Algorithms for appropriate utilization of endoscopy are based on a critical review of the currently available data and expert consensus. Controlled clinical studies may in some cases be needed to clarify aspects of this statement, and revision may be necessary as new data appear. These algorithms are intended to serve as a guide for management of common clinical scenarios potentially involving endoscopy. They are not meant to replace clinical judgment/expertise. In some cases, a course of action at variance with these recommendations may be indicated.

Upper gastrointestinal (UGI) bleeding is a common medical presentation for patients seen by gastroenterologists and is associated with significant morbidity, mortality and the use of healthcare resources. It is estimated that greater than 350,000 hospital admissions for UGI bleeding occur annually with an overall mortality rate of approximately 10%. Endoscopy should be considered a primary and pivotal early intervention in establishing the source of bleeding. Early endoscopy allows clinicians an opportunity for therapeutic interventions and estimation of an individual's risk for recurrent bleeding. These benefits impact greatly on practical patient management since therapeutic interventions have been shown to reduce adverse outcomes associated with UGI bleeding and allow clinicians the opportunity to choose the appropriate level of care and resource utilization commensurate with their likelihood of rebleeding. With selective use of ambulatory services and health care resources, early endoscopy with therapeutic interventions is associated with lower cost of care and with equal or improved medical outcomes.

INITIAL EVALUATION, RESUSCITATION AND STABILIZATION

The evaluation of patients with suspected UGI bleeding requires initial clinical assessment including a history and physical exam that focuses on the possible etiology of bleeding and the severity of the bleeding (Figure 1 A). This should include an evaluation for the common causes of bleeding such as peptic ulcer disease, Mallory-Weiss tears, esophagitis and esophageal/gastric varices, among others. It is important to recognize that the morbidity and mortality associated with varices remains high and requires timely and specific therapeutic interventions (sclerosis, banding, TIPS, surgery) to reduce the associated adverse outcomes. An algorithm for UGI bleeding in patients with known or suspected cirrhosis with varices has been the subject of an additional ASGE review.

Complicating factors such as age, comorbid medical conditions, the use of anticoagulants and clotting disorders (congenital or acquired) are important historical factors to identify. Patients should also be asked about the use of prescription and over-the-counter NSAIDs including anti-thrombotic doses of aspirin, as even low dose aspirin may be associated with ulcer development and bleeding. Calcium channel blockers have also been implicated as a risk factor for UGI bleeding but this association is less clear.

The initial assessment should also focus on whether the source of bleeding is from the upper or the lower tract. Although this may be clinically obvious, ambiguity may be present in a significant number of patients. In many cases, especially those who
present with gross rectal bleeding and/or melena but do not have hematemesis, placement of a nasogastric tube may aid in identifying that bleeding is from the upper GI tract. Noteworthy, however, is the fact that significant UGI bleeding may still have occurred when the nasogastric tube return does not demonstrate blood or is even bile stained. It should be noted that NG tube placement with lavage does not alter the course of bleeding. However, lavage may allow the stomach to be cleared of blood so that endoscopy can be performed safely and better visualization can be achieved.

The initial assessment should include an evaluation of the extent of blood loss as early resuscitation may be required simultaneously (Figure 1, B). Evaluation should focus on documenting the presence of orthostatic changes in blood pressure and pulse, as orthostasis (or hypotension) implies significant volume depletion (at least 15%) and is a predictor of poor outcomes. Appropriate resuscitation efforts should be initiated including securing venous access for the administration of colloid and blood products, as required, to stabilize the patient hemodynamically. Additionally, the patient should be monitored for cardiovascular and other complications commensurate with the degree of estimated volume loss and the presence of comorbid conditions.

Laboratory tests such as a CBC, platelet count and coagulation profile should be obtained early in the evaluation of a patient with UGI bleeding. These data are important in the overall assessment of the patient and in subsequent follow up. Intuitively, reversal of thrombocytopenia and/or coagulation defects improves the success of achieving initial hemostasis and reduces the probability of rebleeding after therapeutic endoscopic procedures are used to control bleeding.

Management of upper GI bleeding requires the expertise of multiple medical subspecialists including gastroenterologists/endoscopists, intensivists and surgeons. Consultative and collaborative management should be initiated early in the course of treatment and prior to endoscopy.

