Upper GI Bleeding in an Urban Hospital

Etiology, Recurrence, and Prognosis

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Acute upper gastrointestinal bleeding (UGIB) continues to be a common cause of hospital admission and morbidity and mortality. This study reviews 469 patients admitted to a surgical service of an urban hospital. There were 562 total admissions because 53 patients were readmitted 93 times (recurrence rate, 20%). The most common causes of bleeding, all endoscopically diagnosed, included acute gastric mucosal lesion (AGML) (135 patients, 24%), esophageal varices (EV) (121 patients, 22%), gastric ulcer (108 patients, 19%), duodenal ulcer (78 patients, 14%), Mallory–Weiss tear (61 patients, 11%), and esophagitis (15 patients, 3%). Nonoperative therapy was sufficient in 504 cases (89.5%). Endoscopic treatment was used in 144 cases. Operations were performed in 58 cases (10.5%), including 29% of ulcers. Emergency operations to control hemorrhage were required in only 2.5% of all cases. The rate of major surgical complications was 11% and the mortality rate was 5.2%. There were 58 deaths (12.6%), with 36 deaths directly attributable to UGIB. Factors correlating with death include shock at admission (systolic blood pressure less than 80), transfusion requirement of more than five units, and presence of EV (all $p < 0.001$). Most cases of UGIB can be treated without operation, including endoscopic treatment, when diagnostic endoscopy establishes the source. Subsequent operation in selected patients can be done with low morbidity and mortality rates.

A CUTE UPPER GASTROINTESTINAL (UGI) bleeding occurs frequently, prompting hospital admission or complicating another illness.[1] Despite advances in critical care monitoring and support, mortality rates of 10% to 20% continue to be reported.[2,3] While spontaneous cessation of bleeding occurs in as many as 85% of cases,[4,5] early intervention is required in those in whom bleeding does not stop spontaneously. Endoscopic diagnosis and therapy is now an integral part of the management of these patients.[6]

This study was designed to accurately portray the incidence of endoscopically diagnosed lesions responsible for acute UGI bleeding, as well as to examine the clinical outcome and survival in the milieu of treating primarily emergency patients in a modern, urban university hospital. Particular attention was given to patients who developed bleeding while hospitalized and to those who were admitted for recurrent UGI bleeding.

Methods

This study was performed at Detroit Receiving Hospital, a Wayne State University-affiliated hospital serving a large inner-city population, and focuses on only a subpopulation of a much larger experience of this department.[6] We examined retrospectively the hospital records and endoscopy reports of 469 patients admitted with UGI bleeding during a 4-year period from January 1984 to December 1987. The list of study patients was drawn from endoscopy records. After chart review, the data was processed and analyzed by computer using SPSS/PC+ Version 2.0. Categorical data was analyzed using chi square and Fisher's exact tests, while Student's t test was used to analyze continuous data. Statistical significance was accepted at $p < 0.05$.

As a matter of policy, nearly all patients admitted through the emergency room with the diagnosis of UGI bleeding were admitted to the surgical service. All patients underwent standard resuscitation with crystalloid and blood and were admitted to the intensive care unit as necessary. Endoscopy was performed under the direction of the surgical staff, usually within 24 hours of admission. More than 95% of diagnostic endoscopy and all of the

therapeutic endoscopy interventions were supervised by a single surgeon. Gastric lavage with room temperature saline was performed through a Salem-Sump or large-bore lavacuator tube before endoscopic examination, which was performed using a standard forward viewing flexible fiberoptic endoscope. When more than one lesion was found, the actual cause of bleeding was defined by the presence of active bleeding or stigmata of recent hemorrhage.[7,8]

Results

Patient Profile

Of the 562 consecutive admissions (469 patients), 53 patients were admitted on multiple occasions. Thirty-two patients were admitted twice, 11 patients were admitted 3 times, 5 patients were admitted 4 times, 4 patients were admitted 5 times, and 1 patient was admitted 9 times. Three hundred thirty-five patients (71.4%) were male and 134 (28.6%) were female. The mean age was 48.6 years (range, 15 to 88 years) and 29% (135 of 469 patients) were more than 60 years old. A history of chronic, moderate, or heavy alcohol consumption was given in 397 of all admissions (71%) and recent heavy alcohol consumption occurred in 288 (51%). Aspirin or nonsteroidal anti-inflammatory agents had been used recently in 103 of the 562 admissions (18%).

Patients presented to the emergency room in 88% of cases (505 of 562) with signs and symptoms of recent UGI bleeding. Fifty-seven patients (12%) developed UGI bleeding during hospitalization for other problems and were referred for evaluation. Presenting symptoms included one or more of the following: hematemesis in 325 (58%), melena in 253 (45%), nasogastric aspirate containing blood or clot in 104 (19%), syncope in 68 (12%), and hematochezia in 56 (10%).

