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Esophageal Varices: Diagnosis, Management, and Main Nursing Interventions

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Abstract:

Background: Esophageal varices (EV) are a leading cause of upper gastrointestinal bleeding (UGIB) and represent a significant health issue worldwide. They commonly arise due to portal hypertension, which can be a result of cirrhosis or other conditions such as schistosomiasis and portal vein thrombosis. Acute variceal bleeding (AVB) is a life-threatening complication that requires timely diagnosis and management to reduce mortality. While endoscopy is considered the gold standard for diagnosing and assessing EV, non-invasive methods such as elastography and artificial intelligence are being explored.

Aim: This review aims to evaluate the diagnosis, management strategies, and the role of nursing interventions in the management of esophageal varices, with a focus on prevention, treatment, and monitoring.

Methods: A comprehensive review of the literature was conducted, examining various diagnostic techniques, including esophagogastroduodenoscopy (EGD), elastography, and emerging technologies such as artificial intelligence. The management strategies, including pharmacological and endoscopic interventions, were assessed, with particular attention to nursing interventions in managing variceal bleeding.

Results: Key findings include the importance of early diagnosis and risk stratification for esophageal varices, with EGD and elastography playing pivotal roles. Primary prophylaxis through nonselective beta-blockers and endoscopic band ligation is essential to prevent first-time bleeding. Nursing interventions,

including monitoring for signs of bleeding, patient education, and medication administration, are crucial in managing patients with EV.

Conclusion: Esophageal varices are a serious medical condition requiring comprehensive management strategies. Nurses play a critical role in the management, prevention, and monitoring of these patients, emphasizing the importance of early detection, pharmacological therapy, and endoscopic interventions.

Keywords: Esophageal varices, portal hypertension, acute variceal bleeding, endoscopy, nursing interventions, beta-blockers, elastography.

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Introduction:

Esophageal varices (EV) represent one of the primary etiologies of acute upper gastrointestinal bleeding (UGIB), exhibiting variable prevalence across different global regions [1,2]. They are the leading cause of mortality from UGIB. Acute variceal bleeding (AVB), a potentially life-threatening complication of clinically significant portal hypertension (CSPH), poses considerable challenges to both economic and population health domains. In the United States, EV ranks as the seventh most frequent cause of gastrointestinal bleeding according to existing literature [3]. The prevalence of schistosomiasis has been associated with EV in specific developing regions [4]. In Western countries, cirrhosis is the predominant cause of EV, with up to 85% of cirrhotic individuals developing EV during their lifetime [5,6], though incidence rates fluctuate based on disease severity. In compensated cirrhosis, EV develop at an annual rate of 8% [7], with significantly higher rates observed in decompensated cirrhosis. The distal third of the esophagus is most commonly affected by esophageal varices, although proximal varices can also arise in conditions that influence extra-portal venous circuits [8,9,10]. Approximately one-third of patients with EV experience AVB, with mortality rates from a first episode ranging from 10% in compensated cirrhosis to 70% in decompensated cirrhosis [6].

Portal hypertension (PH) arises due to an increase in resistance to portal flow, which is exacerbated by enhanced portal collateral blood flow. The obstruction or heightened resistance may occur at different sites, including sinusoidal (as in advanced chronic liver disease, ACLD), pre-sinusoidal (as in schistosomiasis or portal vein thrombosis), or post-sinusoidal (as seen in Budd–Chiari syndrome). The causes of non-cirrhotic portal hypertension can be categorized into three types: prehepatic, intrahepatic, and post-sinusoidal. Prehepatic causes include portal vein thrombosis, splenic vein thrombosis, and splenomegaly due to conditions such as Gaucher's disease or lymphoma. Intrahepatic causes span both presinusoidal and sinusoidal factors, including schistosomiasis, idiopathic portal hypertension, primary biliary cholangitis, sarcoidosis, congenital hepatic fibrosis, primary sclerosing cholangitis, and hepatic arteriopetal fistulas, among others. Postsinusoidal causes include Budd–Chiari syndrome, sinusoidal obstruction syndrome, and conditions like chronic radiation injury, angiosarcoma, and sarcoidosis.

