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Observational Study of Endoscopic Management of Esophageal Variceal Bleeding and Recurrence

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ABSTRACT

Background: Acute bleeding from esophageal varices is a major complication of portal hypertension and requires prompt endoscopic control followed by structured surveillance to prevent rebleeding. This study evaluated the immediate and short-term outcomes of endoscopic variceal ligation/banding in patients with esophageal variceal bleeding.

Methods: This prospective observational study included 100 adult patients who underwent endoscopic variceal ligation/banding for esophageal variceal bleeding at a tertiary care hospital from January 2024 to June 2025. Baseline clinical profile, hemodynamic status, endoscopic grade, procedure details, immediate control, rebleeding, variceal regression at day 15, and recurrence at 3 and 6 months were assessed. Categorical variables were analysed using Chi-square or Fisher exact test.

Results: Mean age was 47.12±10.22 years and 82.0% were males. Alcoholic liver disease was the commonest etiology (79.0%). Grade III varices were present in 62.0%, grade IV in 27.0%, and red wale signs in 71.0%. Immediate bleeding control was achieved in 94.0%, while immediate rebleeding within 5 days occurred in 12.0%. At day 15, partial regression was noted in 88.0%. Three-month recurrence was 13.4% among available follow-up cases and 6-month recurrence was 30.1%. Overall recurrence was documented in 33.0%; post-recurrence bleeding occurred in 57.6% of recurrence cases. Delayed banding interval was significantly associated with recurrence (p=0.006), and number of variceal columns was associated with immediate rebleeding (p=0.016).

Conclusions: Endoscopic variceal ligation achieved high immediate hemostasis with acceptable early safety. Recurrence and post-recurrence bleeding remained clinically important, supporting early intervention, scheduled repeat endoscopy and strict follow-up.

Keywords: Endoscopic variceal ligation; Esophageal varices; Portal hypertension; Rebleeding; Recurrence; Variceal bleeding

INTRODUCTION

Portal hypertension is a major pathophysiological consequence of cirrhosis and other portal venous disorders. It develops because of increased intrahepatic resistance and increased portal venous inflow, and it becomes clinically important when the portal pressure gradient reaches a level at which collaterals, ascites, varices and other decompensating events can occur. Gastroesophageal varices are among the most important portosystemic collaterals because their rupture produces acute upper

gastrointestinal hemorrhage, which remains a life-threatening emergency despite advances in resuscitation, vasoactive therapy, antibiotic prophylaxis, endoscopy and critical care. [1,2]

Esophageal variceal bleeding is determined by the interaction between portal pressure, size of varices, variceal wall tension, endoscopic red signs and severity of liver dysfunction. Large varices, red wale marks, active spurting or oozing, poor hepatic reserve and hemodynamic instability identify a high-risk group in which rapid stabilization and definitive endoscopic therapy are essential. Portal pressure has a direct relationship with the development of gastroesophageal varices and variceal bleeding, and patients with advanced liver disease remain vulnerable to early rebleeding and death even when the index bleed is controlled. [2,3]

The initial management of suspected acute variceal hemorrhage is multidisciplinary. Airway protection, restoration of circulating volume, restrictive and clinically guided blood transfusion, correction of severe coagulopathy when indicated, vasoactive drugs, proton-pump inhibitor support when ulcer bleeding is not yet excluded, antibiotic prophylaxis and early upper gastrointestinal endoscopy form the practical treatment sequence. Endoscopy confirms the source of bleeding, defines the grade and high-risk stigmata of varices, and provides definitive hemostasis. In current practice, endoscopic variceal ligation (EVL) is generally preferred for esophageal varices, while injection sclerotherapy is reserved for selected circumstances where ligation is technically difficult or unavailable. [1,2,4]

