A retrospective analysis of the efficacy of endoscopic variceal ligation versus endoscopic tissue adhesive injection in the treatment of esophagogastric variceal bleeding

Wei Liu
The First Affiliated Hospital of Bengbu Medical College

Linxia Xu
The First Affiliated Hospital of Bengbu Medical College

Feng Xu
The First Affiliated Hospital of Bengbu Medical College

Jianchao Wang
The First Affiliated Hospital of Bengbu Medical College

Min Deng
The First Affiliated Hospital of Bengbu Medical College

Hailun Zheng
The First Affiliated Hospital of Bengbu Medical College

Zhenzeng Ma
The First Affiliated Hospital of Bengbu Medical College

Yongju Xue
The First Affiliated Hospital of Bengbu Medical College

Qizhi Wang
The First Affiliated Hospital of Bengbu Medical College

Xiquan Ke (kexq2006@sina.com)
The First Affiliated Hospital of Bengbu Medical College

Research Article

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Abstract

Objective

To investigate the effectiveness and safety of endoscopic variceal ligation (EVL) and endoscopic tissue adhesive injection (TAI) in the treatment of esophagogastric variceal bleeding.

Methods

245 patients with esophagogastric variceal bleeding attending the First Affiliated Hospital of Bengbu Medical College from December 2017 to June 2021 were retrospectively collected and divided into 103 patients in the esophageal EVL(E-EVL) + gastric EVL(G-EVL) group and 142 patients in the E-EVL + gastric TAI(G-TAI) group according to the procedure, comparing and assessing the clinical characteristics, laboratory results, operation time, rebleeding rate, efficacy, and complications in the two groups.

Results

The diameter of the varicose veins and the operative time were significantly less in the E-EVL + G-EVL group than in the E-EVL + G-TAI group ($p < 0.05$), there was no statistical difference in the length of stay in hospital between the two groups ($p > 0.05$). The total rebleeding rate in the E-EVL + G-EVL group was 9.7%; the total rebleeding rate in the E-EVL + G-TAI group was 11.9%, and there was no statistical difference between the two groups ($P > 0.05$). The overall effective rate of the E-EVL + G-EVL group was 90.21%; the overall effective rate of the E-EVL + G-TAI group was 92.81%, and there was no statistical difference between the two groups ($P > 0.05$). The postoperative ulcer in the E-EVL + G-EVL group were smaller and more superficial than those in the E-EVL + G-TAI group, and the wound surface was smoother.

Conclusion

Both endoscopic variceal ligation and endoscopic tissue adhesive injection have good therapeutic effects on esophagogastric variceal bleeding, and gastric endoscopic variceal ligation is worthy of further clinical promotion because of its effectiveness in preventing re-bleeding, no reduction in efficacy and no increase in complications, shortened operative time, smaller and superficial ulcer and smoother wounds.

Introduction

Gastroesophageal varices (GOV) are a common complication of liver cirrhosis and a major cause of death in cirrhotic patients, which are most often considered to be due to portal hypertension. As portal hypertension worsens, approximately one third of patients with GOV will experience ruptured esophagogastric variceal bleeding (EVB). Without prompt and effective treatment, the chance of death from EVB within 1 year can be as high as 70%. Despite advances in treatment, the 6-week mortality rate
can be as high as 25%, so the accuracy of diagnosis and the timeliness of treatment are critical to patient survival and prognosis. Prevention of the development and progression of varices is key to the treatment of EVB. In the last 20 years, with the development of medical technology, endoscopy has become the first line of investigation and treatment due to its versatility and effectiveness, and multiple endoscopic treatments can provide at least 5–10 years of survival for patients with cirrhotic decompensation. The main endoscopic treatments for EVB include endoscopic variceal ligation (EVL), endoscopic tissue adhesive injection (TAI) and endoscopic injection sclerotherapy (EIS), etc. Current national and international guidelines recommend EVL and EIS for esophageal varices (EV). In gastric varices (GV), previous studies have shown that TAI is effective in controlling bleeding in the acute phase of GV and that repeated treatment can rapidly eliminate varicose veins, but the risk of complications associated with ectopic embolism, bleeding from draining ulcer and sepsis is also higher. However, some studies have also reported that EVL can relatively reduce the incidence of adverse effects without increasing side effects or decreasing overall efficiency. Few clinically controlled studies have been reported at this stage on the relationship between EVL and TAI, The aim of this retrospective analysis was to collect information on 245 cases of EVB treated by endoscopy in our hospital and to further analyze and study the prognostic efficacy between the two groups. The report is as follows.