The heightened resistance in portal hypertension is primarily due to a combination of structural alterations—such as fibrosis, nodules, angiogenesis, and vascular occlusion in the liver microcirculation—and dynamic changes, including an increase in vasoconstrictors like angiotensin II, norepinephrine, thromboxane A2, and endothelins, alongside a reduction in vasodilators such as nitric oxide. Esophageal varices develop as a consequence of portal hypertension, which is conventionally assessed indirectly by measuring the hepatic venous pressure gradient (HVPG). Portal hypertension is diagnosed when HVPG exceeds 5 mmHg, while CSPH is diagnosed when the gradient exceeds 10 mmHg [7,9,10]. This measurement is performed by placing a balloon catheter through the jugular or femoral vein, advancing it to the heart, and measuring the hepatic venous pressure in two distinct phases. First, the free hepatic venous pressure (FHVP) is measured when the balloon is deflated and the catheter is free-floating. Then, the balloon is inflated to occlude the hepatic vein, allowing measurement of the wedged hepatic venous pressure (WHVP). The HVPG is the difference between WHVP and FHVP, representing the gradient between the portal vein and the intra-abdominal vena cava pressure. A key advantage of this measurement is its resistance to fluctuations in intra-abdominal pressure [11].

Diagnosis and Risk Stratification

Physical examination may uncover various signs of portal hypertension (PH), such as caput medusa, enlarged hemorrhoids, platypnea, orthodeoxia, or hepatosplenomegaly. Diagnostic imaging techniques, including Doppler ultrasound, can reveal collateral circulation or reversal of portal flow, while computed tomography (CT) and magnetic resonance imaging (MRI) may identify splenorenal shunts, dilated left and short gastric veins, or recanalization of the umbilical vein. Although clinical findings and imaging results can suggest PH, the gold standard for diagnosing esophageal varices (EV) and gastric varices (GV) is esophagogastroduodenoscopy (EGD). The primary objective of EGD is the identification and risk stratification of EV and GV by assessing their size and the presence of high-risk stigmata. EV are classified based on their size—small, medium, or large—and the presence of red wale marks [12], while GV are categorized as gastroesophageal varices (GOV) or isolated gastric varices (IGV).

Recent advancements have introduced elastography as a non-invasive technique for determining liver stiffness. Several studies have demonstrated that liver stiffness, in combination with platelet count, can accurately identify patients with a low (5%) risk of EV in individuals with compensated cirrhosis [14,15]. As a result, the Baveno VII guidelines recommend against the use of upper endoscopy for EV screening in patients with liver stiffness less than 20 kPa and platelet counts above 150 × 10^9/L [10]. This algorithm serves to exclude patients with varices that would necessitate primary prophylaxis treatment [16]. For patients with virally induced liver disease, such as hepatitis C virus (HCV) or hepatitis B virus (HBV), the Baveno VI criteria (liver stiffness measurement [LSM] < 20 kPa and platelet count > 150 × 10^9/L) can be applied to manage cirrhosis after the underlying infection has been treated. This criterion helps to exclude high-risk varices in patients with compensated liver disease who have achieved a sustained virologic response (SVR) and viral suppression [10]. The updated Baveno VII guidelines now recommend that patients with compensated alcoholic cirrhosis on nonselective beta-blocker (NSBB) therapy, who have no evidence of clinically significant portal hypertension (CSPH) (LSM < 25 kPa) after the removal or suppression of the primary etiological factor, should undergo a repeat EGD within 1 to 2 years [10].

The precision of EGD in detecting and characterizing EV can be enhanced through the integration of artificial intelligence (AI). Chen et al. employed a convolutional neural network (CNN) to assess the efficacy of AI in the detection and risk stratification of EV, demonstrating that AI achieved higher accuracy in detecting both esophageal and gastric varices compared to endoscopists alone (97% vs. 93.94%, $p < 0.01$; 92% vs. 84.43%, $p < 0.05$, respectively). AI also outperformed endoscopists in identifying red wale marks in both EV and GV (84.21% vs. 73.45%, $p < 0.01$; 85.26% vs. 77.52%, $p < 0.05$) [17]. Similarly, machine learning (ML) algorithms have proven valuable in enhancing the prediction of EV, particularly in identifying those requiring treatment, thereby reducing unnecessary EGDs [18]. A recent study demonstrated that an ML-based model significantly reduced the number of EGDs required compared to the Baveno VI criteria (52.6% vs. 29.4% in the training cohort; 58.1% vs. 44.2% in the validation cohort; $p < 0.001$) for patients with compensated cirrhosis [19].