EVL controls bleeding by mechanical strangulation of the variceal column using elastic bands, leading to thrombosis, superficial ulceration, fibrosis and subsequent obliteration. Compared with endoscopic injection sclerotherapy (EIS), EVL avoids sclerosant-related deep tissue injury, mediastinal inflammation and stricture formation, and it usually requires fewer treatment sessions for eradication. However, recurrence of varices after apparent obliteration remains a recognized problem because EVL is a local therapy and does not correct the underlying portal hypertension. Consequently, post-banding surveillance and repeat sessions are necessary, especially in patients with advanced liver disease, large varices, multiple variceal columns and delayed treatment. [4,5]

Although several randomized trials and meta-analyses have compared EVL with EIS, local outcome data remain important because patient profile, etiology of liver disease, timing of endoscopy, availability of emergency endoscopy, follow-up adherence and socioeconomic factors vary across centres. The present study was therefore conducted to evaluate endoscopic management of esophageal variceal bleeding using banding technique, with special emphasis on immediate control of bleeding, early rebleeding, variceal regression at day 15, recurrence at 3 and 6 months, post-recurrence bleeding and clinical outcome.

METHODS

Study design and setting

This was a prospective observational study conducted in the Department of General Surgery at a tertiary care hospital. The study included adult patients presenting with esophageal variceal bleeding who underwent endoscopic variceal ligation/ banding during the study period from January 2024 to June 2025.

Study population

A total of 100 patients were included. Patients aged 18 years or above with clinical features of portal hypertension and endoscopically documented esophageal varices requiring endoscopic management were eligible. Patients with previous endoscopic treatment of esophageal varices, dysphagia, known Zenker diverticulum, pregnancy, implanted electromedical devices, life-threatening conditions precluding protocol-based follow-up or any

condition preventing compliance with study instructions were excluded.

Procedure and follow-up

At presentation, demographic details, etiology of liver disease/portal hypertension, Child-Pugh class, hemodynamic status, blood transfusion requirement and pharmacotherapy were recorded. All patients received standard pharmacotherapy with terlipressin, proton-pump inhibitor and ceftriaxone as per institutional protocol. Endoscopic parameters included variceal grade, features of imminent bleeding, number of variceal columns, number of bands applied and procedure-related complications.

Outcomes included immediate bleeding control, immediate rebleeding within 5 days, variceal regression at day 15, additional EVL sessions required till obliteration, recurrence at 3 and 6 months, post-recurrence bleeding, survival and loss to follow-up. Follow-up percentages at 3 and 6 months were calculated using the available follow-up denominator.

Statistical analysis

Data were entered in Microsoft Excel and analysed using IBM SPSS version 26. Categorical variables were expressed as frequency and percentage. Continuous variables were expressed as mean with standard deviation and, where appropriate, median and range. Chi-square test or Fisher exact test was used for categorical associations. A p value <0.05 was considered statistically significant.

Ethical considerations

The study was conducted after approval from the GMC, Miraj Institutional Ethics Committee (Ref. No. GMCM/IEC/C/03/24) dated 30/07/2024. Written informed consent was obtained from eligible participants or relatives/guardians as applicable. Patient identity and clinical data confidentiality were maintained throughout the study.

RESULTS

The study included 100 patients who underwent endoscopic variceal ligation/banding for esophageal variceal bleeding. The mean age was 47.12±10.22 years, with a range of 20 to 68 years. Most patients were males (82.0%). The highest proportion belonged to the 51-60 years age group (33.0%), followed by 41-50 years (29.0%). Alcoholic liver disease was the commonest etiology (79.0%), followed by viral hepatitis B/C (12.0%). Mean Child-Pugh score was 9.54±2.67 and nearly half of the cohort belonged to Child-Pugh class C (49.0%) (Table 1).

