EMERGENCY SURGICAL TREATMENT OF BLEEDING PEPTIC ULCER: AN ANALYSIS OF THE PUBLISHED DATA ON 21,130 PATIENTS

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BETHESDA

Introduction

Upper gastrointestinal hemorrhage is one of the most difficult medical problems encountered by physicians caring for hospitalized patients. Major reasons for this are its life-threatening nature (often among patients in previously excellent health), the frequently obscure cause, and persisting uncertainties about when to attempt to save a life by means of a life-threatening procedure such as definitive surgery. As when the author first reviewed this subject over 20 years ago,[1] the surgical intervention problem remains the major challenge to physicians caring for these patients. It is the purpose of this review to examine critically the basis of decisions for and against surgery as an emergency procedure, and to draw what conclusions can be drawn from the available data. Unfortunately, these are very few, in spite of an enormous number of reports of clinical experience and opinions over the last 40 years.

For purposes of simplicity, the task has been limited to bleeding from peptic ulcer disease, except that the limitations of early diagnosis necessitate recognition of the fact that some patients with lesions such as cancer, gastritis, and esophageal varices will be treated as if they have ulcers.

Opting for early surgery would be a simple matter if we could use properly all of the facts that should have been gathered up to now. Hemorrhage should be stopped by surgical means only in those who are destined to die if they are treated by medical therapy alone. However, after 40 years of largely uncontrolled clinical observations, it is still impossible to select those patients with meaningful accuracy. Textbooks tell us that mortality from medical therapy is higher among older patients, those with gastric lesions or major cardiopulmonary disease, and

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those who develop shock from the rapidity of their hemorrhage, or who continue to bleed for many days in spite of adequate blood transfusions and ulcer therapy. But so is the mortality of surgical intervention great in that type of patient. Prediction of a fatal outcome of medical therapy at a time when the patient is still in good enough condition to survive definitive surgery is still an imprecise exercise in probabilities, i.e., the patient must rely on the decision-making skills of his physician and surgeon. Such clinical judgment is in reality an educated guess. What are the facts on which physicians base their decisions to operate early, late, or not at all? What is the basis of the education that leads to the educated guess?

Physicians base their treatment decisions on careful observation of the patient at hand, on their personal experience and that of their immediate colleagues, on their knowledge of pathophysiologic rationale, and on the latest articles describing how various patients were treated. The average practitioner rarely has time to review all of the papers evaluating the treatment of specific patients with massive hemorrhage from peptic ulcer. Yet in the last analysis, this information should have the highest priority in his decision-making process. So the purpose of this paper is to report a critical review of the literature.

Methods of Analyzing the Data Available in the Literature

Sixty-one series of patients described in the English language literature between 1930 and 1969 contain both of the following essential bits of information:

(1) Percentage of patients dying during an admission for upper gastrointestinal hemorrhage from a peptic ulcer. Patients who turned out later to have gastritis, cancer, or esophageal varices were usually included if they presented as probable ulcers and were treated accordingly. Papers concerned only with gastric ulcers were omitted.

(2) Percentage of patients operated upon as emergency treatment for continued bleeding. In general the term "emergency surgery" was taken at face value when used in the paper, and patients were included in this group if they were operated upon within 72 hours of admission or cessation of hemorrhage.

It should be emphasized that no attention was paid to the relative case fatality rates of those treated medically or surgically (except in the three trials that employed randomization) because they are meaningless figures. They are bound to depend much more on totally unmeasurable factors of case selection than on efficacy of treatment.

Each series of presumably consecutive hospital admissions reported between 1930 and 1969 included a span of years from which a median could

be determined as the best estimate of the medical era of the series with regard to selection and treatment modalities. Several individual papers included results over more than one time span and these were analyzed as separate series.

Whenever possible the papers were grouped according to their source as:

1.0 *Discipline of the author*

1.1 *Surgery:* Paper submitted primarily from a surgical service or, when not specifically stated as to service or origin, published in a surgical journal.

1.2 *Medicine:* Papers submitted from a medical service or, when origin not stated, published in a medical journal.

2.0 *Type of hospital*

The papers were classified according to the type of hospital to which the patients were admitted, roughly classified as follows:

2.1 *City:* Hospitals operated by cities or counties and usually affiliated with a medical school. Patients could be expected to be sicker, medically indigent, and have a higher rate of alcoholism.

2.2 *Veterans Administration:* Hospitals affiliated with a medical school to a variable degree. Patients are almost all males and could be expected to be slightly younger than those in other types of hospitals.

2.3 *University:* Hospitals closely integrated with a medical school—the principal teaching hospital. There would be a variable percentage of private patients.

2.4. *Other:* None of the above, although many hospitals in this category have some affiliation with a medical school, and may have relatively large ward services.

