

Endoscopic hemoclip treatment for bleeding peptic ulcer

Lai YC, Yang SS, Wu CH and Chen TK

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Subject headings endoscopic hemoclippping; gastrointestinal hemorrhage/therapy; peptic ulcer; hemostasis

Abstract

AIM To evaluate the efficacy of endoscopic hemoclip in the treatment of bleeding peptic ulcer.

METHODS Totally, 40 patients with F1a and F1b hemorrhagic activity of peptic ulcers were enrolled in this uncontrolled prospective study for endoscopic hemoclip treatment. We used a newly developed rotatable clip-device for the application of hemoclip (MD850) to stop bleeding. Endoscopy was repeated if there was any sign or suspicion of rebleeding, and re-clipping was performed if necessary and feasible.

RESULTS Initial hemostatic rate by clipping was 95%, and rebleeding rate was only 8%. Ultimate hemostatic rates were 87%, 96%, and 93% in the F1a and F1b subgroups, and total cases, respectively. In patients with shock on admission, hemoclippping achieved ultimate hemostasis of 71% and 83% in F1a and F1b subgroups, respectively. Hemostasis reached 100% in patients without shock regardless of hemorrhagic activity being F1a or F1b. The average number of clips used per case was 3.0 (range 2-5). Spurting bleeders required more clips on average than did oozing bleeders (3.4 versus 2.8). We observed no obvious complications, no tissue injury, or impairment of ulcer healing related to hemoclippping.

CONCLUSION Endoscopic hemoclip placement is an effective and safe method. With the improvement of the clip and application device, the procedure has become easier and much more efficient. Endoscopic hemoclippping deserves further study in the treatment of bleeding peptic ulcers.

INTRODUCTION

Upper gastrointestinal bleeding is a frequently encountered clinical problem for both the endoscopist and surgeon^[1]. Acute hemorrhage from duodenal and gastric ulcers stops spontaneously in approximately 70% to 80% of cases^[2]. The remaining patients represent a high risk group requiring prompt identification and treatment to improve the high morbidity and death rate. The consensus is that patients who have peptic ulcer with spurting or oozing hemorrhage need active treatment^[3,4]. The death rate of patients with persistent or recurrent bleeding is 12% to 18%^[5-8].

There have been many endoscopic techniques, including thermal application (laser, heater probe, and bicap) and local injection (hypertonic saline, epinephrine, and ethanol), advocated effectively for the control of gastrointestinal bleeding^[9]. But, their results vary depending on the operators or the patients^[10,11]. Although the success rate of initial hemostasis is high, rebleeding has been reported to occur in 10% to 30% of patients^[12-14]. Thermal methods and injection of hemostatic agents can cause tissue injury leading to necrosis and possible perforation^[15-17]. Mechanical hemostasis by the application of a metal hemoclip to a bleeding vessel is an appealing alternative to the currently available techniques. It was first introduced in 1975 by Hayashi *et al*^[18]. However, the initial experience was discouraging because of its complexity and low retention rate. In 1988, Hachisu introduced a modified hemoclip for upper gastrointestinal hemorrhage with a permanent hemostatic rate of 84.3%^[19]. A newly improved rotatable clip-device with better grasping capability has been developed recently, which can make the procedure easier and save much time^[20]. We therefore used this newly improved metallic clip to prospectively evaluate its role in the hemostatic effect on bleeding peptic ulcers.

MATERIALS AND METHODS

From January 1997 to December 1998, totally 40 hospitalized patients were enrolled. All patients were proved to have active hemorrhage from peptic ulcer by endoscopic examination at Cathay General Hospital. All cases had F1a (spurting) or F1b (oozing) hemorrhagic activity by Forrest classification^[21]. Patients who had multiple bleeding sites or gastric cancer were excluded. Since active hemostatic treatment has been recommended

Yung Chih Lai¹, Sien Sing Yang^{1,2}, Chi Hwa Wu¹ and Tzen Kwan Chen¹

¹Division of Gastroenterology, Cathay General Hospital, Taipei and

²Medical Faculty, China Medical College, Taichung, Taiwan, China

Correspondence to: Sien Sing Yang, MD, Division of Gastroenterology, Cathay General Hospital 280 Jen-Ai Road, Section 4 Taipei 106 Tel. 886-2-2708-2121 Ext. 3120, Fax. 886-2-2707-4949

Email: yangss@tptsl.seed.net.tw

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for acute bleeding from the upper gastrointestinal tract^[3,4], the present study did not include a control group which was treated conservatively.

