Fatal Bleeding Ulcer

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AVERY JONES [8] has described the fallacies inherent in most published statistics concerning management of upper gastrointestinal hemorrhage. Because of many variables, it is not possible critically to compare treatment regimens from different centers. Nor does it seem fruitful to attempt to "standardize" clinical material using laboratory data,[16] for this in no way reflects the importance of such factors as age,[9, 11, 17] associated diseases [9, 14] and the underlying gastroduodenal disorder.[1, 9] In addition, the concept of functional blood volume [13] challenges the value of conventional blood volume determinations. There is no objective method of measuring the patient's ability to tolerate and compensate for hemorrhage,[14] yet this ability largely determines survival.

It is not satisfactory to compare different regimens applied in one hospital in consecutive but nonetheless different eras,[9, 17] for improved results always follow enthusiastic interest in a subject,[10] and adjuvant therapy is bound to progress over the time span. Sizable concomitant clinical trials [3] have not been conducted, presumably because of excessive time needed to observe sufficient patients.

To study the factors associated with fatality the charts of 50 consecutive fatal cases of bleeding peptic ulcer seen at the Ottawa Civic Hospital over a 9-year period were reviewed in detail.

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Review of Clinical Observations

History of Hemorrhage. About half the deaths occurred during the first hospital admission for ulcer and in three-fourths during the first admission for gastrointestinal bleeding. Thirty-nine of the 50 patients has previously been diagnosed as having peptic ulcer (Table 1).

It is important to realize that of the 38 patients admitted because of hemorrhage, 24 gave a history suggestive of bleeding in the week prior to the episode that resulted in admission. Thus the admission hemorrhage was often the second or third of the current series of hemorrhages.

Nature of Hemorrhagic Episodes. The authors believe that insufficient attention has been given to Avery Jones.[8, 9] observation that bleeding usually occurs in short, sharp, self-limited bouts that seldom exceed 30 minutes in duration. He and others [2, 5, 19] have pointed out that at emer-

TABLE 1. *Incidence of Hemorrhage and Knowledge of Ulcer in 50 Cases*

Past History		
Previous admission for ulcer	26	
Hemorrhage		14
Other manifestation		12
No previous admission	24	
Known ulcer		13
Dyspepsia, unproved etiology		6
No dyspepsia or ulcer		5
Reason for present admission		
Cause other than ulcer	8	
Ulcer, hemorrhage	38	
Ulcer, other manifestation	4	

TABLE 2. *Recurrent Hemorrhage in Hospital*

Recurrence	0	1	2	3	4	5	6	7	8	9	10
No. Patients	5	7	6	10	7	6	5	1	1	1	1

Median number of hemorrhages in hospital: 3, Median day of death: 6th.

gency operation bleeding has usually stopped, and recurs only if the ulcer is disturbed. Considering the violence of bleeding that follows and the size of vessels usually involved, it is obvious that bleeding could not continue for long without the patient exsanguinating. Yet, as can be seen in Table 2, this rarely occurs. The bleeding must therefore, stop spontaneously. We often forget that because of gastric stasis vomiting of blood may continue some time after bleeding from the ulcer has stopped. Persisting hypotension may indicate persisting decompensation but not necessarily continuing blood loss. The decreasing hematocrit from hemodilution only record events of 12 to 48 hours earlier. Many reports [12, 18] describe the numerous self-limiting hemorrhages that occur before death from an aortic aneurysm which ruptures into the gastro-intestinal tract.

The number and nature of bleeding episodes were determined by reviewing recorded details concerning the occurrence, nature, timing, and size of the hematemeses; the occurrence of incontinent or frequent liquid tarry stools or bloody stools; the occurrence of shock, hypotension, weak or rapid pulse, restlessness, apprehension or sweating, and the response of these and hemoglobin levels to transfusion.. Eighty per cent of bleeding episodes were abrupt, vigorous and short-lived. In most of the remainder, continued slower bleeding was suggested by repeated small hematemeses or small often incontinent stools every 20 to 30 minutes, or by the silent decline of hemoglobin or hematocrit to a level lower than that expected from simple hemodilution. In nine patients there was prolonged violent hemorrhage indicated by copious continued hematemeses or melena, or persisting hypotension despite transfusion of large quantities of blood. In seven of these there had been multiple preceeding hemorrhages.

