

Management of rectal varices in portal hypertension

Kawtar Al Khalloufi, Adeyinka O Laiyemo

Kawtar Al Khalloufi, Adeyinka O Laiyemo, Division of Gastroenterology, Department of Medicine, Howard University College of Medicine, Washington, DC 20060, United States

Author contributions: All authors contributed to this manuscript.

Supported by The National Center for Advancing Translational Science, Nos. KL2TR000102-04 and UL1RT000101; the National Institute for Diabetes; Digestive Diseases and Kidney, No. R21DK100875; and National Institutes of Health.

Conflict-of-interest statement: The authors declare no conflicts of interest regarding this manuscript.

Open-Access: This article is an open-access article which was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

Correspondence to: Adeyinka O Laiyemo, MD, MPH, Division of Gastroenterology, Department of Medicine, Howard University College of Medicine, 2041 Georgia Avenue, NW, Washington, DC 20060, United States. adeyinka.laiyemo@howard.edu
 Telephone: +1-202-8657186
 Fax: +1-202-8654607

Received: July 28, 2015
 Peer-review started: July 29, 2015
 First decision: September 29, 2015
 Revised: October 13, 2015
 Accepted: December 9, 2015
 Article in press: December 11, 2015
 Published online: December 28, 2015

Abstract

Rectal varices are portosystemic collaterals that form as a complication of portal hypertension, their prevalence has been reported as high as 94% in patients with

extrahepatic portal vein obstruction. The diagnosis is typically based on lower endoscopy (colonoscopy or sigmoidoscopy). However, endoscopic ultrasonography has been shown to be superior to endoscopy in diagnosing rectal varices. Color Doppler ultrasonography is a better method because it allows the calculation of the velocity of blood flow in the varices and can be used to predict the bleeding risk in the varices. Although rare, bleeding from rectal varices can be life threatening. The management of patients with rectal variceal bleeding is not well established. It is important to ensure hemodynamic stability with blood transfusion and to correct any coagulopathy prior to treating the bleeding varices. Endoscopic injection sclerotherapy has been reported to be more effective in the management of active bleeding from rectal varices with less rebleeding rate as compared to endoscopic band ligation. Transjugular intrahepatic portosystemic shunt alone or in combination with embolization is another method used successfully in control of bleeding. Balloon-occluded retrograde transvenous obliteration is an emerging procedure for management of gastric varices that has also been successfully used to treat bleeding rectal varices. Surgical procedures including suture ligation and porto-caval shunts are considered when other methods have failed.

Key words: Rectal varices; Portal hypertension; Liver cirrhosis; Colonoscopy; Gastrointestinal bleeding

© The Author(s) 2015. Published by Baishideng Publishing Group Inc. All rights reserved.

Core tip: Rectal varices complicate portal hypertension. Although rare, bleeding from rectal varices can be life threatening. There are no established guidelines for the treatment of rectal varices. In this article, the authors review endoscopic, radiological, and surgical techniques which have been suggested to be effective in the management of bleeding rectal varices.

Al Khalloufi K, Laiyemo AO. Management of rectal varices in

portal hypertension. *World J Hepatol* 2015; 7(30): 2992-2998
Available from: URL: <http://www.wjgnet.com/1948-5182/full/v7/i30/2992.htm> DOI: <http://dx.doi.org/10.4254/wjh.v7.i30.2992>

INTRODUCTION

In 1954, Cabot *et al*^[1] discussed the first reported case of bleeding rectal varices. Ganguly *et al*^[2] defined rectal varices as dilated veins that originate more than 4 cm above the anal verge, clearly distinct from hemorrhoids, and not contiguous with the anal columns and/or pectinate line. The incidence of rectal varices in cirrhotic and non-cirrhotic patient varies in different reports and ranges between 38% and 94%^[3,4]. Their prevalence in patients with cirrhosis is between 38% and 56%, whereas their prevalence in extrahepatic portal vein obstruction was reported between 63% and 94%^[3,5]. Despite the high prevalence of rectal varices, clinically significant bleeding is rare and occurs in 0.5%-5% of patients^[6].

While the management of esophageal varices has been well established^[7], the optimal treatment of rectal varices remains to be determined. Endoscopic therapies, Transjugular Intrahepatic Portosystemic Shunt placement (TIPS), balloon-occluded retrograde transvenous obliteration (BRTO), and surgical management are some of the therapeutic options for management of rectal varices. The purpose of this article is to provide an updated review of current management of rectal varices.

PATHOGENESIS

Rectal varices are collaterals between the portal and systemic circulations that manifest as a dilation of the submucosal veins and constitute a pathway for portal venous flow between the superior rectal veins which branch from the inferior mesenteric system and the middle inferior rectal veins from the iliac system^[8].

The normal hepatic venous pressure gradient (HVPG) ranges between 1 and 5 mmHg, becomes clinically significant when it reaches 10 mmHg and varices usually develop when the value of HVPG increases to at least 12 mmHg^[9,10]. In the western hemisphere, sinusoidal portal hypertension secondary to liver cirrhosis is the most common cause of portal hypertension. There is a direct correlation between the progression of cirrhosis reflected by the Child Pugh or MELD scores and the degree of hyperdynamic circulation^[11,12]. Hosking *et al*^[13] studied 100 patients with cirrhosis and reported that the overall prevalence of rectal varices was 44%, this prevalence increased with the degree of portal hypertension. The authors described rectal varices in 19% of patients with cirrhosis without esophageal varices, 39% in patients with esophageal varices without history of bleeding, and 59% in patients with esophageal varices and history of bleeding. In this study, hemorrhoids occurred independently of the presence of rectal varices and 30% of patients had rectal varices and coexistent hemorrhoids^[13].

