

## Original Article

# Acute upper gastrointestinal bleeding in a tertiary care hospital in South India - Have we Improved the outcomes?

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### ABSTRACT

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**Background:** Since the data on acute upper gastrointestinal bleeding (UGIB) is lacking in many of the institutes of India, this study was taken up to find out the etiology, clinical features and management of patients with acute UGIB. The other aims of the study were to assess the factors associated with re-bleeding and mortality in patients with acute UGIB.

**Methods:** This study was a hospital-based, prospective observational study, done in all patients presenting with acute upper gastrointestinal bleed, over a period of 18 months from September 2010 to February 2012.

**Results:** There were 396 patients admitted with upper GI bleed. 17 patients (4.2%) presented twice with recurrent acute UGIB. The majority of these patients (52.3%) were in 41-60 year age group. 35.9% patients had Oesophageal Varices. The erosive mucosal disease was the commonest cause (29%) of bleeding in patients with Non-Variceal bleed. Endoscopic variceal ligation was done in 125 (30.6%) patients, sclerotherapy in 9 (2.3%) patients and 13 (3.3%) underwent adrenaline injection. Endoscopy failed to control bleeding in 4.5% of patients. The recurrent rate of bleeding during the hospital stay was 11.9%. Thirty-four (8.6%) patients' died. 362 patients went home after a mean hospital stay of 6.2 days.

**Conclusion:** Unlike the evidence from the western studies that peptic ulcer is the commonest cause for acute UGIB; we found varices as the common cause followed by erosive mucosal disease. The recurrent rate of bleeding and mortality were 11.9% and 8.6% respectively. Factors found to be significantly associated with recurrent bleeding & mortality was chronic liver disease and those who needed multiple transfusions. There is scope in improving the outcomes of Acute UGIB.

**KEYWORDS:** Upper gastrointestinal bleeding; varices; management.

## Introduction

Acute upper gastrointestinal bleed (UGIB) is a common medical emergency that has a high mortality rate.<sup>1</sup> Peptic ulcer disease, Oesophageal varices and erosive mucosal disease account for most of the cases, followed by less common causes like Mallory-Weiss tear, malignant ulcer, Dieulafoy's lesion, vascular ectasia, angioma and rare causes like haemobilia, aortoenteric fistula and vasculitis. An astute knowledge of pathophysiology and clinical presentations of acute UGIB enables swift intervention and a reduction in rebleeding and mortality rates.<sup>2</sup> Studies have been performed worldwide to evaluate the etiology, clinical profile and outcome of patients with acute UGIB.<sup>1,2,3,4,5</sup> Since such a study was lacking from our institute, we took up this prospective study with the aim to find out the etiology, clinical features and management of patients with acute UGIB and also to assess the factors associated with rebleeding, mortality in our patients. The secondary aim of the study was to look at the deficiency in the existing methods of in managing these patients in our institute.

## Methods

This study was a hospital-based, prospective observational study, done in all patients presenting with acute upper gastrointestinal bleeding (UGIB) to Emergency Medical Services (EMS) from September 2010 to February 2012. Since endoscopic services are with the Department of Surgery for more than two decades in our institute, these patients were managed by Department of Surgery. Patients admitted with acute UGIB constitute nearly thirty percent of the emergency admissions in the Department of Surgery. Patients below 13 years of age, In-patients developing acute UGIB were excluded from the study. The study was approved by the Institute Research Council and Ethics Committee.

Since the study was an observational study to collect the existing data, no attempt was made to make changes in the existing method of managing these patients and an attempt was made to collect all the available data prospectively. After initial resuscitation of the patient, history was obtained regarding the duration, number

of episodes of haemetemesis, melaena, haematochezia, previous bleeding episodes. Clinical examination was done to look for pallor, icterus, pedal edema, splenomegaly, hepatomegaly, ascites and signs of liver failure. A nasogastric tube was inserted, and the amount and color of the aspirate were noted. A digital rectal examination was performed look for melaena. Relevant laboratory investigations were done in all patients. Serology for Viral markers was done whenever cirrhosis was suspected. Additional investigations like ultrasound, chest X-ray and computed tomogram (CT) of the abdomen were done whenever necessary and possible. Department of Medicine opinion was taken whenever necessary to rule out the possibility of haemoptysis and patients with haemoptysis were transferred to Department of Medicine.