ACID SUPPRESSION THERAPY

While intravenous H2RAs are widely used in patients who present with UGI bleeding, there are no data suggesting that this intervention improves short-term outcomes such as transfusion requirements or rebleeding rates.4,8 In contrast, long-term rebleeding rates are reduced after documented duodenal ulcer healing with the continued use of maintenance H2RAs (e.g., ranitidine 150 mg q HS).9 Similarly, successful eradication of Helicobacter pylori also reduces the long-term (1 year) rate of rebleeding in patients who initially presented with bleeding gastric or duodenal ulcers.10 The concept that more profound acid suppression with proton pump inhibitors (PPIs) will improve short-term outcomes has been tested by various authors.11-15 While study designs vary greatly, it appears that intravenous or, when not possible, oral PPIs may reduce transfusion requirements, rebleeding rates, the need for repeat endoscopic procedures and/or surgical intervention in selected populations. It must, however, be recognized that the use of acid suppression should not be the sole intervention; the majority of these studies show short-term efficacy only after hemostasis has been achieved using some form of therapeutic endoscopic intervention. In a recent placebo-controlled, randomized, blinded study, Khuroo et al, evaluated the efficacy of omeprazole 40 mg PO twice daily for 5 days in patients who did not receive endoscopic therapy.14 While the rate of rebleeding, the need for blood transfusions and the need for surgery were significantly reduced, there was no significant change in mortality.

A recent controlled trial evaluated the efficacy of intravenous omeprazole in reducing the rate of recurrent UGI bleeding in patients who had undergone endoscopic therapy of actively bleeding ulcers or ulcers with non-bleeding visible vessels.15 Recurrent bleeding occurred in 6.7% of the omeprazole group as compared to 22.5% in the placebo group. The number needed to treat with intravenous omeprazole to avert one episode of recurrent bleeding was only 6.3 patients. There was no difference in surgical procedures or mortality between groups.

A recent meta-analysis of 14 trials (involving a total of 1829 patients) evaluated the use of somatostatin or octreotide in the management of acute non-variceal UGI hemorrhage.16 In this study, somatostatin was associated with a 47% risk reduction (RR) for continued bleeding or rebleeding. This reduction was primarily driven by the significant RR for bleeding associated with PUD (RR = 52%). In contrast, results only showed a trend toward efficacy for non-PUD bleeding (RR = 38%).

In summary, acid suppression or somatostatin/octreotide may play an adjunctive role in the short-term management of patients with UGI bleeding, but use of these agents should not be used in lieu of an endoscopic evaluation.

PRE-ENDOSCOPY RISK ASSESSMENT

Endoscopy with the intention of therapeutic intervention(s) should be considered strongly as an early intervention to control bleeding and prevent rebleeding. Several issues regarding the exact timing of endoscopy and post endoscopy management are less clear.
The timing of endoscopy remains a significant controversy and few studies actually address this issue directly. While intuitively endoscopy with the intent of a therapeutic intervention is expected to improve short-term medical outcomes, the use of early endoscopy is difficult to define. In general, most studies evaluate the use of endoscopy within 24 hours of presentation. However, it remains unclear regarding the most optimal timing within the first 24 hours. Emergent endoscopy is generally performed for patients who cannot be hemodynamically stabilized, those presenting with orthostasis, tachycardia, shock and/or signs of continued bleeding. The rationale is that hemostasis can be achieved with therapeutic endoscopic intervention and provide clinicians an opportunity to stabilize the patient hemodynamically. In contrast, endoscopy may be performed under more controlled conditions (but within 24 hours) and after more complete resuscitation in patients who do not have evidence of continued bleeding and who are medically stable. Multiple studies have demonstrated that therapeutic endoscopy using epinephrine injection, sclerosing agents, electrocautery, heater probes and other hemostatic interventions facilitate early control of bleeding reduce rebleeding rates and improve short-term morbidity and mortality.4,17

Prior to endoscopy, simple clinical parameters have been used to prognosticate the need for hospitalization and/or the need for intensive care monitoring when patients are at high risk for rebleeding. In a recent prospective analysis, shock, orthostasis, tachycardia, brisk hemorrhage and history of vascular malformations were noted to be independent predictors for a high rate of recurrent UGI bleeding and as such, the need for inpatient management.18 Notably, endoscopic findings only marginally added to the predictive value in this study.

However, while this study implies that clinical parameters alone may be used to predict patients who are low risk for rebleeding and who can be managed as outpatients, others studies more strongly rely on endoscopic findings to predict the risk of recurrent bleeding and the appropriate setting and duration for post endoscopic management.2,4,17,19-25