There have been conflicting reports regarding the occurrence of rectal varices after obliteration of esophageal varices. However, a large study conducted in Japan by Watanabe *et al*^[14] reported that 95% of patients with rectal varices had a history of esophageal varices and 87% of these patients had previously undergone endoscopic variceal obliteration for esophageal varices. The mechanism of rectal varices after treatment of esophageal or gastric varices is thought to be the result of obliteration of supplying vessels such as the left gastric, posterior gastric and short gastric veins leading to development of collateral vessels of the inferior mesenteric venous system and thus the formation of rectal varices. In this nationally representative study in Japan, the most frequent afferent vessel to the rectal varices was the inferior mesenteric vein, followed by the superior rectal vein and the efferent vessels included the internal iliac vein and the inferior rectal vein^[14].

DIAGNOSIS

Endoscopy

Endoscopy is the main method for diagnosing rectal varices. They are visualized as blue tinted submucosal elevations located near the anus^[15]. Rectal varices may be confused with internal hemorrhoids because of their location. However, hemorrhoids are not related to portal hypertension. Hemorrhoids result from a displacement of the anal cushions and hyperperfusion of the arteriovenous plexus vascular cushions without direct communication with any of the major branches of the portal venous system^[16].

According to the general rules for recording endoscopic findings of esophago-gastric varices prepared by the Japanese Research Committee on Portal Hypertension, all codes for esophageal varices are used to describe ectopic varices including rectal varices^[15]. Varices are classified into four groups according to their shapes and sizes. When there are no varices (F0), small and straight (F1), enlarged and tortuous (F2) and large and coil-shaped (F3). The color (C) of the varices is classified as either white (Cw) or blue (Cb). The dilated, small vessels or telangiectasia on the variceal surface is referred to as the red color sign (RC) which endoscopically indicates a high risk of bleeding. RC signs are graded as 0, 1, 2 or 3 according to their density and distribution. RC0 refers to no RC sign, RC1 to only a few RC signs, RC2 to several RC signs and RC3 to many RC signs. The bleeding signs as well as the mucosal findings can also be evaluated and described by endoscopy^[15] (Table 1).

Endoscopic ultrasound

Conventional endoscopic ultrasound (EUS) reveals rectal varices as rounded, oval, or longitudinal echo free structures in the submucosa and also shows perirectal collateral veins outside the rectal wall. EUS can detect deep rectal varices in a large proportion of patients who do not have identified varices on routine endoscopy^[17].

Table 1 The general rules for recording endoscopic findings of varices prepared by the Japanese research committee on portal hypertension^[15]

Form (F)	F0: No varicose appearance F1: Straight, small-caliber varices F2: Moderately enlarged, beady varices F3: Markedly enlarged, nodular or tumor-shaped varices
Color (C)	Cw: White varices Cb: Blue varices Cw-Th: Thrombosed white varices Cb-Th: Thrombosed blue varices
Red color signs (RC)	RWM: Red wale markings CRS: Cherry red spots HCS: Hematocystic spots RC(-): Absent RC(+): Small in number and localized RC(++): Intermediate between (+) and (+++) RC(+++): Large in number and circumferential
Bleeding signs	Te: Telangiectasia Gushing bleeding Spurting bleeding Oozing bleeding Red plug White plug
Mucosal findings	E: Erosion Ul: Ulcer S: Scar

Dhiman *et al*^[18] showed that EUS is better than endoscopy in detecting rectal varices (85% vs 45%) and in determining their number. Sato *et al*^[19] demonstrated that intramural rectal varices, perirectal collateral veins, and the communicating veins between intramural rectal varices and perirectal collateral veins could be observed clearly with an ultrasonic microprobe. They also showed that the mean velocity of blood flow in rectal varices in the patients with rectal bleeding was significantly higher than in those cases experiencing no bleeding which indicates that the color doppler ultrasonography may be helpful in identifying high-risk group for rectal variceal rupture *via* the measurement of velocity^[20]. Endoscopic color Doppler ultrasonography is better equipped than conventional EUS to evaluate the hemodynamics of varices, it can detect rectal varices through color flow images, calculate the velocity of blood flow in rectal varices for an effective and safe endoscopic variceal management^[21].

TREATMENT

Medical management

The management of bleeding rectal varices essentially includes prompt resuscitation and correction of coagulopathy. The intravascular volume repletion is done with crystalloids and packed red blood cells. The Asian Pacific Association for the Study of the Liver recommends to maintain systolic blood pressure between 90-100 mmHg, and the heart rate below 100 beats/min^[22]. The goal of blood transfusion is a hemoglobin level approximately 8 g/dL (hematocrit of 24)^[7]. A short course of prophylactic antibiotic therapy should be administered to improve

survival and decrease the risk of spontaneous bacterial peritonitis in all patients presenting with cirrhosis and gastrointestinal bleed including rectal bleeding^[23]. There are no randomized control trials to recommend the use of vasoactive drugs such as vasopressin, terlipressin or octreotide in bleeding rectal varices. However, these drugs have a proven benefit in the management of bleeding gastro-oesophageal varices and hence can be considered for use in bleeding rectal varices^[24].