All patients who presented with the history suggestive of UGIB and haemodynamic instability and those patients whose nasogastric aspirate showed blood were admitted. Patient with history of upper gastrointestinal bleeding with a high risk of bleeding like elderly, associated comorbidity were also admitted. Those patients who were provisionally diagnosed as having portal hypertension received octreotide and antibiotics and those in whom peptic ulcer or erosive mucosal disease was suspected received pantoprazole infusion before endoscopy. Blood and blood products transfusions were given whenever necessary. Those patients who were haemodynamically unstable and who had a haemoglobin < 8 gm% and the elderly patients (>65 years) with Haemoglobin < 10gm% were given packed cell transfusions. Fresh Frozen plasma transfusion was given in those who had prolonged Prothrombin time. Upper GI endoscopy (UGIE) was done on the next day (within 48 hours). Since UGIE was done the next day, in some of the patients a Sengstaken-Blakemoore tube was inserted especially in whom a diagnosis of portal hypertension was made if they continue to bleed and remain unstable even after starting octreotide infusion. Endoscopic interventions such as banding or sclerosant injection were done for variceal bleeding. If the bleeding was not controlled Sengstaken-Blakemoore tube was reinserted or planned for surgical variceal ligation. Endoscopic adrenaline injection was done for bleeding

peptic ulcer and if not controlled patient was taken up for surgery. Patients whose blood transfusion requirement was more than six units were also considered for surgery. Patients with hypovolemic shock associated with recurrent haemorrhage or a slow continuous blood loss requiring transfusion of more than three units per day were also considered for surgery. The indication and nature of the surgical intervention and intra-operative findings were noted. Any post-procedural or post treatment re-bleeding, morbidity and mortality were also noted.

## Definitions

Those patients having history of alcohol intake for more than 5-10 years and having ultrasound findings of cirrhosis of liver were taken as alcoholic cirrhotics. This was further confirmed by the presence of varices during endoscopy. Those patients who had bled from oesophageal varices, if they had altered echo texture of the liver on ultrasound were taken as having cirrhosis. If they had portal vein thrombosis or cavernomatous transformation of the portal vein, a diagnosis of extra hepatic portal vein thrombosis (EHPVO) was made. If they had periportal echoes, a diagnosis of Non-cirrhotic portal fibrosis was made. Following endotherapy if the bleeding could not be controlled, it was taken as a failure of endotherapy. Re-bleeding was characterized as a new bleeding episode 24 hours after the control of initial bleed. Complications occurring as a result of UGIB or as a result of surgery in these patients were taken as morbidity.

Both descriptive and inferential statistics were used for presenting and analyzing the data. Univariate analysis for the associations between clinical parameters and the morbidity and mortality of UGIB was carried out using the  $\chi^2$  test or Fisher's exact test for categorical variables. Continuous variables were compared using Student 't' test. A 'p' < 0.05 was considered statistically significant. Multivariate Analysis with Logistic regression to identify independent parameters was performed and is presented with odds ratio and 95% confidence interval. Statistical analysis was done using SPSS version 16.0.

## Results

There were 396 patients who presented with acute upper gastrointestinal bleeding (UGIB). The mean age of the

study population was  $47.4 \pm 13.3$  years. The majority of patients (52.3%) were in 41-60 year age group. Males clearly outnumbered females with a male: female ratio of 4:1. (**Table 1**).

Most of the patients presented with bright red vomitus. At presentation, 73.2% patients had melaena, and 13.6% had haematochezia. History of NSAID intake was observed in 12.6%. 32.8% were alcoholics. One hundred and fifty-six patients (39.4%) patients presented with shock. 17 patients (4.2%) presented twice with recurrent UGIB. Sixty-seven (16.9%) patients had associated comorbidities at the time of presentation. (**Table 2**)

We found that 154 (38.8%) patients had Hb < 8 gm%. Elevated urea and creatinine were found in nearly 45% of the patients. Prothrombin time was prolonged in 56% of the patients. Patients with UGIB due to varices had significantly lower haemoglobin, WBC count and albumin compared with non-variceal bleeders. They also had significantly raised creatinine and total bilirubin. Child-Pugh Grade A, B, C was seen in 48.1%, 39% and 11.7% of patients with variceal bleed.

