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Surgical therapy for peptic ulcer and nonvariceal bleeding

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Abstract Wider use of endoscopic hemostasis in upper gastrointestinal bleeding (UGIB) has reduced significantly the need for operation. Nevertheless, surgery still plays a pivotal role. Failure to control bleeding endoscopically should not delay surgery when necessary, and a close cooperation between endoscopists and surgeons is essential. Initial endoscopy stops the bleeding in approximately 94% of patients and helps to identify those patients with a high or low risk of rebleeding. High-risk patients should be examined for rebleeding by clinical and endoscopic assessment within at least the first 2–3 days. Large ulcers are the most likely to rebleed, and in elderly patients with severe comorbidity showing little or no healing tendency, they benefit from repeated fibrin glue treatment. In cases of rebleeding despite initial endoscopic hemostasis and conservative treatment, another attempt to stop the hemorrhage endoscopically is justified in most patients. A subgroup of patients who are old, suffering from hypotension due to rebleeding, with large ulcers and several other illnesses should undergo surgery immediately because endoscopic intervention often fails, and these patients deteriorate quickly. The surgical procedure should be limited to safe hemostasis.

Keywords Upper gastrointestinal bleeding · Peptic ulcer · Surgery

Introduction

Despite efficient conservative treatment, the number of patients suffering from acute gastrointestinal bleeding has not decreased and occurs with an annual incidence of approximately 100–150 per 100,000 population [1, 2]. Peptic ulcers remain the most common cause of acute nonvariceal upper gastrointestinal bleeding (UGIB) and account for approximately 50% of all cases. Possibly the incidence will decrease as *Heliobacter pylori* eradication therapy comes into wider use and as COX2-specific nonsteroidal anti-inflammatory drugs (NSAIDs) are developed and prescribed in the future.

In the past, most patients suffering from UGIB were treated surgically, and the mortality rate amounted to 30%. In the last two decades, better medication, endoscopic diagnosis, and hemostasis have significantly im-proved the outcome for such patients. In fact, two meta-analyses have shown that endoscopic treatment has decreased the risk of recurrent bleeding and surgical procedures by 62 and 64% respectively [3, 4].

Despite the progress in interventional treatment, the overall mortality has not been significantly reduced in the last 20 years because patients nowadays are older and suffer more often from a relevant comorbidity [5, 6, 7, 8]. Therefore the role of surgery has changed, but is still an important part of the therapeutic concept for treating UGIB.

At present the indication for surgery is confined to:

1. Following a failure to stop hemorrhage endoscopically
2. To prevent further life-threatening recurrent bleeding especially in patients at risk.

Table 1 Influence of recurrent bleeding on emergency surgery and prognosis

Author	Reference	Year of publication	Number of patients	Recurrent bleeding (%)	Emergency operation (%)	Mortality after emergency operation (%)
Branicki	[2]	1990	433	16	59	11
Ishikawa	[11]	1994	253	42	68	8
Quist	[12]	1994	341	23	19	31
Park	[13]	1995	135	19	56	36
Ell	[10]	1995	1139	12	55	33
Rutgeerts	[14]	1997	854	19	59	11
Gralnek	[15]	1998	155	33	61	2
Lau	[16]	1999	1169	9	–	20

Table 2 Recurrent bleeding and mortality

Author	Reference	Year of publication	Recurrent bleeding (%)	Mortality recurrent bleeding (%)	Mortality no recurrent bleeding (%)	Significance
Bearly	[17]	1987	36	16	0.5	$P<0.05$
Branicki	[2]	1990	16	12.5	0.4	$P<0.0001$
Ell	[10]	1995	12	34	7.5	$P<0.05$
Saeed	[18]	1995	23	12	0	$P=0.02$
Schoenberg	[9]	1995	14	12.5	5.7	N.S.

Failure to stop the bleeding by endoscopy or conservative measures is the most important indication for surgery and that surgery has to be performed immediately. Any delay can be lethal, therefore, even if the patient is in shock, proper volume resuscitation should be paralleled by emergency surgery. There is no point in waiting.

Inexperienced endoscopists have a tendency to try to stop the bleeding interventionally for far too long and sometimes, combined with inappropriate monitoring, disregard the overall clinical situation and even hemorrhagic shock. It is therefore essential that endoscopic interventionalists are made aware of the inherent limitations of their methods [9].