Endoscopic management

Endoscopic injection sclerotherapy: Endoscopic injection sclerotherapy (EIS) was first reported to be useful for treatment of rectal bleeding in 1985^[25]. Later on, other case reports of successful EIS for treatment of bleeding rectal varices were published^[26-28]. Sato *et al*^[29] performed EIS using 5% ethanolamine oleate with iopamidol, which was injected intermittently under fluoroscopy in 32 patients. The patients were successfully treated without serious complications. The authors suggested the necessity to evaluate the hemodynamics of the rectal varices before EIS to avoid severe complications such as pulmonary embolism. They also recommended injecting the sclerosant slowly under fluoroscopy. The recurrence rate in this series was 24% over the 1-year follow-up period.

Endoscopic band ligation: Endoscopic band ligation (EBL) has been well studied and its efficiency in treating bleeding esophageal varices is well known^[30,31]. EBL has also been used in treatment of gastric varices. However, its efficacy in this regard is equivocal^[32,33]. In 1996, Kojima *et al*^[34] used EBL in the management of bleeding rectal varices. Subsequently, Uno *et al*^[35] reported a successful use of EBL to treat bleeding rectal varices after failure of sclerotherapy in a child with extrahepatic portal hypertension. Long term follow up of 46 mo after successful use of EBL in treatment of bleeding and obliteration of rectal varices as the initial therapy in an adult patient was reported by Firoozi *et al*^[36] EBL is a safe and effective therapy for rectal varices, however the risk of recurrence is high^[34,37]. Sato *et al*^[38] compared EIS to EBL in the management of rectal varices. EIS appeared to be superior to EBL with regard to effectiveness. The recurrence rate was less with EIS 33.3% vs 55.6% with EBL. No complications were noted with EIS, however one patient who received EBL developed bleeding ulcer^[38].

Cyanoacrylate injection: Cyanoacrylate glue is an accepted therapeutic method for gastric varices, although its use is off-label in the United States^[39]. It was first described by Soehendra *et al*^[40]. This glue preparations work by immediate polymerization upon contact with blood, causing vascular obstruction and is eventually extruded into the gastric lumen, typically about 1 mo after injection^[41,42]. Weilert *et al*^[43] reported a case of rectal varix managed successfully with EUS-guided cyanoacrylate injection and embolization coils.

The use of coils is believed to provide a scaffold to retain glue within the varix, thereby minimizing the risk of embolization and allowing for a decreased volume of glue injection for variceal obliteration^[43]. Color Doppler-EUS has been used to diagnose submucosal endoscopically ineventid rectal varices bleeding and to manage it by histoacryl glue injection^[44]. The most serious adverse events of glue injection therapy is systemic embolization and sepsis which has been reported secondary to embolized glue acting as a septic focus^[45]. Embolization into the arterial circulation (*via* a patent foramen ovale or arteriovenous pulmonary shunt) can result in stroke and multiorgan infarction^[45].

Interventional radiology

TIPS: TIPS is a minimally invasive and effective method used for management of rectal varices during active bleeding. It can serve both as a bridge to transplantation and as the definitive therapy in patients who are not good candidates for surgery^[24]. TIPS was first used in 1993 by Katz *et al*^[46] in a patient with repeated bleeding from anorectal varices (ARV) with marked decompression of the varices 24 h after placement of the TIPS. The patient had no recurrent bleeding after 6 mo of follow up. Several case reports and small case series of bleeding ARV successfully managed with TIPS have been described in the literature^[47-55]. Kochar *et al*^[56] reported in 2008 the largest series of patients ($n = 28$) with bleeding ectopic varices, 12 of them were rectal varices treated by TIPS placement. Hemostasis was effectively achieved in 67% of the patients. This was achieved solely with TIPS without concomitant embolization in 21 of the 22 (95%) patients and in three of the five (60%) patients who had TIPS and concomitant variceal embolization. Rebleeding from ectopic varices occurred in five (21%) patients. In two (40%) patients, the rebleeding was secondary to shunt dysfunction and responded to revision of the shunt. However, rebleeding occurred in three patients despite a functioning shunt with low portal pressure gradients^[56].

Embolization: Embolization is a procedure performed by interventional radiologist to occlude the feeding vein to the rectal varices. It can either be performed alone or in combination with band ligation or TIPS^[53,57]. When used alone, embolization results in high 1 year rebleeding rates^[54]. The combination of TIPS and embolization has been described as efficient in the prevention of recurrent bleeding from esophagogastric varices^[58]. After embolization, the communication of the portal vein and the rectal veins remains partially interrupted even after shunt stenosis. Hence, the increase of the pressure in the portal vein is not directly transmitted into the rectal plexus^[53]. Ahn *et al*^[59] reported recently a case of recurrent bleeding after successful TIPS treated with variceal embolization. Various embolization materials are used, including coils, gelfoam, thrombin, collagen, autologous blood clot and ethanol^[60,61].