Three hundred and eighty-four patients underwent endoscopy out of which 35.9% patients had Oesophageal Varices while 64.1% patients had the Non-Variceal bleed. In patients of Variceal Bleed, 96 (69.5%) patients had grade 3 and 40 (28.9%) patients had grade 2 varices. Seventeen (12.3%) patients had associated gastric varices. In patients of Non-Variceal bleed, 106 patients had either duodenal or gastric ulcer. Most of the patients with gastric ulcer had an ulcer in the pre-pyloric region. The

**Table 1: Age and gender distribution of patients of acute upper gastrointestinal bleeding (Acute UGIB)**

| AGE IN YEARS | MALE<br>N=320(%) | FEMALE<br>N=76(%) | N= 396(%)  |
|--------------|------------------|-------------------|------------|
| <20          | 6 (1.9)          | 4 (5.3)           | 10 (2.5)   |
| 21-30        | 18 (5.6)         | 10 (13.2)         | 28 (7.1)   |
| 31-40        | 63 (19.7)        | 12 (15.8)         | 75 (18.9)  |
| 41-50        | 94 (29.4)        | 13 (17.1)         | 107 (27)   |
| 51-60        | 79 (24.7)        | 21 (27.6)         | 100 (25.3) |
| 61-70        | 47 (14.7)        | 10 (13.2)         | 57 (14.4)  |
| >70          | 13 (4.1)         | 6 (7.9)           | 19 (4.8)   |

Mean age –  $47.4 \pm 13.3$ , Male: female ratio – 4:1





of endotherapy Nine patients with peptic ulcer underwent emergency surgery. The majority of these patients underwent pyloroplasty, under running of bleeder and truncal vagotomy. Surgical morbidity and mortality rate was 77.7% and 55.6% respectively in these patients.

Hepatic encephalopathy was the commonest problem (4.5%) encountered in these patients. Thirteen (3.3%) patients developed MODS. Two patients (0.5%) developed transfusion reactions. SB tube-related complications were seen in 4 patients. (**Table 4**) Thirty-four (8.6%) patients died. The majority of these (67.6%) were patients with the chronic liver disease. Bleeding duodenal ulcer (17.6%) was the second common cause of death in these patients. 362 patients went home after a mean hospital stay of 6.2 days. (**Table 5**)

Univariate analysis showed that patients having co-morbidities like Diabetes, hypertension, coronary artery disease, chronic liver disease, Rockall score >3, bleeding from varices and those who needed multiple or massive transfusion were at high risk for recurrent bleeding. Patients who had massive haemetemesis, acute renal failure, Rockall score >3, chronic liver disease, Hb < 8gm%, bleeding from varices, who needed of SB Tube insertion, who needed endotherapy, those who had rebleeding had a significant morbidity & mortality (**Table 6**) Patients with chronic liver disease, UGIB from varices and those who needed multiple transfusions, were the ones found on multivariate analysis, to have significant association with morbidity. (**Table 7**) But chronic liver disease and need of multiple transfusions were the only factors, found on multivariate analysis, to be significantly associated with mortality.

## Discussion

Our study included 396 patients admitted with acute UGIB. The mean age of the patients was 47 years with a male to female ratio of 4:1, which is similar to other Indian & African studies.<sup>6,7,8</sup> But western studies report a higher age at presentation,<sup>9,10,11</sup> which is due to elderly population in their community. Eighty percentage of the study population presented with haemetemesis, 27.2% had massive haemetemesis, and 39.4% presented with shock but unlike other studies<sup>12</sup> pain abdomen was present only in 13% that is due to higher number of patients with