Prevention and surgical treatment of recurrent bleeding are still a matter of controversy, and various concepts have been proposed. As was shown recently by the German Multicenter Study, 80% of all peptic ulcer bleeding ceases spontaneously [10]. Moreover, 94% of all actively bleeding ulcers (Forrest Ia and Ib) can be stopped by early endoscopic intervention. Despite endoscopic interventional treatment, the rate of recurrence bleeding amounts to 20% (ranging from 9 to 42%). These recurrent bleeding are often difficult to stop endoscopically and lead to emergency operations in approximately 60% of cases, often paralleled by severe hypovolemia and concomitant blood transfusions (see Table 1).Therefore recurrent bleeding causes an increase in morbidity and mortality and thus worsens the outcome of the disease. In order to avoid rebleeding, patients likely to be at risk should be identified as early as possible (see Table 2).

Risk factors for recurrent bleeding

Varies studies have been performed in order to identify patients who have a significant risk of rebleeding and would possibly benefit from early operative intervention. Ten years ago, the following risk factors had already been identified [2, 19, 20]:

- Age over 60
- High comorbidity, especially cardiopulmonary diseases
- Initial severe hemorrhage
- Active bleeding grade Ia, according to the Forrest classification
- Clot or visible vessel classified IIa, according to Forrest
- Localization of the bleeding ulcer at the posterior wall of the duodenal bulb or minor curvature

Recently, Kolkmann and Meuwissen [21] showed that high initial bleeding intensity, active bleeding or visible vessel as seen during endoscopy, as well as bleeding ulcers localized at the posterior wall of the duodenum, are especially predictive for recurrent bleeding. Similarly, Hasselgren et al. [22] determined the outcome of 508 patients over 60 years of age who were admitted to their hospital with acute peptic ulcer bleeding. A significant risk of rebleeding was seen in those patients who were in shock at the time of admission. It is worth noting that the mortality was lowest in older patients who had taken NSAIDs and were found to suffer from gastric rather than duodenal ulcers. In contrast, the mortality of patients was exceptionally high if they suffered from relevant comorbidity, particularly from heart diseases.

While these previous studies have served to indicate which variables are important in determining the risk of rebleeding, few attempts have been made to devise a simple and therefore clinically useful risk-scoring system that makes use of readily available clinical information to categorize patients at risk of recurrent hemorrhage. Possibly this group of patients would benefit from early intervention and/or operative therapy.

Saeed et al. [18] proposed a 3-component scoring system – the Baylor bleeding score – and validated this score, prospectively defining groups of patients with a high or a low risk of rebleeding. The authors could show that the rebleeding rate of the high risk patients amounted to 31%, whereas none of the low risk group showed signs of rebleeding. Concomitantly, Rockall et al. [23] developed a numerical score that closely followed the predictions generated by logistical regression equations. The score was validated prospectively in four different health regions in England and was found to correlate closely with the observed mortality. Moreover, it accurately identified cases at low risk of rebleeding and negligible risk of death, who might therefore be considered for early discharge. Unfortunately, what holds true in England could not be completely reproduced in a Dutch study. Vreeburg et al. [8] showed that the Rockall score was reliable in predicting mortality but was unsatisfactory when predicting rebleeding.

An amalgamation of these studies of the last 10 years, shows that it is possible to identify those high-risk patients who will be the most likely to rebleed from peptic ulcers and/or have a poor prognosis.

Surgical strategy

For patients with a high risk of rebleeding, two treatment strategies have been proposed. In the 1980s, Siewert et al. [19] proposed a concept in which high-risk patients should undergo planned surgery *before* rebleeding occurred. In earlier studies before endoscopic and effective medical treatment, it was shown that recurrent bleeding happened within the first 3 days after hospital admission. In this concept, therefore, planned surgery was scheduled within 2 days of admission to the hospital, in order to avoid rebleeding and subsequent emergency operations. In fact, it was previously shown by Read et al. [24] that emergency operations due to recurrent bleeding significantly increase the morbidity and mortality of patients. The concept of early planned surgery, as was performed mainly in Germany, could convincingly reduce the mortality rate of UGIB to under 10%, which is significantly lower as compared to historical groups of patients.

The English literature favored a more conservative policy, suggesting surgical intervention *after* recurrent bleeding. Their concept was based on two uncontrolled studies by Dronfield et al. [26] and Saperas et al. [27], in which the authors showed that a more aggressive surgical policy leads to an unnecessarily high rate of surgical interventions and an increased mortality. Both studies, however, were flawed by the uncontrolled design and the fact that the rationale for surgery did not mirror the concept by Siewert et al. [19]. Concomitantly, Morris et al. [28] randomized patients to an aggressive early surgical intervention or to a conservative management plan. In all, 60% of the aggressive group and 20% of the conservative group underwent surgery. The data, when analysed on the basis of treatment received, showed a 2% mortality in the surgical group compared with 13% in the conservative group. The authors concluded that an aggressive policy need not lead to an increased mortality, but that early surgical intervention is, in most cases, unnecessary in patients below the age of 60, because the mortality was so low, regardless of the therapeutic strategy. Their analysis, however, was problematic since the two groups were not necessarily comparable, because surgical patients were selected from both groups. The high mortality in the conservative group was possibly due to the inclusion of very high-risk patients, in whom surgery was considered to be too dangerous.

