Journal of Biosciences and Medicines, 2025, 13(9), 333-341
https://www.scirp.org/journal/jbm
ISSN Online: 2327-509X
ISSN Print: 2327-5081

Research Progress on Treatment Strategies for Rebleeding Esophageal and Gastric Varices in Cirrhosis

Shanshan Lan, Chuanxin Zou*

Department of Gastroenterology, Jingzhou Hospital Affiliated to Yangtze University, Jingzhou, China
Email: *458443397@qq.com

How to cite this paper: Lan, S.S. and Zou, C.X. (2025) Research Progress on Treatment Strategies for Rebleeding Esophageal and Gastric Varices in Cirrhosis. *Journal of Biosciences and Medicines*, **13**, 333-341.
https://doi.org/10.4236/jbm.2025.139028

Received: August 17, 2025
Accepted: September 8, 2025
Published: September 11, 2025

Abstract

This article provides a systematic review of comprehensive treatment strategies for esophagogastric variceal bleeding in portal hypertension. For pharmacological treatment, nonselective β-blockers (e.g., carvedilol) and vasoactive agents (e.g., terlipressin) reduce portal pressure and improve hemostasis through distinct mechanisms. Endoscopic treatments include variceal ligation (EVL) and cyanoacrylate injection for esophageal and gastric varices, respectively. Regarding interventional therapy, early transjugular intrahepatic portosystemic shunt (TIPS) can significantly improve prognosis in high-risk patients. Additionally, individualized treatment strategies based on etiology, Child-Pugh classification, and hemodynamic assessment are becoming a clinical focus. Future research should prioritize optimizing combination therapies and expanding applications of novel interventional techniques. This article integrates current evidence to provide systematic guidance for clinical decision-making.

Keywords

Cirrhosis, Portal Hypertension, Esophageal and Gastric Variceal Bleeding, Drug Therapy, Endoscopic Therapy, Interventional Therapy, Individualized Therapy, Therapeutic Advances

1. Introduction

Re-bleeding from esophageal and gastric varices in cirrhosis is a common and severe complication with a high mortality rate. This article reviews the latest advances in the treatment of this condition, with a focus on emerging technologies

*Corresponding author.

and clinical research hotspots. Esophageal and gastric variceal bleeding (EGVB) is one of the primary complications of portal hypertension, particularly in patients with cirrhosis, where it is associated with poor prognosis and a high rate of re-bleeding after treatment. Data indicate that for untreated EVB patients, the re-bleeding rate within 1 - 2 years can reach up to 60% [1], and the 6-week mortality rate can reach up to 20% [2]. Therefore, early implementation of active and effective intervention measures is of significant clinical importance for controlling re-bleeding and reducing mortality rates.

2. Definition and Clinical Significance of Re-Bleeding

Re-bleeding is defined as hematemesis, melena, or black stools accompanied by changes in laboratory findings (hemoglobin level decreasing to >2 g/dl within 24 hours) or vital signs (systolic blood pressure decreasing to <90 mmHg or heart rate increasing to >100 beats per minute), and must be confirmed by endoscopic examination [3]. Clinical observations indicate that approximately 25% of patients may experience uncontrollable bleeding or early recurrence within 6 weeks of the first bleeding episode. Notably, the risk of rebleeding is most significant within the first 5 days, accounting for approximately 40% of rebleeding cases. As time progresses, the risk gradually decreases, and by the 6th week, the patient's risk of rebleeding has largely returned to the baseline level prior to bleeding [4]. High risk of rebleeding and poor prognosis are important causes of mortality in patients with cirrhosis. Recurrent bleeding from gastric varices is a major challenge in the management of cirrhosis.

3. Pathophysiology

Portal hypertension is one of the most severe non-neoplastic complications of cirrhosis. As the primary driver of variceal development and variceal bleeding, it can lead to life-threatening consequences, including esophageal variceal rupture and bleeding, refractory ascites, and hepatic encephalopathy. Its pathogenesis primarily stems from significant increases in portal venous blood flow resistance due to vascular structural changes caused by cirrhosis. On this basis, secondary visceral arterial vasodilation triggers a systemic hyperkinetic circulatory state (characterized by increased cardiac output and reduced peripheral vascular resistance). The combined effects of these two factors further exacerbate portal venous pressure [5].