**Table 4: Morbidity of patients with acute UGIB**

| Parameter                                    | N =396 (%) |
|--|------------|
| Hepatic encephalopathy                       | 18 (4.5)   |
| Need of Mechanical ventilation               | 17 (4.3)   |
| Multi-organ dysfunction syndrome (MODS)      | 13 (3.3)   |
| Pneumonia                                    | 8 (2.0)    |
| Acute renal failure (ARF)                    | 7 (1.8)    |
| Disseminated Intravascular Coagulation (DIC) | 6 (1.5)    |
| Surgical site infections                     | 3 (0.75)   |
| Deep venous thrombosis (DVT)                 | 3 (0.75)   |
| Acute respiratory distress syndrome (ARDS)   | 2 (0.5)    |
| Transfusion reactions                        | 2 (0.5)    |
| Iatrogenic pneumothorax                      | 1 (0.25)   |
| <b>SBT complications</b>                     |            |
| Alar necrosis                                | 1 (0.25)   |
| Rupture of bulb and rebleed                  | 1 (0.25)   |
| Aspiration pneumonia                         | 2 (0.5)    |

**Table 5: Mortality of patients with acute UGIB**

| MORTALITY                 | N= 396 (%) |
|---------------------------|------------|
| Total mortality           | 34 (8.6)   |
| <b>Variceal bleed</b>     | 25         |
| <b>Non-variceal bleed</b> | 9          |
| Duodenal ulcer            | 6          |
| Gastric ulcer             | 2          |
| Haemosuccus Pancreaticus  | 1          |

**Table 6 : Factors found to be significantly associated with morbidity and mortality in Acute UGIB patients following multivariate analysis**

| Parameters                          | Odds ratio | 95 % CI      | p-value |
|-------------------------------------|------------|--------------|---------|
| Patients with Chronic liver disease | 3.524      | 1.037-11.973 | 0.044   |
| Bleeding from Varices               | 7.272      | 2.599-20.344 | <0.001  |
| Need of Packed cell transfusions    | 5.652      | 2.091-15.276 | 0.001   |

variceal bleed in our study. In our study population, 67 patients had co-morbidities with diabetes (55.2%) being the commonest co-morbidity. Other studies<sup>8</sup> report fewer diabetics.

Following endoscopy in 384 patients, 138 (35.9%) patients were found to have varices, erosive mucosal disease was seen in 29%, Peptic ulcer in 27.5% of patients. Thus, Oesophageal varices were the commonest cause for acute UGIB in our patients. This is in contrast to other studies<sup>7,10,11</sup> on acute upper GI bleeding but similar to study done by Rao et al<sup>6</sup> from India. Common causes for UGIB in the order of frequency reported in world literature are the duodenal ulcer (32%), gastric ulcer (29.7%), erosions (21.9%) & Oesophageal varices (10.9%).<sup>13,14</sup> This difference could be explained partly by the referral pattern and partly by the higher prevalence chronic liver disease. The numbers of patients with Non-Cirrhotic portal fibrosis (2.7%) or Extra hepatic portal vein Obstruction (2.0%) were small in our study unlike studies from far east or North Indian studies.<sup>15,16</sup>

In our study, 106 patients had bleeding peptic ulcer with a predominance of duodenal ulcer. Of these 65 (61.3 %) belonged to Grade I and II of Forrest classification that represents persistent signs of recent hemorrhage. In similar study done by Peetsalu et al.,<sup>17</sup> 80.6 % of patients belonged to Grade 1 and 2. This may be because of the practice of endoscopy within 24 hours in their study. In our study 47 patients had the gastric ulcer, 6.3% were type I and 80% were type III. Type III gastric ulcer behaves like the duodenal ulcer that is common in South India.

In our study, 35 % patients didn't require transfusion with either packed cells or frozen plasma while other series report 20-36 %.<sup>18</sup> Sengstaken-Blackmore tube (SBT) was used to control bleeding in 92 (23.2 %) patients of acute upper GI bleed. In a study done by Mushtaq et al<sup>19</sup> where in 24.5 % were in need of SBT. Out of 143 patients who underwent endoscopic intervention, variceal ligation is the major technique used in 63.6% along with Octreotide, which was used in 86.7%. In a study by Seo et al,<sup>20</sup> EVL was done in 90%, but they used both terlipressin and somatostatin to achieve initial hemostasis in 86%.