Age and sex characteristics, severity and origin of hemorrhage, and the type of operation performed as an emergency procedure were extremely difficult to obtain in a uniform manner. Comparisons could be made only with regard to age and the percentage of gastric ulcers, as two rough approximations of severity.

Limitations of Such an Analysis

It must be recognized that such an analysis has grave limitations. None of the reviewed papers followed exactly the same criteria of including or excluding patients, and it was often difficult to extract a uniform definition of emergency surgery. Elective surgery was not included as a variable in the analyses. Extracting such obviously simple data as gross mortality and emergency surgery rates was surprisingly difficult, and many papers

were omitted because a comfortably reliable figure could not be obtained. It would have been nice to be able to compare papers reporting differing mortality and operation rates with regard to such characteristics of the patients as severity of bleeding, age distribution, prevalence of complicating disease, and exact source of hemorrhage. However, those data were very hard to combine with any degree of confidence. Finally, the motivations for writing up a series and for its acceptance by an editor make it impossible to draw valid conclusions about a population of patients or brand of treatment. In only three studies[2, 3, 4] was the question of emergency surgery explored in a statistically valid way. Since the validity of statistical data depends on how the data are collected,[5] no statistical analyses are applied to the composite data reported below.

On the other hand, it should be emphasized that the clinician is handicapped to this same extent every time he turns to the literature for help in handling a problem patient. In that case he must analyze a few series carefully and draw conclusions without an estimate of bias or biological variability. In the present study the fine points of selection and treatment described in a few individual series are ignored in an effort to find out what is happening "on the average." Recognizing these limitations, the data are still useful.

Results

When the case fatality and emergency surgery rates were plotted against the middle year of each series, there was no apparent change in the former over a 30 year period (Figure 1), and there was a marked increase in the frequency with which patients were treated by emergency surgical intervention (Figure 2). Papers from surgical sources reported the same case fatality rates but higher rates of surgery. The only difference by type of hospital was a striking reduction in both case fatality and surgical rates in the series reported from Veterans Administration hospitals. Since the first 15 years, in which surgery rates were consistently low, there has been no apparent relationship between the case fatality and surgical rates.

Data from the 25 papers that included the mean age of the patients confirmed the increasing rate of surgical intervention with calendar time in this smaller series, and revealed an interesting increase in the mean age of patients treated for bleeding peptic ulcer over the last 30 years. An increasing case fatality rate with age is suggested by these data, and it is the older patients in the later time periods who have more emergency surgery. Age data from three of the seven VA studies suggest that the reduced mortality of these patients might be attributed to a younger age, 40, 44, and 48 years, respectively.

Twenty-seven papers reported the percentage of patients with gastric

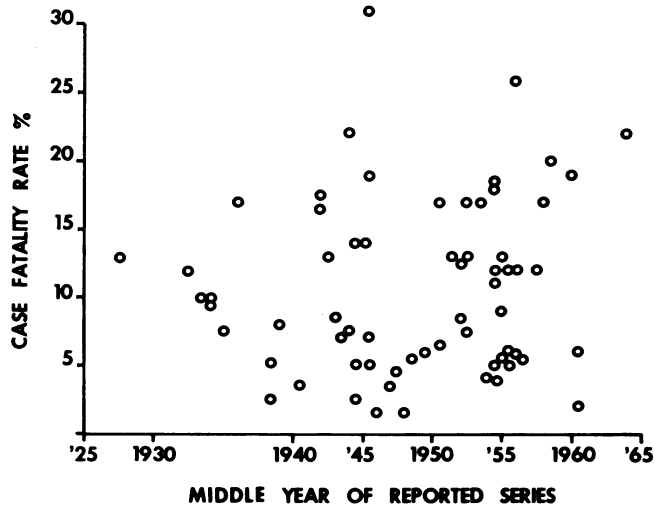

FIG. 1. Case fatality rates according to the middle year of the reported series.

ulcers and there was a rough correlation with case fatality rates and no association with emergency surgery rates, middle year of the series, or age of the patient.

The data on type of operation performed as an emergency procedure were too scanty and too variable. The percentage of gastrectomies performed could be learned from 13 papers, and there was no correlation with the overall case fatality rate. However, several authors suggest that operations less drastic than gastrectomy may, when employed as an emergency procedure, lower the overall fatality rate.

The three controlled trials are totally inconclusive with regard to the value of emergency surgery. The groups are impure in all studies because of frequent changes in therapy after randomization, and no differences were statistically significant. Authors of one of the papers concluded that emergency intervention was frequently indicated, of the second paper in selected patients only, and the authors of the third paper had little enthusiasm for early surgery in any patients.