**Materials And Methods**

1. **Materials**: Patients who attended the First Affiliated Hospital of Bengbu Medical College from December 2017 to June 2021 with a diagnosis of cirrhotic decompensation were retrospectively collected. Inclusion criteria: (1) Diagnosis of cirrhotic decompensation with EVB based on past medical history, clinical presentation and ancillary investigations, (2) clear Sarin staging as GOV1 or GOV2 by endoscopy, (3) Receiving either esophageal EVL and gastric EVL (E-EVL+G-EVL group) or esophageal EVL and gastric TAI (E-EVL+G-TAI group) on treatment. Exclusion criteria: (1) combination of malignant tumors of the liver, (2) other treatment such as surgery, transjugular intrahepatic portosystemic shunt (TIPS) has been performed.

2. **Methods**

   2.1 **Instruments**: CV290-1 gastroscope system (Olympus Corporation, Japan), MBL-6-F multiband variceal ligator (COOK Medical, USA), n-butyl alpha-cyanoacrylate (Beijing Compont Medical Devices Co., Ltd., China), lauromacrogol (Shaanxi Tianyu Pharmaceutical Co., Ltd China), 23G syringe needle (Boston Scientific Corporation, USA) were used.

   2.2 **Methods of operation**: Routine blood, coagulation, biochemistry, electrocardiogram and CT portal venography (CTV) on admission were completed. The patient’s general condition was assessed, drugs were administered to dilate, suppress gastric acid and lower portal pressure, followed by painless endoscopic treatment once vital signs had stabilised. The procedures were all performed by our team of doctors with experience in EVB treatment. Patients in the E-EVL+G-EVL group had GV ligated with a ligature from the cardia towards the fundus of the stomach, gradually retreating the scope, followed by
EV ligated intensively from the cardia spiral upwards. In the E-EVL+G-TAI group, GV was performed using a "modified sandwich method" (lauromacrogol - tissue adhesive - lauromacrogol), followed by intensive ligation of the EV from the cardia spiral upwards. Postoperative fasting for 24-48 hours, proton pump inhibitors were routinely administered to promote ulcer healing. Patients in both groups were followed up at 1 month, 3 months, 6 months and 1 year post-operatively at regular intervals. Depending on the patient's outcome, the choice was made whether to repeat endoscopic treatment until the varicose veins did not require treatment.

3. Effectiveness evaluation: The postoperative observation indicators are as follows: (1) Rebleeding: reappearance of signs of upper gastrointestinal bleeding such as vomiting blood, black stools, falling haemoglobin and shock occur again after the first bleeding has been controlled, with early rebleeding showing active bleeding within 72 hours to 6 weeks after the bleeding has been controlled and late rebleeding showing active bleeding 6 weeks after the bleeding has been controlled. (2) GV efficacy is divided into three levels: (i) ineffective: no improvement in varicose veins, (ii) effective: varicose veins improve but shrink by less than 50%, (iii) markedly effective: massed or nodular veins change to cords, shrink by more than 50% or disappear completely. (3) Complications: including fever, retrosternal pain, ulcer formation, ectopic embolism, perforation, death, etc.

4. Statistics: SPSS 26.0 was used for statistical analysis in this study. Normally distributed measures were expressed as mean ± standard deviation (x±s) and t-test was used to compare differences between groups, non-normally distributed measures and rank data were compared using Mann-Whitney U-test, count data were compared using chi-square test and Fisher's test. The test level is \( P<0.05 \).

