

ORIGINAL ARTICLE

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Retrospective investigation of the effectiveness of fecal occult blood test (FOB), PT-APTT in patients admitted to emergency department with gastrointestinal bleeding**Ekim Saglam Gurmen¹, Mucahit Avcil², Bekir Dagli², Kivanc Karaman³**¹ Ministry of Health, Salihli State Hospital, Manisa, Turkey² Adnan Menderes University Faculty of Medicine, Aydin, Turkey³ Ministry of Health Sinop Atatürk State Hospital, Sinop, Turkey

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Abstract

The purpose of our study is to investigate the fact that gastrointestinal system bleeding, which is a major cause of mortality, is not diagnosed faster by any additional laboratory tests except physical examination and endoscopy, but it is negative in terms of time, workload and cost. Our study was retrospective and the hospital information system was scanned and the patients who were referred to Emergency Medicine Clinic between 01.08.2012-08.08.2013 with Gastrointestinal System (GIS) bleeding symptoms and then underwent endoscopic examination were investigated. Demographic characteristics, physical examination findings, vital signs, required examinations, digital rectal examination findings, endoscopy and colonoscopy results were recorded in the study form. For statistical analysis, SPSS (Statistical Package for Social Sciences) 17.0 program was used. A total of 274 patients aged 18 years and over were admitted to the study and 61.7% were male and 38.3% were female. Most of the patients in our diagnostic group were in the 70-79 age group. Sensitivity of Digital Rectal Examination (DRE) value was 79.6% Specificity 92.30%, negative predictive value (NPV) 60%, Sensitivity of Fecal Occult Blood Test (FOB) value was 31.46% NPV 30.49%, sensitivity of international normalized ratio (INR) was 26.25% NPV 32.95%, sensitivity of prothrombin time (PT) was 19.37%, NPV 34.84%, sensitivity of activated partial thromboplastin time (aPTT) was 14.19% NPV 34.43%. Endoscopies were performed in 169 patients with GIS bleeding and no active bleeding detected in 56 (33.1%) patients and in 113 (66.9%) patients active bleeding was detected. In patients with positive digital rectal examination findings, endoscopy results were also highly positive for gastrointestinal system bleeding. Our study suggests that; Running FOB, PT, APTT, INR tests in patients admitted to emergency department with GIS bleeding, is far from giving important and necessary information about the emergency management of the patients to emergency medicine specialists. The results of the digital rectal examination correlate with endoscopy results. It is also an easy and time-consuming examination method. From this point of view, we would like to emphasize that making the DRE of all patients with suspected GIS bleeding is a correct and immediate approach to the emergency physician.

Keywords: GI bleeding, PT, APTT, INR, FOB, DRE, endoscopy, emergency medicine**Introduction**

Upper gastrointestinal (GIS) hemorrhage is a gastric, duodenal ulcerous hemorrhage originating from the proximal of the trietz ligament. In patients presenting with oral blood, stool blood, or black stool coloration, upper GIS bleeding is an important cause of mortality and morbidity that should be excluded. Lower GIS bleeding is a bleeding originating from the distal part of the trietz ligament [1]. Like upper GIS hemorrhage, lower GIS hemorrhage is a life threatening common problem in emergency departments. Lower GIS hemorrhage is less common than upper GIS hemorrhage [2]. In this context; blood from upper GIS hemorrhage is the most common cause of blood detected in the lower GIS tract [3]. Upper GIS bleeding is always diagnosed by making

esophagogastroduodenoscopy (EGD) [4-6]. In case of acute anemia or hemorrhagic shock, nasogastric tube administration before the EGD is helpful in the diagnostic approach [7].

Complete blood count, coagulation tests, blood group determination and serum biochemistry profile should be included among the initial laboratory evaluations after the peripheral large intravenous access. Physical examination findings may include orthostatic symptoms, postural changes, paleness, palpitation, fatigue, chest pain, dyspnea, tachypnea and abdominal pain. Anorectal digital examination (DRE) should be performed both to investigate whether there is anorectal disease and to confirm the stool color described by the patient. Colonoscopy should be performed as soon as possible in patients presenting with acute lower GIS bleeding [8].

*Corresponding Author: Ekim Saglam Gurmen, Ministry of Health, Salihli State Hospital, Manisa, Turkey
E-mail: ekimdr@hotmail.com

Our primary goal in this study is to investigate incapability of laboratory tests such as fecal occult blood (FOB), prothrombin time

(PT), activated partial thromboplastin time (aPTT), international normalized ratio (INR) to determine the presence of GIS bleeding and the extent of existence bleeding. Our secondary goal is to investigate the adverse effects of these blood parameters on time, workload and especially cost in emergency department.