Unfortunately, any attempt at performing a controlled study which compares surgical versus conservative and interventional treatments is difficult and is, these days, further complicated by the new possibilities of endoscopic hemostasis. Apart from the difficulty in randomizing and blinding patients, there is an ethical dilemma, since the surgical group will include patients in whom the bleeding would have stopped without surgical intervention and some of the patients in the conservative group will eventually require surgery. In fact, all attempts to compare early planned surgery with a combination of endoscopic and conservative therapy failed because, as shown in the German Multi-center prospective study of bleeding peptic ulcer treatment, most high-risk patients refuse to participate in the study [10].

Only one study compared endoscopic hemostasis with medical-surgical therapy in two consecutive, prospective, randomized, controlled trials [15]. In this study, the patients in the medical-surgical arm underwent surgery only if they suffered from severe ulcer rebleeding, whereas in the endoscopically treated group, two unsuccessful attempts at stopping recurrent bleeding endoscopically led to surgical intervention. The concept of early planned surgery in high-risk patients as proposed by Siewert et al. [19] was not studied. It is interesting that altogether 17% of the endoscopically treated patients required surgery after unsuccessful attempts to stop the bleeding whereas heater-probe treatment was far more successful (4.3%) than the BICAP therapy (27.5%). Compared with the medical-surgical group, endoscopic hemostasis yielded significantly lower rates of rebleeding and was safe. The length of hospital stay,

mortality rates, and treatment-related complications were similar.It was also interesting to see that the medical costs and cost savings in the endoscopic group were not significantly better.

In an attempt to combine endoscopic hemostasis with surgery, we performed a prospective clinical study in which all patients were treated initially by endoscopy. If the endoscopic hemostasis was successful, the patients underwent control endoscopy for the following 2 days. In cases of recurrent bleeding, the patient underwent surgery immediately without any new attempts at endoscopic hemostasis.

The results confirmed previous observations that primary endoscopic hemostasis reduces ulcer rebleeding. If necessary, however, *immediate* surgical intervention after the first episode of rebleeding (which occurred in 14% of patients) is a safe procedure. None of the patients died after emergency surgery or suffered from any relevant complications. We concluded that endoscopic hemostasis, endoscopic controls combined with a regular clinical assessment of the patients, and immediate surgery upon rebleeding yield good results which are comparable with those seen after early planned surgery. This concept, moreover, avoids unnecessary operations, especially in those high-risk patients in whom surgery is deemed inappropriate.

Recently, it was shown that early endoscopy (within 24 h), in order to effectively streamline subsequent management, reduces the length of the hospital stay and possibly the rate of surgery [29]. Moreover, in a study similar to our own, Rutgeerts et al. [14] showed in a large clinical trial that daily endoscopy and treatment with fibrin glue significantly reduced the incidence of recurrent bleeding.

Surgical procedures

Gastric ulcers

We prefer the upper midline incision and we open the gastric bowl to stop the active bleeding as quickly as possible. Thereafter, the anesthesiologists have sufficient time to stabilize the patient. After successful hemostasis, a transmural excision of the gastric ulcer for frozen sections is performed, in order to ensure a benign disease. Thereafter, the neighboring branches of the left gastric artery are ligated and the gastric bowl is closed with interrupted sutures.

Duodenal ulcers

If the condition of the patient is stable, we prepare the gastroduodenal and pancreaticoduodenal arteries and ligate them before duodenotomy. Thereafter, the duodenum is opened by a vertical incision over the bleeding ulcer. The bleeding is then stopped by interrupted suture and the ulcer is remucosized by adaptation of the mucosa surrounding the ulcer. This "extraterritorialization" of the ulcer is performed by monofilic interrupted sutures. The duodenum is then closed by a two layer suture.

If the patient has suffered from recurrent ulcer disease despite adequate conservative treatment and is in a stable condition, one might consider surgical treatment of the ulcer disease at the same time. This would mean a gastric resection according to Billroth I for gastric ulcers and a proximal gastric vagotomy for duodenal ulcers. The additional procedures should not, however, endanger the patients or lead to unnecessary complications. In fact, in view of the new endoscopic possibilities, surgery is mostly confined to those high-risk patients in whom extensive operative procedures seem inappropriate.

Ulcer bleeding associated with the use of NSAID is believed to be a distinct disease, differing from peptic ulcer disease in terms of etiology and pathogenesis [30]. In these cases, any extended surgical procedures are unnecessary and a potential danger to the patient.