Table 1: Baseline demographic and etiological profile of patients (n=100)

Parameter	Category / statistic	Frequency / value	Percentage
Age profile			
Age	Mean±SD (range)	47.12±10.22 years (20-68 years)	
Age group	≤30 years	5	5.0
	31-40 years	24	24.0
	41-50 years	29	29.0
	51-60 years	33	33.0
	>60 years	9	9.0
Sex distribution			
Sex	Male	82	82.0
	Female	18	18.0
Etiological profile			

Parameter	Category / statistic	Frequency / value	Percentage
Etiology	Alcoholic liver disease	79	79.0
	Viral hepatitis B/C	12	12.0
	NASH	5	5.0
	EHPVO	4	4.0
Child-Pugh profile			
Child-Pugh score	Mean±SD	9.54±2.67	
Child-Pugh class	A	15	15.0
	B	36	36.0
	C	49	49.0

At presentation, 54.0% of patients were hemodynamically unstable and 88.0% required at least one unit of blood transfusion. The mean blood transfusion requirement was 1.55±0.98 units. EVL was performed on the same day in 69.0%, after 1 day in 26.0%, and after 2 days in 5.0% (Table 2).

Table 2: Clinical, pharmacological and pre-banding endoscopic profile (n=100)

Parameter	Category / statistic	Frequency / value	Percentage
Hemodynamic status			
Hemodynamic status	Stable	46	46.0
	Unstable	54	54.0
Blood transfusion requirement			
Blood transfusion	Mean±SD units	1.55±0.98	
	No blood transfusion	12	12.0
	>=1 unit transfused	88	88.0
Pharmacological management			
Drug therapy	Terlipressin + PPI + ceftriaxone	100	100.0
Timing of banding			
Banding timing	Same-day banding	69	69.0
	Banding after 1 day	26	26.0
	Banding after 2 days	5	5.0
Interval to banding	Mean±SD days	0.36±0.58	
Variceal grade			
Variceal grade	Grade II varices	11	11.0
	Grade III varices	62	62.0
	Grade IV varices	27	27.0
Features of imminent bleed			
Imminent bleed feature	No feature of imminent bleed	11	11.0
	Red wale signs	71	71.0

Parameter	Category / statistic	Frequency / value	Percentage
	Cherry red spots	18	18.0
Number of variceal columns			
Variceal columns	Three variceal columns	69	69.0
	Four variceal columns	31	31.0
Number of columns	Mean±SD	3.31±0.46	

Grade III varices were most frequent (62.0%), followed by grade IV (27.0%). Red wale signs were observed in 71.0% and cherry red spots in 18.0%. Three variceal columns were seen in 69.0%, while four columns were seen in 31.0% (Table 2).

The mean number of bands applied during the index session was 2.94±0.76. No immediate procedure-related complication was recorded in 87.0%. Minor complications were observed in 13.0%, including retrosternal pain (7.0%), minor ulcer (4.0%) and dysphagia (2.0%) (Table 3).

Table 3: Index banding details and early outcome after EVL (n=100)

Parameter	Category / statistic	Frequency / value	Percentage
Index banding details			
Bands applied	2 bands applied	32	32.0
	3 bands applied	42	42.0
	4 bands applied	26	26.0
Number of bands applied	Mean±SD	2.94±0.76	
Procedure-related complications			
Procedure complications	No procedure complication	87	87.0
	Retrosternal pain	7	7.0
	Minor ulcer	4	4.0
	Dysphagia	2	2.0
Early hemostatic outcome			
Immediate outcome	Immediate control of bleed	94	94.0
	No immediate control of bleed	6	6.0
Immediate rebleed	Immediate rebleed within 5 days	12	12.0
	No immediate rebleed within 5 days	88	88.0
Day-15 outcome			
Day-15 status	Partial regression	88	88.0
	Persistent / high-risk varices	12	12.0
Day-15 management	Rescue therapy / early EVL	12	12.0
Additional EVL sessions			
Additional EVL sessions	Mean±SD	2.71±1.07	
	1 additional EVL session	18	18.0

Parameter	Category / statistic	Frequency / value	Percentage
	2 additional EVL sessions	21	21.0
	3 additional EVL sessions	33	33.0
	4 additional EVL sessions	28	28.0

Immediate control of bleeding was achieved in 94.0% of patients. Immediate rebleeding within 5 days occurred in 12.0%, giving an early rebleeding-free rate of 88.0%. At day 15, partial regression of varices was observed in 88.0%, whereas 12.0% had persistent or high-risk varices and required rescue therapy or early repeat EVL. The mean number of additional EVL sessions required till obliteration was 2.71±1.07 (Table 3).