Material and Methods

Study Design

This study was planned retrospectively with the approval of Adnan Menderes University Faculty of Medicine Ethics Board dated 25.07.2013 numbered 14/237. Hospital Information System, patient files and International and Related Health Problems (ICD) Codes were scanned to investigate patients admitted to emergency department with GIS bleeding in 1 year (between 01.08.2012 - 08.08.2013).

Observations, Measurements and Data Collection

Emergency department patients with GIS hemorrhage ICD code in the ICD Coding system were scanned in the archives of the patients who had been referred to the emergency department with symptoms of GIS bleeding for 1 year between 01.08.2012 - 08.08.2013 and who underwent endoscopic examination. Physical examination findings, vital signs, hemoglobin, platelet, PT-APTT values, FOB result, DRE findings, endoscopy, colonoscopy results and final diagnoses were recorded. By comparing the hemogram, FOB, PT-APTT values of the patients with digital rectal examination and endoscopic-colonoscopy examination results, we tried to determine the efficacy of FOB, PT-APTT in the GIS bleeding by retrospective analysis.

Inclusion and Exclusion Criteria

All GIS bleedings were included to the study that had an emergency department application between 01.08.2012 - 01.08.2013, whose ICD code was GIS bleeding according to ICD Coding System in the hospital information system and whose patient files and information was available. Patients under the age of 18, patients whose information and the patient files in the hospital information system were unavailable was excluded.

Statistics

All results were presented as mean $\pm$ standard deviation as statistical method. Patient group information was analyzed in the Statistical Package for Social Sciences (SPSS) 17.0 program. Descriptive statistics; Frequency tables and cross tables for categorical variables; mean, median, standard deviation, minimum for numerical variables. Chi-square test statistic for comparison of independent categorical variables, Monte Carlo Simulation for multiple group comparisons, Fisher's Exact for binary group comparisons, and Mann-Whitney U test statistic for binary group comparisons not provided with normal distribution condition for numerical variables were used. Statistical significance level was accepted as $p < 0.05$.

Results

In our study, a total of 274 patients (105 females, (38.3%) and 169 males (61.7%)) who were admitted to the emergency department between 01.08.2012 - 08.08.2013 with GIS bleeding symptoms and underwent endoscopic examination were reviewed. GIS bleeding was detected in 116 of 169 male patients (68.6%) and 53 of 105 female patients (31.4%) who were included in the study. Patients with GIS bleeding are most common in the 70-79 age group (26.0%) and patients in the non-hemorrhage group are most common in the 50-59 age group (21.9%).

When the hemoglobin values of the patients included in the study were examined, hemoglobin average value was found to be 9.888 mg / dl in 169 patients with GIS bleeding, and hemoglobin average value was found to be 11.565 mg / dl in the other diagnoses group of 101 patients with no GIS bleeding. When the platelet counts of the patients included in the study were examined, the platelet average value of the 169 patient group in which GIS bleeding was detected was 134.13. The mean platelet count was found to be 137.79 in the other diagnoses group of 101 patients without GIS bleeding. ($p > 0.05$)

When PT, APTT, INR were compared with the final diagnosis groups, no statistically significant difference was found between the groups with and without GIS bleeding ($p > 0.05$) (Table 1).

Table 1. Comparison of PT, APTT, INR values with final diagnosis

	PT Group		Total	APTT Group			Total	INR Group		Total
	Normal	High		Low	Normal	High		Normal	High	
GIS Bleeding	129 (%65.15)	31 (%70.45)	160 (%66.1)	51 (%71.8)	88 (%62.4)	23 (%71.9)	162 (%66.4)	118 (%67)	42 (%65.6)	160 (%66.7)
No GIS Bleeding	69 (%34.85)	13 (%29.55)	82 (%33.9)	20 (%28.2)	53 (%37.6)	9 (%28.1)	82 (%33.6)	58 (%33)	22 (%34.4)	80 (%33.3)
Total	198 (%100)	44 (%100)	242 (%100)	71 (%100)	14 (%100)	32 (%100)	244 (%100)	176 (%100)	64 (%100)	240 (%100)

In the study group, FOB was tested in 189 (69.0%) of 274 patients. 143 (75.7%) patients from this group were positive for GIS bleeding and 47(92.2%) patients had FOB +, 28 (90.3%) patients had FOB ++, 30 patients had FOB +++ and 15 patients (%100) FOB ++++ was detected. In 23 patients with GIS bleeding (39%), FOB was negative. In the other group without GIS bleeding, FOB was found in 4 patients (7.8%) +, 3 patients (9.7%) ++ and 3 patients (9.1%) +++. FOB was negative in 36 patients (61.0%)

in the other group without GIS bleeding ($p < 0.001$). DRE was found positive in 104 out of 141 patients who had GIS bleeding. FOB was found to be positive in 118 of these 141 patients. The number of patients with both DRE melena / hematochezia positive and FOB positive is 100. FOB in 23 of the 141 patients with GIS bleeding was found to be false negative. P value was calculated as < 0.001 . The comparison of FOB and DRE results in the group with GIS bleeding is shown in table 2.