Although EGD is considered the gold standard for variceal evaluation, alternative non-invasive methods have been explored. Video capsule endoscopy (VCE) has emerged as a promising alternative for grading EV, particularly the esophageal capsule system. A meta-analysis of 17 studies found that VCE demonstrated a diagnostic accuracy of 92% for grading medium to large varices, suggesting its potential for use in patients who prefer non-endoscopic methods or in cases where endoscopy is contraindicated [20]. Endoscopic ultrasound (EUS) has also evolved from a diagnostic tool into a real-time therapeutic modality. EUS provides unique access to multiple vascular structures in the mediastinum and abdomen, enabling real-time visualization of various structures through the differentiation of tissue densities and vascularity, all while avoiding radiation exposure. The addition of Doppler and contrast-enhanced capabilities further allows for the visualization of blood flow throughout the gastrointestinal tract, enhancing its diagnostic utility. EUS also facilitates interventions such as fine-needle aspiration (FNA) and fine-needle biopsy (FNB) using specialized endoscopic accessories [21,22]. Additionally, CT scans offer an approximately 90% sensitivity in detecting EV, which were later confirmed as large varices during

endoscopy. However, the specificity of CT is only 50%. Despite this limitation, the agreement between radiologists regarding the size of varices is good (Kappa = 0.56) and exceeds the agreement between endoscopists (Kappa = 0.36). CT is non-invasive and more cost-effective than endoscopy, regardless of variceal size [23].

Prevention and Management of Variceal Bleeding

The endoscopic management of esophageal varices (EV) can be categorized into three key approaches: preventing the first variceal bleeding (primary prophylaxis), managing acute variceal bleeding (AVB), and preventing rebleeding after an initial hemorrhagic episode (secondary prophylaxis).

Screening of Esophageal Varices

Upper gastrointestinal (GI) endoscopy is recommended to identify high-risk esophageal varices in patients with decompensated advanced chronic liver disease (ACLD) and liver stiffness measurement (LSM) ≥ 20 kPa or a platelet count ≤ 150×10^9/L. For patients with compensated cirrhosis who are not candidates for nonselective beta-blockers (NSBBs) due to contraindications or intolerance, endoscopic screening for varices should be conducted when LSM ≥ 20 kPa or platelet count ≤ 150×10^9/L is observed [10]. In such cases, if screening endoscopy is not feasible, patients may be monitored annually with transient elastography (TE) and platelet counts. Additionally, for patients ineligible for NSBB therapy but who would typically require endoscopy based on the Baveno VII criteria, spleen stiffness measurement (SSM) ≤ 40 kPa via TE may serve as a surrogate marker to identify those at low risk for high-risk varices, thus avoiding the need for endoscopy [10]. However, the European Society of Gastrointestinal Endoscopy (ESGE) guidelines do not support the use of video capsule endoscopy (VCE) for the screening of EV [20,24,25]. For patients with porto-sinusoidal vascular disorder (PSVD), who cannot utilize the Baveno VII criteria for non-invasive EV screening in cirrhosis, endoscopy is generally required upon PSVD diagnosis. The frequency of endoscopic screening should align with established protocols for liver cirrhosis.

Primary Prophylaxis of Esophageal Varices Bleeding

Primary prophylaxis is crucial for compensated patients with clinically significant portal hypertension (CSPH) and/or EV or gastric varices (GV), as they are at elevated risk for decompensation [10]. For patients with ACLD and high-risk varices, primary prophylaxis is indicated. Both NSBB therapy and endoscopic band ligation (EBL) have demonstrated efficacy in significantly reducing the likelihood of the first variceal bleeding event.

The administration of NSBBs (propranolol, nadolol, or carvedilol) should be considered to prevent decompensation in patients with CSPH. Carvedilol is particularly recommended as the preferred choice in compensated cirrhosis, due to its superior ability to reduce hepatic venous pressure gradient (HVPG), prevent decompensation, and improve survival, in addition to its better tolerance compared to traditional NSBBs [26]. However, NSBBs or carvedilol should be reduced or discontinued in patients with ascites who experience persistently low blood pressure (systolic < 90 mmHg or mean arterial pressure < 65 mmHg) or hepatorenal syndrome-associated acute kidney injury (HRS-AKI). These medications can be resumed once blood pressure normalizes and/or HRS-AKI resolves. For patients receiving NSBBs for primary prophylaxis, screening endoscopy is not necessary. In cases where an endoscopy reveals no high-risk varices and the patient cannot receive NSBB therapy, the ESGE recommends surveillance endoscopy every two years for patients with active liver disease, or every three years for those with quiescent disease [25]. The Baveno VII guidelines further suggest the use of endoscopic band ligation to prevent the first variceal bleeding in compensated patients with high-risk varices who cannot tolerate NSBBs [10]. A study has indicated that cyanoacrylate (CYA) injection is more effective than propranolol in preventing the first bleeding episode in patients with large type 2 gastric varices or isolated type 1 gastric varices, though survival rates did not differ significantly [10]. Currently, there is no indication for balloon-occluded retrograde (or antegrade) transvenous obliteration (BRTO or BATO) or transjugular intrahepatic portosystemic shunt (TIPS) for primary prophylaxis in gastric variceal bleeding in compensated patients.