BRTO: Developed by Kanagawa *et al*^[62] in the early 1990s, the BRTO procedure is an endovascular technique that causes occlusion of outflow portosystemic shunt, such as a gastroduodenal shunt, using an occlusion balloon followed by the endovascular injection of a sclerosing agent directly into the gastro-variceal system^[57,62]. For the past two decades, this procedure has become common practice in Asia for the management of gastric varices. It is now becoming more popular in the United States. It has been shown to be effective in controlling gastric variceal bleeding with low rebleeding rates. BRTO has many advantages over TIPS. It is less invasive and can be performed on patients with poor hepatic reserve and those with encephalopathy^[63]. Anan *et al*^[64] reported a case of successful treatment of colonic varices by means of BRTO in a patient with hepatic encephalopathy leading to resolution of the encephalopathy and worsening of preexisting esophageal varices. This reflects postprocedural increased portal hypertension. A more recent article reported the success of BRTO as an additional therapy to surgical suture in controlling bleeding rectal varices with 1.26 cm feeding vessel. However, the patient died 6 mo later from liver failure^[65].

Surgical management

Surgery has been used for treatment of rectal varices mainly when endoscopic management has failed. Surgical methods include simple suture ligation, inferior mesenteric vein occlusion and porto-caval shunt surgery. The later has been shown to be effective in controlling life threatening bleeding. However, the majority of patients presenting with bleeding rectal varices have a poor general condition and are not good candidate for these major surgical procedures^[66]. The mortality in these patients is high and is mainly secondary to liver failure. Bittinger *et al*^[66] reported 80% mortality within 2 mo despite adequate local treatment of the rectal varices.

Direct suture ligation is a technically challenging option and often not successful. However, the stapled approach seems to be a suitable alternative. Stapled procedure for the control of bleeding varices was first reported in 2002 by Botterill *et al*^[67]. The authors reported a circumferential stapling device was used to successfully control bleeding ano-rectal varices after failure of injection sclerotherapy and band ligation. In 2005, another case report also demonstrated that stapled procedure may be an effective means of bleeding control^[68]. A case series of nine patients was published by Kaul *et al*^[69] with successful control of bleeding following a circumferential stapled procedure. Four of the nine patients were previously treated with endoscopic therapy (three with banding and one with injection sclerotherapy). No further rebleeding was noted during the follow up period of 4 to 24 mo.

CONCLUSION

Bleeding rectal varices can be a life threatening

condition in patients with portal hypertension and should be considered in the differential diagnosis of these patients when they present with lower gastrointestinal bleeding.

The management of rectal varices is multidisciplinary and involves gastroenterologists, interventional radiologists and surgeons. There are no established guidelines to define the appropriate management strategies for rectal varices. Published studies consist mainly of case reports and series. This article provides a review of the literature summarizing the different therapeutic options to manage rectal varices.