Endoscopies were carried out using an Olympus GIF-XQ 200 endoscope (Olympus Corp., Tokyo, Japan). We used a hemoclip (MD 850, Olympus) device, which has a new rotatable clip-device (HX-5LR-1, Olympus) for hemostasis. The hemoclip was applied directly to the bleeding vessel. Vessels transversing the surface were clipped at both ends of the bleeding point. Initial hemostasis was defined as no bleeding from the ulcer for at least 5 minutes.

Patients were treated with intravenous H₂-blockers and oral antacid suspensions after endoscopic examination. A nasogastric tube was inserted to observe the bleeding condition. Blood transfusion was given if the hemoglobin level dropped to less than 90 mg/L, or if vital signs deteriorated.

Shock was defined as systolic blood pressure less than 13.3 kPa (100 mmHg) and a pulse rate greater than 100 beats/min, accompanied by pallor, cold sweating, and oliguria. Rebleeding or recurrent bleeding was defined as blood in the stomach 24 h after treatment, presence of unstable vital signs, and continued tarry or bloody stools, or hematemesis after treatment.

Endoscopic examination was performed again whenever there was evidence or suspicion of rebleeding. Hemoclips were used again if necessary and feasible. Surgical intervention was considered if re-clipping still could not control the bleeding. Ultimate hemostasis was defined as lack of rebleeding for 7 days after treatment. Follow-up endoscopy was performed 1 week after initial hemoclip treatment if patients agreed.

We used Student's *t* test or Wilcoxon 2-sample test for the analysis of continuous variables. Chi-square test and Fisher's exact test were applied for the analysis of nominal variables. A *P* value of less than 0.05 was considered significant.

RESULTS

Totally, 40 patients were included in this study over a 2-year period. There were 29 males and 11 females with a mean age of 62.3±3.3 years (range 26-85 years). Locations of peptic ulcers and their hemorrhagic activity by Forrest classification are listed in Table 1.

Two of our 40 cases failed to terminate hemorrhage in response to hemoclips. One failed case was due to torrential active bleeding from the posterior wall of the mid-gastric body, which prevented treatment feasibility. This patient subsequently received surgical intervention. Another case with F1a activity had hemorrhage from the lesser curvature of the high gastric body, which made clipping difficult to perform, and we were unable to clip this area efficiently. The patient

could not undergo surgery due to end-stage renal disease and sepsis, and he expired in spite of treatment. Rebleeding after hemoclip treatment occurred in three cases. The first patient had chronic liver disease, diabetes mellitus, and renal insufficiency. He had a gastric ulcer (F1b) on the posterior wall of the high body, where the application of clipping was difficult. Massive hemorrhage occurred 2 days after the first endoscopic clipping. Emergent operation was performed and clips were found to have dislodged during the operation. The second patient underwent anti-coagulant treatment for rheumatic heart disease. He had a gastric ulcer (F1a) on the lesser curvature of the antrum. Follow-up endoscopy revealed active oozing from the edge of the clips. Re-clipping successfully stopped the hemorrhage. The third case had a duodenal ulcer (F1a) on the posterior wall. Follow-up endoscopy revealed that the clip had dislodged. The rebleeding rates of F1a and F1b subgroups were 15% and 4%, respectively (Table 2). This difference is not statistically significant.

The final results of our study are shown in Table 3. The overall hemostatic rate was 93%. In patients with F1a ulcers, the rate was 87%, and in F1b ulcers was 96%; the difference between them is not significant. Two cases received emergent operation, and their post-operative courses were smooth and uneventful. Mortality occurred in only one patient who had serious underlying disease (end-stage renal disease and sepsis) and was unable to receive surgical intervention.