Rebleeding rates have been reported in the literature to occur in 20-30% of patients.<sup>21,22</sup> and is associated with a high risk of mortality. Rebleeding rate in our study group was 14.1% that is in accordance with the reports in the literature. Rockall score is a clinical risk predictor score for rebleeding and mortality. A score <3 was associated

with a zero mortality in patients with ulcers or varices.<sup>21</sup> Rockall scores show a progressive increase in mortality from 2% to 39% in patients with a Rockall score >8.<sup>4,22,23</sup> In our study taking < 3 as low score and > 3 as high score, we stratified our study patients 262 (66.1%) as low-risk and 134 (33.9%) as a high-risk group. It was observed that this 33.9% were found to have high rebleeding, significant morbidity and mortality.

Only 9 (2.3%) out of 396 patients were operated in our study. Unlike the reports in the literature where the rate of surgical treatment varies from 10 to 30%.<sup>6,14,24</sup> In our study only patients with rebleeding from peptic ulcer were operated and patients with rebleeding from varices, since majority had chronic liver disease, were managed with octreotide infusion and SB tube insertion whenever needed.

Hepatic encephalopathy and MODS were the commonest morbidities seen in our study. All patients who had significant morbidity have had received either Packed Cells or Fresh Frozen Plasma. In a study of Taha et al. on blood transfusion<sup>25</sup> in patients with moderately severe Nonvariceal UGIB, mortality was higher, following blood transfusion. Whether this reflects selection bias, or an effect of co-morbidity or an effect of transfusion necessitates further studies. In Our study, mortality rates of UGI Bleed patients were 8.6% that is comparable with the similar studies in the literature.<sup>26-28</sup> Patients with variceal bleeding had a greater mortality as in other studies than patients with non-variceal bleed. This may be attributed to underlying chronic liver disease.

In our study, most of the recurrent bleeders were having varices. On performing Univariate analysis of recurrent bleeders and non-recurrent bleeders, factors found to significant were those with co-morbidities, Chronic liver disease, large varices, those undergoing endotherapy, those in need of blood transfusion, those who had morbidity and Rockall score > 3. In Charatcharoenwittaya et al. study<sup>29</sup> by univariate analysis, an increased risk of rebleeding was observed in endoscopic stigmata of recent bleed and blood transfusion.

In a study by Gado et al<sup>30</sup>, significant mortality were seen in patients of older age (>60 years), among in-patients, major co-morbidities, with chronic liver disease, in those whom early endoscopy was done and in variceal

bleeders. Our analysis that high Rockall score can have high morbidity and mortality could prove the role of its risk scoring system in UGIB as showed by Vreeburg E M et al.<sup>23</sup> In the study by Enns et al.<sup>9</sup> on analysis of patients with morbidity and mortality with those didn't have, the factors found to be significant were massive haematemesis (>500ml), haematochezia, acute renal failure, associated medical conditions, chronic liver disease, hemoglobin (<8 gm/dl), bleeding varices, packed cell/FFP transfusions, SBT insertion, Surgical intervention, rebleeding - Postendotherapy Rockall score > 3. Sugawa et al<sup>18</sup> has reported hypotension, blood transfusion and varices as factors significantly associated with mortality and they also proposed liver failure and MODS as the major cause of morbidity and mortality.

In our study, chronic liver disease, bleeding from varices and those needed multiple transfusions were the factors found on multivariate analysis, using logistic regression, to be significantly associated with morbidity but only chronic liver disease and need of multiple transfusions were significantly associated with mortality. In another study<sup>29</sup> multivariate analysis was done concerning mortality, the presence of hemodynamic instability at presentation, a background of liver cirrhosis or disseminated malignancy, a transfusion requirement during admission, and the development of rebleeding, which were statistically significant.

There were many deficiencies in managing these patients. There was no stratification of patients into low-risk or high-risk at admission based on risk stratification scores. Current recommendations emphasize early risk stratification, by using validated prognostic scales.<sup>31</sup> It has also been shown that the prokinetics (erythromycin or metoclopramide) before endoscopy increase the visibility during endoscopy<sup>32</sup> and reduces the need for repeat endoscopy, but such practice was not existing. Antifibrinolytics have been found to decrease the mortality rate in patients with non-variceal bleed,<sup>33</sup> but antifibrinolytics were not used in managing any of the patients.