DISCUSSION

Increasing rates of emergency surgical intervention in the last two decades have not been accompanied by any decrease in overall case fatality rates. However, there has apparently been a real increase in the mean age of patients admitted during these decades, with a higher mortality in

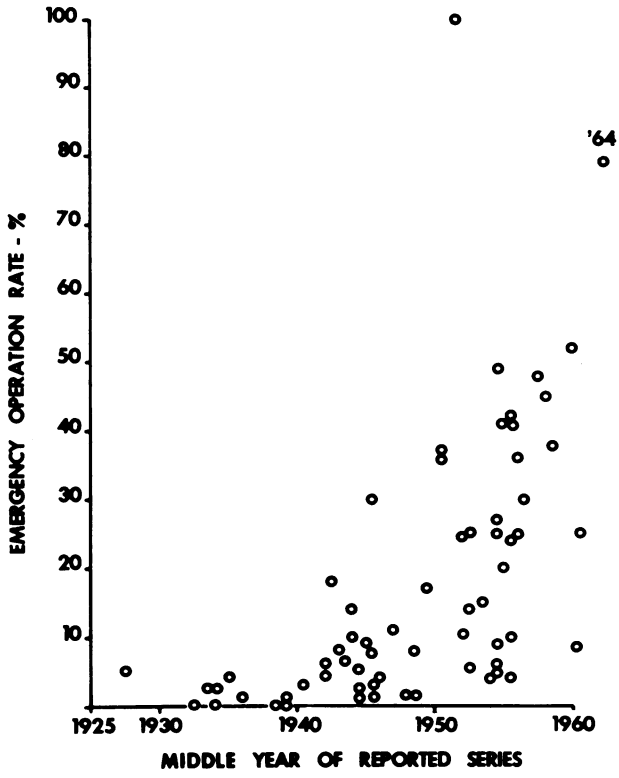

FIG. 2. Rates of emergency surgical intervention according to the middle year of series.

the older patients, and this suggests that the overall case fatality rates might have been increasing if therapy had not been improved during this period. Whether or not this hypothetical improvement is the result of early surgery in some patients or the result of other advances such as modern antibiotic and fluid therapy, especially valuable in older patients, cannot be determined from these data. More and better controlled trials are needed to determine whether or not the current high rate of surgical intervention is accomplishing anything.

Patients admitted for bleeding and destined to have an elective operation for their peptic ulcer before discharge might just as well have it as soon as possible after admission, so as not to suffer from the hazards of exsanguination added to those of surgery. Otherwise surgery might better be reserved for those who do not stop bleeding massively on adequate medical therapy, or who resume life-threatening hemorrhage after medical

therapy has apparently been successful. Since much simpler procedures than subtotal gastrectomy seem to be as satisfactory as the latter in the long-term management of the ulcer diathesis, they might well be preferred for emergency surgery.

The increasing age of patients admitted for bleeding peptic ulcer in the last 30 years is of extreme interest. That it may be a reflection of the aging population is suggested by the data on Table I and Figure 3. As the population ages, the number of people in the peak years of peptic ulcer increases relatively, thus leading to an increase in the mean age of patients being admitted to the hospital with peptic ulcer. That this may not be the total explanation is suggested by the data in Table II, in which the age distribution of patients with peptic ulcer admitted in 1956 is estimated from the population of that time, based on the percentage of the population admitted in each age group in 1940 with peptic ulcer. There is a significant difference between the actual distribution and that predicted from the population change. If these data were valid it would suggest that there was some other factor than an aging population involved in the increased age of patients with bleeding peptic ulcer. However, the assumptions required for such a conclusion are too broad to be seriously accepted.

TABLE I

Age Distribution of the Population of the United States in Millions

Age	1930	1960	Increase	
			No.	%
30–39	18.3	24.4	6.1	33
40–49	15.0	22.5	7.5	50
50–59	10.6	18.0	7.4	70
60–69	3.8	13.4	9.6	250

TABLE II

Age Distribution in Per Cent of Ulcer Patients

Ages	Actual		Calculated from Population 1956
	1940	1956	
30–39	20.3	14.4	17.6
40–49	28.6	20.1	26.8
50–59	26.6	25.8	26.1
60–69	17.2	22.6	19.3
>69	7.2	17.1	10.2