Table 1. Comparison of FOB and DRE results

	Fecal Occult Blood		Total	P Value
	Negative	Positive		
DRE NORMAL	14	15	29	
MELENA/HEMATOCHEZIA(+)	4	100	104	
EMPTY RECTAL AMPULLA	5	3	8	
TOTAL	23	118	141	<0.001

Endoscopies were performed in 169 patients who had GIS bleeding and 56 patients (33.1%) had endoscopy negative and 113 patients (66.9%) had endoscopy positive for GIS bleeding.

Gastric hemorrhage was detected in 81 of 274 patients in our study group, and this was shown endoscopically. Melena was detected in DRE at 29.6% of patients with GIS bleeding. Melena was not detected in 6.9% of patients in digital rectal examination in patients who had GIS bleeding diagnosed by endoscopy. Melena was

detected in DRE at 8% in all patients included to our study. In 23 patients, lower GIS bleeding was detected (8.4%). In 13 patients, bleeding due to Crohn's disease or ulcerative colitis was detected (4.7%). In the upper GIS bleeding clinical diagnosis group, 11 patients (4.0%) were present. This group of patients is referred to referral patients, patients without endoscopy or examination of diagnostic tests. The group without GIS bleeding contains 105 patients (38.3%). The final diagnosis table of the study group is shown in table 3.

Table 3. Final Diagnosis Table

	Frequency	Percentage
Upper GIS bleeding clinical diagnose+ melena +	22	8.0
Upper GIS bleeding endoscopy + melena-	19	6.9
Upper GIS bleeding endoscopy+ melena+	81	29.6
Upper GIS bleeding clinical diagnose	11	4.0
Lower GIS bleeding +	23	8.4
Crohn or ulcerative colitis +	13	4.7
Others	105	38.3
TOTAL	274	100

Sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) calculated for FOB, PT, aPTT, INR, DRE in our study are shown in table 4. FOB, DRE, FOB +++

/ ++++ were found to be statistically significant in detecting GIS bleeding. (p <0.05)

Table 4. Comparison of Sensitivity, Specificity, PPV, NPV, P values of Working Tests

	SENSITIVITY	SPECIFICITY	PPV	NPV	P VALUE
FOB	83.91	78.26	92.30	61.10	P<0.05
FOB+++ /++++	31.46	93.47	93.75	30.49	P<0,05
PT	19.37	84.14	70.45	34.84	P>0.05
APTT	14.19	89.02	71.87	34.43	P>0.05
INR	26.25	72.5	65.62	32.95	P>0,05
DRE	79.61	92.30	96.89	60.00	P>0,05

Discussion

When one studies the relation between the GIS bleeding and age groups, it is understood that the patients are mostly 70-79 years old. The group comprises of 44 patients (26%).

By the way, the relation between the GIS bleeding and gender

groups reveal that the male patients are dominant. The study group includes 116 men and 53 women who suffers GIS bleeding.

As for the FOB sensitivity, selectivity, PPV and NPV, they were estimated to be 83.91%, 78.26%, 92.30% and 61.10% respectively. The relation between FOB and GIS bleeding was found to be statistically significant (p<0.05). Tsung-Hsien Chiang et al. studied

the immunochemical FOB test for determination of the upper GIS and lower GIS lesions, and found the sensitivity to be 25% and 90% for the colon cancer and colorectal cancers respectively. They however claimed that the FOB test failed in detecting the GIS lesions. They attributed the false positive cases found in the course of study to the use of antiplatelet agents and the low hemoglobin concentration [8]. The study in question elaborated the diagnostic capabilities of the FOB test in general and under the elective conditions. When one considers the overall medical practices, the FOB test is understood to serve the purpose. On the other hand, the FOB test has a common use particularly in the GIS bleeding in emergency rooms. Contrary to that study, we did not categorize the GIS bleedings as the lower and upper GIS bleedings. Nonetheless our patients mostly had the upper GIS bleeding. The sensitivity and specificity determined in this study were of medium level. While the FOB test had a medium level diagnostic capability, it excludes the bleeding, which makes it insufficient to a great extent.

The patient group being positive for the FOB test was additionally worked as the sub-group. The sensitivity, specificity, PPV and NPV were estimated to be 31.46%, 93.47%, 93.75% and 30.49% respectively. It is apparent from these values that the sensitivity reduced to some extent, which however made the test more specific. It means that the test has a low potential to catch the patients with GIS bleeding solely through the evaluation of 3+ and 4+ test results. As for the PPV and the NPV for FOB are low in general as well as the 3+ and 4+ groups. When a patient is admitted to the emergency clinic, the negative FOB result would not expel the diagnosis. Such a patient has still a high potential of GIS bleeding.