Whenever fundal varix was found, patients were referred to medical gastroenterologist of the same institute or other institutes where facility for glue injection was available immediately. While treating patients with

bleeding peptic ulcer endoscopically, only adrenaline was injected, and the recommendation<sup>34</sup> of dual modality was not followed. This must have resulted in recurrent bleeding in this subgroup of patients.

Though our institute is one of the tertiary care hospitals in this region, there is still a lack of an interventional radiologist. It has been shown in patients with recurrent bleed from peptic ulcer with co-morbidity, mortality following angioembolization is less (3%) compared with surgery (14%).<sup>35</sup> None of the cases of bleeding following surgery or those unsuitable for surgery could be managed by embolization.

Transjugular Intrahepatic Portosystemic Shunt (TIPS) was not done any of the patients, though there were five patients with the chronic liver disease who died during the stage of resuscitation, before endoscopy. There were 9 (11.7%) of patients with variceal bleed who were in Child C status who were in need of a TIPS procedure. Following one of the studies at our institute,<sup>36</sup> which showed a mortality of 46% following emergency devascularisation procedure, not much attempt is being done for either devascularisation procedure or shunt surgery. The other reason for not attempting such procedures was because majority portal hypertension patients were cirrhotics.

Patients who were admitted on Saturday, endoscope, could not be done on Sunday and was done only on Monday. This "weekend" effect could be one of contributing factors of mortality. The available data shows a reduction in hospital stay, recurrent bleeding and need for surgery and decreased mortality in this subgroup.<sup>37,38</sup> It is also suggested that improvement in care can be measured by the proportion of patients, in whom endoscopy was done within 24 hours.<sup>39</sup> In our study endoscopy was done within 24 to 48 hours only and all patient could not undergo endoscopy within 24 hours.

## Conclusions

It can be concluded, unlike the evidence from the west that peptic ulcer is the commonest cause for UGIB; we found varices as the common cause, followed by erosive mucosal disease. The majority of these patients can be treated by a combination of drugs and endotherapy. A Small percentage (2.3%) of these patients needs surgery.

Recurrent bleeding is seen in 14.1% of these patients. The morbidity and mortality rates are 11.6% and 8.6% respectively. Factors found to be significantly associated with morbidity are chronic liver disease, bleeding from varices and those who needed multiple transfusions. But only chronic liver disease and need of multiple transfusions were significantly associated with mortality. There is scope in improving the outcomes of Acute UGIB.