Management of Acute Esophageal Variceal Bleeding

Esophageal varices typically remain asymptomatic until they rupture, leading to severe hemorrhage, often manifested by hematemesis and/or melena, pronounced anemia, and potential loss of consciousness. Such an event constitutes a medical emergency that necessitates urgent intervention in an emergency department.

Hemodynamic Resuscitation

The primary objective of hemodynamic resuscitation is to enhance tissue perfusion, rectify intravascular hypovolemia, and avert multi-organ failure [27]. However, there remains debate regarding the optimal resuscitation strategy (aggressive versus restrictive), especially for esophagogastric variceal bleeding. Some evidence supports that a restrictive fluid resuscitation approach may result in fewer adverse events (AEs) and a reduction in mortality [28,29]. The ideal intravenous fluid for initial resuscitation remains unclear, with crystalloids or colloids frequently employed, while blood product transfusion is evaluated on a case-by-case basis [30,31]. In a large randomized controlled trial (RCT) and a meta-analysis of critically ill patients, the use of "balanced" crystalloid solutions (e.g., lactated Ringer's) was associated with a reduction in mortality and major renal adverse events, as compared to saline solutions [32]. Sedation techniques employed during endoscopic procedures for treating esophageal varices are categorized into non-anesthesiology sedation (NAS), where the endoscopist, assisted by a trained nurse, controls the level of sedation, and those requiring anesthesiology support, classified as Monitored Anesthesia Care (MAC) and Non-Operating Room Anesthesia (NORA). The goal of sedation in gastrointestinal (GI) endoscopy is to alleviate patient anxiety and discomfort while ensuring the procedural success [33].

The administration of fresh frozen plasma is not recommended during an acute variceal bleeding (AVB) event, as it does not rectify coagulopathy and could potentially exacerbate volume overload and portal hypertension [10]. There is insufficient evidence to suggest that platelet count or fibrinogen levels significantly influence the risk of AVB failure to control bleeding or rebleeding. In cases where bleeding remains uncontrolled, decisions to correct hemostatic abnormalities should be made individually. Recombinant factor VIIa and tranexamic acid are also not advised in the management of AVB [10]. Red blood cell transfusions should be approached conservatively, targeting a hemoglobin level of 7–8 g/dL, while considering factors such as cardiovascular status, age, and ongoing bleeding [10]. Anticoagulants should be temporarily discontinued in patients with AVB until hemorrhage is controlled, with the duration of discontinuation adjusted according to the strength of the anticoagulation indication.

Risk Stratification

According to the European Society of Gastrointestinal Endoscopy, patients with advanced chronic liver disease (ACLD) presenting with suspected AVB should undergo risk stratification using the Child–Pugh and MELD scores, alongside documentation of active or inactive bleeding during upper GI endoscopy [25]. A meta-analysis of individual patient data has indicated that patients with a Child–Pugh score of B > 7 or C ≤ 13, along with active variceal bleeding at the time of GI endoscopy (manifested as variceal jet or oozing despite vasoactive drugs), are at heightened risk for poor outcomes and may benefit from preemptive transjugular intrahepatic portosystemic shunt (TIPS) placement [34]. Although the prognostic accuracy of these variables has been questioned due to the subjectivity involved in assessing ascites severity or hepatic encephalopathy, as well as the actual risk for patients with Child–Pugh B, some studies have demonstrated their efficacy in stratifying patient risk [35,36]. A MELD score ≥ 19 has also been utilized in several studies to identify high-risk ACLD patients [37,38].