The most impressive feature of the hospital courses of these patients, was the multiple recurrent bleeding episodes. The number of recurrent hemorrhages ranged from none to ten, with a median of three (Table 2). Many of the 12 patients who died with one or no recurrent hemorrhages were abandoned because of old age or died from other causes such as myocardial infarction before they had time to bleed again. Only two patients had single violent prolonged hemorrhages which provided ample warning of the serious nature of the illness. It seems then that death results from cardiovascular embarrassment following repeated blood losses of from 1,000 to 2,000 cc. which have been replaced inadequately. That the passing of some time is necessary for deterioration to take place, is indicated by the fact that the median day of death was the 6th after admission.

The classic case of fatal bleeding ulcer then, will have four or five short-lived, vig-

TABLE 3. *Distribution of Cases According to Age and Sex*

Sex	<49	50–54	55–59	60–64	65–69	70–74	75–79	>80	Total
Male	3	2	5	9	6	7	4	2	38
Female	0	0	1	0	2	2	2	5	12

TABLE 4. *Nature and Site of Lesions According to Sex*

	Male	Female
Acute gastric and gastritis	1	2
Chronic gastric	9	6
Chronic duodenal	24	4
Stomal	2	0
Unknown (1 after autopsy)	2	0

orous, self-limiting hemorrhages. One occurs during the week before hospitalization. One results in hospitalization. Three will occur at 12 to 48 hour intervals in the hospital. By the time the bleeding is recognized, it will have stopped in 80 per cent of the episodes. In those in whom it continues, whether slowly or violently, there will be little difficulty in subsequent recognition.

As reported by others [1, 8, 11, 19] about three fourths of the cases were in males (Table 3). Below age 65, the male:female ratio was 19 to one.

Only five deaths occurred in patients under 55 years of age, and three of these followed technical procedures now discarded by most surgeons. Death should rarely occur in men under 55 or in women under age 65—a decade later than suggested by most authors.[2, 11, 14]

Associated Diseases. In only 15 patients was there no significant associated diseases diagnosed; four were over age 70, and nine were over age 60. Others [9, 19] have observed the high incidence of associated diseases. Mitty *et al.*[14] showed how poorly patients with general medical disorders tolerate gastro-intestinal bleeding. Inability to compensate for repeated blood losses accounts for the high mortality after age 55, rather than any difference in the ulcer or severity or frequency of recurrent hemorrhage.[4, 9, 11]

Nature and Site of Lesions. The incidence of chronic duodenal ulcers in men (Table 4) corresponds with that observed by Coghill and Willocx.[1] As in previous reports [1, 9, 11] acute gastric ulcers rarely caused fatal bleeding. The history, of course, did not always indicate chronicity of the ulcer. Eight patients subsequently shown to have chronic ulcers had short or inconclusive histories of dyspepsia.

Assessment of Management

Since these patients had died, the treatment had not achieved its purpose. It seemed worthwhile therefore, to critically analyze these experiences with all the advantages of hindsight. In this way difficulties in management were identified for special consideration in the consequent plan of therapy.

By reviewing all details relevant to the number and nature of recurrent hemorrhages, speed and volume of blood given, response of the patients' pulse rate, blood pressure and urine outputs, response of hemoglobin levels to transfusions given and evidence for or against further bleeding episodes, the adequacy of volume and rate of transfusion was evaluated.

In 44 patients, the volume of blood given was considered inadequate. The amount of blood required on admission was regularly underestimated by nearly one half. Commonly, hemoglobin levels of six to eight grams and hypovolemia that these levels imply (but by no means exactly reflect), were accepted. Patients were not provided with a reserve of blood for subsequent recurrent hemorrhages.[4, 9] This failure to provide the volume of blood necessary was thought to be the most important factor in the unsuccessful management of the patients.

The rate of transfusion was frequently found to be inadequate. In only nine instances, excluding operating room transfusions, was blood given rapidly (1,000 cc./hour), and most received rapid transfusions only in immediately preoperative resuscitation. There was regularly a delay in instituting transfusion. This was worst on the patient's arrival at the hospital, when 2 to 4 hours frequently elapsed before blood was actually given.

In assessing the need for operation it was assumed that two recurrent (in-hos-

pital) hemorrhages or violent continued hemorrhage demanded emergency surgical intervention; otherwise it was believed that there was no reason for an emergency (though not necessarily an elective) procedure. Failure to perform indicated operation, or poor timing of operation occurred in 58 per cent of the patients. In 21 instances operation was thought by the reviewers to have been indicated clearly, but was not carried out. In eight patients it was indicated considerably earlier than it was carried out. The responsibility for the failure to perform indicated surgery was by no means invariably due to the medical attendant. In 19 of 29 patients it was the surgeon who failed to recognize his responsibility to operate at the necessary time. In four instances there was doubt whether operation was justified at the early stage at which it was carried out.