Cause of Bleeding

The primary lesion responsible for bleeding was established by endoscopy in all but two cases (0.02%; Table 1).

TABLE 1. Cause of Bleeding

Cause	Initial Admission (%)	Readmissions (%)	Total (%)
Acute gastric mucosal lesions	118 (25)	17 (18)	135 (24)
Gastric ulcer	97 (21)	11 (12)	108 (19)
Esophageal varices	85 (18)	36 (38)	121 (22)
Duodenal ulcer	69 (15)	9 (10)	78 (14)
Mallory–Weiss	52 (11)	9 (10)	61 (11)
Esophagitis	14 (3)	1 (1)	15 (3)
Other	34 (7)	10 (11)	44 (8)
Total	469	93	562

TABLE 2. Causes of Bleeding: In-hospital (n = 57)

Primary Diagnosis	n	%
Acute gastric mucosal lesions	15	26
Gastric ulcer	15	26
Duodenal ulcer	13	23
Esophageal varices	4	7
Mallory–Weiss tear	2	4
Esophagitis	2	4
Other	6	10
Total	57	100

The other causes of bleeding in initial admissions included gastric tumor (n = 10), marginal ulcer (n = 9), vascular ectasia (n = 5), duodenitis (n = 4), and gastric varices (n = 4). Two or more endoscopic findings were present in 320 admissions (57%). The endoscopic diagnosis for patients who had a single admission or the first admission for those with multiple subsequent bleeding episodes is shown in the first column on Table 1.

In-hospital Bleeding

The endoscopic diagnoses for the subgroup of 57 patients who developed UGI bleeding while hospitalized for other problems are shown in Table 2. The most common primary problems included cervical spinal cord injury (n = 7), head injury (n = 4), recent major operation (n = 9), wound sepsis (n = 5), pneumonia (n = 7), cirrhosis (n = 4), and sepsis (n = 7).

Recurrent Admission for Bleeding

During the 4-year study period, 416 patients had single admissions, but 53 patients were readmitted a total of 93 times. The endoscopic diagnoses for the second and subsequent admissions for these patients are shown in the second column on Table 1. Many (38%) were readmitted with the same primary lesion noted on their previous admission, and 83% of those with multiple lesions presented on subsequent admissions with the same combination.

Blood Transfusion Requirements

Table 3 shows the amount of blood transfused for each of the major causes of bleeding. The amounts of blood are those given during the entire hospitalization for patients admitted with UGI bleeding or the amount given during an episode of bleeding for those who bled during the course of another illness.

Nonoperative Treatment

Bleeding was managed without operation in 504 of the 562 admissions (89.6%). Initial therapy consisted of restoration of fluid and blood volume and normalization of vital signs with crystalloid and blood administration. La-

TABLE 3. *Diagnosis and Transfusion*

Diagnosis	Units 0–1 (%)	Units 2–5 (%)	Units More than 6 (%)	Total
Acute gastric mucosal lesion	62 (46)	54 (40)	19 (14)	135
Esophageal varices	4 (3)	54 (45)	63 (52)	121
Gastric ulcer	21 (19)	44 (41)	43 (40)	108
Duodenal ulcer	18 (23)	38 (49)	22 (26)	78
Mallory–Weiss	27 (44)	24 (39)	10 (16)	61

vage with room temperature saline through a large-bore nasogastric tube was used routinely. Intravenous vasopressin (0.2 to 0.4 units/minute) was used in 35 cases of esophageal varices, and a Sengstaken-Blakemore tube was used on 25 occasions. Sclerotherapy was performed in 99 cases (82%) of varices. Endoscopic treatment of nonvariceal lesions included injection therapy in 37 cases and thermocautery in eight cases. The main indications for endoscopic treatment of nonvariceal lesions were gastric ulcer (n = 21), duodenal ulcer (n = 9), Mallory–Weiss (n = 5), and acute gastric mucosal lesion (AGML) (n = 4). Of the 45 patients who underwent endoscopic treatment for nonvariceal lesions, 9 (19%) required subsequent surgery, 2 on an emergency basis for the control of hemorrhage, and 7 on an elective basis for definitive treatment of ulcer disease.