Results

1. Comparison of baseline date between the two groups

According to the inclusion and exclusion criteria, a total of 245 patients were included in this study, including 103 patients in the E-EVL+G-EVL group: 64 males, 39 females, mean age 51.8 ± 12.0 years, 45, 53 and 5 patients for liver function Child-Pugh class A, B and C, respectively, GOV1 type 70 cases, GOV2 type 33 cases. The E-EVL+G-TAI group consisted of 142 patients: 103 males and 39 females, mean age 50.6 ± 8.9 years, 66, 62 and 14 patients for liver function Child-Pugh class A, B and C, respectively, GOV1 in 86 cases, GOV2 in 56 cases. There was no statistically significant difference in the baseline level of the two groups of patients in terms of basic information, Child-Pugh classification of liver function, classification, etc \( P>0.05 \). As Table 1 shows.

2. Varicose vein diameter, operation time, length of stay in hospital

The diameter of the varicose vein in the E-EVL+G-EVL group was (1.1±0.5) cm, the operative time was (18.5±2.1) min and the length of stay in hospital was (16.0±8.7) days, The diameter of the varicose vein in the E-EVL+G-TAI group was (1.6±0.8) cm, the operative time was (35.2±2.4) min and length of stay in hospital was (16.9±6.9) days. The diameter of the varicose vein and operative time were significantly less
in the E-EVL+G-EVL group than in the E-EVL+G-TAI group, while there was no statistical difference between the two groups in terms of length of stay in hospital. As Table 2 shows.

3. Incidence of rebleeding

Rebleeding occurred in a total of 10 patients in the E-EVL+G-EVL group of 103 patients, with an overall rebleeding rate of 9.7%, including 4 cases of early rebleeding, with an early rebleeding rate of 3.9%, and 6 cases of delayed rebleeding, with a delayed rebleeding rate of 5.8%. A total of 17 patients in the E-EVL+G-TAI group had rebleeding in 142 patients, with a total rebleeding rate of 12.0%, including 7 cases of early rebleeding, with an early rebleeding rate of 4.9%, and 10 cases of late rebleeding, with a late rebleeding rate of 7.0%. There was no statistical difference in the total rebleeding rate, early rebleeding rate or delayed rebleeding rate between the two groups of patients. (P>0.05). As Table 3 shows.

4. Comparison of endoscopic treatment results

Patients in both groups were followed up regularly with endoscopy after treatment, and the choice was made whether to treat the varicose veins endoscopically again depending on the treatment of the varicose veins. After endoscopic follow-up and re-treatment or multiple, The GV of 103 patients in the E-EVL+G-EVL group met the criteria of marked effectiveness in 44 cases, with a markedly effective rate of 42.7%, 49 cases met the criteria of effectiveness, with an effective rate of 47.6%, 10 cases met the criteria of ineffectiveness, with an ineffectiveness rate of 9.7%. The GV of 142 patients in the E-EVL+G-TAI group met the criteria of marked effectiveness in 67 cases, with a markedly effective rate of 47.2%, 65 cases met the criteria of effectiveness, with an effective rate of 45.8%, 10 cases met the criteria of ineffectiveness, with an ineffectiveness rate of 7.0%. There was no statistical difference in GV treatment outcome between the two groups (p>0.05). As Table 4 shows.

5. Complications

Most patients had varying degrees of postoperative discomfort and pain behind the sternum, which disappeared with symptomatic management. In the E-EVL+G-EVL group, 2 cases (1.9%) had fever and 5 cases (4.9%) had postoperative bleeding, in the E-EVL+G-TAI group, 6 cases (4.2%) had fever and 3 cases (2.1%) had postoperative bleeding, which were treated symptomatically and the temperature returned to normal and the bleeding stopped after emergency haemostasis. Postoperative ulcer in the E-EVL+G-EVL group (Fig. 1) were small and superficial with smoother wounds at endoscopic follow-up, and multiple forms of postoperative adhesive discharge ulcer were observed in the E-EVL+G-TAI group (Fig. 2) at endoscopic follow-up. No serious complications such as ectopic embolism or perforation occurred in either group.