Three-month follow-up data were available for 82 patients. Among these, variceal obliteration was documented in 86.6%, recurrence in 13.4% and rebleeding in 11.0%. At 6 months, follow-up was available for 73 patients; persistent obliteration was noted in 69.9%, recurrence in 30.1% and rebleeding in 13.7%. Overall recurrence in the full cohort was 33.0%. Among recurrence cases, grade I recurrence was seen in 60.6% and grade II in 39.4%. Post-recurrence bleeding occurred in 57.6% of recurrence cases, corresponding to 19.0% of the full cohort. Mean interval from obliteration to recurrence was 150.00±43.08 days (range 90-180 days) (Table 4).

Table 4: Follow-up, recurrence, post-recurrence bleeding and vital outcome

Parameter	Category / statistic	Frequency / value	Percentage
Three-month follow-up outcome			
Follow-up	3-month follow-up available	82	82.0 of full cohort
3-month outcome	Obliteration at 3 months	71	86.6 of 3-month follow-up
	Recurrence at 3 months	11	13.4 of 3-month follow-up
	Rebleed at 3 months	9	11.0 of 3-month follow-up
Six-month follow-up outcome			
Follow-up	6-month follow-up available	73	73.0 of full cohort
6-month outcome	Obliteration at 6 months	51	69.9 of 6-month follow-up
	Recurrence at 6 months	22	30.1 of 6-month follow-up
	Rebleed at 6 months	10	13.7 of 6-month follow-up
Overall recurrence profile			
Overall recurrence	Overall recurrence in full cohort	33	33.0
	Recurrence among available follow-up cases	33	40.2
Recurrence grade	Grade I recurrence	20	60.6 of recurrence cases

Parameter	Category / statistic	Frequency / value	Percentage
	Grade II recurrence	13	39.4 of recurrence cases
Post-recurrence bleeding			
Post-recurrence bleeding	Bleed after recurrence	19	57.6 of recurrence cases
	Post-recurrence bleeding in full cohort	19	19.0
Time to recurrence	Days from obliteration to recurrence, mean±SD	150.00±43.08	Range 90-180 days
Vital and follow-up status			
Vital outcome	Alive at end of recorded follow-up	90	90.0
	Dead at end of recorded follow-up	10	10.0
Follow-up status	Lost to follow-up	18	18.0

Note: Percentages at 3 and 6 months were calculated using available follow-up denominators.

At the end of recorded follow-up, 90.0% of patients were alive and 10.0% had died. Hypovolemic shock accounted for 60.0% of deaths and liver failure for 40.0%. Loss to follow-up was recorded in 18.0%.

Association analysis for recurrence was performed among available follow-up cases (n=82). Interval between bleed and banding showed a statistically significant association with recurrence (p=0.006). Recurrence occurred in all patients whose banding was delayed by 2 days. Age group, sex, etiology, Child-Pugh class, hemodynamic status, variceal grade, features of imminent bleed, number of variceal columns, immediate rebleeding, day-15 status and number of additional EVL sessions were not significantly associated with recurrence (Table 5).

