American Journal of Clinical and Experimental Medicine
2026, Vol. 14, No. 4, pp. 56–60
https://doi.org/10.11648/j.ajcem.20261404.11

Review Article

Early Interventions Slow the Progression of Cirrhosis After Acute Variceal Bleeding

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Abstract

Background: Acute variceal bleeding (AVB) is a life-threatening manifestation of portal hypertension and an important precipitant of acute decompensation in cirrhosis. The present review evaluates whether early post-bleed interventions can reduce not only early mortality and rebleeding but also the subsequent downward spiral of cirrhosis progression. Methods: A narrative review was conducted using recent society guidance and high-level evidence published mainly between 2022 and 2026, including Baveno VII, AASLD guidance, APASL recommendations, EASL guidance on acute-on-chronic liver failure and TIPS, individual patient data meta-analyses, randomized trials and selected real-world studies. Institutional cohort observations from prior doctoral research were integrated to illustrate long-term clinical trajectories after first and recurrent bleeding. Results: Early standard care - restrictive transfusion, vasoactive therapy, antibiotic prophylaxis and timely endoscopic variceal ligation - acts beyond hemostasis by reducing infection, systemic inflammation, treatment failure and organ dysfunction. In high-risk AVB, pre-emptive TIPS within 24-72 hours is consistently associated with lower rebleeding and improved survival when patients are selected appropriately. Cohort data also indicate that patients with a previous bleeding episode have higher long-term rebleeding and functional deterioration, while stepwise endoscopic-endovascular escalation may reduce recurrent bleeding. Conclusions: Early interventions after AVB may slow cirrhosis progression by interrupting repeated bleeding, inflammation and decompensation cycles. Future studies should standardize progression endpoints, including MELD-Na change, ACLF occurrence, readmission, recurrent bleeding and transplant-free survival.

Keywords

Cirrhosis, Acute Variceal Bleeding, Portal Hypertension, Decompensation, Acute-on-chronic Liver Failure, Pre-emptive TIPS, Endoscopic Variceal Ligation, Secondary Prophylaxis

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Received: 28 April 2026; **Accepted:** 7 May 2026; **Published:** 24 July 2026

1. Introduction

Acute variceal bleeding is a sentinel event in the natural history of cirrhosis. It usually appears when portal hypertension has progressed from a hemodynamic abnormality to a clinically significant and systemic condition. Even when urgent endoscopic hemostasis is achieved, the episode can initiate a chain of complications that includes anemia, transfusion requirements, bacterial infection, renal stress, ascites aggravation, hepatic encephalopathy and repeated hospitalization [1-4]. This broader clinical impact explains why AVB should be interpreted not only as an isolated bleeding episode but also as a marker of transition toward a less stable phase of liver disease.

Contemporary guidelines have improved the early management of AVB through structured pathways, including restrictive transfusion, early vasoactive therapy, antibiotic prophylaxis, urgent endoscopy and secondary prophylaxis [1, 2, 7], reflecting a marked improvement in survival after variceal bleeding over the past two decades [14]. Nevertheless, day-to-day practice often still focuses on whether active bleeding has stopped, while the longer-term consequences of the bleed may receive less attention. For Child-Pugh A and B patients, this gap is clinically relevant because preserved or moderately impaired hepatic reserve may create the false impression that prognosis returns to baseline after hemostasis.

The purpose of this review is to examine whether early interventions after AVB can slow the subsequent progression of cirrhosis. We summarize recent guideline-based evidence, discuss plausible mechanisms linking bleeding to accelerated decline, integrate institutional cohort observations, and propose a practical post-bleed pathway for patients who remain at risk of recurrent hemorrhage and decompensation.

2. Methods: Narrative Review Approach

A narrative review approach was used because the objective was to synthesize mechanistic, guideline-based and clinical evidence rather than to answer a single narrowly framed comparative question. We prioritized recent high-level sources published from 2022 to early 2026, including consensus recommendations, clinical practice guidance, systematic reviews, individual patient data meta-analyses, randomized controlled trials and large observational studies. Core sources included Baveno VII, the 2024 AASLD practice guidance, APASL guidance on acute variceal bleeding, EASL clinical practice guidelines on acute-on-chronic liver failure and TIPS, and key trials or meta-analyses of pre-emptive TIPS [1, 2, 5-9].

