Thereafter, a gas-collecting card was inserted into the measuring chamber of the instrument and measured for 250 s.

Table I: Comparison of general data between the two groups.

	Gender		Age (years)	Haematemesis		Urea breath test timing	
	Male	Female		Yes	No	Bleeding (days)	Admission day (days)
H. pylori +	43 (84.3%)	8 (15.7%)	46.82±15.46	30 (58.8%)	21 (41.2%)	4.00 (3.00,6.00)	2.00 (2.00,4.00)
H. pylori -	25 (96.2%)	1 (3.8%)	45.04±17.09	14 (53.8%)	12 (46.2%)	4.00 (3.00,6.50)	2.00 (2.00,4.25)
p-values	0.248		0.645	0.676		0.486	0.969

Counts <50 per minute were considered negative, according to the test instructions. SPSS23.0 (IBM, USA) was used for data processing with independent sample t-tests, Mann–Whitney U test, and χ^2 test. Statistical significance was set at $p < 0.05$.

Of the 77 patients assembled in the study, the average ages of the *H. pylori*-positive and -negative groups were 46.82 ± 15.46 and 45.04 ± 17.09 years respectively. The positive group had 84.3% and 15.7% males and females, respectively; the negative group had 96.2% and 3.8% males and females, respectively. The *H. pylori*-positive detection rate was 66.2%. The *H. pylori*-positive and *H. pylori*-negative groups presented no statistical difference in the time from bleeding to detection or from admission to detection (p=0.486 and 0.969, respectively). There were also no significant differences in haematemesis history, gender, age between the *H. pylori*-positive and -negative groups (p=0.676, 0.248, and p=0.645, respectively, Table I).

When patients with PUB are treated with PPIs, UBT may seem inappropriate. However, their real-world value and the optimal timing remain controversial. This study explored the practicality of *H. pylori* detection during PPI treatment in patients with PUB and found that the positivity rate of *H. pylori* was 66.2%. A study in Beijing, China, found that the positivity rate of *H. pylori* infection in patients with PUB decreased from 2010 to 2019, with 69.7% in 2010, and only 50.9% in 2019.[3] This was close to the positive rate in this study (66.2%) and was sufficient to provide useful guidance for the clinical practice. The difference was that their analysis included most methods, except bacterial culture and antibody detection tests, and in this study, only ^{14}C-UBT were analysed. The analyses of haematemesis history and timing of testing was based on the possibility that haemorrhage may affect the test results. However, in this study, testing was performed after active bleeding ceased. Hence, the influence of blood was minimised. There was no significant difference in the UBT positivity rate between patients with and without a history of haematemesis. Another study found that the specificity and sensitivity rates of ^{13}C-UBT for PUB were not affected by stomach blood.[4] However, in contrast, the present authors performed UBT after active bleeding ceased. Therefore, it is advisable to conduct UBT after active bleeding has ceased, even if there is a history of haematemesis and during PPI treatment.

The strategy of performing UBT after resolving bleeding is supported by a recent high-quality review.[5] In this study, there was no statistically significant difference in the *H. pylori* positivity rate between the time from admission and from bleeding to testing. In contrast, Gisbert *et al*. found that it took more days for *H. pylori*-negative patients to be tested from admission than for *H. pylori*-positive patients.[6] One difference was that patients drank a citric-acid-containing urea solution half an hour before the test, which affected the positivity rate.

This study showed that during hospitalisation, regardless of whether patients have a history of haematemesis, UBT can be performed when bleeding ceases, to obtain an acceptable positivity rate. The time from bleeding to detection and from admission to detection had little influence on the overall test results of the population.

AVAILABILITY OF DATA AND MATERIALS:
Datasets can be obtained from the corresponding author upon reasonable request.

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ETHICAL APPROVAL:
Ethics Committee approval was granted by Quanzhou First Hospital, affiliated with Fujian Medical University, with ethics approval Number: 2020 [190].

PATIENTS' CONSENT:
All the patients have provided written consent.

COMPETING INTEREST:
None of the authors declared a competing interest.

AUTHORS' CONTRIBUTION:
ZH, DW: Conception of the work, analysis of data for the work, drafting, revising the work, and the final approval of the version to be published.

REFERENCES

1. Hung KW, Knotts RM, Faye AS, Pont AR, Lebwohl B, Abrams JA, *et al*. Factors associated with adherence to helicobacter pylori testing during hospitalization for bleeding peptic ulcer disease. *Clin Gastroenterol Hepatol* 2020; **18(5)**: 1091-8.e1. doi:10.1016/j.cgh.2019.07.037.
2. Guo CG, Cheung KS, Zhang F, Chan EW, Chen L, Wong ICK, *et al*. Delay in retreatment of helicobacter pylori infection increases risk of upper gastrointestinal bleeding. *Clin Gastroenterol Hepatol* 2021; **19(2)**:314-22.e2. doi:10.1016/

j.cgh.2020.03.071.

3. Duan RQ, Du YL, Chen C, Duan LP. Time trends of H. pylori infection and related drug use in patients with peptic ulcer bleeding in a hospital in Beijing from 2010 to 2019. *Zhonghua Yi Xue Za Zhi* 2022; **102(6)**:435-41. doi:10.3760/cma.j.cn112137-20210608-01305.
4. Wildner-Christensen M, Touborg Lassen A, Lindebjerg J, Schaffalitzky de Muckadell OB. Diagnosis of helicobacter pylori in bleeding peptic ulcer patients, evaluation of urea-based tests. *Digestion* 2002; **66(1)**:9-13. doi:10.1159/000064421.
5. Ansari S, Yamaoka Y. Helicobacter pylori infection, its laboratory diagnosis, and antimicrobial resistance: A perspective of clinical relevance. *Clin Microbiol Rev* 2022: e0025821. doi:10.1128/cmr.00258-21.
6. Gisbert JP, Esteban C, Jimenez I, Moreno-Otero R. 13C-urea breath test during hospitalisation for the diagnosis of Helicobacter pylori infection in peptic ulcer bleeding. *Helicobacter* 2007; **12(3)**:231-7. doi:10.1111/j.1523-5378.2007.00492.x.