

Role of endoscopy in management of gastrointestinal complications of portal hypertension

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rapid expansion with the advent of different and novel endoscopic modalities, with consequent improvement of investigation and treatment of these patients. The choice of best therapeutic strategy depends on many factors: baseline disease, patient's clinical performance and the timing when it is done if in emergency or a prophylactic approaches. In this review we evaluate the endoscopic management of patients with the gastrointestinal complications of portal hypertension.

Key words: Portal hypertension; Gastrointestinal complications; Bleeding; Esophageal varices; Gastric varices

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Core tip: Endoscopy plays a primary role in the staging, diagnosis and treatment of gastrointestinal complications of portal hypertension. In this review, we summarize data from randomized clinical trials or prospective studies together with meta-analytical data, when applicable, to present the most updated recommendations on endoscopic management of the gastrointestinal complications of portal hypertension.

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Abstract

The management of patients with gastrointestinal complications of portal hypertension is often complex and challenging. The endoscopy plays an important role in the management of these patients. The role of endoscopy is both diagnostic and interventional and in the last years the techniques have undergone a

INTRODUCTION

Portal hypertension is defined as a pathologic increase in portal vein to inferior vena cava pressure gradient greater than 5 mmHg. According to anatomic location,

the diseases causing portal hypertension are classified as pre-hepatic if involve portal, splenic or mesenteric veins, intra-hepatic if cause acute or chronic liver diseases, and post-hepatic if interfere with the venous outflow of the liver. The most prevalent cause of portal hypertension is liver cirrhosis with greater resistance to portal flow. Hepatic venous pressure gradient (HVPG) is an indirect measurement of portal hypertension which is obtained by placing a catheter in the hepatic vein or by occluding a large branch of hepatic vein by inflating a balloon. Portal hypertension likely causes the development of varices and hemodynamic and mucosal changes in the entire gastrointestinal (GI) tract. Varices are present in the 50% of cirrhotic patients^[1-4]. Bleeding occurs in approximately 5%-15% of patients, depends on the size of varices. Other predictors of bleeding may be the presence of red wale mark and decompensated cirrhosis^[5]. The variceal bleeding mortality is around 20% at 6 wk despite improvement in therapy over the last decade thanks to the development of endoscopic and pharmacological therapies and antibiotic prophylaxis^[6-8].

In the patients with portal hypertension the gut mucosa undergoes microcirculatory changes, such as submucosal angiogenesis and vascular ectasia, that impair its integrity and promote its susceptibility to damage. Stomach changes can cause bleeding [portal hypertensive gastropathy (PHG)], usually the involvement of small bowel is asymptomatic (portal hypertensive enteropathy), but sometimes can cause occult blood loss, finally colon involvement (portal hypertensive colopathy) is often associated with bleeding and the symptoms are similar to inflammatory bowel disease^[9].

The aim of this paper is to review the interventional and diagnostic role of endoscopy in patients with GI complications of portal hypertension.

ESOPHAGEAL VARICES

Primary prophylaxis

The goal of primary prophylaxis is to prevent first bleeding episode and consequently improve survival through decreasing bleeding-related death. All cirrhotic patients should be screened for varices through endoscopy to detect the patients that need a prophylactic treatment^[10,11]. The Child-Pugh (C-P) score suggests that risk factors of bleeding are the presence of red wale marks, the size of varices and the liver disease severity^[5].

Typically, one of two approaches is used for primary prophylaxis: pharmacologic prophylaxis using a non-selective beta-adrenergic blockers (NSBBs) or with endoscopic band ligation (EBL).

EBL consists in the placement of rubber rings on variceal columns which are sucked into a plastic hollow cylinder attached to the tip of the endoscope. Endoscopic ligation causes occlusion of the varix and then thrombosis with ischemic necrosis of the mucosa. Multiple-shot devices have largely replaced the original single-shot ligators, since the procedure is much

simpler and faster with multi shot devices. Endoscopic variceal ligation is associated with complications such as hemorrhage, chest pain, dysphagia, and odynophagia and ulceration of the mucosa. There are only few studies that have evaluated the risk of bleeding from ligation-induced ulcers. Schepke *et al*^[12] found that the incidence of bleeding from ligation ulcers after EBL was 6.7%. Another retrospective data analysis of EBL described hemorrhage from ligation ulcers as 5.7%, irrespective of the indication^[13]. Endoscopic variceal ligation sessions are usually repeated at 1-2 wk intervals until complete obliteration^[11]. A randomized, controlled trial of bimonthly *vs* biweekly EBL (primary and secondary prophylaxis) found that EBL bimonthly had a higher total eradication rate, lower recurrence rate, and lower rate of additional treatment than biweekly EBL and that the patients treated bi-monthly showed better ulceration healing in the second and third treatments than the patients treated bi-weekly^[14]. This approach may decrease the risk of bleeding or perforation.

NSBBs can be used in patients that present cirrhosis, small varices and risk of bleeding according to C-P score^[10,11]. It's known that patients with small varices with red signs on its wall or with C-P score class C, have the same risk of bleeding of patients with large varices^[5]. In patients with medium/large varices either NSBBs or EBL are an appropriate choice for primary prophylaxis of bleeding^[10,11]. A systematic review of 11 randomized controlled trials (RCTs) about prevention of variceal hemorrhage, has compared NSBBs with placebo or non active treatment, and has shown a 9% absolute risk reduction of first variceal bleeding at two years^[15]. A significant reduction in mortality was also seen with NSBBs use^[16]. The use of NSBBs is limited by their side-effect profile, which includes hypotension, fatigue, lethargy, depression, and dyspnea in patients with associated pulmonary disease. Around 15%-20% of patients suffer from intolerable side effects that require discontinuation of the drug^[17].

A meta-analysis of 5 trials comparing prophylactic EBL with controls found that EBL decreases the risk of variceal hemorrhage and the mortality related to hemorrhage^[18]. The treatment choice is based on patient preference, local resources and side effects^[10]. A Cochrane meta-analysis that included 19 RCTs, has compared prophylactic EBL with NSBBs and has shown a slight beneficial effect for EBL, without different bleeding-related mortality in the two arms^[19].

Evolving data suggest novel uses for endoscopic ultrasonography (EUS) in patients with esophageal varices, in fact a RCT has shown that in the treatment of esophageal varices EUS-guided injection sclerotherapy is most safe and efficacious respect to endoscopic injection therapy^[20].

In patients treated with NSBBs endoscopic follow-up isn't necessary, conversely in patients treated with EBL, is necessary repeat endoscopy every one or two

weeks until obliteration, 1-3 mo after obliteration and finally every year to check for variceal recurrence^[11]. In patients with small varices and who not receive NSBBs, is necessary repeat endoscopy in two years. In the case of hepatic decompensation, endoscopy should be repeated every year and in cirrhotic patients without the presence of varices on the initial endoscopy it should be repeated every three years^[10,11].

Acute variceal bleeding

Ruptured esophageal varices cause 70% of all upper GI bleeding episodes in patients with portal hypertension. Therefore, a variceal origin should be suspected in any cirrhotic patient that presents a GI bleeding^[7]. In patients with hematemesis or hemodynamic instability, an endoscopic evaluation should be done in the first 12 h after admission^[10,11].

The use of new drugs, which are able to decrease portal pressure, the novel and specialized endoscopic therapy, the use of antibiotics and the interventional radiologic procedures improved the survival in the last 25 years^[6]. Mortality during the bleeding episode remains high and ranges from 24% in unselected cirrhotic variceal bleeders to about 16% among those receiving the current standard of care (band ligation + vasoactive drugs + antibiotics)^[21-23]. For the treatment of acute bleeding related to variceal the current recommendation is to combine antibiotic prophylaxis, hemodynamic stabilization, the use of drugs and the treatment through endoscopy^[11]. It's important maintaining hemodynamic stability and a hemoglobin of 8 g/dL^[11]. The restitution of lost blood causes an increasing in portal pressure to levels higher respect to baseline^[24]. A recently RCT showed that a restrictive transfusion strategy in patients with portal hypertensive bleeding reduced further bleeding, need for rescue therapy and length of stay in the hospital. In the restrictive-strategy group the hemoglobin threshold for transfusion was 7 g/dL per deciliter with a target range of 7 to 9 g/dL per deciliter^[25]. Antibiotic prophylaxis is a standard practice, in fact it is known that is able to decrease the rate of bacteria infections and the incidence of rebleeding, and increase the survival^[26,27]. The combination of endoscopic and pharmacological therapy is the most common approach for treatment of acute variceal bleeding^[10,11]. For example a meta-analysis of 8 RCTs has shown that vasoactive drugs enhance the efficacy of endoscopic therapy respect to endoscopic therapy alone, without evidence of side effects or mortality^[28].

EBL is the best endoscopic therapy for active bleeding because respect to endoscopic sclerotherapy (ES), allows a greater control of bleeding, the possible adverse events are lower and improves the survival^[10,29,30]. When EBL is not technically feasible, endoscopic sclerotherapy is recommended^[10]. Endoscopic ultrasound allows a more effective distribution of sclerosant, the injection of sclerosant agents can be realized into esophageal varices,

and causes a decrease of the recurrence rate^[31].