4. Advances in Drug Treatment

New advances in drug treatment for bleeding esophageal varices in cirrhosis show that non-selective beta-blockers can effectively reduce portal pressure, and terlipressin is more effective than traditional drugs in stopping bleeding. It is worth noting that a Cochrane review incorporating 12 RCTs indicated that the prophylactic use of antibiotics (such as ceftriaxone or norfloxacin) has become a standard care measure for acute bleeding, significantly reducing the risk of bacterial infection (RR 0.35) and short-term mortality (RR 0.79) [6]; The latest clinical evidence

shows that combined endoscopic treatment can reduce the risk of rebleeding by 50%, highlighting the comprehensive advantages of multimodal treatment.

- Non-selective beta-blockers (NSBBs)

NSBBs are the cornerstone of drug therapy for portal hypertension, with a multifaceted mechanism of action: they reduce cardiac output by blocking beta-1 receptors, while simultaneously inducing a visceral vascular alpha-receptor dominance effect through beta-2 receptor blockade, resulting in a significant reduction in portal vein pressure [7]. In clinical practice, traditional NSBBs (propranolol, nadolol) and the newer drug carvedilol each have distinct characteristics: the latter, which blocks both β and α_1 receptors, not only achieves more pronounced portal pressure-lowering effects but also exhibits multifunctional pharmacological properties such as antioxidant and anti-inflammatory effects [8]. Extensive clinical evidence confirms that these drugs effectively reduce the risk of rebleeding in both primary and secondary prevention of variceal bleeding [9], providing an important treatment option for patients with cirrhosis. It is important to note that drug selection requires individualized assessment to balance efficacy with potential adverse effects.

- Vasopressin and its derivatives

The pharmacological treatment of acute variceal bleeding (AVB) primarily involves two classes of drugs: vasopressin analogues (e.g., terlipressin) and somatostatin analogues (e.g., octreotide) [10]. Terlipressin, a synthetic analog of vasopressin, exerts an immediate systemic vasoconstrictive effect by slowly converting into its active component. It selectively targets V1 receptors in the visceral circulation, causing constriction of the superior mesenteric artery and abdominal trunk vascular bed, thereby significantly reducing portal vein pressure. Additionally, it enhances esophageal smooth muscle tone to directly compress varicose veins [10]. A Cochrane meta-analysis (including seven placebo-controlled trials) confirmed that terlipressin effectively controls variceal bleeding and improves survival rates [11]. Compared with octreotide, terlipressin has a more sustained portal vein pressure-lowering effect [12]; clinical studies show that it is superior to other vasoactive drugs in controlling bleeding [13].

- Combination therapy

A recent RCT study by Wu *et al.* (2025) [14] provided evidence for the use of NSBBs in combination with endoscopic therapy. The study showed that adding NSBB (propranolol/carvedilol) to endoscopic variceal treatment (obliteration and ligation) reduced the 1-year rebleeding rate in GOV1/GOV2 patients from 32.6% to 15.2%, with good safety, significantly reducing recurrent variceal bleeding in cirrhotic patients. This benefit may be related to NSBB's ability to lower portal vein pressure (HVPG), inhibit early inflammatory portal hypertension, and promote long-term vascular remodeling.

5. Advances in Endoscopic Treatment

- Endoscopic sclerotherapy (EIS)

The most commonly used agents are polyethylene glycol and ethylene glycol, which have similar chemical properties. In China, the most commonly used agent is domestically produced polyethylene glycol [15]. The mechanism of polyethylene glycol and ethylene glycol in treating varicose veins involves injecting the sclerosant into the varicose veins, which damages the vascular endothelium, causing aseptic chemical inflammation in the varicose veins, followed by thrombosis and fibrosis, ultimately leading to the closure and disappearance of the lumen [16]. This method is suitable for bleeding esophageal varices [17], but may cause complications such as ulcers and strictures [18].

- Endoscopic variceal ligation (EVL)

Endoscopic variceal ligation (EVL) remains the primary method for controlling active bleeding. During multiple treatments, rubber bands are placed around the varices until they are eliminated. By ligating the varices, blood flow is blocked, reducing the risk of rebleeding [18]. Studies have shown that EVL is highly effective in preventing rebleeding [19]. However, this technique also carries certain risks of complications, the most common of which is post-ligation ulceration. Other possible complications include temporary difficulty swallowing and postoperative bleeding.