Moreover, the European Society for the Study of the Liver (EASL) has introduced the Chronic Liver Failure–Sequential Organ Failure Assessment (CLIF-SOFA) score, which is valuable in distinguishing between acute decompensation and acute-on-chronic liver failure (ACLF) [39]. A recent study comparing the MELD-Na, Child–Pugh, and CLIF-SOFA scores for predicting mortality in patients with variceal bleeding found that CLIF-SOFA outperformed the other scores, achieving an area under the receiver operating characteristic curve (AUROC) of 0.79 for 30- and 90-day mortality in ACLF patients, while the Child–Pugh

score was more accurate in predicting mortality in patients with acute decompensation, with an AUROC of 0.71 (30-day) and 0.74 (90-day) [40]. Another study confirmed the CLIF-SOFA score's role as a significant prognostic indicator for 28-day mortality in patients with ACLF and variceal bleeding (HR, 1.32; 95% CI, 1.19–1.46, $p < 0.001$) [41]. Furthermore, CLIF-SOFA was superior to MELD and Child–Pugh scores in predicting in-hospital and 6-week mortality following endoscopic band ligation (EBL) for variceal hemorrhage. Specifically, the AUROC values for predicting in-hospital mortality were 0.964 (CLIF-SOFA), 0.876 (MELD), and 0.846 (Child–Pugh), while for predicting 6-week mortality, the AUROCs were 0.943 (CLIF-SOFA), 0.817 (MELD), and 0.834 (Child–Pugh) [42].

Medical Therapy

1. **Vasoactive Agents**: The Baveno VII guidelines recommend the prompt initiation of vasoactive medications, such as terlipressin and octreotide, in cases of suspected variceal bleeding, continuing their administration for 2–5 days [10]. Several systematic reviews and meta-analyses [43,44] have assessed the effectiveness and safety of vasoactive agents in managing acute variceal bleeding (AVB), consistently demonstrating that these agents outperform the absence of vasoactive treatment in reducing in-hospital mortality, overall mortality, control of variceal bleeding, the incidence of variceal re-bleeding, and the need for blood transfusions. While octreotide is considered as effective as terlipressin and vasopressin, it presents with fewer adverse effects. Vasopressin is no longer used due to its extra-splanchnic vasoconstrictive effects and its high adverse event profile. Moreover, vasoactive agents have been shown to significantly reduce the incidence of early re-bleeding within 5 days following successful endoscopic hemostasis [45].
2. **Antibiotic Prophylaxis**: Bacterial infections are prevalent in patients with compensated cirrhosis or severe portal hypertension (CSPH) and can exacerbate decompensation. Patients with advanced chronic liver disease (ACLD) who are present with AVB are particularly susceptible to bacterial infections, especially those involving the respiratory tract [46]. Such infections not only increase the risk of re-bleeding but also elevate overall mortality rates. In a multicenter retrospective cohort study involving 371 cirrhotic patients with AVB, prophylactic antibiotic use did not entirely prevent infections, with 14% of patients developing a bacterial infection within 14 days, most of which were respiratory infections [46]. Furthermore, some studies suggest that patients treated under standard conditions face a significantly lower likelihood of bacterial infections compared to those treated under emergency conditions [47]. According to Baveno VII guidelines, antibiotic prophylaxis is critical for patients with ACLD who present with upper gastrointestinal bleeding (UGIB) and should be administered promptly. In settings with a high prevalence of quinolone-resistant bacterial infections, intravenous ceftriaxone (1 g/24 h for up to seven days) is recommended for patients with advanced cirrhosis, particularly those with prior quinolone prophylaxis. However, these recommendations should always align with local antimicrobial resistance patterns and policies [10].
3. **Timing of Endoscopy**: The optimal timing for upper gastrointestinal (GI) endoscopy in patients with AVB remains a matter of debate, due to variations in defining "early" versus "late" endoscopy and differing study conclusions, indicating a lack of high-level evidence supporting specific guideline recommendations. It is advised that upper endoscopy be performed within 12 hours of presentation in patients with suspected AVB, following initial hemodynamic resuscitation. In cases of patient instability, endoscopy should be performed immediately [10]. A systematic review/meta-analysis involving 2824 patients with ACLD and AVB demonstrated that early endoscopy (within 12 hours) resulted in significantly lower overall mortality compared to delayed endoscopy (beyond 12 hours) [48]. Current evidence does not suggest that the international normalized ratio (INR) at the time of presentation influences the timing of endoscopy in AVB cases. According to the European Society of Gastrointestinal Endoscopy (ESGE) guidelines, the timing of endoscopy should not be influenced by INR levels at presentation [25,49].
4. **Anesthesia**