In 13 patients death was a result of technical surgical complications. Five bled from retained ulcers. Nine suffered fistulas or injury to abdominal organs (e.g., acute pancreatitis). In four patients operation was performed impulsively with no reasonable attempt to correct blood volume, water or electrolyte deficits.

Table 5 describes the number of physicians involved in the management of these patients. Experience gained from these fatal cases was so widely distributed over the 9 years and 85 physicians that there was little hope that lessons from one patient would be remembered when the next patient was encountered. Also, all too often the responsibility of assessing the patient's condition or blood requirements was left to the woefully inadequate experience and comprehension of a nurse or junior intern.

TABLE 5. *Physicians Involved*

Physicians	Residents	No. Patients Seen
54	30	1
19	4	2
6	3	3
5	2	4
1	0	6
Total 85	39	50

Plan of Therapy

The following plan of therapy is based on these observations of the natural history of fatal bleeding ulcer. Provided he is adequately transfused, the patient will survive the admission hemorrhage and the first recurrence in the hospital. There is then no indication for immediate operation simply because of the hemorrhage at admission. Such immediate operation is unnecessary (as a life-saving procedure) since 75 per cent of patients will have no further bleeding.[5, 9, 19] The remaining 25 per cent can be expected to survive the first recurrent hemorrhage.

Thus the initial treatment regardless of the age or sex of the patient, or the nature of the lesion, is simply adequate transfusion. Since bleeding will usually have stopped by the time the physician examines the patient, the only concern is adequate estimate of blood loss and then, if necessary with central venous pressure monitoring, aggressive replacement.[1, 4, 6, 7, 13, 15] Rapid transfusion is as vital to allow the patient to withstand the loss of 1,500 cc. of blood in the next hemorrhage, if it occurs, as to assist recovery from the previous one.[4]

If another significant hemorrhage occurs in the hospital, it must be feared that the patient will have further recurrent hemorrhages for which he will not be able to compensate. If he is older than 55 and has a chronic ulcer, emergency operation is indicated, not as a rule to stop the bleeding but to prevent further bleeding episodes in the current series. If there are associated general diseases that make the patient less tolerant of blood volume reduction, then operation is even more necessary.[1, 14] It is essential that a 1- or 2-hour period of intense resuscitation precede operation.

Since fatal hemorrhage seldom resulted from an acute ulcer or in patients under 55 years of age, such patients may be transfused through the first hospital recurrent hemorrhage, and operation delayed until

after a second recurrence. In this way some unnecessary operations may be avoided. Similarly, the rarity of fatal acute gastric ulcers challenges the role of "blind" gastrectomy.

The number of deaths resulting from operative injury, fistulas and retained ulcers indicates the need to restrict this operative surgery to those who are experienced. Suture-ligation, vagotomy and pyloroplasty seem to be indicated when the operation appears technically difficult, although recent evidence suggests that a high rate of recurrence follows this procedure in the very patients who have complicated lesions.

The final feature of management should be a "hematemesis team" which would treat patients with gastrointestinal bleeding in a hospital. It has been seen how the lessons, the errors and the understanding were forgotten between cases. The enthusiasm of such a team should alone improve results. It is believed that the concentrated experience of a team, together with its greater interest, might have saved the lives of many of these patients.

Summary

Fifty consecutive deaths from bleeding peptic ulcer, occurring during a 9-year period, have been reviewed.

The natural history of fatal bleeding ulcer was one of multiple, recurrent, abrupt, self-limited hemorrhages. The median number of hemorrhages before death was five, and the median day of death was the sixth after admission. Death seldom occurred in patients under 55 years or in the absence of a chronic ulcer. Death appeared to result from inability to compensate for repeated, inadequately-corrected blood losses.

Review of management showed the most common errors to be: inadequate transfusion, both in volume and rate (88%), failure to operate or improper timing (58%) and avoidable technical surgical complications (26%). The attending physician's infrequent exposure to patients with fatal bleeding ulcers was also an important factor.

A method of management characterized by aggressive transfusion and selective operation is described; most important is a "hematemesis team."

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