Discussion

GV is located in the submucosa, which is deeper and has a larger average diameter than EV, and is exposed to an acidic environment and pepsin for a long period of time. Once GV ruptures, blood loss is
more severe and the prognosis is poor, which can be a serious threat to the patient's life.\textsuperscript{11} The principle of EVL is that the ligature blocks the flow of blood through the varicose veins, causing thrombosis, tissue necrosis and gradual fibrosis, which eventually leads to the gradual disappearance of the varicose veins to achieve the desired effect of stopping bleeding and reducing rebleeding. Given the good efficacy and prognosis of EVL, national and international guidelines\textsuperscript{4,5} recommend it as a first-line treatment for EV. Gamal Shiha et al\textsuperscript{12} first proposed EVL for gastric varices in 1999 as a safe and effective treatment for different types of GV, especially isolated gastric varices. However, clinical studies at home and abroad in recent years have shown that EVL for GV still has certain limitations due to the following reasons: (1) the gastric mucosa is thicker than the esophageal mucosa, increasing the difficulty of inhalation during snare; (2) the gastric varices are relatively thick and difficult to enter the snare completely, which can easily cause cutting and bleeding; (3) snare only partially fibrosis the varices, which can easily cause postoperative rebleeding and variceal regeneration.\textsuperscript{13–15} TAI injections of tissue adhesive into varicose veins cause rapid aggregation, solidification and occlusion of the vessel to control varicose bleeding and thus achieve haemostasis. However, a higher dosage of tissue adhesive increases the risk of ectopic embolism and increases the likelihood of bleeding from draining ulcer and pulmonary embolism in patients with large gastric-renal shunts and hepatopulmonary syndrome.\textsuperscript{16–18}

In recent years there has been increasing interest in the choice of GV treatment modality.\textsuperscript{19} Although the use of EVL in EV treatment is well established, only a few studies have evaluated the utility and effectiveness of EVL in GV treatment. Most of the studies were small, single-center and not comparable. A single-center retrospective study\textsuperscript{20} showed no statistical difference in the rates of acute bleeding control and early rebleeding between EVL and TAI for GV, but the rate of delayed rebleeding was lower in the EVL group than in the TAI group; H El Amin\textsuperscript{21} et al. A randomized controlled study including 150 patients showed no statistical difference between EVL and TAI in controlling acute bleeding from GV, and both were similar in terms of postoperative rebleeding rates, but the rate of complications after TAI treatment was higher, suggesting that EVL is likely to be an alternative treatment for GV. National studies\textsuperscript{8,22} have also concluded that there is no statistical difference between EVL and TAI in terms of acute haemostasis of GV, variceal elimination and risk of rebleeding, but that EVL has a lower rate of complications; The results of prospective randomized trials of Lo GH\textsuperscript{23} and Tan PC\textsuperscript{24} enrolling 60 and 97 patients, respectively, indicate that TAI may be safer and more effective in the treatment of GV. One study\textsuperscript{25} comparing the efficacy of EVL and TAI for GV showed that both treatment modalities were equally effective in controlling active bleeding and there was no difference in overall survival between the two groups, but the rate of re-bleeding was higher in the EVL group than in the TAI group.

This study retrospectively summarized 245 patients with cirrhosis in decompensated phase with EVB, and the results showed that the diameter of the varicose vein and the operative time were significantly less in the E-EVL + G-EVL group than in the E-EVL + G-TAI group ($P < 0.05$), and there was no statistical difference in the length of stay in hospital between the two groups ($P > 0.05$). The total rebleeding rate in the E-EVL + G-EVL group was 9.7\%, of which the early rebleeding rate was 3.9\% and the delayed rebleeding rate was 5.8\%; the total rebleeding rate in the E-EVL + G-TAI group was 12.0\%, of which the
early rebleeding rate was 4.9% and the delayed rebleeding rate was 7.0%. There was no statistical
difference in the total rebleeding rate, early rebleeding rate and late rebleeding rate between the two
groups \( P > 0.05 \). The overall effective rate of the E-EVL + G-EVL group was 90.3%, of which the markedly
effective rate was 47.6%, the effective rate was 42.7% and the ineffectiveness rate was 9.7%; the overall
effective rate of the E-EVL + G-TAI group was 93.0%, of which the markedly effective rate was 45.8%, the
effective rate was 47.2% and the ineffectiveness rate was 7.0%, with no statistical difference between the
two groups \( P > 0.05 \). Postoperative ulcer was small and superficial with smoother wounds in the E-EVL
+ G-EVL group at endoscopic follow-up, and multiple forms of postoperative adhesive discharge ulcer
were observed in the E-EVL + G-TAI group at endoscopic follow-up. No serious complications such as
ectopic embolism or perforation occurred in either group. The improvement in the rebleeding rate in this
study compared to previous studies may be related to the regular use of proton pump inhibitors in all
patients in this study and regular follow-up followed by re-treatment or multiple treatments.