Emergency injection of acrylate glue could be also an effective method for treat the bleeding of esophageal varices^[32]. Vaso-active medications decrease portal blood flow which relate closely to variceal pressure and include vasopressine, somatostatin, and their analogs (terlipressin and octreotide, respectively). Vasoactive therapy should be continued for 5 d to prevent the rebleeding^[10], the reason behind this treatment is that a higher portal pressure is associated with a prognosis less favorable^[33].

Patients with cirrhosis in Child-Pugh class C or those in class B who have persistent bleeding at endoscopy, are at high risk for treatment failure and a poor prognosis and early use of PTFE-covered TIPS (within 72 h) markedly and significantly reduces failures to control bleeding or rebleeding and improves survival^[34].

Secondary prophylaxis

Over 70% of patients experience recurrent variceal bleeding within one year of their index bleed^[35,36]. To prevent recurrent bleeding all surviving patients should receive prophylactic treatments^[11]. Available treatments for preventing variceal rebleeding include pharmacological therapy, endoscopic therapy, transjugular intra-hepatic porto-systemic shunt (TIPS) and surgical shunting. A recently meta-analysis showed that NSBBs and EBL are similarly able to reduce upper GI bleeding, variceal rebleeding and bleeding-related mortality, but the overall mortality rate was only lowered with NSBBs^[37]. The beneficial effect of b-blockers goes beyond the reduction in the variceal bleeding risk and is probably related to an improvement of other complications of portal hypertension.

A combination of NSBBs and endoscopic therapy is the currently recommended first line treatment for the prevention of variceal rebleeding^[10,11]. Band ligation is the endoscopic therapy of choice and has replaced injection sclerotherapy because it is safer and more effective^[38]. EBL should be repeated every 1-2 wk until obliteration, the first surveillance endoscopy is performed 1-3 mo after obliteration and then every 6-12 mo to check for variceal recurrence and NSBBs should be adjusted to the maximal tolerated dose^[10,11].

Recently, a meta-analysis of 9 trials has confirmed that the combination of EBL and drug treatment reduces the risk of overall and variceal rebleeding, but not overall mortality, when compared with b-blockers or EBL alone^[39]. However, data evaluating this issue are not very strong. Lo and de la Pena, have shown that adding b-blockers to EBL reduces the risk of rebleeding and variceal recurrence but this effect was not confirmed in a third study^[40-42]. Another two trials failed to show a clear-cut benefit from adding EBL to combined pharmacological therapy with nadolol plus isosorbide mononitrate^[43,44].

In cirrhotic patients that are unable or that refuse EBL, NSBBs is a valid option, in fact causes a reduction in portal pressure and a slight increase of side effects^[11,45].

TIPS should be considered in patients who are Child A or B who experience recurrent variceal hemorrhage despite combination pharmacological and endoscopic therapy^[10,11]. The use of polytetrafluoroethylene (PTFE)-covered stents significantly decreased the rates of obstruction and re-intervention^[46]. Surgical shunt prevents rebleeding but markedly increases the risk of hepatic encephalopathy^[47].

Rescue therapy

In about 10% of patients, despite urgent endoscopic, variceal bleeding cannot be controlled and thus they may be candidates for salvage therapy^[11]. A TIPS is suggested in patients with uncontrolled hemorrhage from esophageal varices with bleeding recurs^[11,48-50]. Balloon tamponade (BT) is a temporary measure in patients with uncontrollable bleeding^[10]. The main complications associated with BT include aspiration pneumonia in unventilated patients, esophageal ulcers, esophageal tears and airway obstruction with fatal complications in 6%-20% of cases^[50].

Fully covered self-expanding metal stent (FCSEMS) placement have been recently proposed as rescue therapy^[51], their use allow the stabilization of the patients until is performed the definitive therapy. Preliminary studies showed an high success rate, with minor complications^[51-54]. Recently the hemostatic powder TC-325 was used as rescue therapy with good results^[55].

GASTRIC VARICES

Seventeen percent of patients with hepatic cirrhosis are affected by gastric varices (GV)^[56]. Gastric varices are classified according their location in: esophago-gastric varices, *i.e.*, esophageal varices extending either from the gastroesophageal junction to the small curvature of the stomach (GOV1), or to the fundus (GOV2); and isolated gastric varices (IGV), located in the stomach (IGV2) or elsewhere in the fundus (IGV1); GOV1 represent 75% of GV, GOV2, IGV1 and IGV2 represent respectively 21%, 1% and 4% of GV^[57]. GOV1 constitute an extension of esophageal varices^[10]. GV bleed less frequently than esophageal varices and with a reported incidence of bleeding of about 25% in 2 years. Fundal varices, however, had a significantly higher bleeding incidence (78% for IGV1 and 55% for GOV2), than GOV1 and IGV2 (10%)^[56]. Risk factors for GV bleeding include red color spots, larger nodular GV, fundal location and an advanced Child-Pugh class^[56,58].

Primary prophylaxis

Little data have been reported about the primary prophylaxis of GV bleeding. Recently a RCT has compared the injection of cyanoacrylate glue with NSBBs in primary prophylaxis of GV bleeding and showed that cyanoacrylate therapy is more efficacious than NSBBs in preventing gastric variceal bleeding^[59].

Acute variceal bleeding

Gastric varices bleeding is less frequent, but more severe than esophageal varices bleeding, therefore it can be more challenging to treat. The management of acute GV bleeding is similarly to the management of esophageal varices bleeding, and include antibiotic prophylaxis, management of euvoletic status and early use of vasoactive drugs^[10,11]. The use of cyanoacrylate glue injection resulted in an high percentage of success (*i.e.*, bleeding cessation)^[60]. A small RCTs compared cyanoacrylate glue injection with EBL and ES and showed that cyanoacrylate injection is as effective as (or more than) ligation in acute bleeding^[61,62]. Leaking of glue (4.4%), sepsis (1.3%), systemic embolism (2%-3%) represent the more common complications related to this treatment^[63,64].

A new technique of treatment was introduced in last years, EUS-guided therapy of gastric fundal varices with a combination of cyanoacrylate glue and coil injection that reduced the risk of glue embolization. Coils act as a scaffold to sustain the cyanoacrylate glue within the varix and decrease the amount of glue injection. In a retrospective cohort study this technique was successful in all patients without procedure-related complications^[65]. A recently study that compared the treatment of GV by using EUS-guided cyanoacrylate injection or EUS-guided coil application showed that both techniques are effective in the obliteration of localized GV. EUS-guided coil required fewer endoscopies and tended to have fewer adverse events compared with EUS-guided cyanoacrylate injection^[66].

TIPS is considered in patients with hemorrhage from fundal varices that can't be controlled or with bleeding that recurs despite the therapy^[11]. Fibrin sealant (a solution of fibrinogen and thrombin) has been injected for arrest of variceal bleeding in small uncontrolled series^[67,68]. Thrombin has been evaluated for use in endoscopic hemostasis of variceal bleeding. In 2 retrospective studies, thrombin achieved hemostasis in bleeding gastric varices in 75% to 94%^[69,70].

Secondary prophylaxis

Cyanoacrylate injection is the most frequent treatment for secondary prophylaxis of GV^[10]. Rebleeding rates after an acute GV bleeding episode treated with tissue adhesives range from 7%-65%^[71]. After initial hemostasis with tissue adhesives, repeated sessions are performed from two to four weeks until is achieved the endoscopic obliteration. Two RCTs compared cyanoacrylate injection with variceal band ligation, showing that cyanoacrylate injection reduced the rebleeding rates^[61,62]. Another study compared cyanoacrylate injection with sclerotherapy and showed a greater control of initial hemostasis and a lower rebleeding rates with cyanoacrylate^[72]. TIPS is considered when patients show hemorrhage that can not be controlled or in whom bleeding recurs^[11,73].

PHG

The prevalence of PHG, in patients with severe liver disease, ranges between the 11% and 80% and is a potential cause of bleeding^[74]. PHG is classified as mild when the only change consists of a snakeskin mosaic pattern, and it is classified as severe when in addition to the mosaic pattern, flat or bulging red or black-brown spots are seen, and/or when there is active hemorrhage^[75]. Acute bleeding from PHG is a rare event, with an incidence less than 3%, the incidence of chronic bleeding is around 10%-15%^[76]. At the current time, there is not enough data to recommend primary prophylaxis of bleeding from PHG in cirrhotic patients^[77].

In the case of acute haemorrhage are administered vasoactive drugs such as vasopressin and its analogue and terlipressin, this drugs are able to control haemorrhage^[78-80]. In rare cases, the medical therapy is unable to control bleeding and in this cases limited data suggests the endoscopic thermal therapy^[81]. Moreover TIPS is employed in the treatment of PHG with improvement of both mild and severe forms and reduction in endoscopic severity as well as transfusion requirement^[82]. Recently haemostatic powder (Hemospray) has been evaluated in patients with acute bleeding due to PHG. This haemostatic powder, which acts by forming a barrier over them bleeding site and enhancing the concentration of clotting factors, was successfully used in four patients actively bleeding from PHG^[83]. In patients who have previously experienced clinically significant GI blood loss, NSBBs should be used for prevention of recurrent bleeding^[10].

