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Nonvariceal upper gastrointestinal bleeding refractory to endoscopy: The role of interventional radiology and surgery

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ABSTRACT

Acute nonvariceal upper gastrointestinal bleeding is a common and life-threatening emergency. Despite optimal endoscopic and pharmacologic therapy, 8%-10% of patients continue to bleed or develop rebleeding. Surgery has been the traditional salvage treatment in these patients. However, surgery is associated with high morbidity and mortality rates. In the past few decades, transarterial embolization has emerged as a promising nonoperative alternative to surgery. High technical (69%-100%) and clinical success rate (63%-97%) were reported. However, comparative studies between the 2 treatment modalities are retrospective in nature. Current guidelines suggest transarterial embolization to be an alternative to surgery if expertise is available. This review attempts to summarize the published literature and to provide our view on the role of radiology and surgery for acute nonvariceal upper gastrointestinal bleeding refractory to endoscopic treatment. Factors leading to rebleeding and preventive measures to improve outcomes are also discussed.

1. Introduction

Acute upper gastrointestinal bleeding is a common and potentially life-threatening condition. Nonvariceal upper gastrointestinal bleeding (NVUGIB) accounts for more than 80%-90% of the cause with gastroduodenal peptic ulcer being the major etiology [1,2]. Recent reviews suggest that the incidence of NVUGIB ranges from 20-60 per 100,000 population in North America and Europe [3,4]. Endoscopic hemostasis has significantly improved the outcome of these patients [5,6]. Despite acid suppression and advancements in endoscopic treatment, 8%-10% of patients continue to bleed or develop rebleeding [7]. Recurrent bleeding remains one of the most important predictors of mortality [8,9]. In cases of rebleeding after initial endoscopic control of bleeding, therapeutic options include repeat endoscopy, surgery, and transarterial embolization (TAE). Endoscopic retreatment has been shown to reduce the need for surgery without increasing the risk of death and is associated with fewer complications than surgery [10]. Traditionally, salvage surgery was considered the standard after failed endoscopic hemostasis. However, surgery carries a morbidity rate of 55% and a mortality rate of 30% [11,12]. Therefore, TAE was proposed as an alternative to surgery. Owing to the limited reports available, the role of TAE and how it compares to surgery remains poorly characterized. Management of these patients should be divided into (1) those bleeding that cannot be controlled during endoscopy and (2) those who develop rebleeding after initial successful endoscopic hemostasis.

2. Management in patients who failed initial endoscopic hemostasis

2.1. Role of surgery and its decline

Patients with massive bleeding with failed endoscopic hemostasis have in the past been managed with emergency surgery. Surgery however, as a salvage procedure, is associated with high morbidity and mortality rates. Between 2 National United Kingdom audits conducted in 1993 and 2007 respectively, the rate of surgery decreased from 7% in 1993 [13] to only 2% of the patients required surgery in 2007. The rates of surgery in this audit were similar to those from other large registries including the Canadian Registry on Nonvariceal Upper Gastrointestinal Bleeding and Endoscopy [14] and that from Hong Kong [15]. Globally, we are witnessing a dramatic decline in surgery. This is especially

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Fig. 1. (A) Endoscopic photo of a bulbar ulcer with a bleeding vessel that was of the size of the heater probe. (B) Angiogram of the same patient showing active bleeding from the gastroduodenal artery with coiling performed. (Color version of figure is available online.)

remarkable when compared to the surgical rates of 25% in the 1970s [16]. Techniques of endoscopic hemostasis are more widespread. Elective acid reduction surgery is no longer practiced following widespread *Helicobacter pylori* eradication and use of proton pump inhibitors (PPIs). In the same audit, mortality rate following emergency surgery was 30% and the morbidity rate was 55% [11]. At present, the indication of surgery is confined to failure to stop bleeding during endoscopy and to manage perforations after endoscopic treatment [1,17-20].

2.2. Role of angiographic embolization

Angiographic embolization has been proposed as an alternative when its expertise is immediately available [21,22]. Nusbaum and Baum [23] first described selective arterial catheterization to identify sites of hemorrhage in 1960. In 1972, Rosch et al [24] successfully controlled an acute gastric hemorrhage by embolizing the gastroepiploic artery with an autologous blood clot. TAE has become the primary intervention for massive arterial bleeding from the upper gastrointestinal tract that is refractory to endoscopic therapy in many centers [25,26] (Figures 1 and 2). Common complications associated with TAE include groin hematoma (3%-17%), contrast-related complications (0.04%-12.7%), and dissection of vessels [27]. Arterial embolization above the ligament of Treitz is considered safe due to the rich collaterals but significant bowel ischemia has been reported [27]. Inadvertent embolization of the common hepatic artery may manifest from temporary raise in liver enzymes to fulminant hepatic failure [27].

In a review by Loffroy et al [27], 15 studies on endovascular management of intractable NVUGIB were included. Technical success was achieved in 762 patients (93%). Active extravasation was present at the time of embolization in 442 (54%) patients. Consequently, 46% patients underwent blind embolization guided by the findings on endoscopy or placement of clips around the area of the bleeding vessel. The overall clinical success rate was 67%. In all, 33% of patients continued to bleed but almost half of them responded to repeat embolization. Finally, 20% of patient underwent open surgical intervention. Complications developed in 9% of patients and the overall 30-day mortality rate was 28%. Mirsadraee et al [28] also summarized the results of 35 studies. The pooled mean technical success rate and clinical success rate were 84% and 67%, respectively. The pooled mean rate of rebleeding, complication rate, and mortality rate were 27%, 6%, and 8%, respectively.

2.3. TAE vs Surgery

Nine retrospective comparative studies were available on angiographic embolization against surgery for those refractory to

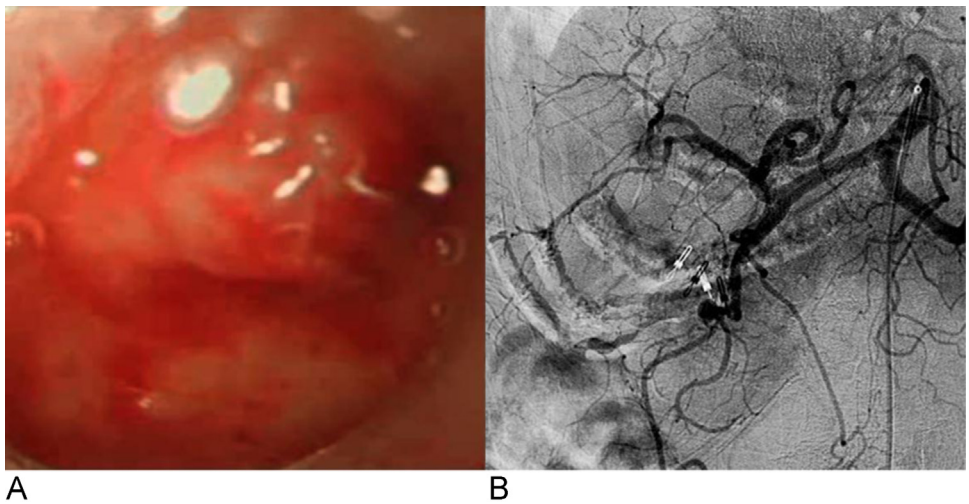

Fig. 2. (A) Endoscopic photo of a pseudoaneurysm of the gastroduodenal artery in the posterior wall of duodenum. (B) Angiogram of the same patient showing pseudoaneurysm of the gastroduodenal artery with coiling performed. (Color version of figure is available online.)