- Endoscopic tissue adhesive injection (ECI)

Mainly used for bleeding from gastric varices, its core principle is to use rapidly curing tissue adhesives (such as cyanoacrylate) to occlude varices through injection, achieving immediate hemostasis and long-term prevention of rebleeding [19]. Studies have shown that tissue glue injection is effective in controlling bleeding from gastric varices, but the risk of embolism should be noted [20].

6.Advances in Interventional Therapy

- Transjugular intrahepatic portosystemic shunt (TIPS)

TIPS involves artificially creating a connection between the main branches of the hepatic vein and portal vein within the liver to reduce portal vein pressure, thereby achieving hemostasis and preventing rebleeding [21]. TIPS is highly effective in controlling acute bleeding and preventing rebleeding, but it may increase the risk of hepatic encephalopathy [22].

- Balloon-occluded retrograde variceal obliteration (BRTO)

This procedure involves blocking the gastric-renal venous shunt and injecting a sclerosing agent to occlude varicose veins. It is performed by inserting a balloon catheter via deep vein puncture, advancing it retrograde through the circulatory system to the distal end of the gastric varices (GV), inflating the balloon to block GV blood flow, and injecting an embolization agent to occlude the GV and shunt. BRTO demonstrates significant efficacy in treating gastric variceal bleeding. Experimental studies by Nakazawa *et al.* [23] and Ishikawa *et al.* [24] indicate that it does not increase the risk of hepatic encephalopathy. Additionally, research by Li Yuting *et al.* [25] highlights that BRTO effectively prevents and controls gastric variceal bleeding and offers notable advantages in improving liver function [26].

- Combined use of TIPS and BRTO

Endoscopic tissue injection (ECI) combined with BRTO or TIPS can significantly reduce gastric variceal bleeding, gastric variceal rebleeding, and rebleeding-related mortality [27].

7. Individualized Treatment Strategies

Through risk assessment and stratification, based on Child-Pugh classification combined with Hepatic venous pressure gradient (HVPG, obtained by measuring the difference between hepatic venous wedge pressure and free pressure via catheter), and integrating portal shunt anatomy as shown by CT/MR, the risk of rebleeding can be accurately stratified into four levels:

Low risk: Child-Pugh A/B and HVPG < 12 mmHg—only endoscopic EVL combined with non-selective beta-blockers (NSBB) is required [28].

Moderate risk: Child-Pugh A/B but HVPG ≥ 12 mmHg or GOV2 with splenic-renal shunt—prioritize BRTO; the 2025 Chinese Expert Consensus explicitly states that for patients with spontaneous splenic-renal shunt, BRTO should be prioritized, as it can control variceal bleeding while reducing the incidence of hepatic encephalopathy [29].

High-risk: Child-Pugh C or HVPG ≥ 20 mmHg—early TIPS within 72 hours; The Baveno VII Consensus states that patients with Child-Pugh C grade or HVPG ≥ 20 mmHg, or Child-Pugh B grade with a score > 7 points, and active bleeding at the first endoscopy should aim to undergo early TIPS within 72 hours of bleeding to significantly reduce the risk of rebleeding and mortality [30].

Very high risk: High risk combined with PVT or previous endoscopic failure. The 2023 AASLD guidelines further note that if portal vein thrombosis is present, anticoagulation can be administered concurrently with TIPS to further improve patency and hemostasis [31].

8. Future Research Directions

1) EUS-guided tissue glue plus coil embolization (PCSS): A multicenter RCT (n = 120) published in March 2024 was the first to compare PCSS with traditional endoscopic treatment in patients with cirrhosis-related GOV. Preliminary results suggest that PCSS significantly reduces the 6-month rebleeding rate (3.3% vs. 18.3%, P = 0.013), but 1-year follow-up and sample size remain insufficient [32].

2) Next-generation small-diameter covered stents - TIPS technology

a) Controllable expansion PTFE covered stents (Viatorr CX)

- Stent diameter: 8 - 10 mm. During surgery, the stent can be "on-demand expanded" to the target diameter using a constriction balloon, theoretically reducing the risk of excessive shunting leading to hepatic encephalopathy (HE). A retrospective cohort study showed an early rebleeding rate < 5% and an HE incidence ≤ 15%, but randomized controlled trials comparing this with traditional 10 mm stents or drug-plus-endoscopy combination strategies are still lacking [33].

b) Small-diameter (6 - 8 mm) intrahepatic coated stents

- Several countries have recently begun to use 6 mm stents for Child-Pugh A/B patients; early data show that the decrease in portal pressure gradient is slightly lower than that of conventional 10 mm stents, but the incidence of HE is significantly reduced [34].