GASTRIC ANTRAL VASCULAR ECTASIA

Gastric antral vascular ectasia (GAVE) is a disorder of the stomach that is characterized by the presence of dilated and fragile blood vessels. In patients with cirrhosis GAVE is less detected compared to PHG^[84,85]. There are 2 types of GAVE based on distinctive endoscopic appearances. The classic manifestation consists of appearance of multiple flat, linear, erythematous strips of ectatic vessels radiating from the pylorus to the antrum. The second type is punctate, with punctate red spots scattered throughout the antrum and tends to be more associated with liver cirrhosis^[86]. It is reasonable to not treat GAVE lesions that are asymptomatic^[77]. Neodymium-yttrium-aluminum garnet laser coagulation is used to control GAVE-related bleeding, in fact is able to reduce the need of blood transfusions in 50%-80% of cases. The disadvantages of this technique are the high cost and the need of a long training period^[87-89].

Argon plasma coagulation (APC) is a thermoablative method, which produces thermal coagulation by the use of electric current with high frequency that is passed through with argon gas without contact with the mucosa. APC treatment have an efficacy ranging from 90% to 100%, without the need of blood transfusions with an increase of hemoglobin level in most patients^[90,91].

The most frequently complication of APC treatment is the intestinal gas distension, more serious adverse events are antral stenosis and upper GI hemorrhage^[91]. Argon plasma coagulation is frequently associated with recurrence of bleeding in 30%-60% of cases, in the medium to long term period^[91,92]. The use of EBL has been recently demonstrated for GAVE treatment^[93].

EBL may more reliably obliterate vascular structures in the deep mucosa and submucosa, thus reducing the need for further treatments. Ligation bands are applied to abnormal-appearing mucosa in the antrum. First is treated the distal antrum, after the ligation bands are applied more proximally until most of the abnormal mucosa is treated. Wells *et al.*^[93], in a retrospective study, found that EBL reduced recurrent bleeding and required less treatment sessions and hospital admissions compared to APC treatment^[93]. This finding is in accordance with other two studies^[94,95].

Recently studies examined the use of radiofrequency ablation (RFA) for the treatment of GAVE^[96,97]. These two studies suggests that endoscopic mucosal ablation by using the RFA with HALO system is a viable option for the treatment of chronic bleeding related to GAVE^[96,97]. Additional therapy for GAVE includes cryotherapy, cyanoacrylate spray and surgical antrectomy^[98-101].

ECTOPIC VARICES

Ectopic varices are those varices which are not located in the gastro-esophageal area, are less common and occur in different sites, such as in the jejunum or ileum (18%), in the duodenum (17%) or in the colon (14%), in the rectum (8%), and finally in the peritoneum (9%)^[102,103].

Duodenal varices

Duodenal varices (DV) were reported to be the second cause of ectopic variceal bleeding after the rectal location^[104]. They are most commonly noted in the duodenal bulb followed by the second part of the duodenum^[102,104]. Bleeding due to DV is usually massive, with a mortality rate around the 40% at the first episode^[105,106]. Different sclerosant agents are used for endoscopic injection therapy, for example Seo *et al.*^[107] have been shown how bleeding duodenal varices can be eradicated with injection of ethanolamine. Liu *et al.*^[106] in a five-year retrospective study reported the successful treatment with cyanoacrylate injection in 4 patients with bleeding due to DV. Some authors have reported also the successful EBL of DV bleeding^[108-110]. If rebleeding occur after endoscopic therapy, and TIPS are used as rescue therapy with good results^[111,112].

Small-bowel varices

An uncommon, difficult to treat and sometimes fatal manifestation of portal hypertension is the hemorrhage associated with small-bowel varices. In fact, 8.1% of patients with portal hypertension who underwent to capsule endoscopy present small-bowel varices^[113]. When

the terminal ileum is intubated on colonoscopy the 18% of patients with portal hypertension, present terminal ileal varices^[114]. Double-balloon enteroscopy (DBE) allows to display whole small bowel and perform endoscopic surgeries in patients with bleeding small-bowel varices. Enteroscopic and colonoscopic sclerotherapy of jejunal and ileal varices has been described^[115-118]. TIPS is the first line treatment for refractory variceal bleeding^[119].

Colonic varices

The most common sites of colonic varices are the rectum and cecum^[105]. The rate of colonic variceal bleeding in liver cirrhosis is approximately 1%-8%^[120]. Several interventional therapies like endoscopic variceal ligation, glue injection, TIPS, BRTO, colonic resection have been reported^[121-126].

Rectal varices

Rectal varices are one of the most important causes of bleeding in portal hypertension, they occur in 44% to 89% of cirrhosis^[127-129]. The endoscopic options for treatment of rectal varices are injection therapies using sclerosants or cyanoacrylate glue and band ligation^[130-133]. Recently EUS-guided approach has been used in management of rectal varices. The advantages to use EUS-guided therapy are different and include the ability to treat directly the varix and visualize deeper collateral vessels. The EUS-guided therapy with sclerosant or coil embolization showed good results^[134-136].

PORTAL HYPERTENSIVE BILIOPATHY

Portal hypertensive biliopathy (PHB) is an abnormalities of all biliary tract including intra-hepatic and extra-hepatic bile ducts, cystic duct and gallbladder. The frequency of PHB in patients with extra-hepatic portal venous obstruction (EHPVO), is greater respect to patients with cirrhosis^[137]. EUS could be useful in patients with cirrhosis to identify CBD varices or bile duct stones^[138].

The extraction of CBD stones by endoscopic sphincterotomy is the normally treatment applied in patients with CBD stones. Endoscopic treatment is the best treatment for patients with dominant biliary stricture, but without a shuntable vein. Porto-systemic shunt is performed in patients with dominant biliary strictures with a shuntable vein^[139,140].

PORTAL HYPERTENSIVE ENTEROPATHY

Portal hypertensive enteropathy (PHE) is defined as the presence of several red spots like arterovenous malformations, patchy hyperemia of the mucosa, diffuse mucosal edema, spontaneous bleeding from the mucosa or small bowel varices^[141-143]. Due to the difficult access to the small bowel, in the past the diagnosis of PHE was very difficult, but with the introduction of capsule endoscopy and DBE, PHE seems more common and has

been seen that in cirrhotic patients may cause chronic GI bleeding with portal hypertension^[144,145]. PHG is mostly asymptomatic, although it may bleed acutely leading to hematemesis and/or melena.

PORTAL HYPERTENSIVE COLOPATHY

Portal hypertensive colopathy (PHC) is characterized by erythema of the colonic mucosa and vascular lesions including telangiectasias, cherry-red spots and angiodysplasia-like lesions. The prevalence of PHC in patients with cirrhosis ranging between 25%-70%^[146-148]. Portal hypertension seems to play an important role, and there is an association with a hyperkinetic circulatory state^[149]. Lower GI bleeding due to PHC is estimated up to 9%^[150-152]. In patients with chronic lower GI bleeding secondary to PHC, as reported the treatment with NSBBs is effective^[153]. In patients with acute bleeding, vasoactive medications, such as octreotide or terlipressin, could be effective^[153]. TIPS has been used as a rescue therapy in patients with refractory GI bleeding^[154].

REFERENCES

- 1 **Garcia-Tsao G**, Groszmann RJ, Fisher RL, Conn HO, Atterbury CE, Glickman M. Portal pressure, presence of gastroesophageal varices and variceal bleeding. *Hepatology* 1985; **5**: 419-424 [PMID: 3873388 DOI: 10.1002/hep.1840050313]
- 2 **Groszmann RJ**, Bosch J, Grace ND, Conn HO, Garcia-Tsao G, Navasa M, Alberts J, Rodes J, Fischer R, Bermann M. Hemodynamic events in a prospective randomized trial of propranolol versus placebo in the prevention of a first variceal hemorrhage. *Gastroenterology* 1990; **99**: 1401-1407 [PMID: 2210246]
- 3 **Casado M**, Bosch J, García-Pagán JC, Bru C, Bañares R, Bandi JC, Escorsell A, Rodríguez-Láiz JM, Gilibert R, Feu F, Schorlemer C, Echenagusia A, Rodes J. Clinical events after transjugular intrahepatic portosystemic shunt: correlation with hemodynamic findings. *Gastroenterology* 1998; **114**: 1296-1303 [PMID: 9609767]
- 4 **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**: 217-231 [PMID: 16298014 DOI: 10.1016/j.jhep.2005.10.013]
- 5 **North Italian Endoscopic Club for the Study and Treatment of Esophageal Varices**. Prediction of the first variceal hemorrhage in patients with cirrhosis of the liver and esophageal varices. A prospective multicenter study. *N Engl J Med* 1988; **319**: 983-989 [PMID: 3262200 DOI: 10.1056/NEJM198810133191505]
- 6 **Carbonell N**, Pauwels A, Serfaty L, Fourdan O, Lévy VG, Poupon R. Improved survival after variceal bleeding in patients with cirrhosis over the past two decades. *Hepatology* 2004; **40**: 652-659 [PMID: 15349904 DOI: 10.1002/hep.20339]
- 7 **D'Amico G**, De Franchis R. Upper digestive bleeding in cirrhosis. Post-therapeutic outcome and prognostic indicators. *Hepatology* 2003; **38**: 599-612 [PMID: 12939586 DOI: 10.1053/jhep.2003.50385]
- 8 **Bernard B**, Grangé JD, Khac EN, Amiot X, Opolon P, Poinard T. Antibiotic prophylaxis for the prevention of bacterial infections in cirrhotic patients with gastrointestinal bleeding: a meta-analysis. *Hepatology* 1999; **29**: 1655-1661 [PMID: 10347104 DOI: 10.1002/hep.510290608]
- 9 **Urrunaga NH**, Rockey DC. Portal hypertensive gastropathy