Operative Management

Fifty-eight patients underwent surgery. The endoscopic causes of bleeding in these patients were gastric ulcer (n = 29), duodenal ulcer (n = 24), marginal ulcer (n = 1), esophageal varices (n = 3), and gastric carcinoma (n = 1). Emergency operations to control bleeding were required in 14 cases (2.5% of 562 admissions) and 44 cases (7.8%) had semielective procedures performed because of clinical factors such as age, magnitude of blood loss, and previous ulcer history. Twenty-seven per cent of gastric (29 of 108) and 31% of duodenal ulcers (24 of 78) were treated with operated. Fifty-four operations were done for bleeding ulcers, including one marginal ulcer. Vagotomy and pyloroplasty, with or without suture ligation of the bleeding point, was done in 13 cases and partial gastrectomy, with or without vagotomy, was done in 41 cases. Three portocaval shunts for bleeding varices and one total gastrectomy for carcinoma were done. Major complications occurred in six patients (11%). These complications included cardiac arrest (n = 1), pneumonia (n = 1), subphrenic abscess (n = 1), dehiscence (n = 3), bowel obstruction (n = 1), and congestive heart failure (n = 1). Six other patients (11%) had minor complications, including dumping (n = 1), wound or other minor infections (n = 3), and atelectasis (n = 2). There were three operative deaths

(5.2%), one after a portocaval shunt and two in the ulcer group (3.7%), both of whom developed bleeding while hospitalized for unrelated problems.

Mortality Rate

The overall mortality rate was 12.6% (59 of 469 patients) or 10.5% of 562 admissions. Table 4 shows the mortality rates of 469 patients by diagnosis. The overall mortality rate in nonvariceal bleeding was 8.6% (33 of 384). In 36 of the total number of cases, death was primarily caused by UGI bleeding, and the ultimate mechanism of these deaths are detailed in Table 5. In the other 23 cases, deaths were caused by underlying disease, including multiple-system organ failure, liver failure, pneumonia, sepsis, CVA, aspiration, and cancer. Of 57 patients who developed in-hospital UGI bleeding, 13 died, including 3 deaths directly attributable to UGI bleeding (5.3% mortality), and 10 from unrelated disease.

Clinical factors that were significant predictors of death are shown in Table 6 and include shock, a more than 5-unit transfusion requirement, and a diagnosis of esophageal varices. Age of more than 60 years was not found to be a significant predictor of mortality (p = 0.1434).

Discussion

Cause of Bleeding

The present series reports a relatively high incidence of esophageal varices, AGML, Mallory–Weiss syndrome, and gastric ulcer as causes of UGI bleeding requiring hospital admission.[9-12] This is probably a reflection of our inner-city population and contrasts with community hospital or multicenter series, in which peptic ulcer disease is the more frequent cause of bleeding,[13-15] although others also have noted a decrease in proportion of duodenal ulcer.[16] Comparison of our data with other series is shown in Table 7.

Few studies examine the incidence of readmissions for UGI bleeding. In a multicenter series, de Dombal et al.[15] report a 50% rate of further bleeding in cases of carcinoma or varices, and further bleeding in 29%, 24%, and 15%

TABLE 4. *Mortality*

Cause of Bleeding	Total Mortality N	Total Mortality %	Mortality Due to UGI Bleeding N	Mortality Due to UGI Bleeding %
Esophageal varices	26	31	25	29
Acute gastric mucosal lesion	12	10	3	3
Gastric ulcer	8	8	4	4
Mallory–Weiss tears	7	13	5	10
Duodenal ulcer	3	4	1	1
Esophagitis	0	0	0	0
Other	3	9	0	0

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TABLE 5. *Cause of Death Due to Bleeding*

Exsanguination	13
Liver failure	10
Multiple-organ system failure	7
Respiratory failure	4
Aspiration	2
Total	36

for gastric ulcers, duodenal ulcers, and gastric erosions, respectively. While we found a 20% incidence of rebleeding, without a 'captive' population we cannot discern the true recurrence rates. Esophageal varices were responsible for most recurrences (38%), whereas peptic ulcer disease (both gastric and duodenal) accounted for 28%.

In-hospital Bleeding

We analyzed cases of in-hospital bleeding separately, because the patient population is somewhat different, and found that in these patients UGI bleeding indeed may be a component of sepsis and multiple-organ failure.[3,17] We found that an incidence of gastric and duodenal ulcer is higher than reported by some others, while the incidence of AGML,[3] which has been found as high as 75% in other series,[17] was lower. Incorrectly ascribing UGI bleeding to stress gastritis in hospitalized patients without endoscopic examination may overlook a significant number of ulcers.[18] Endoscopy was performed on these patients only when substantial bleeding occurred, which possibly explains the lower incidence of AGML.

The present series found that close to one half of the patients who bled while hospitalized did so from peptic ulcer disease and about a quarter bled from stress gastritis. Although others[19] have suggested that evaluation of bleeding in hospitalized patients may be deferred, prompt evaluation may be warranted[18] in cases of significant bleeding, as suggested by our data.