Table 5: Association of selected parameters with recurrence among available follow-up cases (n=82)

Variable	Category	No recurrence n (%)	Recurrence n (%)	p value
Age group	≤30 years	4 (80.0)	1 (20.0)	0.288
	31-40 years	13 (65.0)	7 (35.0)	
	41-50 years	12 (52.2)	11 (47.8)	
	51-60 years	18 (66.7)	9 (33.3)	
	>60 years	2 (28.6)	5 (71.4)	
Sex	Male	40 (58.0)	29 (42.0)	0.448
	Female	9 (69.2)	4 (30.8)	
Etiology	Alcoholic liver disease	41 (64.1)	23 (35.9)	0.237
	Viral hepatitis B/C	3 (30.0)	7 (70.0)	
	NASH	3 (60.0)	2 (40.0)	
	EHPVO	2 (66.7)	1 (33.3)	
Child-Pugh class	A	8 (53.3)	7 (46.7)	0.819
	B	19 (59.4)	13 (40.6)	
	C	22 (62.9)	13 (37.1)	

Variable	Category	No recurrence n (%)	Recurrence n (%)	p value
Hemodynamic status	Stable	21 (63.6)	12 (36.4)	0.557
	Unstable	28 (57.1)	21 (42.9)	
Interval bleed to banding	0 day	32 (58.2)	23 (41.8)	0.006
	1 day	17 (77.3)	5 (22.7)	
	2 days	0 (0.0)	5 (100.0)	
Variceal grade	Grade II	5 (55.6)	4 (44.4)	0.750
	Grade III	30 (57.7)	22 (42.3)	
	Grade IV	14 (66.7)	7 (33.3)	
Number of variceal columns	3	36 (65.5)	19 (34.5)	0.133
	4	13 (48.1)	14 (51.9)	
Immediate rebleed ≤5 days	No	43 (58.9)	30 (41.1)	0.734
	Yes	6 (66.7)	3 (33.3)	

Note: Percentages in outcome columns are calculated within each category. Chi-square test or Fisher exact test was applied as appropriate.

Immediate rebleeding within 5 days was significantly associated with the number of variceal columns (p=0.016). Other assessed parameters, including Child-Pugh class, hemodynamic status, variceal grade, features of imminent bleeding, number of bands applied and procedure complications, were not significantly associated with immediate rebleeding (Table 6).

Table 6: Association of clinical and endoscopic parameters with immediate rebleeding within 5 days (n=100)

Variable	Category	No immediate rebleed n (%)	Immediate rebleed n (%)	p value
Child-Pugh class	A	15 (100.0)	0 (0.0)	0.248
	B	30 (83.3)	6 (16.7)	
	C	43 (87.8)	6 (12.2)	
Hemodynamic status	Stable	40 (87.0)	6 (13.0)	0.767
	Unstable	48 (88.9)	6 (11.1)	
Variceal grade	Grade II	8 (72.7)	3 (27.3)	0.251
	Grade III	56 (90.3)	6 (9.7)	
	Grade IV	24 (88.9)	3 (11.1)	
Features of imminent bleed	None	9 (81.8)	2 (18.2)	0.799
	Red wale signs	63 (88.7)	8 (11.3)	
	Cherry red spots	16 (88.9)	2 (11.1)	
Number of variceal columns	3	57 (82.6)	12 (17.4)	0.016
	4	31 (100.0)	0 (0.0)	
Number of bands applied	2	27 (84.4)	5 (15.6)	0.652
	3	37 (88.1)	5 (11.9)	

Variable	Category	No immediate rebleed n (%)	Immediate rebleed n (%)	p value
	4	24 (92.3)	2 (7.7)	
Procedure complications	None	75 (86.2)	12 (13.8)	0.565
	Retrosternal pain	7 (100.0)	0 (0.0)	
	Minor ulcer	4 (100.0)	0 (0.0)	
	Dysphagia	2 (100.0)	0 (0.0)	

Note: Percentages in outcome columns are calculated within each category. Chi-square test or Fisher exact test was applied as appropriate.