- and colopathy. *Clin Liver Dis* 2014; **18**: 389-406 [PMID: 24679502 DOI: 10.1016/j.cld.2014.01.008]
- 10 **de Franchis R.** Revising consensus in portal hypertension: report of the Baveno V consensus workshop on methodology of diagnosis and therapy in portal hypertension. *J Hepatol* 2010; **53**: 762-768 [PMID: 20638742 DOI: 10.1016/j.jhep.2010.06.004]
 - 11 **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]
 - 12 **Schepke M,** Kleber G, Nürnberg D, Willert J, Koch L, Veltzke-Schlieker W, Hellerbrand C, Kuth J, Schanz S, Kahl S, Fleig WE, Sauerbruch T. Ligation versus propranolol for the primary prophylaxis of variceal bleeding in cirrhosis. *Hepatology* 2004; **40**: 65-72 [PMID: 15239087 DOI: 10.1002/hep.20284]
 - 13 **Schmitz RJ,** Sharma P, Badr AS, Qamar MT, Weston AP. Incidence and management of esophageal stricture formation, ulcer bleeding, perforation, and massive hematoma formation from sclerotherapy versus band ligation. *Am J Gastroenterol* 2001; **96**: 437-441 [PMID: 11232687 DOI: 10.1111/j.1572-0241.2001.03460.x]
 - 14 **Yoshida H,** Mamada Y, Taniai N, Yamamoto K, Kawano Y, Mizuguchi Y, Shimizu T, Takahashi T, Tajiri T. A randomized control trial of bi-monthly versus bi-weekly endoscopic variceal ligation of esophageal varices. *Am J Gastroenterol* 2005; **100**: 2005-2009 [PMID: 16128945 DOI: 10.1111/j.1572-0241.2005.41864.x]
 - 15 **D'Amico G,** Pagliaro L, Bosch J. Pharmacological treatment of portal hypertension: an evidence-based approach. *Semin Liver Dis* 1999; **19**: 475-505 [PMID: 10643630 DOI: 10.1055/s-2007-1007133]
 - 16 **Poynard T,** Calès P, Pasta L, Ideo G, Pascal JP, Pagliaro L, Lebrech D. Beta-adrenergic-antagonist drugs in the prevention of gastrointestinal bleeding in patients with cirrhosis and esophageal varices. An analysis of data and prognostic factors in 589 patients from four randomized clinical trials. Franco-Italian Multicenter Study Group. *N Engl J Med* 1991; **324**: 1532-1538 [PMID: 1674104 DOI: 10.1056/NEJM199105303242202]
 - 17 **Garcia-Tsao G,** Bosch J. Management of varices and variceal hemorrhage in cirrhosis. *N Engl J Med* 2010; **362**: 823-832 [PMID: 20200386 DOI: 10.1056/NEJMra0901512]
 - 18 **Imperiale TF,** Chalasani N. A meta-analysis of endoscopic variceal ligation for primary prophylaxis of esophageal variceal bleeding. *Hepatology* 2001; **33**: 802-807 [PMID: 11283842 DOI: 10.1053/jhep.2001.23054]
 - 19 **Glued LL,** Krag A. Banding ligation versus beta-blockers for primary prevention in oesophageal varices in adults. *Cochrane Database Syst Rev* 2012; **8**: CD004544 [PMID: 22895942 DOI: 10.1002/14651858.CD004544.pub2]
 - 20 **de Paulo GA,** Ardengh JC, Nakao FS, Ferrari AP. Treatment of esophageal varices: a randomized controlled trial comparing endoscopic sclerotherapy and EUS-guided sclerotherapy of esophageal collateral veins. *Gastrointest Endosc* 2006; **63**: 396-402; quiz 463 [PMID: 16500386 DOI: 10.1016/j.gie.2005.10.039]
 - 21 **Augustin S,** Muntaner L, Altamirano J, González A, Saperas E, Dot J, Abu-Suboh M, Armengol JR, Malagelada JR, Esteban R, Guardia J, Genescà J. Predicting early mortality after acute variceal hemorrhage based on classification and regression tree analysis. *Clin Gastroenterol Hepatol* 2009; **7**: 1347-1354 [PMID: 19699816 DOI: 10.1016/j.cgh.2009.08.011]
 - 22 **Amitrano L,** Guardascione MA, Manguso F, Bennato R, Bove A, DeNucci C, Lombardi G, Martino R, Menchise A, Orsini L, Picascia S, Riccio E. The effectiveness of current acute variceal bleed treatments in unselected cirrhotic patients: refining short-term prognosis and risk factors. *Am J Gastroenterol* 2012; **107**: 1872-1878 [PMID: 23007003 DOI: 10.1038/ajg.2012.313]
 - 23 **Augustin S,** Altamirano J, González A, Dot J, Abu-Suboh M, Armengol JR, Azpiroz F, Esteban R, Guardia J, Genescà J. Effectiveness of combined pharmacologic and ligation therapy in high-risk patients with acute esophageal variceal bleeding. *Am J Gastroenterol* 2011; **106**: 1787-1795 [PMID: 21625271 DOI: 10.1038/ajg.2011.173]
 - 24 **Castañeda B,** Morales J, Lionetti R, Moitinho E, Andreu V, Pérez-Del-Pulgar S, Pizcueta P, Rodés J, Bosch J. Effects of blood volume restitution following a portal hypertensive-related bleeding in anesthetized cirrhotic rats. *Hepatology* 2001; **33**: 821-825 [PMID: 11283845 DOI: 10.1053/jhep.2001.23437]
 - 25 **Villanueva C,** Colomo A, Bosch A, Concepción M, Hernandez-Gea V, Aracil C, Graupera I, Poca M, Alvarez-Urturi C, Gordillo J, Guarner-Argente C, Santaló M, Muñoz E, Guarner C. Transfusion strategies for acute upper gastrointestinal bleeding. *N Engl J Med* 2013; **368**: 11-21 [PMID: 23281973 DOI: 10.1056/NEJMoa1211801]
 - 26 **Hou MC,** Lin HC, Liu TT, Kuo BI, Lee FY, Chang FY, Lee SD. Antibiotic prophylaxis after endoscopic therapy prevents rebleeding in acute variceal hemorrhage: a randomized trial. *Hepatology* 2004; **39**: 746-753 [PMID: 14999693 DOI: 10.1002/hep.20126]
 - 27 **Chavez-Tapia NC,** Barrientos-Gutierrez T, Tellez-Avila F, Soares-Weiser K, Mendez-Sanchez N, Glued C, Uribe M. Meta-analysis: antibiotic prophylaxis for cirrhotic patients with upper gastrointestinal bleeding - an updated Cochrane review. *Aliment Pharmacol Ther* 2011; **34**: 509-518 [PMID: 21707680 DOI: 10.1111/j.1365-2036.2011.04746.x]
 - 28 **Bañares R,** Albillos A, Rincón D, Alonso S, González M, Ruiz-del-Arbol L, Salcedo M, Molinero LM. Endoscopic treatment versus endoscopic plus pharmacologic treatment for acute variceal bleeding: a meta-analysis. *Hepatology* 2002; **35**: 609-615 [PMID: 11870374 DOI: 10.1053/jhep.2002.31354]
 - 29 **Laine L,** Cook D. Endoscopic ligation compared with sclerotherapy for treatment of esophageal variceal bleeding. A meta-analysis. *Ann Intern Med* 1995; **123**: 280-287 [PMID: 7611595 DOI: 10.7326/0003-4819-123-4-199508150-00007]
 - 30 **Avgerinos A,** Armonis A, Stefanidis G, Mathou N, Vlachogiannakos J, Kougioumtzian A, Triantos C, Papaxoinis C, Manolopoulos S, Panani A, Raptis SA. Sustained rise of portal pressure after sclerotherapy, but not band ligation, in acute variceal bleeding in cirrhosis. *Hepatology* 2004; **39**: 1623-1630 [PMID: 15185303 DOI: 10.1002/hep.20236]
 - 31 **Lahoti S,** Catalano MF, Alcocer E, Hogan WJ, Geenen JE. Obliteration of esophageal varices using EUS-guided sclerotherapy with color Doppler. *Gastrointest Endosc* 2000; **51**: 331-333 [PMID: 10699783 DOI: 10.1016/S0016-5107(00)70363-4]
 - 32 **Cipolletta L,** Zambelli A, Bianco MA, De Grazia F, Meucci C, Lupinacci G, Salerno R, Piscopo R, Marmo R, Orsini L, Rotondano G. Acrylate glue injection for acutely bleeding oesophageal varices: A prospective cohort study. *Dig Liver Dis* 2009; **41**: 729-734 [PMID: 19362522 DOI: 10.1016/j.dld.2009.02.006]
 - 33 **Villanueva C,** Ortiz J, Miñana J, Soriano G, Sàbat M, Boadas J, Balanzó J. Somatostatin treatment and risk stratification by continuous portal pressure monitoring during acute variceal bleeding. *Gastroenterology* 2001; **121**: 110-117 [PMID: 11438499 DOI: 10.1053/gast.2001.25536]
 - 34 **García-Pagán JC,** Caca K, Bureau C, Laleman W, Appenrodt B, Luca A, Abraldes JG, Nevens F, Vinel JP, Mössner J, Bosch J. Early use of TIPS in patients with cirrhosis and variceal bleeding. *N Engl J Med* 2010; **362**: 2370-2379 [PMID: 20573925 DOI: 10.1056/NEJMoa0910102]
 - 35 **Graham DY,** Smith JL. The course of patients after variceal hemorrhage. *Gastroenterology* 1981; **80**: 800-809 [PMID:

- 6970703]
- 36 **Burroughs AK**. The natural history of varices. *J Hepatol* 1993; **17** Suppl 2: S10-S13 [PMID: 8491964 DOI: 10.1016/S0168-8278(05)80448-9]
 - 37 **Li L, Yu C, Li Y**. Endoscopic band ligation versus pharmacological therapy for variceal bleeding in cirrhosis: a meta-analysis. *Can J Gastroenterol* 2011; **25**: 147-155 [PMID: 21499579]
 - 38 **García-Pagán JC, Bosch J**. Endoscopic band ligation in the treatment of portal hypertension. *Nat Clin Pract Gastroenterol Hepatol* 2005; **2**: 526-535 [PMID: 16355158 DOI: 10.1038/ncpgasthep0323]
 - 39 **Thiele M, Krag A, Rohde U, Gluud LL**. Meta-analysis: banding ligation and medical interventions for the prevention of rebleeding from oesophageal varices. *Aliment Pharmacol Ther* 2012; **35**: 1155-1165 [PMID: 22449261 DOI: 10.1111/j.1365-2036.2012.05074.x]
 - 40 **Lo GH, Lai KH, Cheng JS, Chen MH, Huang HC, Hsu PI, Lin CK**. Endoscopic variceal ligation plus nadolol and sucralfate compared with ligation alone for the prevention of variceal rebleeding: a prospective, randomized trial. *Hepatology* 2000; **32**: 461-465 [PMID: 10960435 DOI: 10.1053/jhep.2000.16236]
 - 41 **de la Peña J, Brullet E, Sanchez-Hernández E, Rivero M, Vergara M, Martin-Lorente JL, Garcia Suárez C**. Variceal ligation plus nadolol compared with ligation for prophylaxis of variceal rebleeding: a multicenter trial. *Hepatology* 2005; **41**: 572-578 [PMID: 15726659 DOI: 10.1002/hep.20584]
 - 42 **Kumar A, Jha SK, Sharma P, Dubey S, Tyagi P, Sharma BC, Sarin SK**. Addition of propranolol and isosorbide mononitrate to endoscopic variceal ligation does not reduce variceal rebleeding incidence. *Gastroenterology* 2009; **137**: 892-901, 901.e1 [PMID: 19481079 DOI: 10.1053/j.gastro.2009.05.049]
 - 43 **García-Pagán JC, Villanueva C, Albillos A, Bañares R, Morillas R, Abraldes JG, Bosch J**. Nadolol plus isosorbide mononitrate alone or associated with band ligation in the prevention of recurrent bleeding: a multicentre randomised controlled trial. *Gut* 2009; **58**: 1144-1150 [PMID: 19218249 DOI: 10.1136/gut.2008.171207]
 - 44 **Lo GH, Chen WC, Chan HH, Tsai WL, Hsu PI, Lin CK, Chen TA, Lai KH**. A randomized, controlled trial of banding ligation plus drug therapy versus drug therapy alone in the prevention of esophageal variceal rebleeding. *J Gastroenterol Hepatol* 2009; **24**: 982-987 [PMID: 19638080 DOI: 10.1111/j.1440-1746.2009.05792.x]
 - 45 **Gournay J, Masliah C, Martin T, Perrin D, Galmiche JP**. Isosorbide mononitrate and propranolol compared with propranolol alone for the prevention of variceal rebleeding. *Hepatology* 2000; **31**: 1239-1245 [PMID: 10827148 DOI: 10.1053/jhep.2000.8106]
 - 46 **Bureau C, Garcia-Pagan JC, Otal P, Pomier-Layrargues G, Chabbert V, Cortez C, Perreault P, Péron JM, Abraldes JG, Bouchard L, Bilbao JI, Bosch J, Rousseau H, Vinel JP**. Improved clinical outcome using polytetrafluoroethylene-coated stents for TIPS: results of a randomized study. *Gastroenterology* 2004; **126**: 469-475 [PMID: 14762784 DOI: 10.1053/j.gastro.2003.11.016]
 - 47 **Grace ND, Conn HO, Resnick RH, Groszmann RJ, Atterbury CE, Wright SC, Gusberg RJ, Vollman R, Garcia-Tsao G, Fisher RL**. Distal splenorenal vs. portal-systemic shunts after hemorrhage from varices: a randomized controlled trial. *Hepatology* 1988; **8**: 1475-1481 [PMID: 3056820 DOI: 10.1002/hep.1840080602]
 - 48 **Azoulay D, Castaing D, Majno P, Saliba F, Ichai P, Smail A, Delvart V, Danaoui M, Samuel D, Bismuth H**. Salvage transjugular intrahepatic portosystemic shunt for uncontrolled variceal bleeding in patients with decompensated cirrhosis. *J Hepatol* 2001; **35**: 590-597 [PMID: 11690704 DOI: 10.1016/S0168-8278(01)00185-4]
 - 49 **Vangeli M, Patch D, Burroughs AK**. Salvage tips for uncontrolled variceal bleeding. *J Hepatol* 2002; **37**: 703-704 [PMID: 12399244 DOI: 10.1016/S0168-8278(02)00321-5]
 - 50 **D'Amico G, Pagliaro L, Bosch J**. The treatment of portal hypertension: a meta-analytic review. *Hepatology* 1995; **22**: 332-354 [PMID: 7601427 DOI: 10.1002/hep.1840220145]
 - 51 **Wright G, Lewis H, Hogan B, Burroughs A, Patch D, O'Beirne J**. A self-expanding metal stent for complicated variceal hemorrhage: experience at a single center. *Gastrointest Endosc* 2010; **71**: 71-78 [PMID: 19879564 DOI: 10.1016/j.gie.2009.07.028]
 - 52 **Hubmann R, Bodlaj G, Czompo M, Benkö L, Pichler P, Al-Kathib S, Kiblböck P, Shamyieh A, Biesenbach G**. The use of self-expanding metal stents to treat acute esophageal variceal bleeding. *Endoscopy* 2006; **38**: 896-901 [PMID: 16981106 DOI: 10.1055/s-2006-944662]
 - 53 **Zehetner J, Shamyieh A, Wayand W, Hubmann R**. Results of a new method to stop acute bleeding from esophageal varices: implantation of a self-expanding stent. *Surg Endosc* 2008; **22**: 2149-2152 [PMID: 18622540 DOI: 10.1007/s00464-008-0009-7]
 - 54 **Dechène A, El Fouly AH, Bechmann LP, Jochum C, Saner FH, Gerken G, Canbay A**. Acute management of refractory variceal bleeding in liver cirrhosis by self-expanding metal stents. *Digestion* 2012; **85**: 185-191 [PMID: 22269340 DOI: 10.1159/000335081]
 - 55 **Ibrahim M, El-Mikkawy A, Mostafa I, Devière J**. Endoscopic treatment of acute variceal hemorrhage by using hemostatic powder TC-325: a prospective pilot study. *Gastrointest Endosc* 2013; **78**: 769-773 [PMID: 24120338 DOI: 10.1016/j.gie.2013.07.037]
 - 56 **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]
 - 57 **Ryan BM, Stockbrugger RW, Ryan JM**. A pathophysiologic, gastroenterologic, and radiologic approach to the management of gastric varices. *Gastroenterology* 2004; **126**: 1175-1189 [PMID: 15057756 DOI: 10.1053/j.gastro.2004.01.058]
 - 58 **Kim T, Shijo H, Kokawa H, Tokumitsu H, Kubara K, Ota K, Akiyoshi N, Iida T, Yokoyama M, Okumura M**. Risk factors for hemorrhage from gastric fundal varices. *Hepatology* 1997; **25**: 307-312 [PMID: 9021939 DOI: 10.1002/hep.510250209]
 - 59 **Mishra SR, Sharma BC, Kumar A, Sarin SK**. Primary prophylaxis of gastric variceal bleeding comparing cyanoacrylate injection and beta-blockers: a randomized controlled trial. *J Hepatol* 2011; **54**: 1161-1167 [PMID: 21145834 DOI: 10.1016/j.jhep.2010.09.031]
 - 60 **Consolo P, Luigiano C, Giacobbe G, Scaffidi MG, Pellicano R, Familiari L**. Cyanoacrylate glue in the management of gastric varices. *Minerva Med* 2009; **100**: 115-121 [PMID: 19078888]
 - 61 **Tan PC, Hou MC, Lin HC, Liu TT, Lee FY, Chang FY, Lee SD**. A randomized trial of endoscopic treatment of acute gastric variceal hemorrhage: N-butyl-2-cyanoacrylate injection versus band ligation. *Hepatology* 2006; **43**: 690-697 [PMID: 16557539 DOI: 10.1002/hep.21145]
 - 62 **Lo GH, Lai KH, Cheng JS, Chen MH, Chiang HT**. A prospective, randomized trial of butyl cyanoacrylate injection versus band ligation in the management of bleeding gastric varices. *Hepatology* 2001; **33**: 1060-1064 [PMID: 11343232 DOI: 10.1053/jhep.2001.24116]
 - 63 **Cheng LF, Wang ZQ, Li CZ, Lin W, Yeo AE, Jin B**. Low incidence of complications from endoscopic gastric variceal obturation with butyl cyanoacrylate. *Clin Gastroenterol Hepatol* 2010; **8**: 760-766 [PMID: 20621678 DOI: 10.1016/j.cgh.2010.05.019]
 - 64 **Joo HS, Jang JY, Eun SH, Kim SK, Jung IS, Ryu CB, Kim YS, Kim JO, Cho JY, Kim YS, Lee JS, Lee MS, Shim CS, Kim**