Search concepts included acute variceal bleeding, portal hypertension, cirrhosis progression, decompensation, recurrent bleeding, endoscopic variceal ligation, non-selective beta-blockers, pre-emptive TIPS, ACLF and systemic inflammation. We also incorporated clinically relevant data from prior doctoral research conducted in patients with Child-Pugh A/B cirrhosis and portal hypertension to contextualize how rebleeding and functional deterioration develop over long-term follow-up [16, 17].

3. Key Evidence from Recent Guidelines and Studies

Table 1. *Summarizes major evidence sources that directly inform the relationship between AVB, early intervention and cirrhosis progression.*

Source	Design/type	Key message	Relevance to cirrhosis progression
Baveno VII, 2022	Consensus	Defines time-critical AVB management and recommends pre-emptive TIPS in selected high-risk patients.	Reducing early treatment failure may interrupt recurrent bleeding and decompensation cycles.
AASLD guidance, 2024	Practice guidance	Emphasizes risk stratification, EVL, vasoactive therapy, antibiotics and secondary prophylaxis.	Targets both bleeding control and complications that drive organ dysfunction.
EASL ACLF guideline, 2023	Guideline	Frames ACLF as a syndrome of acute decompensation and organ failures.	Bleeding and infection are key precipitants of functional decline.
EASL TIPS guideline, 2025	Guideline	Provides patient selection and peri-procedural principles for TIPS.	Appropriate TIPS selection can prevent repeated decompensation episodes.
Updated IPD meta-analysis, 2024	Individual patient data meta-analysis	Pre-emptive TIPS improves survival in high-risk AVB.	Survival benefit is likely mediated by less rebleeding and fewer downstream events.

Source	Design/type	Key message	Relevance to cirrhosis progression
APASL AVB guideline, 2025	Guideline	Confirms the high early mortality of AVB and the importance of standardized early care.	Supports protocolized management to reduce progression triggers.

4. Mechanistic Links Between AVB and Accelerated Progression

The pathophysiological effects of AVB extend beyond blood loss [12]. Hypovolemia and tissue hypoxia can impair renal perfusion and reduce hepatic oxygen delivery. The intestinal barrier becomes more vulnerable during shock and portal hypertension, facilitating bacterial translocation and infection. Infection then amplifies systemic inflammation, which is increasingly recognized as a driver of acute decompensation and ACLF [5, 10]. These pathways interact with reduced liver reserve, meaning that the same bleeding episode may have a disproportionate effect in a patient who appears only moderately compromised by Child-Pugh criteria.

Recurrent bleeding adds a second layer of risk. Each episode may require hospitalization, blood transfusion, repeated endoscopy and interruption of nutritional rehabilitation. The patient may move through a cycle of anemia, infection, ascites aggravation and renal dysfunction. Over time, this pattern can be reflected by worsening Child-Pugh class, increasing MELD-Na score, readmission, and diminished transplant-free survival. In this sense, recurrent bleeding can act as both a marker and a mediator of cirrhosis progression [3, 4, 15].

5. Early Standard Care: More Than Hemostasis

The first therapeutic window after AVB is short. A restrictive transfusion strategy avoids unnecessary increases in portal pressure, vasoactive therapy reduces portal inflow, and prophylactic antibiotics reduce infection-related treatment failure [1, 2, 7]. Early endoscopic variceal ligation is the main endoscopic modality for esophageal varices, but its benefit should be viewed as part of a complete package rather than as an isolated technical procedure.

The progression-focused value of this package lies in reducing the biological consequences of the bleeding episode. Prevention of infection and early treatment failure may reduce systemic inflammation and subsequent organ dysfunction. Optimization of secondary prophylaxis with repeated EVL and non-selective beta-blocker therapy where tolerated can reduce recurrent bleeding risk, while structured reassessment after discharge can identify patients who are moving toward decompensation despite apparent endoscopic control [2, 11, 13].

6. Pre-emptive TIPS in High-Risk AVB

Pre-emptive TIPS has become the most important early intervention for selected high-risk patients. The clinical rationale is straightforward: if the main driver of recurrent bleeding is uncontrolled portal pressure, then early portal decompression can prevent the cascade before repeated bleeding and decompensation occur. The landmark randomized evidence and subsequent updated individual patient data meta-analysis support improved outcomes when pTIPS is performed within 24-72 hours in appropriate high-risk patients [8, 9].

However, pTIPS is not a universal solution. Selection requires assessment of liver reserve, encephalopathy risk, cardiac function, renal status and local expertise. In regions with limited interventional radiology capacity, the most realistic strategy is an organized referral pathway: early identification of high-risk AVB, rapid communication with a TIPS-capable center, and a fallback plan combining optimized EVL, pharmacological therapy and endovascular or surgical options where TIPS is not available [6, 7, 18].