Endoscopic retreatment and surgery

As shown above, despite initial endoscopic hemostasis, 9–42% of the patients suffer from recurrent bleeding (see Table 1). In the German Multi-center Study, the mortality rate amounted to 34.5% if the patients, after initial endoscopic hemostasis, rebled and were treated once more endoscopically and conservatively. In the same study, patients who underwent surgery after the first or second recurrent bleeding – which occurred in 9 out of 37 patients (25%) – had a mortality rate of 33% [10]. In the latter group, nearly 40% of the patients were suffering from severe comorbidity and were considered as high-risk patients.

Nevertheless, the high mortality of patients treated once more by interventional endoscopy supports our previous concept that recurrent bleeding after initial endoscopic treatment should be treated by surgical intervention.

However, in a prospective randomized clinical study, Lau et al. recently compared endoscopic treatment with surgery in patients who rebled after initial endoscopic hemostasis [16]. In this study, 48 patients (out of 1169) who rebled after initially successful endoscopic treatment were assigned to undergo repeated endoscopic treatment, whereas 44 patients were randomized for surgical intervention.

In the endoscopic group, a long-term control of bleeding was achieved in 35 patients (73%) while 13 patients required surgery. Five patients died in this group, as compared with eight patients who died after surgical intervention. Moreover, the patients in the endoscopy
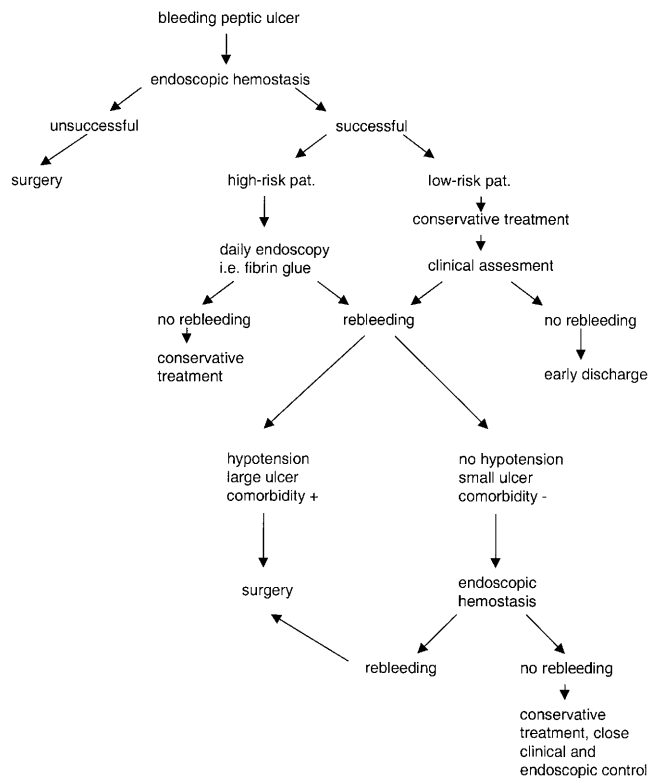
Fig. 1 Decision-making in upper gastrointestinal bleeding

group suffered from significantly fewer complications. The duration of hospital stay, blood transfusions, and other endpoints in this study were similar in the two groups. The authors concluded that it is worthwhile to attempt endoscopic retreatment after a patient rebleeds, despite initial endoscopic intervention.

In this study, however, the authors identified a sub-group of patients in whom endoscopic retreatment was unsuccessful. The characteristics of these patients were severe hypotension due to initial rebleeding and a large peptic ulcer with a diameter exceeding 2 cm. Moreover, all patients in whom retreatment often failed suffered from severe comorbidity.

Conclusion

Wider use of endoscopic treatment has further reduced the number of patients who need an operation. Nevertheless, surgery still plays a pivotal role in UGIB. Failure to control bleeding endoscopically should not delay surgery when it is considered necessary, and a close cooperation between endoscopists and surgeons is essential [31].

The initial endoscopy should stop the bleeding and identify those patients with a high or low risk of rebleeding. High-risk patients should be examined for rebleeding by clinical and endoscopic assessment within at least the first 3 days. Large ulcers, which are most likely to rebleed in elderly patients with severe comorbidity, showing little or no healing tendency, might benefit from repeated fibrin glue treatment, although admittedly the treatment regime is rather costly.

In cases of rebleeding despite initial endoscopic hemostasis, an attempt to stop the hemorrhage endoscopically seems justified in most patients. If patients are old and suffering from hypotension due to rebleeding, with large ulcers and several other illnesses, they should undergo surgery immediately, because endoscopic reintervention is often unsuccessful and the clinical situation of the patients might deteriorate quickly.

In these patients the surgical procedure should be limited to safe hemostasis. Any attempts to treat the peptic ulcer disease might even endanger them. For these patients less is more, see Fig. 1).

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