Table 4 shows the relationship between shock and the rebleeding rate. After hemoclippping, the rebleeding rate in the F1a shock subgroup was 20%, a rate not different from that 13% in the F1a non-shock subgroup. In the F1b group, the rebleeding rates did not differ between the shock and non shock groups (17% versus 0%, *P* = 0.07). In those patients without shock, the hemostatic rate was 100% in both F1a and F1b subgroups. In patients with shock, the hemostatic rates after hemoclippping were 71% in F1a cases and 83% in F1b cases (Table 5).

The number of clips used per patient in each subgroup is shown in Table 6. The average number of clips used in all cases was 3.0 (range 2-5). The average number was higher in the F1a subgroup (3.4, including gastric and duodenal ulcers) than in the F1b subgroup (2.8, including gastric, duodenal, and marginal ulcers, *p* = 0.04 by Wilcoxon 2-sample test). The number of clips (including F1a and F1b) did not differ between gastric and duodenal ulcers. We also tried to analyze the difference of clip number used in various locations of gastric and duodenal ulcers, but were unable to reach any definite conclusion because of limited case numbers.

Table 1 Number of patients by ulcer type and Forrest classification

Type	F1a	F1b
Gastric ulcer	10	14
Duodenal ulcer	5	9
Marginal ulcer	0	2
Total	15	25

Table 2 Number of rebleeding cases in each subgroup

Type	F1a	F1b
Gastric ulcer	1/8 ^a	1/14
Duodenal ulcer	1/5	0/9
Marginal ulcer	0/0	0/2
Total	2/13 ^b	1/25

Data are expressed as rebleeding/subgroup case number. ^aTwo cases without initial hemostasis are excluded. ^b $P = 0.27$.

Table 3 Outcome of endoscopic hemoclip treatment

Treatment	F1a (n = 15)	F1b (n = 25)	Total (n = 40)
Ultimate hemostasis ^a	13(87%)	24(96%)	37(93%)
Emergent surgery	1	1	2(5%)
Mortality	1	0	1(3%)

Data are presented as case number (percentage).

^aTwo patients with re-clipping are included. ^b $P = 0.28$.

Table 4 The relationship between shock and rebleeding rate

Subgroup	F1a	F1b
Shock ^a	1/5(20%) ^b	1/6(17%) ^c
Non-shock	1/8(13%)	0/9 (0%)

Data are expressed as rebleeding/subgroup case number. ^aTwo cases without initial hemostasis are excluded. ^b $P = 0.77$; ^c $P = 0.07$ compared with non-shock subgroups.

Table 5 The relationship between shock and ultimate hemostatic rate

Subgroup	F1a	F1b
Shock	5/7(71%) ^a	5/6(83%) ^b
Non-shock	8/8(100%)	19/19(100%)

Data are expressed as ultimate hemostasis/subgroup case number.

^a $P = 0.11$, ^b $P = 0.07$ compared with non-shock subgroups.

Table 6 Number of clips used per case in different subgroups

Type	F1a	F1b
Gastric ulcer	3.5 (n = 8)	2.9 (n = 14)
Duodenal ulcer	3.2 (n = 5)	2.7 (n = 9)
Marginal ulcer	—	2.5 (n = 2)
Average ^a	3.4 (n = 13)	2.8 (n = 25)

^a $P = 0.04$.

DISCUSSION

The rotatable clip-device we used was developed in 1995. This device has a dial at the center of the handle, which can rotate the clip and open at the tip of the device. The working length of HX-5LR-1 is 165 cm for an upper GI endoscope. Use of a special wire resistant to rotational distortion and a special coating facilitate rotation of the clips and markedly reduce the force required for clipping, as compared to the conventional device (HX-3/4 clip-device). As a result, precise clipping with application of a smaller force has become possible^[20]. HX-5LR-1 has advantages over the older HX-3/4 clip-device in its rotatability, which

can make clipping more accurate, and its durability including the ability to withstand sterilization by autoclaving^[20].