Blood Transfusion

Blood transfusion is a mainstay of therapy and also an index of severity. The present series is consistent with

TABLE 6. *Predictors of Mortality*

	Mortality		
Indication	With	Without	Significance
Shock on admission SBP less than 80	28.4% (29/102)	6.5% (30/460)	p < .001
Transfusion more than 5 units PRBC	20.2% (39/193)	5.4% (20/369)	p < .001
Esophageal varices	21.5% (26/121)	7.5% (33/441)	p < .001

TABLE 7. *Frequency (%) of Various Causes of UGI Hemorrhage in Published Series*

Series	Varices	Mallory–Weiss tear	Peptic Ulcer	Acute Gastric Mucosal Lesions
Dagradi (n = 500)[14]	16	3	11	34
ASGE (n = 2097)[12]	15	8	45	30
Larson (n = 115)[3]	11	5	29	41
de Dombal (n = 4.010)[15]	13	2	36	7
This series (n = 562)	22	11	33	24

others' findings that the number of transfusions correlates with mortality.[2,15,20]

Only 26% of patients required no transfusion, while other series report that 20% to 36% did not require it. A requirement of more than five units of transfused blood occurred in 31% of cases, which compares to reports of 26% to 34% requiring more than five[3] or six units.[20,21] Varices and gastric and duodenal ulcers are responsible for most of these cases of massive bleeding. We have found also that clinical shock is a significant predictor of mortality, as reported by others.[22,23]

Management

There is still controversy about the value of endoscopy in increasing survival.[1,21,24,25] However the role of endoscopy in guiding therapy, especially by nonoperative means, is probably more important,[4,14] but this is also controversial.[26] Endoscopic therapy was commonly used in this series. This may be responsible for the greater in-hospital survival rate in cases of esophageal varices.[27] Endoscopic control of nonvariceal bleeding,[28,29] even if on a temporary basis, may explain the few cases that required emergency laparotomy for control of bleeding.

Operative Therapy

Surgery was required in 12.4% of patients (58 of 469) and 10.3% of admissions (58/562), but in only 2.5% of admissions was it required as an emergency measure to control hemorrhage. Other series report operative rates of 11.9% to 40%,[3,16,20,30,31] with most surgery done on an emergency basis.[20,32] Our frequency of operations for gastric and duodenal ulcers (27% and 31%) are comparable to other rates,[30] although fewer were required to control bleeding (6% and 10%, respectively). One possible explanation is that endoscopic injection or thermocoagulation[33] afforded temporary control of bleeding and allowed sur-

gery to be delayed until after stabilization of the patient. This may explain our low mortality rate in these cases (two deaths, 3.7%) because emergency operations are associated with a higher mortality rate.[32] Also the overall lower age of this population may be responsible for the lower death rate when compared to studies with older patients.[31] The lower overall rate of surgery in this series is explained in the lack of operations performed for varices,[11] gastritis,[16] and other lesions, and the lower incidence of carcinoma in this population. Early endoscopy may have allowed selection of those patients who would benefit from early operation,[24,34-36] such as peptic ulcer with exposed blood vessel,[7,8] and those in whom nonoperative management would be more prudent, such as AGML, varices, and Mallory–Weiss tears.

Mortality

In this series, we have divided deaths into those that are directly or indirectly attributable to GI bleeding and those that, in our judgment, are secondary to unrelated causes. Table 8 compares mortality figures of recent series for common diagnoses. The mortality rate in this study compares with most other series.

When repeated admissions for varices are considered, the expected mortality rate per admission is 21%, which is similar to other studies considering total admissions. Mallory–Weiss tears in our experience were associated with a higher incidence of death; however all but one of these patients had cirrhosis and coexisting (but nonbleeding) varices.

Unexpectantly the number of deaths did not correlate with age, as reported by others.[3,23] This may be due to the large number of young patients with variceal bleeding who comprise most of the deaths. In series with an elderly patient population, most deaths have been attributed to concomitant medical disease, with ulcers comprising most deaths.[31]

TABLE 8. *Comparison of Mortality in Recent Series (%)*

Series	Esoph. Varices	Duod. Ulcer	Gast. Ulcer	Mallory–Weiss tear	Acute Gastric Mucosal Lesions
Silverstein[20] (1981)	30	7	8	4	10
Larson[3] (1986)	36	8	16	17	27
de Dombal[15] (1988)	31	4	6	2	7
Katschinski[31] (1989)	17	9	12	2	5
This study: initial admission	31	4	8	13	10
Total admission	21	4	7	11	9

Conclusion

In an urban hospital, AGML, gastric ulcer, esophageal varices, and Mallory–Weiss tears are more common than in a community population in which the incidence of duodenal ulcer is greater. There is a high recurrence rate, especially with esophageal varices. Early endoscopy is important in selecting those 89% of patients who can be treated without operation. When surgery is required, it can be done with a low incidence of death. Significant predictors of death include the presence of shock on admission, transfusion requirement greater than five units, and diagnosis of esophageal varices.