In conclusion, both EVL and TAI have good therapeutic effects on GV. EVL can effectively prevent
rebleeding, without reducing curative effect, and without increasing complications. The ulcer is small and
superficial, and the wound surface is smoother. The present study confirms the feasibility, efficacy and
safety of EVL and TAI in the treatment of GV, which can provide some basis and reference value for
clinical treatment. G-EVL is suitable for patients of EVB with subcardia fundic vessels, vessels up to 1.5
cm in diameter, small vessels with a trailing distribution, re-treatment or multiple treatments due to its
minimal invasion, simple operation, rapid action, flat treatment wound and no significant adverse effects.
EVL is performed after the patient’s vital signs have stabilised, so that the patient can more easily tolerate
the anaesthetic and have a clearer view during gastroscopy. In addition, the necessary postoperative
fasting, antibiotics and PPI can further improve the outcome. This is a retrospective study without
information from a prospective, multicenter, large-sample controlled studies, and there may be issues of
bias. Whether EVL is superior to TAI for the treatment of EVB needs to be further explored as it needs to
be supported by a large amount of clinical data.

**Abbreviations**

EVL, endoscopic variceal ligation

TAI, endoscopic tissue adhesive injection

EV, esophageal varices

GV, gastric varices

GOV, gastroesophageal varices

EVB, esophagogastric variceal bleeding

**Declarations**
Ethics approval and consent to participate:

Approval for this study was obtained from the Ethics Committee of The First Affiliated Hospital of Bengbu Medical College (No. 20200026). All experiments were performed in accordance with relevant guidelines and regulations. Written informed consent was obtained from individual or guardian participants.

Consent for publication:

During patients’ lifetime, the patients consented to the use of their all related images and information for scientific purposes. We have obtained informed consent from all subjects and/or their legal guardian(s) for publication of identifying information/images in an online open-access publication.

Availability of data and materials:

The datasets used and/or analyzed during the current retrospective analysis are available from the corresponding author upon reasonable request.

Competing interests:

The authors declare that they have no competing interests.

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Authors' contributions:

XK and QW were involved in the clinical treatment of the patient. WL was responsible for manuscript generation, literature searches, and image acquisition. LX provided assistance with the literature search. All authors read and approved the final manuscript.

Acknowledgements:

All data included in this study are available upon request by contact with the corresponding author.

References


Tables

Table 1. Comparison of baseline data between the two groups of patients
<table>
<thead>
<tr>
<th>Patient characteristics</th>
<th>E-EVL+G-EVL group</th>
<th>E-EVL+G-TAI group</th>
<th>$\chi^2$/$t$/U</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (male/ female)</td>
<td>64/39</td>
<td>103/39</td>
<td>2.975</td>
<td>0.085&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>age/years</td>
<td>51.8±12.0</td>
<td>50.6±8.9</td>
<td>0.946</td>
<td>0.345&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>causes of disease</td>
<td></td>
<td></td>
<td>5.882</td>
<td>0.318&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hepatitis B liver cirrhosis</td>
<td>59</td>
<td>91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis C cirrhosis</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>alcoholic cirrhosis</td>
<td>4</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biliary cirrhosis</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>autoimmune liver cirrhosis</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>unknown cause</td>
<td>31</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>hepatic encephalopathy</td>
<td>3</td>
<td>4</td>
<td>0.000</td>
<td>1.000&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>number of cases of ascites</td>
<td></td>
<td></td>
<td>-0.319</td>
<td>0.750&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>none</td>
<td>36</td>
<td>51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mild</td>
<td>45</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>moderate</td>
<td>15</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>severe</td>
<td>7</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albumin (g/L)</td>
<td>33.1±5.5</td>
<td>33.2±5.8</td>
<td>-0.105</td>
<td>0.916&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>bilirubin (umol/L)</td>
<td>19.4(11.4,24.4)</td>
<td>19.8(11.2,24.1)</td>
<td>-0.209</td>
<td>0.834&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>prothrombin time (s)</td>
<td>14.1(12.6,15.1)</td>
<td>14.2(12.8,15.3)</td>
<td>-0.940</td>
<td>0.347&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Child-Pugh score</td>
<td>6.9(6.0,8.0)</td>
<td>7.0(6.0,8.0)</td>
<td>-0.066</td>
<td>0.947&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Child-Pugh classification</td>
<td></td>
<td></td>
<td>-0.024</td>
<td>0.980&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>A</td>
<td>45</td>
<td>66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>53</td>
<td>62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>5</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GOV typing</td>
<td></td>
<td></td>
<td>1.412</td>
<td>0.235&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>GOV1</td>
<td>70</td>
<td>86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GOV2</td>
<td>33</td>
<td>56</td>
<td></td>
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</tbody>
</table>
Note. a, Chi-square test; b, independent sample t test; c, MannWhitney U test