DISCUSSION

Acute esophageal variceal bleeding remains one of the most serious presentations of portal hypertension because successful management depends not only on arresting the index hemorrhage but also on preventing early rebleeding and later recurrence. In the present prospective observational study of 100 patients, EVL achieved immediate control of bleeding in 94.0% of patients, while immediate rebleeding within 5 days occurred in 12.0%. These findings support EVL as an effective first-line endoscopic modality in the emergency management of bleeding esophageal varices. The result is consistent with current portal hypertension recommendations, which emphasize vasoactive therapy, antibiotic prophylaxis and early endoscopic treatment as integrated components of acute variceal hemorrhage care. [1,2]

The baseline profile of the present cohort showed a mean age of 47.12±10.22 years with marked male predominance (82.0%). Alcoholic liver disease was the commonest etiology (79.0%), and nearly half of the patients belonged to Child-Pugh class C (49.0%). This profile reflects the burden of decompensated alcohol-related liver disease encountered in surgical and emergency endoscopy practice. The predominance of grade III varices (62.0%), grade IV varices (27.0%) and red wale signs (71.0%) indicates that the study population had high-risk endoscopic morphology at presentation. Garcia-Tsao G et al. demonstrated the relationship between portal pressure, gastroesophageal varices and variceal hemorrhage, supporting the biological basis for increased bleeding risk among patients with large varices and advanced portal hypertension. [3]

The immediate hemostasis rate of 94.0% in the present study compares favourably with earlier randomized and comparative studies. Sarin SK et al. reported that control of acute bleeding was comparable between sclerotherapy and EVL, with control rates of 86.0% and 80.0%, respectively, but EVL subsequently showed advantages in faster eradication and lower rebleeding. [9] Stiegmann GV et al. and Laine L et al. also established that EVL was at least as effective as sclerotherapy for bleeding control, while producing fewer local complications and requiring fewer sessions for eradication.[6,7] Thus, the high control rate in the present study is in agreement with the broader literature and may reflect prompt endoscopic intervention in most patients, as 69.0% underwent banding on the same day and 26.0% within one day.

Early rebleeding in the present study occurred in 12.0% within 5 days. Dai C et al., in a meta-analysis of 14 studies including 1236 patients, observed significantly lower rebleeding with EVL than with EIS (RR=0.68, 95% CI: 0.57-0.81). [5] In the same meta-analysis, the overall rebleeding rate reported across included EVL arms was 21.7%, compared with 33.1% among EIS arms. [5] Against this background, the 12.0% early rebleeding rate in the present study appears acceptable, especially considering that the cohort contained a high proportion of Child-Pugh

class C patients and high-grade varices. However, because the present study measured very early rebleeding, while many trials used longer follow-up windows, direct numerical comparison should be interpreted cautiously.

The number of sessions required for eradication is an important practical endpoint because repeated endoscopy increases cost, hospital visits and non-adherence. In the present study, the mean number of additional EVL sessions required till obliteration was 2.71±1.07. Sarin SK et al. found that EVL obliterated esophageal varices in fewer sessions than sclerotherapy (4.1±1.2 vs 5.2±1.8 sessions, $p<0.01$) and in a shorter time (4.4±1.3 vs 6.9±3.4 weeks, $p<0.01$). [9] Triwikatmani C et al. similarly reported significantly fewer sessions with EVL than with sclerotherapy (2.23±0.59 vs 4.33±1.16 sessions, $p<0.001$). [10] In addition, data summarized by Triwikatmani C et al. showed that mean sessions to obliteration in studies by Laine L et al. and Stiegmann GV et al. were lower with ligation than with sclerotherapy. [6,7,10] These comparisons reinforce that EVL can achieve obliteration with a lower procedural burden.

The safety profile in the present study was favourable. No immediate procedure-related complication was noted in 87.0% of patients, while 13.0% had minor complications, mainly retrosternal pain (7.0%), minor ulcer (4.0%) and dysphagia (2.0%). This pattern is comparable with the expected post-banding adverse effects and contrasts with the deeper ulceration, stricture, perforation and injection-related complications historically associated with EIS. In the meta-analysis by Dai C et al., EVL had a significantly lower complication rate than EIS (RR=0.28, 95% CI: 0.13-0.58). [5] Sarin SK et al. reported esophageal stricture formation in 10.4% after sclerotherapy and none after EVL, while portal hypertensive gastropathy developed more often after sclerotherapy than after ligation (20.5% vs 2.3%, $p=0.02$). [9] These findings support the observation that EVL is safer than EIS in routine clinical use.