Chien-Hua Chiang et al. worked out three different FOB tests in the patients with upper GIS bleeding, including the chemical o-toluidine test, immunochemical OC-Hemodia test and immunochromatographic Quick Chaser Occult Blood (QCOB) test, which were found to have accuracy in detecting the upper GIS bleeding as 39.6%, 45.8% and 68.8% respectively [9].

Considering the results of the above mentioned studies and our study, the FOB test is seen to be inappropriate for use in exclusion of the GIS diagnosis, even though it supports the GIS bleeding diagnosis in the emergency clinics. More comprehensive prospective studies are needed to evaluate its performance under emergency circumstances.

As it is understood in the findings of this study, no significant statistical interrelation could be found among the PT, APTT and INR tests and the GIS bleeding ($p>0.05$). When the data obtained from these tests are interpreted, they are understood to have negligible diagnostic values in determination or exclusion of the GIS bleeding as expected. It is opinion that the said diagnostic tests might be requested to commence the causative treatment of the patients who have a medical background or medicament use to raise the PT test value in anamnesis and story. inappropriate to adopt it as a routine test in GIS bleeding. In this context, the author is of the opinion that the said diagnostic tests might be requested to commence the causative treatment of the patients who have a medical background or medicament use to raise the PT test value in anamnesis and story.

The DRE test results reveal sensitivity, specificity, PPV and NPV

of 79.61%, 92.30%, 96.89% and 60.0% respectively. In terms of discrimination of the GIS bleeding, the rectal palpation is statistically significant ($p<0.05$).

In 169 patients with GIS bleeding, the average value of hemoglobin was found to be 9.88 mg/dl, compared to 11.56 mg/dl in 101 patients without GIS bleeding. In statistical respect, the difference is not significant ($p=0.13$). However, the initially measured hemoglobin values are logically low in the patients admitted for GIS bleeding. The statistically insignificant difference may be attributed to the respectively higher old age population of the GIS bleeding group, who have intrinsically lower average hemoglobin values. In this context, it would likely be useful to estimate a cut-point and sensitivity-specificity for the hemoglobin value by means of using a number of different statistical methods.

169 patients with GIS bleeding underwent the endoscopy, and no active bleeding was detected in endoscopy of 56 patients (33.1%). Our study is based on the consequent diagnostic findings of the GIS bleeding group. For the patients found positive in GIS bleeding, it was possible to perform endoscopy not at the time of their admission in the emergency care unit, but at the later days, and even after their hospitalization. Furthermore, a group of patient arrived at our center days after their GIS bleeding at home, or their hospitalization in another center for a few days. It is natural to take negative results from the interim endoscopies. By the way, our study was focused on the capabilities of all such diagnostic tests on GIS bleeding, irrespective of the upper or lower GIS bleeding. However, it was possible to achieve only the upper GIS endoscopy results. Hence, the endoscopy was negatively defined in some one third of the patients with GIS bleeding.

A literature search revealed that the studies on GIS bleeding were usually focused on the advanced diagnostic methods. On the other hand, alternative diagnostic methods are needed to confirm or exclude the GIS bleeding diagnosis in the emergency care practice. The endoscopy is the mostly accessible one of the advanced diagnostic methods, and it has been observed that even it could not be immediately applied in all the GIS bleeding patients. For the GIS bleeding diagnosis in the emergency care unit, the anamnesis and physical examination are still seen as almost the sole ways. By the way, the FOB that is a simple and cost effective method may not provide the emergency care physicians with such concrete data as is it a GIS bleeding, the patient must be hospitalized, or it is not a GIS bleeding, the patient may be discharged, etc. As it is also understood in this study, the bleeding tests are rarely coherent with the GIS bleeding. Indeed, such tests do not target diagnosis and exclusion, but rather the causative explanation. Though the DRE has a medium level sensitivity and specificity, but it is still correlated with the endoscopic results. It is however an easy examination method that is not time consuming. In this context, it is old, but still accurate approach to perform DRE in all the patients prone of the GIS bleeding.

Conclusion

The indication of FOB test supports the GIS bleeding diagnosis in the patients who are admitted to the emergency care units, but it seems inappropriate for use in exclusion. The routine PT, APTT and INR tests in the patients prone of GIS bleeding are far from providing important and necessary information for the emergency

patient management. It seems more appropriate to work on the patients who have such factors as may improve these test results. The DRE results are related to the endoscopic results. It is however an easy examination method that is not time consuming. Hence, it is a justifiable approach to perform DRE in all the patients prone of GIS bleeding, which drives the emergency care physician to the accurate diagnosis.

Limitations

It is possible to more comprehensively evaluate the correlation among the PT, APT and INR values and the GIS bleeding by means of additional comparable studies in larger populations.

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