Mechanical clipping of a bleeding ulcer is appealing because the bleeding can be stopped immediately^[22]. This technique was once abandoned due to its complexity. In 1993, Binmoeller *et al* in Germany evaluated an improved metallic clip for endoscopic treatment of non-variceal hemorrhage from various sources in the upper gastrointestinal tract and concluded its highly effective hemostatic effect^[9]. Our results confirm the efficacy and safety of hemoclips for the treatment of peptic ulcer with active hemorrhage.

It is well recognized that about 50% of high risk patients had continuous hemorrhage or rebleeding during hospitalization^[23]. In our cases, hemoclip treatment reduced the rates of rebleeding to 15% in the F1a subgroup and 4% in the F1b subgroup. The ultimate hemostasis rate was 93%. The tangential application of clips is sometimes difficult, which is the same as for other therapeutic endoscopic modalities (e.g. laser or injection therapy). Application of clips should ideally be performed while approaching the bleeding spot *en face*^[22]. In two of our patients who failed to terminate the hemorrhage by using hemoclip treatment, the locations of the ulcers were such that it was difficult to use an *en face* approach.

Dislodging of clips is another cause of rebleeding. Two of our patients had clips which dislodged, one on the posterior wall of the high gastric body and another on the posterior wall of the duodenal bulb. The locations of the ulcers were difficult to approach when applying the clips. Underlying diseases with bleeding tendency may influence the effect of endoscopic hemostatic procedure^[24]. In one patient with oozing from the site of clipping, the hemorrhage might be related in part to the use of anti-coagulant medications.

In those patients with hemorrhage from the upper gastrointestinal tract, the presence of shock on admission and visible vessel significantly predict rebleeding^[1,25,26]. Hsu *et al* reported that an adherent clot associated with hypovolemic shock had a 50% rebleeding rate. On the contrary, the presence of a clot without hypovolemic shock had a rebleeding rate of only 17%. Non-bleeding visible vessel associated with shock had a 40% rebleeding rate; without shock it decreased to 25%^[7]. The presentation of active hemorrhage, shock on admission, and low hemoglobin concentration predict a poor outcome^[23]. In our series, neither the rebleeding rate nor the ultimate hemostatic rate was influenced by the presence of shock. In our study, the F1a with shock subgroup had the highest rebleeding rate of only 20%, which suggests that endoscopic hemoclippping be a useful and effective

hemostatic method.

Clipping allows clamping of bleeding vessels and achieves mechanical sealing without affecting the ulcer's depth or size. Clips dislodge spontaneously and pass through the gastrointestinal tract safely within 3 weeks^[22]. The damage to surrounding tissue was reported to be limited^[27,28]. In the present study, follow-up endoscopy showed no obvious clip-related tissue injury or impairment of ulcer healing. Our findings confirm that no obvious complications resulted from clip placement.

Both heater probe and injection therapies are widely used. Their hemostatic rates are about 75% to 95%^[1,2,5,29,30]. Our study shows that the hemostatic effect of hemoclips is 93% in peptic ulcers, which is comparable to the above reports. Our data are consistent with those of Takahashi's in which the outcomes of bleeding ulcers did not differ between injection and hemoclippping^[31].

The number of clips required for hemostasis depends on the bleeding activity, endoscopic accessibility of the bleeding site, and the characteristics of the vessel^[9]. Spurting lesions generally require more clips to achieve hemostasis than do oozing lesions. In our series, the average number of clips was higher in the F1a subgroup than in the F1b subgroup. Our results are comparable to the number of Binmoeller *et al*, who used an average of 3.2 clips per case for spurting bleeders and 2.7 clips for oozing bleeders^[9].

In conclusion, endoscopic hemoclip treatment for bleeding peptic ulcer is an effective and safe modality. It has a high initial hemostatic rate (95%) and a low rebleeding rate (8%). Ultimate hemostasis reached 93% in our study with no obvious complications. With the development of newly developed clips and clip application devices, the endoscopic hemoclip treatment has become easier and much more efficient. Endoscopic hemoclip treatment deserves further comparative studies with other hemostatic methods.

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