REFERENCES

- 1 **Cabot RC**, Castleman B, Towne VW. Case 40102. *N Engl J Med* 1954; **250**: 434-438 [DOI: 10.1056/NEJM195403112501008]
- 2 **Ganguly S**, Sarin SK, Bhatia V, Lahoti D. The prevalence and spectrum of colonic lesions in patients with cirrhotic and noncirrhotic portal hypertension. *Hepatology* 1995; **21**: 1226-1231 [PMID: 7737627 DOI: 10.1016/0270-9139(95)90041-1]
- 3 **Chawla Y**, Dilawari JB. Anorectal varices--their frequency in cirrhotic and non-cirrhotic portal hypertension. *Gut* 1991; **32**: 309-311 [PMID: 2013427 DOI: 10.1136/gut.32.3.309]
- 4 **Misra SP**, Dwivedi M, Misra V. Prevalence and factors influencing hemorrhoids, anorectal varices, and colopathy in patients with portal hypertension. *Endoscopy* 1996; **28**: 340-345 [PMID: 8813499 DOI: 10.1055/s-2007-1005477]
- 5 **Misra SP**, Dwivedi M, Misra V, Dharmani S, Kunwar BK, Arora JS. Colonic changes in patients with cirrhosis and in patients with extrahepatic portal vein obstruction. *Endoscopy* 2005; **37**: 454-459 [PMID: 15844025 DOI: 10.1055/s-2005-861252]
- 6 **Shudo R**, Yazaki Y, Sakurai S, Uenishi H, Yamada H, Sugawara K. Clinical study comparing bleeding and nonbleeding rectal varices. *Endoscopy* 2002; **34**: 189-194 [PMID: 11870567]
- 7 **Garcia-Tsao G**, Sanyal AJ, Grace ND, Carey W. Prevention and management of gastroesophageal varices and variceal hemorrhage in cirrhosis. *Hepatology* 2007; **46**: 922-938 [PMID: 17879356 DOI: 10.1002/hep.21907]
- 8 **Sato T**, Akaike J, Toyota J, Karino Y, Ohmura T. Clinicopathological features and treatment of ectopic varices with portal hypertension. *Int J Hepatol* 2011; **2011**: 960720 [PMID: 21994879 DOI: 10.4061/2011/960720]
- 9 **Groszmann RJ**, Garcia-Tsao G, Bosch J, Grace ND, Burroughs AK, Planas R, Escorsell A, Garcia-Pagan JC, Patch D, Matloff DS, Gao H, Makuch R. Beta-blockers to prevent gastroesophageal varices in patients with cirrhosis. *N Engl J Med* 2005; **353**: 2254-2261 [PMID: 16306522 DOI: 10.1056/NEJMoa044456]
- 10 **Iwakiri Y**, Groszmann RJ. The hyperdynamic circulation of chronic liver diseases: from the patient to the molecule. *Hepatology* 2006; **43**: S121-S131 [PMID: 16447289 DOI: 10.1002/hep.20993]
- 11 **Llach J**, Ginès P, Arroyo V, Rimola A, Titó L, Badalamenti S, Jiménez W, Gaya J, Rivera F, Rodés J. Prognostic value of arterial pressure, endogenous vasoactive systems, and renal function in cirrhotic patients admitted to the hospital for the treatment of ascites. *Gastroenterology* 1988; **94**: 482-487 [PMID: 3335320]
- 12 **Møller S**, Hobolth L, Winkler C, Bendtsen F, Christensen E. Determinants of the hyperdynamic circulation and central hypovolaemia in cirrhosis. *Gut* 2011; **60**: 1254-1259 [PMID: 21504996 DOI: 10.1136/gut.2010.235473]
- 13 **Hosking SW**, Smart HL, Johnson AG, Triger DR. Anorectal varices, haemorrhoids, and portal hypertension. *Lancet* 1989; **1**: 349-352 [PMID: 2563507 DOI: 10.1016/S0140-6736(89)91724-8]
- 14 **Watanabe N**, Toyonaga A, Kojima S, Takashimizu S, Oho K, Kokubu S, Nakamura K, Hasumi A, Murashima N, Tajiri T. Current status of ectopic varices in Japan: Results of a survey by the Japan Society for Portal Hypertension. *Hepatol Res* 2010; **40**: 763-776 [PMID: 20649816 DOI: 10.1111/j.1872-034X.2010.00690.x]
- 15 **Idezuki Y**. General rules for recording endoscopic findings of esophagogastric varices (1991). Japanese Society for Portal Hypertension. *World J Surg* 1995; **19**: 420-422; discussion 423 [PMID: 7638999 DOI: 10.1007/BF00299178]
- 16 **Lohsiriwat V**. Hemorrhoids: from basic pathophysiology to clinical management. *World J Gastroenterol* 2012; **18**: 2009-2017 [PMID: 22563187 DOI: 10.3748/wjg.v18.i17.2009]
- 17 **Wiechowska-Kozłowska A**, Bialek A, Milkiewicz P. Prevalence of 'deep' rectal varices in patients with cirrhosis: an EUS-based study. *Liver Int* 2009; **29**: 1202-1205 [PMID: 19508616 DOI: 10.1111/j.1478-3231.2009.02047.x]
- 18 **Dhiman RK**, Choudhuri G, Saraswat VA, Mukhopadhyay DK, Khan EM, Pandey R, Naik SR. Endoscopic ultrasonographic evaluation of the rectum in cirrhotic portal hypertension. *Gastrointest Endosc* 1993; **39**: 635-640 [PMID: 8224684 DOI: 10.1016/S0016-5107(93)70214-X]
- 19 **Sato T**, Yamazaki K, Toyota J, Karino Y, Ohmura T, Suga T. The value of the ultrasonic microprobe in the detection and treatment of rectal varices: a case report. *Hepatol Res* 2003; **27**: 158-162 [PMID: 14563431 DOI: 10.1016/S1386-6346(03)00203-1]
- 20 **Sato T**, Yamazaki K, Toyota J, Karino Y, Ohmura T, Akaike J. Diagnosis of rectal varices via color Doppler ultrasonography. *Am J Gastroenterol* 2007; **102**: 2253-2258 [PMID: 17561969 DOI: 10.1111/j.1572-0241.2007.01340.x]
- 21 **Sato T**, Yamazaki K, Akaike J. Evaluation of the hemodynamics of rectal varices by endoscopic ultrasonography. *J Gastroenterol* 2006; **41**: 588-592 [PMID: 16868808 DOI: 10.1007/s00535-006-1815-0]
- 22 **Sarin SK**, Kumar A, Angus PW, Baijal SS, Baik SK, Bayraktar Y, Chawla YK, Choudhuri G, Chung JW, de Franchis R, de Silva HJ, Garg H, Garg PK, Helmy A, Hou MC, Jafri W, Jia JD, Lau GK, Li CZ, Lui HF, Maruyama H, Pandey CM, Puri AS, Rerknimitr R, Sahni P, Saraya A, Sharma BC, Sharma P, Shiha G, Sollano JD, Wu J, Xu RY, Yachha SK, Zhang C. Diagnosis and management of acute variceal bleeding: Asian Pacific Association for Study of the Liver recommendations. *Hepatol Int* 2011; **5**: 607-624 [PMID: 21484145 DOI: 10.1007/s12072-010-9236-9]
- 23 **Soares-Weiser K**, Brezis M, Tur-Kaspa R, Leibovici L. Antibiotic prophylaxis for cirrhotic patients with gastrointestinal bleeding. *Cochrane Database Syst Rev* 2002; **(2)**: CD002907 [PMID: 12076458 DOI: 10.1002/14651858.CD002907]
- 24 **Maslekar S**, Toh EW, Adair R, Bate JP, Botterill I. Systematic review of anorectal varices. *Colorectal Dis* 2013; **15**: e702-e710 [PMID: 24020839 DOI: 10.1111/codi.12417]
- 25 **Wang M**, Desigan G, Dunn D. Endoscopic sclerotherapy for bleeding rectal varices: a case report. *Am J Gastroenterol* 1985; **80**: 779-780 [PMID: 3876025]
- 26 **Weiser DB**, Zfass AM, Messmer J. Control of massive hemorrhage from rectal varices with sclerotherapy. *Gastrointest Endosc* 1986; **32**: 419-421 [PMID: 3492406 DOI: 10.1016/S0016-5107(86)71928-7]
- 27 **Richon J**, Berclaz R, Schneider PA, Marti MC. Sclerotherapy of rectal varices. *Int J Colorectal Dis* 1988; **3**: 132-134 [PMID: 3411184 DOI: 10.1007/BF01645319]
- 28 **Yamanaka T**, Shiraki K, Ito T, Sugimoto K, Sakai T, Ohmori S, Takase K, Nakano T, Oohashi Y, Okuda Y. Endoscopic sclerotherapy (ethanolamine oleate injection) for acute rectal varices bleeding in a patient with liver cirrhosis. *Hepatogastroenterology* 2002; **49**: 941-943 [PMID: 12143248]
- 29 **Sato T**. Efficacy of Endoscopic Injection Sclerotherapy for Rectal Varices. *Clin Exp Gastroenterol* 2010; **2**: 159-163
- 30 **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; **119**: 1-7 [PMID: 8498757 DOI: 10.7326/0003-4819-119-1-199307010-00001]
- 31 **Lo GH**, Lai KH, Cheng JS, Hwu JH, Chang CF, Chen SM, Chiang HT. A prospective, randomized trial of sclerotherapy versus ligation in the management of bleeding esophageal varices. *Hepatology* 1995; **22**: 466-471 [PMID: 7635414 DOI: 10.1002/hep.1840220215]
- 32 **Jutabha R**, Jensen DM, Egan J, Machicado GA, Hirabayashi