- BS. [Long-term results of endoscopic histoacryl (N-butyl-2-cyanoacrylate) injection for treatment of gastric varices--a 10-year experience]. *Korean J Gastroenterol* 2007; **49**: 320-326 [PMID: 17525520]
- 65 **Binmoeller KF**, Weilert F, Shah JN, Kim J. EUS-guided transesophageal treatment of gastric fundal varices with combined coiling and cyanoacrylate glue injection (with videos). *Gastrointest Endosc* 2011; **74**: 1019-1025 [PMID: 21889139 DOI: 10.1016/j.gie.2011.06.030]
- 66 **Romero-Castro R**, Ellrichmann M, Ortiz-Moyano C, Subtil-Inigo JC, Junquera-Florez F, Gornals JB, Repiso-Ortega A, Vila-Costas J, Marcos-Sanchez F, Muñoz-Navas M, Romero-Gomez M, Brullet-Benedi E, Romero-Vazquez J, Caunedo-Alvarez A, Pellicer-Bautista F, Herrerias-Gutierrez JM, Fritscher-Ravens A. EUS-guided coil versus cyanoacrylate therapy for the treatment of gastric varices: a multicenter study (with videos). *Gastrointest Endosc* 2013; **78**: 711-721 [PMID: 23891417 DOI: 10.1016/j.gie.2013.05.009]
- 67 **Datta D**, Vlavianos P, Alisa A, Westaby D. Use of fibrin glue (beriplast) in the management of bleeding gastric varices. *Endoscopy* 2003; **35**: 675-678 [PMID: 12929063 DOI: 10.1055/s-2003-41517]
- 68 **Heneghan MA**, Byrne A, Harrison PM. An open pilot study of the effects of a human fibrin glue for endoscopic treatment of patients with acute bleeding from gastric varices. *Gastrointest Endosc* 2002; **56**: 422-426 [PMID: 12196788 DOI: 10.1016/S0016-5107(02)70054-0]
- 69 **Przemioslo RT**, McNair A, Williams R. Thrombin is effective in arresting bleeding from gastric variceal hemorrhage. *Dig Dis Sci* 1999; **44**: 778-781 [PMID: 10219838 DOI: 10.1023/A:1026626212129]
- 70 **Yang WL**, Tripathi D, Therapondos G, Todd A, Hayes PC. Endoscopic use of human thrombin in bleeding gastric varices. *Am J Gastroenterol* 2002; **97**: 1381-1385 [PMID: 12094854 DOI: 10.1111/j.1572-0241.2002.05776.x]
- 71 **García-Pagán JC**, Barrufet M, Cardenas A, Escorsell A. Management of gastric varices. *Clin Gastroenterol Hepatol* 2014; **12**: 919-928.e1; quiz e51-52 [PMID: 23899955 DOI: 10.1016/j.cgh.2013.07.015]
- 72 **Sarin SK**, Jain AK, Jain M, Gupta R. A randomized controlled trial of cyanoacrylate versus alcohol injection in patients with isolated fundic varices. *Am J Gastroenterol* 2002; **97**: 1010-1015 [PMID: 12003381 DOI: 10.1111/j.1572-0241.2002.05622.x]
- 73 **Lo GH**, Liang HL, Chen WC, Chen MH, Lai KH, Hsu PI, Lin CK, Chan HH, Pan HB. A prospective, randomized controlled trial of transjugular intrahepatic portosystemic shunt versus cyanoacrylate injection in the prevention of gastric variceal rebleeding. *Endoscopy* 2007; **39**: 679-685 [PMID: 17661241 DOI: 10.1055/s-2007-966591]
- 74 **Merli M**, Nicolini G, Angeloni S, Gentili F, Attili AF, Riggio O. The natural history of portal hypertensive gastropathy in patients with liver cirrhosis and mild portal hypertension. *Am J Gastroenterol* 2004; **99**: 1959-1965 [PMID: 15447756 DOI: 10.1111/j.1572-0241.2004.40246.x]
- 75 **de Franchis R**. Updating consensus in portal hypertension: report of the Baveno III Consensus Workshop on definitions, methodology and therapeutic strategies in portal hypertension. *J Hepatol* 2000; **33**: 846-852 [PMID: 11097497 DOI: 10.1016/S0168-8278(00)80320-7]
- 76 **Primignani M**, Carpinelli L, Preatoni P, Battaglia G, Carta A, Prada A, Cestari R, Angeli P, Gatta A, Rossi A, Spinzi G, De Franchis R. Natural history of portal hypertensive gastropathy in patients with liver cirrhosis. The New Italian Endoscopic Club for the study and treatment of esophageal varices (NIEC). *Gastroenterology* 2000; **119**: 181-187 [PMID: 10889167 DOI: 10.1053/gast.2000.8555]
- 77 **Ripoll C**, Garcia-Tsao G. The management of portal hypertensive gastropathy and gastric antral vascular ectasia. *Dig Liver Dis* 2011; **43**: 345-351 [PMID: 21095166 DOI: 10.1016/j.dld.2010.10.006]
- 78 **Kouroumalis EA**, Koutroubakis IE, Manousos ON. Somatostatin for acute severe bleeding from portal hypertensive gastropathy. *Eur J Gastroenterol Hepatol* 1998; **10**: 509-512 [PMID: 9855068]
- 79 **Zhou Y**, Qiao L, Wu J, Hu H, Xu C. Comparison of the efficacy of octreotide, vasopressin, and omeprazole in the control of acute bleeding in patients with portal hypertensive gastropathy: a controlled study. *J Gastroenterol Hepatol* 2002; **17**: 973-979 [PMID: 12167118 DOI: 10.1046/j.1440-1746.2002.02775.x]
- 80 **Bruha R**, Marecek Z, Spicak J, Hulek P, Lata J, Petrtyl J, Urbanek P, Taimr P, Volfova M, Dite P. Double-blind randomized, comparative multicenter study of the effect of terlipressin in the treatment of acute esophageal variceal and/or hypertensive gastropathy bleeding. *Hepatogastroenterology* 2002; **49**: 1161-1166 [PMID: 12143227]
- 81 **Herrera S**, Bordas JM, Llach J, Ginès A, Pellisé M, Fernández-Esparrach G, Mondelo F, Mata A, Cárdenas A, Castells A. The beneficial effects of argon plasma coagulation in the management of different types of gastric vascular ectasia lesions in patients admitted for GI hemorrhage. *Gastrointest Endosc* 2008; **68**: 440-446 [PMID: 18423466 DOI: 10.1016/j.gie.2008.02.009]
- 82 **Kamath PS**, Lacerda M, Ahlquist DA, McKusick MA, Andrews JC, Nagorney DA. Gastric mucosal responses to intrahepatic portosystemic shunting in patients with cirrhosis. *Gastroenterology* 2000; **118**: 905-911 [PMID: 10784589 DOI: 10.1016/S0016-5085(00)70176-4]
- 83 **Smith LA**, Morris AJ, Stanley AJ. The use of hemospray in portal hypertensive bleeding; a case series. *J Hepatol* 2014; **60**: 457-460 [PMID: 24140803 DOI: 10.1016/j.jhep.2013.10.008]
- 84 **Ward EM**, Raimondo M, Rosser BG, Wallace MB, Dickson RD. Prevalence and natural history of gastric antral vascular ectasia in patients undergoing orthotopic liver transplantation. *J Clin Gastroenterol* 2004; **38**: 898-900 [PMID: 15492609]
- 85 **Fontana RJ**, Sanyal AJ, Mehta S, Doherty MC, Neuschwander-Tetri BA, Everson GT, Kahn JA, Malet PF, Sheikh MY, Chung RT, Ghany MG, Gretch DR. Portal hypertensive gastropathy in chronic hepatitis C patients with bridging fibrosis and compensated cirrhosis: results from the HALT-C trial. *Am J Gastroenterol* 2006; **101**: 983-992 [PMID: 16573786 DOI: 10.1111/j.1572-0241.2006.00461.x]
- 86 **Ito M**, Uchida Y, Kamano S, Kawabata H, Nishioka M. Clinical comparisons between two subsets of gastric antral vascular ectasia. *Gastrointest Endosc* 2001; **53**: 764-770 [PMID: 11375585 DOI: 10.1067/mge.2001.113922]
- 87 **Gostout CJ**, Ahlquist DA, Radford CM, Viggiano TR, Bowyer BA, Balm RK. Endoscopic laser therapy for watermelon stomach. *Gastroenterology* 1989; **96**: 1462-1465 [PMID: 2785467]
- 88 **Sargeant IR**, Loizou LA, Rampton D, Tulloch M, Bown SG. Laser ablation of upper gastrointestinal vascular ectasias: long term results. *Gut* 1993; **34**: 470-475 [PMID: 8491392 DOI: 10.1136/gut.34.4.470]
- 89 **Potamiano S**, Carter CR, Anderson JR. Endoscopic laser treatment of diffuse gastric antral vascular ectasia. *Gut* 1994; **35**: 461-463 [PMID: 8174981 DOI: 10.1136/gut.35.4.461]
- 90 **Roman S**, Saurin JC, Dumortier J, Perreira A, Bernard G, Ponchon T. Tolerance and efficacy of argon plasma coagulation for controlling bleeding in patients with typical and atypical manifestations of watermelon stomach. *Endoscopy* 2003; **35**: 1024-1028 [PMID: 14648415 DOI: 10.1055/s-2003-44594]
- 91 **Yusoff I**, Brennan F, Ormonde D, Laurence B. Argon plasma coagulation for treatment of watermelon stomach. *Endoscopy* 2002; **34**: 407-410 [PMID: 11972274 DOI: 10.1055/