9. Conclusion

The treatment of variceal bleeding in cirrhosis with portal hypertension has evolved into a multidisciplinary comprehensive treatment model. The current combination of drug therapy and endoscopic treatment has significantly reduced the rate of rebleeding, while interventional techniques such as TIPS offer new options for high-risk patients. The application of technologies such as EUS-guided precise embolization and novel covered stents shows promising prospects. Future efforts should focus on addressing key issues such as balancing treatment risks and benefits, and optimizing individualized treatment plans. By developing artificial intelligence prediction models (for predicting the risk of rebleeding and patient response to specific treatments), targeted drug research and development, and improving multidisciplinary collaboration standards, patient outcomes will be further improved, and the goal of comprehensive management will be achieved. Developments in this field provide an important opportunity to improve the quality of life of patients with cirrhosis.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Magaz, M., Baiges, A. and Hernández-Gea, V. (2020) Precision Medicine in Variceal Bleeding: Are We There Yet? *Journal of Hepatology*, **72**, 774-784. https://doi.org/10.1016/j.jhep.2020.01.008

[2] Xu, X., Tang, C., Linghu, E. and Ding, H. (2023) Guidelines for the Management of Esophagogastric Variceal Bleeding in Cirrhotic Portal Hypertension. *Journal of Clinical and Translational Hepatology*, **11**, 1565-1579. https://doi.org/10.14218/jcth.2023.00061

[3] Wu, K., Fu, Y., Guo, Z. and Zhou, X. (2022) Analysis of the Timing of Endoscopic Treatment for Esophagogastric Variceal Bleeding in Cirrhosis. *Frontiers in Medicine*, **9**, Article ID: 1036491. https://doi.org/10.3389/fmed.2022.1036491

[4] Hunter, S.S. and Hamdy, S. (2013) Predictors of Early Re-Bleeding and Mortality after Acute Variceal Haemorrhage. *Arab Journal of Gastroenterology*, **14**, 63-67. https://doi.org/10.1016/j.ajg.2013.05.001

[5] Guixé-Muntet, S., Quesada-Vázquez, S. and Gracia-Sancho, J. (2024) Pathophysiology and Therapeutic Options for Cirrhotic Portal Hypertension. *The Lancet Gastroenterology & Hepatology*, **9**, 646-663. https://doi.org/10.1016/s2468-1253(23)00438-7

[6] Chavez-Tapia, N.C., Barrientos-Gutierrez, T., Tellez-Avila, F.I., Soares-Weiser, K. and Uribe, M. (2010) Antibiotic Prophylaxis for Cirrhotic Patients with Upper Gas-

trointestinal Bleeding. *Cochrane Database of Systematic Reviews*, **2010**, CD002907. https://doi.org/10.1002/14651858.cd002907.pub2

[7] Turco, L., Reiberger, T., Vitale, G. and La Mura, V. (2023) Carvedilol as the New Non-Selective Beta-Blocker of Choice in Patients with Cirrhosis and Portal Hypertension. *Liver International*, **43**, 1183-1194. https://doi.org/10.1111/liv.15559

[8] Gillespie, S., Hanrahan, T.P., Rockey, D.C., Majumdar, A. and Hayes, P.C. (2023) Review Article: Controversies Surrounding the Use of Carvedilol and Other Beta Blockers in the Management of Portal Hypertension and Cirrhosis. *Alimentary Pharmacology & Therapeutics*, **57**, 454-463. https://doi.org/10.1111/apt.17380

[9] D'Amico, G., Pagliaro, L. and Bosch, J. (1999) Pharmacological Treatment of Portal Hypertension: An Evidence-Based Approach. *Seminars in Liver Disease*, **19**, 475-505. https://doi.org/10.1055/s-2007-1007133

[10] Saner, F.H., Canbay, A., Gerken, G. and Broelsch, C.E. (2007) Pharmacology, Clinical Efficacy and Safety of Terlipressin in Esophageal Varices Bleeding, Septic Shock and Hepatorenal Syndrome. *Expert Review of Gastroenterology & Hepatology*, **1**, 207-217. https://doi.org/10.1586/17474124.1.2.207