- K. Randomized, prospective study of cyanoacrylate injection, sclerotherapy, or rubber band ligation for endoscopic hemostasis of bleeding canine gastric varices. *Gastrointest Endosc* 1995; **41**: 201-205 [PMID: 7789677 DOI: 10.1016/S0016-5107(95)70338-1]
- 33 **Sarin SK**, Lahoti D, Saxena SP, Murthy NS, Makwana UK. Prevalence, classification and natural history of gastric varices: a long-term follow-up study in 568 portal hypertension patients. *Hepatology* 1992; **16**: 1343-1349 [PMID: 1446890 DOI: 10.1002/hep.1840160607]
- 34 **Kojima T**, Onda M, Tajiri T, Kim DY, Toba M, Masumori K, Umehara M, Yoshida H, Mamada Y, Taniiai N, Nishikubo H, Yokoyama S, Matsuzaki S, Tanaka N, Yamashita K, Aramaki T, Tetsuoh Y. [A case of massive bleeding from rectal varices treated with endoscopic variceal ligation (EVL)]. *Nihon Shokakibyo Gakkai Zasshi* 1996; **93**: 114-119 [PMID: 8865752]
- 35 **Uno Y**, Munakata A, Ishiguro A, Fukuda S, Sugai M, Munakata H. Endoscopic ligation for bleeding rectal varices in a child with primary extrahepatic portal hypertension. *Endoscopy* 1998; **30**: S107-S108 [PMID: 9932774 DOI: 10.1055/s-2007-1001436]
- 36 **Firoozi B**, Gamagaris Z, Weinschel EH, Bini EJ. Endoscopic band ligation of bleeding rectal varices. *Dig Dis Sci* 2002; **47**: 1502-1505 [PMID: 12141807]
- 37 **Sato T**. Two Cases of Rectal Varices Treated by Endoscopic Variceal Ligation. *Dig Endosc* 1999; **11**: 66-69 [DOI: 10.1111/j.1443-1661.1999.tb00196.x]
- 38 **Sato T**, Yamazaki K, Akaike J, Toyota J, Karino Y, Ohmura T. Retrospective analysis of endoscopic injection sclerotherapy for rectal varices compared with band ligation. *Clin Exp Gastroenterol* 2010; **3**: 159-163 [PMID: 21694861 DOI: 10.2147/CEG.S15401]
- 39 **Ljubicić N**, Biscanin A, Nikolic M, Supanc V, Hrabar D, Pavić T, Boban M. A randomized-controlled trial of endoscopic treatment of acute esophageal variceal hemorrhage: N-butyl-2-cyanoacrylate injection vs. variceal ligation. *Hepatogastroenterology* 2011; **58**: 438-443 [PMID: 21661410]
- 40 **Soehendra N**, Grimm H, Nam VC, Berger B. N-butyl-2-cyanoacrylate: a supplement to endoscopic sclerotherapy. *Endoscopy* 1987; **19**: 221-224 [PMID: 3500847 DOI: 10.1055/s-2007-1018288]
- 41 **Nguyen AJ**, Baron TH, Burgart LJ, Leontovich O, Rajan E, Gostout CJ. 2-Octyl-cyanoacrylate (Dermabond), a new glue for variceal injection therapy: results of a preliminary animal study. *Gastrointest Endosc* 2002; **55**: 572-575 [PMID: 11923777 DOI: 10.1067/mge.2002.122032]
- 42 **Wang YM**, Cheng LF, Li N, Wu K, Zhai JS, Wang YW. Study of glue extrusion after endoscopic N-butyl-2-cyanoacrylate injection on gastric variceal bleeding. *World J Gastroenterol* 2009; **15**: 4945-4951 [PMID: 19842227 DOI: 10.3748/wjg.15.4945]
- 43 **Weilert F**, Shah JN, Marson FP, Binmoeller KF. EUS-guided coil and glue for bleeding rectal varix. *Gastrointest Endosc* 2012; **76**: 915-916 [PMID: 22172480]
- 44 **Sharma M**, Somasundaram A. Massive lower GI bleed from an endoscopically inevident rectal varices: diagnosis and management by EUS (with videos). *Gastrointest Endosc* 2010; **72**: 1106-1108 [PMID: 20579995 DOI: 10.1016/j.gie.2010.02.054]
- 45 **Seewald S**, Ang TL, Imazu H, Naga M, Omar S, Groth S, Seitz U, Zhong Y, Thonke F, Soehendra N. A standardized injection technique and regimen ensures success and safety of N-butyl-2-cyanoacrylate injection for the treatment of gastric fundal varices (with videos). *Gastrointest Endosc* 2008; **68**: 447-454 [PMID: 18760173 DOI: 10.1016/j.gie.2008.02.050]
- 46 **Katz JA**, Rubin RA, Cope C, Holland G, Brass CA. Recurrent bleeding from anorectal varices: successful treatment with a transjugular intrahepatic portosystemic shunt. *Am J Gastroenterol* 1993; **88**: 1104-1107 [PMID: 8317414]
- 47 **Godil A**, McCracken JD. Rectal variceal bleeding treated by transjugular intrahepatic portosystemic shunt. Potentials and pitfalls. *J Clin Gastroenterol* 1997; **25**: 460-462 [PMID: 9412951 DOI: 10.1097/00004836-199709000-00014]
- 48 **Vangeli M**, Patch D, Terreni N, Tibballs J, Watkinson A, Davies N, Burroughs AK. Bleeding ectopic varices--treatment with transjugular intrahepatic porto-systemic shunt (TIPS) and embolisation. *J Hepatol* 2004; **41**: 560-566 [PMID: 15464235 DOI: 10.1016/j.jhep.2004.06.024]