- s-2002-25287]
- 92 **Probst A**, Scheubel R, Wienbeck M. Treatment of watermelon stomach (GAVE syndrome) by means of endoscopic argon plasma coagulation (APC): long-term outcome. *Z Gastroenterol* 2001; **39**: 447-452 [PMID: 11474999 DOI: 10.1055/s-2001-15722]
 - 93 **Wells CD**, Harrison ME, Gurudu SR, Crowell MD, Byrne TJ, Depetris G, Sharma VK. Treatment of gastric antral vascular ectasia (watermelon stomach) with endoscopic band ligation. *Gastrointest Endosc* 2008; **68**: 231-236 [PMID: 18533150 DOI: 10.1016/j.gie.2008.02.021]
 - 94 **Sato T**, Yamazaki K, Akaike J. Endoscopic band ligation versus argon plasma coagulation for gastric antral vascular ectasia associated with liver diseases. *Dig Endosc* 2012; **24**: 237-242 [PMID: 22725108 DOI: 10.1111/j.1443-1661.2011.01221.x]
 - 95 **Keohane J**, Berro W, Harewood GC, Murray FE, Patchett SE. Band ligation of gastric antral vascular ectasia is a safe and effective endoscopic treatment. *Dig Endosc* 2013; **25**: 392-396 [PMID: 23808945 DOI: 10.1111/j.1443-1661.2012.01410.x]
 - 96 **Gross SA**, Al-Haddad M, Gill KR, Schore AN, Wallace MB. Endoscopic mucosal ablation for the treatment of gastric antral vascular ectasia with the HALO90 system: a pilot study. *Gastrointest Endosc* 2008; **67**: 324-327 [PMID: 18226696 DOI: 10.1016/j.gie.2007.09.020]
 - 97 **McGorisk T**, Krishnan K, Keefer L, Komanduri S. Radiofrequency ablation for refractory gastric antral vascular ectasia (with video). *Gastrointest Endosc* 2013; **78**: 584-588 [PMID: 23660565 DOI: 10.1016/j.gie.2013.04.173]
 - 98 **Kantsevov SV**, Cruz-Correa MR, Vaughn CA, Jagannath SB, Pasricha PJ, Kalloo AN. Endoscopic cryotherapy for the treatment of bleeding mucosal vascular lesions of the GI tract: a pilot study. *Gastrointest Endosc* 2003; **57**: 403-406 [PMID: 12612530 DOI: 10.1067/mge.2003.115]
 - 99 **Cho S**, Zanati S, Yong E, Cirocco M, Kandel G, Kortan P, May G, Marcon N. Endoscopic cryotherapy for the management of gastric antral vascular ectasia. *Gastrointest Endosc* 2008; **68**: 895-902 [PMID: 18640673 DOI: 10.1016/j.gie.2008.03.1109]
 - 100 **Walia SS**, Sachdeva A, Kim JJ, Portocarrero DJ, Lewis TD, Zhao YS. Cyanoacrylate spray for treatment of difficult-to-control GI bleeding. *Gastrointest Endosc* 2013; **78**: 536-539 [PMID: 23948199 DOI: 10.1016/j.gie.2013.05.011]
 - 101 **Sherman V**, Klassen DR, Feldman LS, Jabbari M, Marcus V, Fried GM. Laparoscopic antrectomy: a novel approach to treating watermelon stomach. *J Am Coll Surg* 2003; **197**: 864-867 [PMID: 14585429 DOI: 10.1016/S1072-7515(03)00600-8]
 - 102 **Norton ID**, Andrews JC, Kamath PS. Management of ectopic varices. *Hepatology* 1998; **28**: 1154-1158 [PMID: 9755256 DOI: 10.1002/hep.510280434]
 - 103 **Lebrec D**, Benhamou JP. Ectopic varices in portal hypertension. *Clin Gastroenterol* 1985; **14**: 105-121 [PMID: 3872747]
 - 104 **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]
 - 105 **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]
 - 106 **Liu Y**, Yang J, Wang J, Chai G, Sun G, Wang Z, Yang Y. Clinical characteristics and endoscopic treatment with cyanoacrylate injection in patients with duodenal varices. *Scand J Gastroenterol* 2009; **44**: 1012-1016 [PMID: 19513934 DOI: 10.1080/00365520903030787]
 - 107 **Seo YS**, Kwon YD, Park S, Keum B, Park BJ, Kim YS, Jeon YT, Chun HJ, Kim CD, Ryu HS, Um SH. Complete eradication of duodenal varices after endoscopic injection sclerotherapy with ethanolamine oleate: a case report. *Gastrointest Endosc* 2008; **67**: 759-762 [PMID: 18206152 DOI: 10.1016/j.gie.2007.08.027]
 - 108 **Schmeltzer PA**, Smith MT. Duodenal variceal bleeding successfully treated with endoscopic banding (with video). *Gastrointest Endosc* 2011; **74**: 716-717 [PMID: 21111410 DOI: 10.1016/j.gie.2010.09.030]
 - 109 **Sousa HT**, Gregório C, Amaro P, Ferreira M, Romãozinho JM, Gouveia H, Leitão MC. Successful endoscopic banding after cyanoacrylate failure for active bleeding duodenal varix. *Rev Esp Enferm Dig* 2008; **100**: 171-172 [PMID: 18416643]
 - 110 **Gunnerson AC**, Diehl DL, Nguyen VN, Shellenberger MJ, Blansfield J. Endoscopic duodenal variceal ligation: a series of 4 cases and review of the literature (with video). *Gastrointest Endosc* 2012; **76**: 900-904 [PMID: 22840294 DOI: 10.1016/j.gie.2012.05.020]
 - 111 **Hashimoto R**, Sofue K, Takeuchi Y, Shibamoto K, Arai Y. Successful balloon-occluded retrograde transvenous obliteration for bleeding duodenal varices using cyanoacrylate. *World J Gastroenterol* 2013; **19**: 951-954 [PMID: 23429766 DOI: 10.3748/wjg.v19.i6.951]
 - 112 **Kim MJ**, Jang BK, Chung WJ, Hwang JS, Kim YH. Duodenal variceal bleeding after balloon-occluded retrograde transverse obliteration: treatment with transjugular intrahepatic portosystemic shunt. *World J Gastroenterol* 2012; **18**: 2877-2880 [PMID: 22719200 DOI: 10.3748/wjg.v18.i22.2877]
 - 113 **De Palma GD**, Rega M, Masone S, Persico F, Siciliano S, Patrone F, Matantuono L, Persico G. Mucosal abnormalities of the small bowel in patients with cirrhosis and portal hypertension: a capsule endoscopy study. *Gastrointest Endosc* 2005; **62**: 529-534 [PMID: 16185966 DOI: 10.1016/S0016-5107(05)01588-9]
 - 114 **Misra SP**, Dwivedi M, Misra V, Gupta M. Ileal varices and portal hypertensive ileopathy in patients with cirrhosis and portal hypertension. *Gastrointest Endosc* 2004; **60**: 778-783 [PMID: 15557954 DOI: 10.1016/S0016-5107(04)02049-8]
 - 115 **Getzlaff S**, Benz CA, Schilling D, Riemann JF. Enteroscopic cyanoacrylate sclerotherapy of jejunal and gallbladder varices in a patient with portal hypertension. *Endoscopy* 2001; **33**: 462-464 [PMID: 11396768 DOI: 10.1055/s-2001-14258]
 - 116 **Hekmat H**, Al-toma A, Mallant MP, Mulder CJ, Jacobs MA. Endoscopic N-butyl-2-cyanoacrylate (Histoacryl) obliteration of jejunal varices by using the double balloon enteroscope. *Gastrointest Endosc* 2007; **65**: 350-352 [PMID: 17259003 DOI: 10.1016/j.gie.2006.07.001]
 - 117 **Kachaamy T**, Harrison ME. Successful treatment of bleeding ileal varices by double-balloon enteroscopy and cyanoacrylate injection (with video). *Gastrointest Endosc* 2014; **80**: 170-171; discussion 171 [PMID: 24703088 DOI: 10.1016/j.gie.2014.02.024]
 - 118 **Varanasi RV**, Fleisher AS, Darwin PE, King CE, Haluszka O. Colonoscopic sclerotherapy of ileal varices. *Gastrointest Endosc* 2000; **52**: 109-111 [PMID: 10882977 DOI: 10.1067/mge.2000.106538]
 - 119 **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]
 - 120 **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]
 - 121 **Misra SP**, Dwivedi M. Ligation of a bleeding colonic varix