7. Integration of Institutional Cohort Findings

Our prior cohort data support the concept that a bleeding history identifies a less stable disease trajectory. In patients with Child-Pugh A/B cirrhosis, rebleeding was 29.3% in the prior-bleeding group versus 13.0% in patients without previous bleeding during the first year. The difference persisted at 1-2 years (41.4% vs 20.4%) and 2-3 years (50.0% vs 31.5%). Functional progression, defined as worsening Child-Pugh class, reached 72.4% after previous bleeding compared with 48.1% among those without previous bleeding by the fifth year [16].

These findings should not be interpreted as proof that bleeding alone causes every element of decline. Baseline hepatic reserve, portal pressure, infection risk, nutritional status and treatment availability all contribute. Nevertheless, the direction and consistency of the data are clinically meaningful. Patients who bleed once should not be followed as low-risk compensated patients after hemostasis alone. They require structured surveillance, aggressive secondary prophylaxis, and early consideration of escalation when recurrent bleeding or functional deterioration appears [16, 17].

8. Proposed Post-Bleed Pathway

Table 2. *Outlines a practical pathway that links early AVB management with progression prevention. The pathway is not intended to replace local guidelines, but it provides a framework for identifying patients who may benefit from timely escalation.*

Time point	Clinical priority	Key actions	Progression-related endpoint
0-24 hours	Stabilize and control the acute episode	Restrictive transfusion, vasoactive therapy, antibiotics, risk stratification and urgent endoscopy.	Treatment failure, infection, renal dysfunction.
24-72 hours	Identify high-risk patients	Consider pTIPS referral for high-risk AVB where criteria and expertise are met.	Early rebleeding, survival, organ failure.
Discharge to 4 weeks	Prevent recurrence	Plan repeat EVL, optimize NSBB if tolerated, reassess ascites, renal function and nutrition.	Readmission, recurrent bleeding, MELD-Na/Child-Pugh change.
3-12 months	Detect progression early	Structured follow-up, endoscopy schedule, ultrasound/laboratory monitoring and escalation if rebleeding occurs.	Decompensation, ACLF, transplant-free survival.

9. Gaps and Future Research

Several gaps remain. First, trials and cohorts often use early mortality, rebleeding and treatment failure as primary outcomes, whereas progression endpoints are less standardized. Future studies should include MELD-Na dynamics, Child-Pugh transition, ACLF incidence, ascites progression, renal dysfunction, readmission burden and transplant-free survival. Second, implementation studies are needed because pTIPS benefit depends not only on evidence but also on local availability, referral speed and multidisciplinary coordination.

Third, studies from regions with limited endovascular capacity are particularly important. In such settings, stepwise endoscopic-endovascular pathways may be more feasible than immediate pTIPS for every high-risk patient. Comparative pragmatic trials could evaluate whether protocolized follow-up, repeated EVL, NSBB optimization and selective referral for portal decompression reduce long-term decompensation compared with usual care.

10. Conclusions

Acute variceal bleeding can accelerate cirrhosis progression by triggering recurrent bleeding, infection, systemic inflammation, renal stress and organ dysfunction. Early interventions can slow this downward spiral when they are applied as a structured pathway rather than as isolated procedures. Standard early care reduces treatment failure and infection, while pTIPS offers a survival advantage in selected high-risk patients. Long-term prevention requires follow-up that measures not only whether varices have been eradicated but also whether the patient is moving toward decompensation. Progression-focused endpoints should therefore become a routine part of future AVB research and clinical protocols.

Abbreviations

ACLF	Acute-on-chronic Liver Failure
AVB	Acute Variceal Bleeding
EVL	Endoscopic Variceal Ligation
MELD-Na	Model for End-stage Liver Disease-sodium
NSBB	Non-selective Beta-blocker
pTIPS	Pre-emptive Transjugular Intrahepatic Portosystemic Shunt
TIPS	Transjugular Intrahepatic Portosystemic Shunt

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Raximov Anvar Polatbaevich: Investigation, Validation, Writing – review & editing

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Data Availability Statement

Data supporting the institutional cohort summary are available from the corresponding author upon reasonable request

and subject to institutional and ethical restrictions.

Conflicts of Interest

The authors declare no conflicts of interest.