- 49 **Fantin AC**, Zala G, Risti B, Debatin JF, Schöpke W, Meyenberger C. Bleeding anorectal varices: successful treatment with transjugular intrahepatic portosystemic shunting (TIPS). *Gut* 1996; **38**: 932-935 [PMID: 8984036 DOI: 10.1136/gut.38.6.932]
- 50 **Ory G**, Spahr L, Megevand JM, Becker C, Hadengue A. The long-term efficacy of the intrahepatic portosystemic shunt (TIPS) for the treatment of bleeding anorectal varices in cirrhosis. A case report and review of the literature. *Digestion* 2001; **64**: 261-264 [PMID: 11842284]
- 51 **Vidal V**, Joly L, Perreault P, Bouchard L, Lafortune M, Pomier-Layrargues G. Usefulness of transjugular intrahepatic portosystemic shunt in the management of bleeding ectopic varices in cirrhotic patients. *Cardiovasc Intervent Radiol* 2006; **29**: 216-219 [PMID: 16284702 DOI: 10.1007/s00270-004-0346-4]
- 52 **Haskal ZJ**, Scott M, Rubin RA, Cope C. Intestinal varices: treatment with the transjugular intrahepatic portosystemic shunt. *Radiology* 1994; **191**: 183-187 [PMID: 8134568 DOI: 10.1148/radiology.191.1.8134568]
- 53 **Hidajat N**, Stobbe H, Hosten N, Schroeder RJ, Fauth M, Vogl T, Felix R. Transjugular intrahepatic portosystemic shunt and transjugular embolization of bleeding rectal varices in portal hypertension. *AJR Am J Roentgenol* 2002; **178**: 362-363 [PMID: 11804893 DOI: 10.2214/ajr.178.2.1780362]
- 54 **Demirel H**, Pieterman H, Laméris JS, van Buuren HR. Transjugular embolization of the inferior mesenteric vein for bleeding anorectal varices after unsuccessful transjugular intrahepatic portosystemic shunt. *Am J Gastroenterol* 1997; **92**: 1226-1227 [PMID: 9219809]
- 55 **Shibata D**, Brophy DP, Gordon FD, Anastopoulos HT, Sentovich SM, Bleday R. Transjugular intrahepatic portosystemic shunt for treatment of bleeding ectopic varices with portal hypertension. *Dis Colon Rectum* 1999; **42**: 1581-1585 [PMID: 10613477 DOI: 10.1007/BF02236211]
- 56 **Kochar N**, Tripathi D, McAvoy NC, Ireland H, Redhead DN, Hayes PC. Bleeding ectopic varices in cirrhosis: the role of transjugular intrahepatic portosystemic stent shunts. *Aliment Pharmacol Ther* 2008; **28**: 294-303 [PMID: 19086235 DOI: 10.1111/j.1365-2036.2008.03719.x]
- 57 **Ibukuro K**, Kojima K, Kigawa I, Tanaka R, Fukuda H, Abe S, Tobe K, Tagawa K. Embolization of rectal varices via a paraumbilical vein with an abdominal wall approach in a patient with massive ascites. *J Vasc Interv Radiol* 2009; **20**: 1259-1261 [PMID: 19729137 DOI: 10.1016/j.jvir.2009.05.041]
- 58 **Hidajat N**, Vogl T, Stobbe H, Schmidt J, Wex C, Lenzen R, Berg T, Neuhaus P, Felix R. Transjugular intrahepatic portosystemic shunt. Experiences at a liver transplantation center. *Acta Radiol* 2000; **41**: 474-478 [PMID: 11016769 DOI: 10.1080/028418500127345712]
- 59 **Ahn SS**, Kim EH, Kim MD, Lee WJ, Kim SU. Successful hemostasis of intractable rectal variceal bleeding using variceal embolization. *World J Gastroenterol* 2015; **21**: 2558-2562 [PMID: 25741168 DOI: 10.3748/wjg.v21.i8.2558]
- 60 **Helmy A**, Al Kahtani K, Al Fadda M. Updates in the pathogenesis, diagnosis and management of ectopic varices. *Hepatol Int* 2008; **2**: 322-334 [PMID: 19669261 DOI: 10.1007/s12072-008-9074-1]
- 61 **Almadi MA**, Almessabi A, Wong P, Ghali PM, Barkun A. Ectopic varices. *Gastrointest Endosc* 2011; **74**: 380-388 [PMID: 21612777 DOI: 10.1016/j.gie.2011.03.1177]
- 62 **Kanagawa H**, Mima S, Kouyama H, Gotoh K, Uchida T, Okuda K. Treatment of gastric fundal varices by balloon-occluded retrograde transvenous obliteration. *J Gastroenterol Hepatol* 1996; **11**: 51-58 [PMID: 8672742 DOI: 10.1111/j.1440-1746.1996.tb00010.x]
- 63 **Saad WE**. Balloon-occluded retrograde transvenous obliteration of gastric varices: concept, basic techniques, and outcomes. *Semin Intervent Radiol* 2012; **29**: 118-128 [PMID: 23729982 DOI: 10.1055/s-0032-1312573]
- 64 **Anan A**, Irie M, Watanabe H, Sohda T, Iwata K, Suzuki N, Yoshikane M, Nakane H, Hashiba T, Yokoyama M, Higashihara H, Okazaki M, Sakisaka S. Colonic varices treated by balloon-occluded retrograde transvenous obliteration in a cirrhotic patient