At day 15, partial regression was observed in 88.0% of patients, while 12.0% had persistent or high-risk varices requiring rescue therapy or early repeat EVL. This is clinically important because complete obliteration is not expected after a single session in most patients with grade III or IV varices. The present mean additional session requirement of 2.71±1.07 is therefore consistent with the mechanism of banding, where sequential sessions progressively reduce variceal columns. Hou MC et al. reported that ligation reduced variceal size more quickly than sclerotherapy, and comparative evidence from multiple trials supports the concept that EVL produces more rapid regression with fewer treatment sessions. [8]

Recurrence of varices remains the principal long-term concern after successful endoscopic therapy. In the present study, overall recurrence was 33.0% in the full cohort and 40.2% among patients with available follow-up. At 3 months, recurrence was documented in 13.4% of available cases, increasing to 30.1% at 6 months. Sarin SK et al. found higher actuarial recurrence after EVL than after sclerotherapy (28.7% vs 7.5%, $p<0.05$), despite lower rebleeding and fewer complications with EVL. [9] Triwikatmani C et al. reported high recurrence after both modalities during longer follow-up, with recurrence of 70.0% after EVL and 84.21% after sclerotherapy ($p>0.05$). [10] The recurrence rate in the present study is therefore within the expected range for EVL-based management, especially when follow-up is limited to six months and includes patients with advanced liver disease.

Post-recurrence bleeding was seen in 19 of the 33 recurrence cases (57.6%), corresponding to 19.0% of the full cohort. This finding highlights the clinical significance of surveillance after apparent obliteration. Dai C et al. showed that EVL reduced rebleeding compared with EIS, but

mortality was not significantly different between the two techniques (RR=0.95, 95% CI: 0.77-1.17), indicating that outcomes depend not only on local variceal control but also on hepatic reserve, infection, renal dysfunction and other decompensating events. [5] In the present study, the mortality rate was 10.0%, with hypovolemic shock accounting for 60.0% of deaths and liver failure for 40.0%. The relatively lower mortality compared with older literature may be related to modern combined treatment, but the observational design and short follow-up limit definitive interpretation.

The association analysis showed that delayed interval between bleed and banding was significantly associated with recurrence (p=0.006). All patients banded after a 2-day interval developed recurrence, although this subgroup contained only five patients. Nevertheless, it is clinically plausible because delayed endoscopy may reflect more severe illness, delayed stabilization or logistical barriers, and current guidance favours early endoscopic evaluation and therapy in acute variceal hemorrhage. [1,2] The number of variceal columns was significantly associated with immediate rebleeding (p=0.016), suggesting that a greater variceal burden may increase the chance of early failure or recurrent ooze after the index session.

Overall, the present study adds local prospective data supporting EVL as an effective and safe method for managing esophageal variceal bleeding. The findings align with comparative evidence showing that EVL provides similar or better acute control than EIS, fewer complications, fewer sessions for eradication and lower rebleeding, although recurrence after eradication remains important. The main clinical implication is that EVL should be combined with structured follow-up endoscopy and secondary prophylaxis rather than considered a single-session definitive cure. More robust multicentric studies with longer follow-up and a direct comparator arm would help clarify predictors of recurrence, optimal surveillance interval and the role of adjunctive pharmacotherapy in this population.

Limitations

This study was limited by its single-centre observational design and absence of a comparison group receiving sclerotherapy or non-endoscopic management. Follow-up attrition was present, with 18.0% lost to follow-up, and 6-month data were available for 73 patients. Hemodynamic measurements such as hepatic venous pressure gradient, detailed biochemical predictors and long-term survival beyond 6 months were not assessed. Hence, the findings should be interpreted as short-term institutional outcomes after EVL rather than definitive comparative efficacy data.