Multiple authors have developed scoring systems, to differentiate patients at low and high risk for recurrent bleeding.26-30 A common and pivotal feature of these systems is the use of endoscopy to guide patient management. This does not necessarily negate the clinical pre-endoscopy assessment, but rather stresses the importance of integrating clinical information together with endoscopic findings for optimal decision-making and patient care. Longstreth and Feitelberg have demonstrated that clinical and endoscopic criteria can be used prospectively in identifying patients at low risk for rebleeding and who can be managed successfully in an outpatient setting.26 Similarly in a combined approach, Hay et al reported the use of four variables: hemodynamics, time from bleeding, comorbidity and EGD findings, when used as a practice guideline in a large (1000 bed) university — affiliated teaching hospital, reduced hospital length of stay in low-risk patients from 4.6 days to 2.9 days (p < 0.001); early endoscopy proved to be an important independent variable that predicted shorter LOS for low risk patients.27 Rockall et al have reported another large study representing the findings of the National Audit of Acute UGI Hemorrhage in Britain. In this study, a numeral score based on age, shock/extent of volume depletion, comorbidity, diagnosis and stigmata of bleeding predicted mortality associated with UGI bleeding.29 In this study, 29% of patients were categorized as being at low-risk for of bleeding and at negligible risk of death suggesting that they could be successfully and safely treated as outpatients or be considered for early hospital discharge. Together these, and other, studies demonstrate that clinical and endoscopic variables can be used to predict low risk patients who do not require prolonged hospital inpatient care or who can be managed in an ambulatory setting. It is important to emphasize that in doing so, the traditional costs associated with the management of UGI bleeding can be significantly reduced. In an interesting prospective study involving 110 consecutive patients presenting to the emergency room with stable nonvariceal UGI bleeding, Lee et al compared the clinical outcomes and 30-day costs after emergent endoscopy for low risk patients versus hospital admission and inpatient endoscopy within 48 hours.3 This study demonstrated equal medical outcomes for the two groups but additionally showed that 46% of patients endoscoped in the emergency room could be immediately discharged for outpatient management. This translated into a 50% reduction in median hospital stay for the group and a highly significant reduction in cost of care [30-day median costs $2068 vs. $3,662 (p=0.00006)]. These savings are related to lower costs associated with outpatient/ambulatory management of low risk patients as opposed to inpatient care and to shorter LOS and/or inpatient resource utilization associated with the identification of patients at lower risk for rebleeding.

While many of these scoring systems have been validated in selected populations, the inclusion/exclusion criteria and the definitions of clinical and endoscopic findings vary greatly between studies. Moreover, certain variables appear to be significant in one study but not in others leading to an ambiguity in their application. However, as seen in Table 1, key predictors of rebleeding should be considered and evaluated when developing a treatment plan for patients with UGI bleeding.
Table 1 Predictors of Rebleeding
1. Older age
2. Shock/hemodynamic instability/orthostasis
3. Comorbid disease states (e.g., coronary artery disease, congestive heart failure, renal and hepatic diseases, cancer)
4. Specific endoscopic diagnosis (e.g., GI malignancy)
5. Use of anticoagulants/coagulopathy
6. Presence of a high-risk lesion (e.g., arterial bleeding, nonbleeding, visible vessel and clot)

ENDOSCOPY
Beyond its diagnostic and prognostic value, early endoscopy allows endoscopists the ability to alter the natural course of patients at high risk for recurrent bleeding; at the time of endoscopy, various hemostatic techniques can be used to reduce the rate of rebleeding and the morbidity and mortality associated with high-risk lesions.4,17 In parallel, these improved health outcomes have been shown to be associated with significant cost savings. Hemostatic techniques used at the time of endoscopy to control bleeding or reduce the risk of recurrent bleeding include:

Laser therapy — Laser therapy requires significant training and expertise. While used successfully in experienced centers, the limited availability and cost of the units preclude its widespread use.

Thermal contact — Thermal contact techniques include mono- and bipolar electrocautery and heater probes. These techniques rely on thermal (electrical or heat) injury to cause tissue injury and attain hemostasis. Monopolar electrocautery has been associated with greater tissue injury than bipolar electrocautery. These techniques are widely available and require minimal training. The use of thermal hemostatic devices has been shown to reduce adverse outcomes associated with high-risk endoscopic lesions.

Injection therapy — Injection of a variety of agents such as epinephrine (1:10,000 dilution) with or without various sclerosant solutions have been successfully used alone or in combination with thermal contact devices to achieve hemostasis and to prevent rebleeding. This technique is relatively easy to learn and only requires a simple endoscopic injection needle.