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(4): 959-974. https://doi.org/10.1016/j.jhep.2021.12.022

[2] Kaplan DE, Ripoll C, Thiele M, Fortune BE, Simonetto DA, Garcia-Tsao G, Bosch J. AASLD practice guidance on risk stratification and management of portal hypertension and varices in cirrhosis. Hepatology. 2024; 79(5): 1180-1211. https://doi.org/10.1097/HEP.0000000000000647

[3] Garcia-Tsao G, Abraldes JG, Berzigotti A, Bosch J. Portal hypertensive bleeding in cirrhosis: risk stratification, diagnosis and management. Hepatology. 2017; 65(1): 310-335. https://doi.org/10.1002/hep.28906

[4] European Association for the Study of the Liver. EASL Clinical Practice Guidelines for the management of patients with decompensated cirrhosis. J Hepatol. 2018; 69(2): 406-460. https://doi.org/10.1016/j.jhep.2018.03.024

[5] European Association for the Study of the Liver. EASL Clinical Practice Guidelines on acute-on-chronic liver failure. J Hepatol. 2023; 79(2): 461-491. https://doi.org/10.1016/j.jhep.2023.04.021

[6] European Association for the Study of the Liver. EASL Clinical Practice Guidelines on transjugular intrahepatic portosystemic shunt. J Hepatol. 2025; 83(1): 177-210. https://doi.org/10.1016/j.jhep.2025.01.029

[7] Lesmana CRA, Shukla A, Kumar A, Shalimar, Qi X, Gani RA, et al. Management of acute variceal bleeding: updated APASL guidelines. Hepatol Int. 2025; 19(5): 1003-1031. https://doi.org/10.1007/s12072-025-10894-4

[8] Nicoara-Farcau O, Han G, Rudler M, Angrisani D, et al. Preemptive TIPS in high-risk acute variceal bleeding: an updated and revised individual patient data meta-analysis. Hepatology. 2024; 79(3): 624-635. https://doi.org/10.1097/HEP.0000000000000613

[9] Garcia-Pagan JC, Caca K, Bureau C, Laleman W, Appenrodt B, Luca A, et al. Early use of TIPS in patients with cirrhosis and variceal bleeding. N Engl J Med. 2010; 362(25): 2370-2379. https://doi.org/10.1056/NEJMoa0910102

[10] Zanetto A, Pelizzaro F, Campello E, Bulato C, Balcar L, Gu W, et al. Severity of systemic inflammation is the main predictor of ACLF and bleeding in individuals with acutely decompensated cirrhosis. J Hepatol. 2023; 78(2): 301-311. https://doi.org/10.1016/j.jhep.2022.09.005

[11] Villanueva C, Albillos A, Genesca J, Abraldes JG, Calleja JL, Aracil C, et al. Beta blockers to prevent decompensation of cirrhosis in patients with clinically significant portal hypertension. N Engl J Med. 2019; 381(11): 1005-1015. https://doi.org/10.1056/NEJMoa1904919

[12] Bosch J, Abraldes JG, Berzigotti A, Garcia-Pagan JC. Portal hypertension and gastrointestinal bleeding. Semin Liver Dis. 2008; 28(1): 3-25. https://doi.org/10.1055/s-2008-1040318

[13] Sarin SK, Kumar A, Angus PW, Baijal SS, Baik SK, Bayraktar Y, et al. Diagnosis and management of acute variceal bleeding: Asian Pacific Association for Study of the Liver recommendations. Hepatol Int. 2011; 5(2): 607-624. https://doi.org/10.1007/s12072-010-9236-9

[14] Carbonell N, Pauwels A, Serfaty L, Fourdan O, Levy VG, Poupon R. Improved survival after variceal bleeding in patients with cirrhosis over the past two decades. Hepatology. 2004; 40(3): 652-659. https://doi.org/10.1002/hep.20339

[15] D'Amico G, Garcia-Tsao G, Pagliaro L. Natural history and prognostic indicators of survival in cirrhosis: a systematic review of 118 studies. J Hepatol. 2006; 44(1): 217-231. https://doi.org/10.1016/j.jhep.2005.10.013

[16] Umarov ZZ. Effectiveness of a complex of minimally invasive interventions in the prevention and treatment of complications of portal hypertension. PhD dissertation. Tashkent Medical Academy; 2025.

[17] Matkuliev UI. Minimally invasive interventions in the prevention and treatment of bleeding in patients with portal hypertension. Doctoral dissertation. Tashkent Medical Academy; 2017.

[18] Praktiknjo M, Shawcross D, Laleman W. The clinical relevance of acute-on-chronic liver failure in medical procedures: endoscopy, interventions and surgery. Liver Int. 2025; 45(3): e15749. https://doi.org/10.1111/liv.15749