- using an upper gastrointestinal endoscope. *Endoscopy* 2006; **38**: 657 [PMID: 16673302 DOI: 10.1055/s-2006-925189]
- 122 **Chen WC**, Hou MC, Lin HC, Chang FY, Lee SD. An endoscopic injection with N-butyl-2-cyanoacrylate used for colonic variceal bleeding: a case report and review of the literature. *Am J Gastroenterol* 2000; **95**: 540-542 [PMID: 10685765 DOI: 10.1111/j.1572-0241.2000.01782.x]
- 123 **Schafer TW**, Binmoeller KF. Argon plasma coagulation for the treatment of colonic varices. *Endoscopy* 2002; **34**: 661-663 [PMID: 12173089 DOI: 10.1055/s-2002-33238]
- 124 **Chevallier P**, Motamedi JP, Demuth N, Caroli-Bosc FX, Oddo F, Padovani B. Ascending colonic variceal bleeding: utility of phase-contrast MR portography in diagnosis and follow-up after treatment with TIPS and variceal embolization. *Eur Radiol* 2000; **10**: 1280-1283 [PMID: 10939490 DOI: 10.1007/s003309900308]
- 125 **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]
- 126 **Lopes LM**, Ramada JM, Certo MG, Pereira PR, Soares JM, Ribeiro M, Areias J, Pinho C. Massive lower gastrointestinal bleeding from idiopathic ileocolonic varix: report of a case. *Dis Colon Rectum* 2006; **49**: 524-526 [PMID: 16395635 DOI: 10.1007/s10350-005-0279-2]
- 127 **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]
- 128 **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]
- 129 **Goenka MK**, Kochhar R, Nagi B, Mehta SK. Rectosigmoid varices and other mucosal changes in patients with portal hypertension. *Am J Gastroenterol* 1991; **86**: 1185-1189 [PMID: 1882798]
- 130 **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]
- 131 **Ryu SH**, Moon JS, Kim I, Kim YS, Lee JH. Endoscopic injection sclerotherapy with N-butyl-2-cyanoacrylate in a patient with massive rectal variceal bleeding: a case report. *Gastrointest Endosc* 2005; **62**: 632-635 [PMID: 16185988 DOI: 10.1016/j.gie.2005.05.012]
- 132 **Firoozi B**, Gamagaris Z, Weinschel EH, Bini EJ. Endoscopic band ligation of bleeding rectal varices. *Dig Dis Sci* 2002; **47**: 1502-1505 [PMID: 12141807 DOI: 10.1023/A:1015802732217]
- 133 **Coelho-Prabhu N**, Baron TH, Kamath PS. Endoscopic band ligation of rectal varices: a case series. *Endoscopy* 2010; **42**: 173-176 [PMID: 20140834 DOI: 10.1055/s-0029-1243840]
- 134 **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]
- 135 **Levy MJ**, Wong Kee Song LM, Kendrick ML, Misra S, Gostout CJ. EUS-guided coil embolization for refractory ectopic variceal bleeding (with videos). *Gastrointest Endosc* 2008; **67**: 572-574 [PMID: 17997404 DOI: 10.1016/j.gie.2007.06.063]
- 136 **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 DOI: 10.1016/j.gie.2011.09.027]
- 137 **Dhiman RK**, Behera A, Chawla YK, Dilawari JB, Suri S. Portal hypertensive biliopathy. *Gut* 2007; **56**: 1001-1008 [PMID: 17170017 DOI: 10.1136/gut.2006.103606]
- 138 **Palazzo L**, Hochain P, Helmer C, Cuillier E, Landi B, Roseau G, Cugnenc PH, Barbier JP, Cellier C. Biliary varices on endoscopic ultrasonography: clinical presentation and outcome. *Endoscopy* 2000; **32**: 520-524 [PMID: 10917183 DOI: 10.1055/s-2000-9009]
- 139 **Sezgin O**, Oğuz D, Altıntaş E, Sarıtaş U, Sahin B. Endoscopic management of biliary obstruction caused by cavernous transformation of the portal vein. *Gastrointest Endosc* 2003; **58**: 602-608 [PMID: 14520303 DOI: 10.1067/S0016-5107(03)01975-8]
- 140 **Chaudhary A**, Dhar P, Sarin SK, Sachdev A, Agarwal AK, Vij JC, Broor SL. Bile duct obstruction due to portal biliopathy in extrahepatic portal hypertension: surgical management. *Br J Surg* 1998; **85**: 326-329 [PMID: 9529484 DOI: 10.1046/j.1365-2168.1998.00591.x]
- 141 **Higaki N**, Matsui H, Imaoka H, Ikeda Y, Murakami H, Hiasa Y, Matsuura B, Onji M. Characteristic endoscopic features of portal hypertensive enteropathy. *J Gastroenterol* 2008; **43**: 327-331 [PMID: 18592149 DOI: 10.1007/s00535-008-2166-9]
- 142 **Barakat M**, Mostafa M, Mahran Z, Soliman AG. Portal hypertensive duodenopathy: clinical, endoscopic, and histopathologic profiles. *Am J Gastroenterol* 2007; **102**: 2793-2802 [PMID: 17900330 DOI: 10.1111/j.1572-0241.2007.01536.x]
- 143 **Kodama M**, Uto H, Numata M, Hori T, Murayama T, Sasaki F, Tsubouchi N, Ido A, Shimoda K, Tsubouchi H. Endoscopic characterization of the small bowel in patients with portal hypertension evaluated by double balloon endoscopy. *J Gastroenterol* 2008; **43**: 589-596 [PMID: 18709480 DOI: 10.1007/s00535-008-2198-1]
- 144 **Rondonotti E**, Villa F, Dell' Era A, Tontini GE, de Franchis R. Capsule endoscopy in portal hypertension. *Clin Liver Dis* 2010; **14**: 209-220 [PMID: 20682230 DOI: 10.1016/j.cld.2010.03.004]
- 145 **Akyuz F**, Pinarbasi B, Ermis F, Uyanikoglu A, Demir K, Ozdil S, Besik F, Kaymakoglu S, Boztas G, Mungan Z. Is portal hypertensive enteropathy an important additional cause of blood loss in portal hypertensive patients? *Scand J Gastroenterol* 2010; **45**: 1497-1502 [PMID: 20695721 DOI: 10.3109/00365521.2010.510568]
- 146 **Naveau S**, Bedossa P, Poynard T, Mory B, Chaput JC. Portal hypertensive colopathy. A new entity. *Dig Dis Sci* 1991; **36**: 1774-1781 [PMID: 1748048 DOI: 10.1007/BF01296624]
- 147 **Kozarek RA**, Botoman VA, Bredfeldt JE, Roach JM, Patterson DJ, Ball TJ. Portal colopathy: prospective study of colonoscopy in patients with portal hypertension. *Gastroenterology* 1991; **101**: 1192-1197 [PMID: 1936789]
- 148 **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]
- 149 **Yamakado S**, Kanazawa H, Kobayashi M. Portal hypertensive colopathy: endoscopic findings and the relation to portal pressure. *Intern Med* 1995; **34**: 153-157 [PMID: 7787318]
- 150 **Bresci G**, Parisi G, Capria A. Clinical relevance of colonic lesions in cirrhotic patients with portal hypertension. *Endoscopy* 2006; **38**: 830-835 [PMID: 17001574 DOI: 10.1055/s-2006-944629]
- 151 **Rabinovitz M**, Schade RR, Dindzans VJ, Belle SH, Van Thiel DH, Gavalier JS. Colonic disease in cirrhosis. An endoscopic evaluation in 412 patients. *Gastroenterology* 1990; **99**: 195-199 [PMID: 2344925]
- 152 **Chen LS**, Lin HC, Lee FY, Hou MC, Lee SD. Portal hypertensive colopathy in patients with cirrhosis. *Scand J Gastroenterol* 1996; **31**: 490-494 [PMID: 8734347 DOI: 10.3109/00365529609006770]

153 **Yoshie K**, Fujita Y, Moriya A, Kawana I, Miyamoto K, Umemura S. Octreotide for severe acute bleeding from portal hypertensive colopathy: a case report. *Eur J Gastroenterol Hepatol* 2001; **13**: 1111-1113 [PMID: 11564965]

154 **Balzer C**, Lotterer E, Kleber G, Fleig WE. Transjugular intrahepatic portosystemic shunt for bleeding angiodysplasia-like lesions in portal-hypertensive colopathy. *Gastroenterology* 1998; **115**: 167-172 [PMID: 9649472 DOI: 10.1016/S0016]

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