## References

- Longstreth GF. Epidemiology of hospitalization for acute upper gastrointestinal hemorrhage: a population-based study. *Am. J. Gastroenterol.* 1995;90(2):206-10.
- Van Leerdam ME, Vreeburg EM, Rauws EAJ, Geraedts AAM, Tijssen JGP, Reitsma JB, Tytgat GNJ. Acute upper Gi bleeding: did anything change? Time trend analysis of incidence and outcome of acute upper Gi bleeding between 1993/1994 and 2000. *Am. J. Gastroenterol.* 2003;98:1494-1499.
- Yavorski RT, Wong RK, Maydonovitch C, Battin LS, Furnia A, Amundson DE. Analysis of 3,294 cases of upper gastrointestinal bleeding in military medical facilities. *Am. J. Gastroenterol.* 1995;90(4):568-73.
- Rockall TA, Logan RF, Devlin HB, Northfield TC. Incidence of and mortality from acute upper gastrointestinal haemorrhage in the United Kingdom. Steering Committee and members of the National Audit of Acute Upper Gastrointestinal Haemorrhage. *BMJ.* 1995 22;311(6999):222-6.
- Higham J, Kang J-Y, Majeed A. Recent trends in admissions and mortality due to peptic ulcer in England: increasing frequency of haemorrhage among older subjects. *Gut.* 2002;50(4):460-4.
- Rao TH, Pande GK, Sahni P, Nundy S. The management of upper gastrointestinal haemorrhage in a tropical country. *Arch Emerg Med.* 1991;8(3):169-76.
- Kashyap R, Mahajan S, Sharma B, Jaret P, Patial RK, Rana S, Pal SL. A Clinical Profile of Acute Upper Gastrointestinal Bleeding at Moderate altitude. *JICAM.* 2005;6(3):224-8.
- Elghuel A. The characteristics of adults with upper gastrointestinal bleeding admitted to Tripoli Medical Center: a retrospective case-series analysis. *Libyan J Med.* 2011;6:6283.
- Enns R-A, Gagnon Y-M, Barkun A-N, Armstrong D, Gregor J-C, Fedorak R-N. Validation of the Rockall scoring system for outcomes from non-variceal upper gastrointestinal bleeding in a Canadian setting. *World J. Gastroenterol.* 2006;12(48):7779-85.
- Marmo R, Koch M, Cipolletta L, Capurso L, Grossi E, Cestari R. Predicting mortality in non-variceal upper gastrointestinal bleeders: validation of the Italian PNED Score and Prospective Comparison with the Rockall Score. *Am J Gastroenterol.* 2010;105(6):1284-91.
- Romagnuolo J, Barkun AN, Enns R, Armstrong D, Gregor J. Simple clinical predictors may obviate urgent endoscopy in selected patients with nonvariceal upper gastrointestinal tract bleeding. *Arch Intern Med.* 2007;167(3):265-70.
- Rathod JB, Shah DK, Yagnik BD, Yagnik VD. Upper gastrointestinal bleeding: audit of a single center experience in Western India. *Clinics and Practice.* 2011; 1: e132.
- Faiza A Qari. Major Causes of Upper Gastrointestinal Bleeding at King Abdul Aziz University Hospital (Jeddah). *Kuwait Medical Journal.* 2001;33(2):127-130.
- Lakhwani MN, Ismail AR, Barras CD. Upper gastrointestinal bleeding in Kuala Lumpur Hospital, Malaysia. *Med J Malaysia.* 2000;55(4):498-50.
- Kingham J, Levison D, Stansfeld A. Noncirrhotic intrahepatic portal hypertension: A long term follow up study. *Quarterly journal of medicine.* 1981;50:259-268.
- Bhargava DK, Dasarathy S, Sundaram KR, Ahuja RK. Efficacy of endoscopic sclerotherapy on long-term management of oesophageal varices: a comparative study of results in patients with cirrhosis of the liver, non-cirrhotic portal fibrosis (NCPF) and extrahepatic portal venous obstruction (EHO). *J Gastroenterol Hepatol.* 1991; 6(5):471-5.
- Peetsalu A, Kirsimägi U, Peetsalu M. Giant peptic ulcer hemorrhages: epidemiology, treatment, and outcome in the teaching hospital of Tartu. *Medicina (Kaunas).* 2011;47(1):19-24.
- Sugawa C, Steffes CP, Nakamura R, Sferra JJ, Sferra CS, Sugimura Y. Upper GI bleeding in an Urban Hospital: Etiology, Recurrence and Prognosis. *Ann. Surg.* 1990;212(4) 521-6.
- Cheema M A, Sohail D, Shafique M, Ajmal N M, Asad, Mustafa et al, Cheema, Davidsohail, Shafique. Control of acute variceal haemorrhage - a comparison of octreotide and balloon tamponade. *Biomedica.* 2004;20:23-7.
- Seo YS, Kim YH, Ahn SH, Yu SK, Baik SK, Choi SK, et al. Clinical features and treatment outcomes of upper gastrointestinal bleeding in patients with cirrhosis. *J. Korean Med. Sci.* 2008;23(4):635-43.