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DISCUSSION

DR. KEITH KELLY (Rochester, Minnesota): It was most interesting to note the distribution of cases in this inner city series, a distribution different than we would see at Mayo. We don't have as large a percentage of varices or stress ulcers among our series as does Dr. Sugawa.

There are a couple of other things that struck me about the series and especially about the methods of management, and I would like to concentrate more on the management than on the epidemiology. I notice in the ulcer group that there were 166 patients. Of these, 11 died, but only five died of bleeding. That is a 3% rate of death from bleeding. Thirty per cent of the patients were operated on, which is about the usual percentage, but among these only two died, yielding only a 4% incidence of death after surgery. These results are superb. They are as good as any reported in the literature. Is this because early endoscopy was done by surgeons who controlled most of the tough cases endoscopically?

In contrast to the bleeding ulcer group, the results in the bleeding varices patients were not as good. Here 85 patients were present, and among these 26 died, which is almost one third. Most of the patients who died, died from bleeding. These patients were also endoscoped, and they also had endoscopic therapy, but apparently endoscopic therapy wasn't so good. More recurrent bleeding occurred, and more deaths from that. What I didn't find in the paper was why only a few of these patients were operated on. What about shunt therapy? What about operative control of the bleeders?

I presume that what we are seeing in the varices group is a series of acutely ill patients in an inner city hospital with severe problems of liver failure and bleeding. Nonetheless, I wonder if some of these patients might not have been saved by operation.

DR. PAUL JORDAN (Houston, Texas): I can probably only reiterate much of what Keith Kelly has just commented on. This is an old problem that has been with us and it is going to continue to be with us, and I suppose that under some circumstances it is almost as dramatic as some of the things we have heard here today, such as transplanting a kidney in a baby younger than 1 year old. But sometimes we have a problem with this condition, and I think that the authors are to be commended for the mortality rate they have achieved.

Just to pick one condition, for example, duodenal and gastric ulcer, their mortality rate for surgery was 3.7% and when you consider that 25 or 30 years 30% was an acceptable figure, this is a remarkably good result and one can only speculate that perhaps it is because of the fact that the surgeons have complete control of these patients from the time they come to the emergency room through the diagnostic procedures and the endoscoping therapeutic procedures, as well as being able to make the decision as to when and how to operate on them.

Endoscopy has not only affected this condition in terms of diagnosis but also in therapy.

One of my questions to the authors has been why haven't more cases been successfully treated by sclerosis, and does this mean that it is a failure of the procedure? But in the literature it says that endoscopy has not improved the survival rates of patients with upper GI bleeding, and when you consider the fact that 85%, or I think it was 89%, in this study all upper GI bleeding stopped spontaneously, it is very hard to show that endoscopy changes the survival rate in this condition.

However, for the surgeon, it has been a great source of satisfaction to have some idea of what the diagnosis is when they operate, and another point related to endoscopy is that when patients bleed and when they rebleed in the hospital, and then they stop, you never know when they are going to rebleed again. So I think that every patient who bleeds should be endoscoped as soon as he or she is stabilized if the endoscopy is not already done to try to produce therapy.

There were 196 patients with duodenal and gastric ulcers in this series. Fifty-four of them were operated on, and I think that 20% of the duodenal ulcers patients came back with rebleeding. What were the indications for operation in this series that more of them weren't operated on originally because they had control of the patient?

My thought has always been that in patients who rebleed, the more times they rebleed the higher the mortality rate will be, and so I would have thought that maybe more of the duodenal and gastric ulcers might have been operated on.

DR. BARRY LEVINE (San Antonio, Texas): Their presentation is relevant because it shows us the cold reality of how we fare in treating upper gastrointestinal hemorrhage in an inner city population whose diseases are mostly alcohol related. They have also demonstrated, by using a prescribed algorithm for control of acute hemorrhage and defining subgroups with surgically amenable lesions, that patients can undergo operative therapy electively with a decreased mortality rate.

Obliquely, what I think the group has tried to tell us is that they attempted to define the role of endoscopy in assessing and treating these patients and, perhaps, that use of this modality has allowed them to achieve these better morality rates. However, before they can make such