[11] Ioannou, G.N., Doust, J. and Rockey, D.C. (2003) Terlipressin for Acute Esophageal Variceal Hemorrhage. *Cochrane Database of Systematic Reviews*, **1**, CD002147. https://doi.org/10.1002/14651858.cd002147

[12] Baik, S.K., Jeong, P.H., Ji, S.W., Yoo, B.S., Kim, H.S., Lee, D.K., *et al.* (2005) Acute Hemodynamic Effects of Octreotide and Terlipressin in Patients with Cirrhosis: A Randomized Comparison. *The American Journal of Gastroenterology*, **100**, 631-635. https://doi.org/10.1111/j.1572-0241.2005.41381.x

[13] Kulkarni, A.V., Arab, J.P., Premkumar, M., Benítez, C., Tirumalige Ravikumar, S., Kumar, P., *et al.* (2020) Terlipressin Has Stood the Test of Time: Clinical Overview in 2020 and Future Perspectives. *Liver International*, **40**, 2888-2905. https://doi.org/10.1111/liv.14703

[14] Wu, L., Huang, X., Li, F., Jiang, S., Ni, L., Ai, Y., *et al.* (2024) Secondary Prophylaxis of Cirrhotic Gastric Variceal Bleeding: Addition of Non-Selective Beta-Blockers to Endoscopic Combined Treatment. *United European Gastroenterology Journal*, **13**, 586-598. https://doi.org/10.1002/ueg2.12739

[15] Chen, T.Q., Lin, R.Y., Han, Q.X. and Huang, Z.M. (2014) Clinical Comparison of Lauromacrogol Injection and Sodium Morrhuate in the Treatment of Esophageal Varices. *Chinese Journal of Endoscopy*, **20**, 274-276.

[16] Endoscopic Diagnosis and Treatment of Esophageal and Gastric Varices Group of the Digestive Endoscopy Branch of the Chinese Medical Association (2023) Expert Consensus on Endoscopic Tissue Glue Injection Treatment of Cirrhotic Portal Hypertension Gastrointestinal Varices (2022, Changsha). *Chinese Journal of Digestive Endoscopy*, **40**, 12-23.

[17] Xu, X.Y., Ding, H.G., Linghu, E.Q., *et al.* (2023) Guidelines for the Prevention and Treatment of Esophageal and Gastric Variceal Bleeding in Patients with Portal Hypertension and Cirrhosis. *Journal of Clinical Hepatobiliary Diseases*, **39**, 527-538.

[18] Diaz-Soto, M.P. and Garcia-Tsao, G. (2022) Management of Varices and Variceal Hemorrhage in Liver Cirrhosis: A Recent Update. *Therapeutic Advances in Gastroenterology*, **15**. https://doi.org/10.1177/17562848221101712

[19] Zhou, X., Tripathi, D., Song, T., Shao, L., Han, B., Zhu, J., *et al.* (2018) Terlipressin for the Treatment of Acute Variceal Bleeding: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Medicine* (*Baltimore*), **97**, e13437. https://doi.org/10.1097/md.0000000000013437

[20] Guo, Y., Miao, H., Wen, Z., Xuan, J. and Zhou, H. (2017) Procedure-Related Complications in Gastric Variceal Obturation with Tissue Glue. *World Journal of Gastroenterology*, **23**, 7746-7755. https://doi.org/10.3748/wjg.v23.i43.7746

[21] Liu, X.Q., Wang, P.G., He, S., *et al.* (2023) Research Progress on Treatment Strategies for Acute Gastric Esophageal Variceal Bleeding. *Journal of Clinical Emergency*, **24**, 657-662.