CONCLUSION

Endoscopic variceal ligation/banding was effective for acute esophageal variceal bleeding, achieving immediate control in 94.0% of patients with only minor procedure-related complications. Early rebleeding occurred in 12.0%, and recurrence remained clinically significant during follow-up, particularly by 6 months. Delayed banding was associated with recurrence, and the number of variceal columns was associated with immediate rebleeding. These findings support early endoscopic intervention, repeat sessions till obliteration and strict scheduled surveillance after EVL to reduce recurrence-related bleeding.

Declaration by Authors

Ethical Approval: The study was approved by the Institutional Ethics Committee

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REFERENCES

1. de Franchis R, Bosch J, Garcia-Tsao G, Reiberger T, Ripoll C, Baveno VII Faculty. Baveno VII - Renewing consensus in portal hypertension. J Hepatol. 2022; 76:959-974. doi: 10.1016/j.jhep.2021.12.022.
2. Kaplan DE, Ripoll C, Thiele M, Fortune BE, Simonetto DA, Garcia-Tsao G, et al. AASLD Practice Guidance on risk stratification and management of portal hypertension and varices in cirrhosis. Hepatology. 2024 May 1;79(5):1180-1211. doi: 10.1097/HEP.0000000000000647.
3. Garcia-Tsao G, Groszmann RJ, Fisher RL, Conn HO, Atterbury CE, Glickman M. Portal pressure, presence of gastroesophageal varices and variceal bleeding. Hepatology. 1985 May-Jun;5(3):419-24. doi: 10.1002/hep.1840050313.
4. Cordon JP, Torres CF, Garcia AB, Rodriguez FG, de Parga JM. Endoscopic management of esophageal varices. World J Gastrointest Endosc. 2012 Jul 16;4(7):312-22. doi: 10.4253/wjge. v4.i7.312.
5. Dai C, Liu WX, Jiang M, Sun MJ. Endoscopic variceal ligation compared with endoscopic injection sclerotherapy for treatment of esophageal variceal hemorrhage: a meta-analysis. World J Gastroenterol. 2015 Feb 28;21(8):2534-41. doi: 10.3748/wjg. v21.i8.2534.
6. Stiegmann GV, Goff JS, Michaletz-Onody PA, Korula J, Lieberman D, Saeed ZA, et al. Endoscopic sclerotherapy as compared with endoscopic ligation for bleeding esophageal varices. N Engl J Med. 1992 Jun 4;326(23):1527-32. doi: 10.1056/NEJM199206043262304.
7. Laine L, El-Newihi HM, Migikovsky B, Sloane R, Garcia F. Endoscopic ligation compared with sclerotherapy for the treatment of bleeding esophageal varices. Ann Intern Med. 1993 Jul 1;119(1):1-7. doi: 10.7326/0003-4819-119-1-199307010-00001.
8. Hou MC, Lin HC, Kuo BI, Chen CH, Lee FY, Lee SD. Comparison of endoscopic variceal injection sclerotherapy and ligation for the treatment of esophageal variceal hemorrhage: a prospective randomized trial. Hepatology. 1995; 21:1517-1522.
9. Sarin SK, Govil A, Jain AK, Guptan RC, Issar SK, Jain M, et al. Prospective randomized trial of endoscopic sclerotherapy versus variceal band ligation for esophageal varices: influence on gastropathy, gastric varices and variceal recurrence. J Hepatol. 1997 Apr;26(4):826-32. doi: 10.1016/s0168-8278(97)80248-6.
10. Triwikatmani C, Bayupurnama P, Maduseno S, Ratnasari N, Indrarti F, Nurdjanah S. Endoscopic sclerotherapy and band ligation in secondary prophylaxis of esophageal variceal treatment. Indones J Gastroenterol Hepatol Dig Endosc. 2010; 11:121-124. DOI: 10.24871/1132010121-124

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