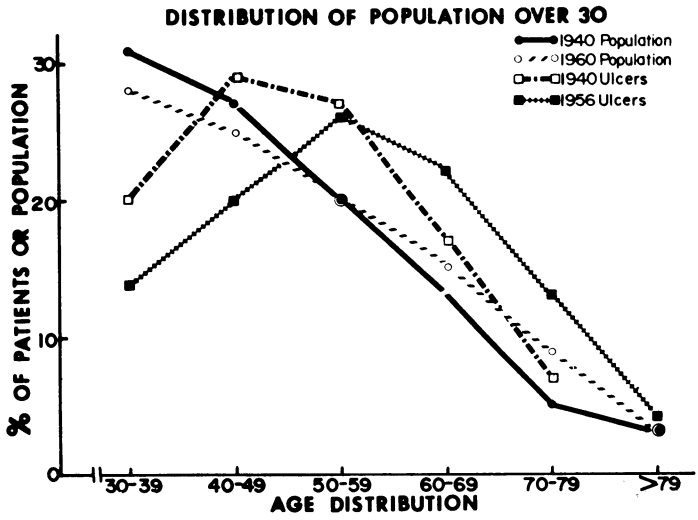

FIG. 3. Age distribution of the U.S. population and ulcer patients over the time period spanned by this study.

SUMMARY

1. Sixty-one series of patients with massive hemorrhage from peptic ulcer disease, selected because they contained both emergency surgery and case fatality rates, contain data on 21,310 patients, 3,418 of whom received emergency surgery.

2. Case fatality rates have not changed in the last thirty years while rates of emergency surgical intervention have increased markedly.

3. As the age of patients with bleeding peptic ulcer has increased, the case fatality and emergency surgery rates have also increased in older patients.

4. Thus, it is possible that increased emergency surgery is the result of increasing severity of hemorrhage, and that it has contributed to keeping the overall case fatality rates from rising. However, other modern therapies such as antibiotics and fluid administration undoubtedly deserve some credit for this.

5. Until more adequate controlled trials are done it is probably wiser to reserve emergency surgery for highly selected patients.

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DISCUSSION

DR. HERBERT G. LANGFORD (Jackson, Mississippi): I've only peripheral clinical interest but, getting back to the days when I was Dr. Harvey's house officer, one of his

students did a paper on the mortality in patients over 70 from the house service. He couldn't tell any difference from operating or not operating, but the critical thing seemed to be whether they fell out of bed or not, which apparently happened frequently enough for him to be able to chalk it up. Whether they went eventually to surgery or continued to be transfused, this was the bad prognostic feature.

DR. FRANK P. BROOKS (Philadelphia): You mentioned a subcategory, namely the individual who had a long history of peptic ulcer and might well be a candidate for an elective operation anyway. Do you have any evidence from these series that the number of such patients in the overall group of patients with bleeding ulcers is changing?

DR. CHALMERS: I'm afraid I can't answer that, Frank. That kind of information was very hard to obtain with any precision from these data because the authors' criteria for including patients and the descriptive details were so different. With regard to whether any surgery is better than none for recurrent hemorrhage, this question has not yet been answered.

It is possible that a controlled trial may get under way in the next few years to try to find out which patients benefit from elective surgery for bleeding, and it is indicated because the frequency of bleeding following surgery for bleeding peptic ulcer is distressingly high.

DR. FRED KERN, JR. (Denver): Two questions, Tom. Did you look at any published reports from outside of the United States? I wonder if you found the same thing. And two, in what group of bleeding ulcer patients do you think a controlled trial of emergency surgery should be done?

DR. CHALMERS: We looked at all the English language papers which means there were some from Britain, and some from Scandinavia, but we left out all the papers in French, German, Spanish and Russian. It was hard enough to get the data we wanted out of the English! With regard to a controlled trial, I think that the situation has certainly not been settled in people under the age of 50. Emergency surgery using a more benign surgical procedure for peptic ulcer might be tried in a randomized series in that group. With regard to the patients over the age of 50, one has the ethical problem that most of the literature says that they should be operated on early. I think it might be hard to settle on a protocol which would test this. One of the controlled trials did set up a group of patients who were treated medically no matter what, and they had to abandon it because of pressure by the house staff who felt they were killing patients on the medical wards by not operating on them. However, the differences in patients' mortality rates were very unimpressive, and there is no evidence whatever that this purely medical therapy was hurting. I think we need a little more maturity and experience about these decision-making difficulties before we can set up a controlled trial of patients who are massively bleeding over the age of 50, because one would be withholding therapy that general medical experience now says should be carried out. I suspect that some day we may be able to do that and may find that really good medical therapy is at least not any worse than emergency surgery.

Can I add a word about the mortality in the Veterans Administration cases? I think I can explain the low case fatality rate in these papers. They were published in the 50's when the largest group of veterans were World War II veterans and therefore in the 25–40 year age span, and they would be expected to have a low case mortality rate. It may also have something to do with the fact that veteran hospitals do not have readily available emergency ambulance service and patients may go to the city hospitals when they are very sick. But I think it is largely explained by the fact that 10 years ago most veterans were young people.