[22] Dunne, P.D.J., Sinha, R., Stanley, A.J., Lachlan, N., Ireland, H., Shams, A., *et al.* (2020) Randomised Clinical Trial: Standard of Care versus Early-Transjugular Intrahepatic Porto-Systemic Shunt (TIPSS) in Patients with Cirrhosis and Oesophageal Variceal Bleeding. *Alimentary Pharmacology & Therapeutics*, **52**, 98-106. https://doi.org/10.1111/apt.15797

[23] Nakazawa, M., Imai, Y., Uchiya, H., Ando, S., Sugawara, K., Nakayama, N., *et al.* (2017) Balloon-Occluded Retrograde Transvenous Obliteration as a Procedure to Improve Liver Function in Patients with Decompensated Cirrhosis. *JGH Open*, **1**, 127-133. https://doi.org/10.1002/jgh3.12020

[24] Ishikawa, T., Sasaki, R., Nishimura, T., Matsuda, T., Iwamoto, T., Saeki, I., *et al.* (2021) Short-Term Effects of Hepatic Arterial Buffer Responses Induced by Partial Splenic Embolization on the Hepatic Function of Patients with Cirrhosis According to the Child-Pugh Classification. *Internal Medicine*, **60**, 1331-1342. https://doi.org/10.2169/internalmedicine.6267-20

[25] Li, Y.T., Yang, J.H., Zhao, M.Z., *et al.* (2021) Clinical Application and Research Progress of Retrograde Transvenous Balloon Occlusion in the Treatment of Gastric Varices in Decompensated Liver Cirrhosis. *Chinese Journal of Hepatology*, **29**, 890-895.

[26] Luo, X., Ma, H., Yu, J., Zhao, Y., Wang, X. and Yang, L. (2017) Efficacy and Safety of Balloon-Occluded Retrograde Transvenous Obliteration of Gastric Varices with Lauromacrogol Foam Sclerotherapy: Initial Experience. *Abdominal Radiology*, **43**, 1820-1824. https://doi.org/10.1007/s00261-017-1346-6

[27] Biswas, S., Vaishnav, M., Gamanagatti, S., Swaroop, S., Arora, U., Aggarwal, A., *et al.* (2025) Endoscopic Glue Injection vs Glue plus BRTO or TIPSS for Preventing Gastric Variceal Bleeding: A Randomized Controlled Trial. *Clinical Gastroenterology and Hepatology*, **23**, 954-964.e10. https://doi.org/10.1016/j.cgh.2024.06.023

[28] Xie, X.Y. and Benmassaoud, A. (2025) Advances in the Diagnosis and Management of Clinically Significant Portal Hypertension in Cirrhosis: A Narrative Review. *World Journal of Hepatology*, **17**, Article ID: 104761. https://doi.org/10.4254/wjh.v17.i6.104761

[29] Splenic and Portal Hypertension Surgery Group of the Chinese Medical Association, Yang, L.Y. and Bai, X.L. (2025) Expert Consensus on the Diagnosis and Treatment of Esophageal and Gastric Variceal Bleeding in Patients with Portal Hypertension Due to Liver Cirrhosis (2025 Edition). *Chinese Journal of Practical Surgery*, **45**, 249-256.

[30] de Franchis, R., Bosch, J., Garcia-Tsao, G., Reiberger, T., Ripoll, C. and Baveno VII Faculty (2022) Baveno VII—Renewing Consensus in Portal Hypertension. *Journal of Hepatology*, **76**, 959-974.

[31] Lee, E.W., Eghtesad, B., Garcia-Tsao, G., Haskal, Z.J., Hernandez-Gea, V., Jalaeian, H., *et al.* (2023) AASLD Practice Guidance on the Use of TIPS, Variceal Embolization, and Retrograde Transvenous Obliteration in the Management of Variceal Hemorrhage. *Hepatology*, **79**, 224-250. https://doi.org/10.1097/hep.0000000000000530

[32] Ma, J.L., He, L.L., Wei, H.S., *et al.* (2025) A Randomized Controlled Study of Selective Endoscopic Puncture and Tissue Glue Sealing of Esophageal and Gastric Varices with Conventional Endoscopic Treatment. *Journal of Clinical Hepatobiliary Diseases*, **41**,

1113-1119.

[33] Wang, Z., Huang, J.T., Zhong, B.Y., *et al*. (2023) Clinical Application and Research Progress of Early Transjugular Intrahepatic Portosystemic Shunt. *Journal of Clinical Hepatobiliary Diseases*, **39**, 1513-1522.

[34] Yao, X., Yang, G.D., *et al*. (2023) Influence of Intraoperative Factors on Postoperative Hepatic Encephalopathy during Transjugular Intrahepatic Portosystemic Shunt Surgery. *Journal of Clinical Hepatobiliary Diseases*, **39**, 1966-1971.