21. Hearnshaw SA, Logan RF, Lowe D, Travis SP, Murphy MF, Palmer KR. Acute upper gastrointestinal bleeding in the UK: patient characteristics, diagnoses and outcomes in the 2007 UK audit. *Gut*. 2011;60(10):1327-35.
22. Vreeburg E, Terwee C, Snel P, Rauws E, Bartelsman J, Meulen J, et al. Validation of the Rockall risk scoring system in upper gastrointestinal bleeding. *Gut*. 1999;44(3):331-5.
23. Rockall TA, Logan RFA, Devlin HB. Selection of patients for early discharge or outpatient care after acute upper gastrointestinal haemorrhage. *Lancet*. 1996;347:1138-40.
24. Salimi J, Salimzadeh A, Yazdani V, Ghadimi H, Habibi G Z. Outcome of Upper Gastrointestinal Hemorrhage According to the BLEED Risk Classification: a Two-year Prospective Survey. *Bahrain Med Bull*. 2007;29.
25. Taha A S, McCloskey C, Craigen T, Angerson W J, Shah A, Morran C. Mortality following blood transfusion for non-variceal upper gastrointestinal bleeding. *Frontline Gastroenterology*. 2011;2:218-25.
26. M Kaliamurthy, MG Lee, M Mills, T Murphy. Upper Gastrointestinal Bleeding: A Jamaican Perspective. *West Indian Med J*. 2011;60(3):289-92.
27. Marmo R, Koch M, Cipolletta L, Capurso L, Grossi E, Cestari R, Bianco MA et al. Predicting mortality in nonvariceal upper gastrointestinal bleeders: validation of the Italian PNED score and prospective comparison with the Rockall score. *Amer J Gastroenterol*. 2010;105:1284-91.
28. Hearnshaw SA, Logan RFA, Lowe D. Use of endoscopy for management of acute upper gastrointestinal bleeding in the UK: result of a nationwide audit. *Gut*. 2010;59:1022-9.
29. Charatcharoenwitthaya P, Pausawasdi N, Laosanguaneak N, Bubthamala J, Tanwandee T, Leelakusolvong S. Characteristics and outcomes of acute upper gastrointestinal bleeding after therapeutic endoscopy in the elderly. *World J Gastroenterol*. 2011;17(32):3724-3732.
30. Gado AS, Ebeid BA, Abdelmohsen AM, Axon AT. Clinical Outcome of Acute Upper Gastrointestinal Hemorrhage among Patients Admitted to a Government Hospital in Egypt. *Saudi J Gastroenterol*. 2012;18(1):34-39.
31. Barkun AN, Bardou M, Kuipers EJ, Sung J, Hunt RH, Martel M, Sinclair P; International Consensus Upper Gastrointestinal Bleeding Conference Group. International consensus recommendations on the management of patients with nonvariceal upper gastrointestinal bleeding. *Ann Intern Med*. 2010;152(2):101-13.
32. Altraif I, Handoo FA, Aljumah A, Alalwan A, Dafalla M, Saeed AM, Alkhormi A, Albekairy AK, Tamim H. Effect of erythromycin before endoscopy in patients presenting with variceal bleeding: a prospective, randomized, double-blind, placebo-controlled trial. *Gastrointest Endosc*. 2011;73(2):245-50.
33. Gluud LL, Klingenberg SL, Langholz SE. Systematic review: tranexamic acid for upper gastrointestinal bleeding. *Aliment Pharmacol Ther*. 2008;27(9):752-8.
34. Marmo R, Rotondano G, Piscopo R, Bianco MA, D'Angella R, Cipolletta L. Dual therapy versus monotherapy in the endoscopic treatment of high-risk bleeding ulcers: a meta-analysis of controlled trials. *Am J Gastroenterol*. 2007;102(2):279-89.
35. Eriksson LG, Ljungdahl M, Sundbom M, Nyman R. Transcatheter arterial embolization versus surgery in the treatment of upper gastrointestinal bleeding after therapeutic endoscopy failure. *J Vasc Interv Radiol*. 2008;19(10):1413-8.
36. Mohanrajda, Hadke NS. A comparison of Shunt & Nonshunt procedure in the treatment of bleeding esophageal varices. A dissertation submitted to Pondicherry university in partial fulfilment for MS degree in General Surgery, 1991
37. Ananthakrishnan AN, McGinley EL, Saeian K. Outcomes of weekend admissions for upper gastrointestinal hemorrhage: a nationwide analysis. *Clin Gastroenterol Hepatol*. 2009;7(3):296-302e1.
38. Shaheen AA, Kaplan GG, Myers RP. Weekend versus weekday admission and mortality from gastrointestinal hemorrhage caused by peptic ulcer disease. *Clin Gastroenterol Hepatol*. 2009;7(3):303-10.
39. Jairath V, Barkun AN. Improving outcomes from acute upper gastrointestinal bleeding. *Gut*. 2012;61(9):1246-9.