The use of these techniques are generally reserved for patients who are found to have actively bleeding lesions, visible vessels, and stigmata of recent bleeding such as an overlying clot. Lesser lesions such as those with a flat red spot or a clean based ulcer are associated with much lower rates of rebleeding and generally do not require therapeutic interventions as above. It should be noted that these techniques are not without risk. Uncommon but significant complications include perforation and worsening of bleeding if hemostasis is not obtained. Despite these risks, these interventions are important tools and provide a net benefit in the management of patients with high-risk lesions. As described by Gralnek and colleagues in a prospectively designed randomized controlled trial, primary hemostasis rates were 100% and 90% for heater probe and injection therapy respectively vs. 8% in medically managed patients who presented with active ulcer bleeding.2 This improved medical outcome was also associated with lower transfusion rates and the need for emergent surgery. As suspected intuitively, the improved medical outcomes with therapeutic endoscopic interventions resulted in significantly lower direct healthcare costs; per patient costs were greater than 50% lower with either therapeutic endoscopic interventions as compared to traditional medical-surgical management.

In the case of esophageal or gastric varices (Figure 1, E) sclerosis or banding may be used to improve short-term outcomes. Other endoscopic findings, such as AVMs, Mallory-Weiss tears, Dieulafoy’s lesions may be treated with endoscopic interventions such as electrocautery with or without epinephrine and/or sclerosants to stop or prevent bleeding (Figure 1, G). Occasionally, no obvious source is identified in patients with suspected UGI bleeding (Figure 1, H); these patients will require further diagnostic studies (Figure 1, I).

Gastric or duodenal ulcers (Figure 1, F) are the most common causes of UGI bleeding and there is a large volume of literature evaluating the prognosis associated with the endoscopic treatment of high-risk ulcer lesions.4,16 At the time of endoscopy and in the presence of gastric or duodenal ulcers, a test for Helicobacter pylori should be obtained. When positive H.pylori eradication has been shown to reduce the long-term (1 year) rate of rebleeding as compared to no treatment.10 Figure 2 details the endoscopy-based therapeutic approaches to the various findings seen at the time of endoscopy.
ACTIVELY BLEEDING ULCERS AND ULCERS WITH NONBLEEDING VISIBLE VESSELS

Actively bleeding ulcers and ulcers with nonbleeding visible vessels are associated with the greatest risk of poor outcomes and/or rebleeding and are seen collectively in up to 35% of patients with ulcers at the time of endoscopy.4,17 For this reason, endoscopy should be always performed with the intention for therapeutic intervention. Endoscopic therapies may include injection of epinephrine and/or sclerosants, electrocautery, heater probe or a combination of injection with subsequent thermal therapies. While the optimal choice of therapy is debated, studies repeatedly show that the use of these hemostatic therapies reduce the rate of rebleeding as compared to no intervention. While many trials compare and contrast the individual efficacy of these techniques, the endoscopist is wise to use those techniques that they have the most experience with and feel most comfortable using.

Once an intervention has been applied, the procedure can be considered successful if bleeding is stopped and there is no recurrent bleeding. For these high-risk lesions, patients are generally observed to assess stability or rebleeding in an acute care setting. Studies suggest rebleeding can occur in up to 20% of patients after therapeutic endoscopy and that if rebleeding occurs, it will be within 48-72 hours.31-33 If hemostatic therapy is unsuccessful, either because bleeding is not controlled or rebleeding occurs, clinical judgment will dictate the appropriate approach. In patients in whom initial therapy is unsuccessful in controlling bleeding, repeat endoscopy, angiography or surgery may be considered. In recent prospectively randomized trial, endoscopic retreatment was compared to surgery in a cohort of patients with recurrent bleeding after initial endoscopic control of bleeding ulcers.34 This study evaluated outcomes of 48 patients undergoing immediate endoscopic retreatment as compared to 44 patients assigned to the surgical arm of the study. Thirty-five of the 48 patients with endoscopic retreatment had long-term control of bleeding (73%). While 13 of the 48 patients subsequently required surgical intervention, (11 endoscopic failures and 2 perforations secondary to thermocoagulation), this study clearly demonstrates that endoscopic retreatment reduces the need for surgical intervention and was associated with fewer complications than surgery.

Alternatively, angiography or may be considered based on the clinical findings; angiography is generally reserved for patients who cannot go to surgery.

Recent data has suggested that patients with overlying/adherent clots may benefit from removal of the clot and therapeutic intervention based on the appearance of the ulcer base.35 A clot may be removed by simple irrigation to expose the underlying ulcer bases. If the clot dislodges, the ulcer base can be inspected for the presence of a visible vessel or acute bleeding; appropriate action can be taken. If the clot remains adherent, the endoscopist may opt for medical management. Alternatively, if the clot cannot be removed by simple irrigation, a preliminary study reports reduced rate of bleeding with epinephrine injection into the base of the base of the adherent clot, followed by clot removal and application of thermal contact therapy.36 In this prospective trial including 56 patients, rebleeding rates were reduced from 34% in the medical treatment arm to 5% in the endoscopic treatment group. (p < 0.02).

REFERENCES


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