- with encephalopathy: a case report. *Gastrointest Endosc* 2006; **63**: 880-884 [PMID: 16650568 DOI: 10.1016/j.gie.2005.11.038]
- 65 **Yoshino K**, Imai Y, Nakazawa M, Chikayama T, Ando S, Sugawara K, Hamaoka K, Inao M, Oka M, Mochida S. Therapeutic strategy for patients with bleeding rectal varices complicating liver cirrhosis. *Hepatol Res* 2014; **44**: 1088-1094 [PMID: 24033909 DOI: 10.1111/hepr.12232]
- 66 **Bittinger M**. Bleeding from Rectal Varices in Patients with Liver Cirrhosis - an Ominous Event. *Gastrointest Endosc* 2004; **59**: 270 [DOI: 10.1016/S0016-5107(04)01197-6]
- 67 **Botterill ID**, Jayne DG, Snelling AP, Ambrose NS. Correction of symptomatic ano-rectal varices with circumferential stapled anoplasty. *Colorectal Dis* 2002; **4**: 217 [PMID: 12780622 DOI: 10.1046/j.1463-1318.2002.00343.x]
- 68 **Parvaiz A**, Azeem S, Singh RK, Lamparelli M. Stapled hemorrhoidopexy: an alternative technique for the treatment of bleeding anorectal varices. Report of a case. *Dis Colon Rectum* 2006; **49**: 411-412 [PMID: 16322963 DOI: 10.1007/s10350-005-0255-x]
- 69 **Kaul AK**, Skaife PG. Circumferential stapled procedure for bleeding ano-rectal varices is an effective treatment--experience in nine patients. *Colorectal Dis* 2009; **11**: 420-423 [PMID: 18624814 DOI: 10.1111/j.1463-1318.2008.01616.x]

P- Reviewer: Nakayama Y, Zielinski J **S- Editor:** Qiu S
L- Editor: A **E- Editor:** Liu SQ





Published by **Baishideng Publishing Group Inc**

8226 Regency Drive, Pleasanton, CA 94588, USA

Telephone: +1-925-223-8242

Fax: +1-925-223-8243

E-mail: bpgoffice@wjgnet.com

Help Desk: <http://www.wjgnet.com/esps/helpdesk.aspx>

<http://www.wjgnet.com>