**Table 2:** Comparison of varicose vein diameter, operative time and length of hospital stay between the two groups of patients

<table>
<thead>
<tr>
<th></th>
<th>E-EVL+G-EVL group</th>
<th>E-EVL+G-TAI group</th>
<th>t</th>
<th>P</th>
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</thead>
<tbody>
<tr>
<td>Varicose vein diameter (cm)</td>
<td>1.1±0.5</td>
<td>1.6±0.8</td>
<td>-5.362</td>
<td>0.000</td>
</tr>
<tr>
<td>Operation time (min)</td>
<td>18.5±2.1</td>
<td>35.2±2.4</td>
<td>-75.57</td>
<td>0.000</td>
</tr>
<tr>
<td>Length of stay in hospital (d)</td>
<td>16.0±8.7</td>
<td>16.9±6.9</td>
<td>-0.895</td>
<td>0.372</td>
</tr>
</tbody>
</table>

**Table 3.** Rebleeding situation of the two groups of patients

<table>
<thead>
<tr>
<th></th>
<th>E-EVL+G-EVL group</th>
<th>E-EVL+G-TAI group</th>
<th>χ²</th>
<th>P</th>
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</thead>
<tbody>
<tr>
<td>Early rebleeding rate</td>
<td>4(3.9%)</td>
<td>7(4.9%)</td>
<td>0.152</td>
<td>0.696</td>
</tr>
<tr>
<td>Delayed rebleeding rate</td>
<td>6(5.8%)</td>
<td>10(7.0%)</td>
<td>0.145</td>
<td>0.704</td>
</tr>
<tr>
<td>Total rebleeding rate</td>
<td>10(9.7%)</td>
<td>17(11.9%)</td>
<td>0.312</td>
<td>0.577</td>
</tr>
</tbody>
</table>

**Table 4:** Comparison of endoscopic treatment results between the two groups of patients

<table>
<thead>
<tr>
<th>Treatment results</th>
<th>E-EVL+G-EVL group</th>
<th>E-EVL+G-TAI group</th>
<th>U</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ineffective</td>
<td>10(9.7%)</td>
<td>10(7.0%)</td>
<td>0.872</td>
<td>0.408</td>
</tr>
<tr>
<td>Effective</td>
<td>49(47.6%)</td>
<td>65(45.8%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Markedly effective</td>
<td>44(42.7%)</td>
<td>67(47.2%)</td>
<td></td>
<td></td>
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</table>

**Figures**
The efficacy of treatment in the E-EVL+G-EVL group was observed under painless gastroscopy. Both esophageal varices (A) and gastric varices (B) were performed with EVL (C, D). Esophageal varices (E) and gastric varices have almost disappeared and the superficial and smooth ulcer (F) on the stomach fundus can be seen at the postoperative endoscopic follow-up.

Figure 1
Figure 2

The efficacy of treatment in the E-EVL+G-TAI group was observed under painless gastroscopy. A, Esophageal varices was performed with EVL. B, Gastric varices was performed with TAI. Esophageal varices (E) and gastric varices (F) have almost disappeared and draining ulcer on the stomach can be seen at the postoperative endoscopic follow-up.