- **Elective Procedures**: In the pre-procedural assessment, patient risks should be evaluated using the American Society of Anesthesiologists (ASA) classification, with appropriate anesthesia selection based on individual risk factors. Patients undergoing endoscopic procedures for the diagnosis and treatment of

esophageal varices typically have cirrhosis and are at an increased risk of complications related to sedation, necessitating anesthesia-directed support [47,50,51]. Propofol is favored for patients with liver disease due to its rapid metabolism, short duration of action, and superior profile compared to benzodiazepines like midazolam [52,53]. While midazolam is frequently used in non-anesthesia sedation (NAS) routines, studies have shown that a combination of low-dose midazolam and propofol yields a superior sedative effect and greater endoscopist satisfaction compared to midazolam alone [47]. Additionally, the inclusion of opioids, such as oxycodone, with sedatives like midazolam or propofol may enhance analgesia and alleviate visceral pain, though fentanyl should be used cautiously due to its risk of respiratory depression, chest wall stiffness, and choking [54,55].

- **Emergency Procedures**: There is no universally accepted protocol regarding the level of monitoring and anesthetic support for patients undergoing emergency endoscopic procedures for UGIB, with some requiring general anesthesia and endotracheal intubation, while others may only need monitored anesthesia care (MAC) [56]. Patients with variceal bleeding typically have multiple comorbidities and a higher mortality rate, prompting many endoscopists to hesitate when administering sedation. However, recent research suggests that propofol-based sedation can stabilize patients during procedures and ensure successful outcomes with a low-risk profile [58]. If a patient's condition deteriorates or hemodynamic instability occurs, sedation may become ineffective. Aspiration is a primary concern during emergency procedures for UGIB, but studies indicate that sedation endoscopy does not increase the incidence of aspiration compared to non-sedation endoscopy [59]. Preventive measures such as prophylactic endotracheal intubation to prevent aspiration have shown no significant effect on mortality or hospitalization duration, though they have increased adverse events, particularly in patients with pre-existing cardiac disease [60,61,62].

Excessive sedation, altered consciousness, devastation, airway obstruction, or aspiration during active bleeding may necessitate emergency endotracheal intubation [10,63]. In cases of massive hemorrhage, intubation should be performed in the supine position, followed by a left lateral decubitus position for the procedure. Given the risks associated with moving patients after anesthesia induction, video-laryngoscopy allows for intubation directly in the left lateral position [64]. Extubation should occur as promptly as possible following the procedure [10].

Endoscopic Treatment

Endoscopy plays a pivotal role in managing esophageal variceal (EV) bleeding. It is critical to have an on-call gastrointestinal (GI) endoscopist who is proficient in endoscopic hemostasis, supported by technical staff skilled in the use of endoscopic devices, as per current recommendations [10]. Additionally, it is advantageous for the medical team to engage interventional radiology (IR) staff early in cases of uncontrolled bleeding, particularly when a transjugular intrahepatic portosystemic shunt (TIPS) may be required.

Endoscopic Variceal Ligation

Endoscopic band ligation (EBL) is the preferred endoscopic therapy for acute variceal bleeding (AVB) [65,66,67,68,69]. The current EBL technique utilizes a multiband device [65,66]. This method involves the deployment of an elastic band around the varix after it has been suctioned into an endoscope cap, which is activated via a firing device attached to the biopsy valve port. The ligation causes strangulation of the varix, leading to hemostasis, followed by thrombus formation, necrosis, fibrosis, and ultimately obliteration of the varix. The ligation bands are placed distally, with priority given to varices exhibiting recent bleeding, platelet plugs, or active bleeding stigmata. The placement is conducted in a helical fashion, from distal to proximal esophagus, although this may be hindered by impaired vision in the presence of active bleeding. EBL has been shown to effectively control active variceal bleeding in approximately 90% of cases [66]. Several randomized controlled trials (RCTs) have compared the efficacy of EBL with esophageal variceal sclerotherapy (EVS) for AVB, and meta-analyses have demonstrated that EBL results in lower rates of re-bleeding and mortality than EVS [70,71]. Additionally, a meta-analysis indicated that EBL was superior

to EVS in terms of re-bleeding, complications, and variceal eradication, although no significant difference in mortality was observed [72]. EBL should be performed at regular intervals following AVB treatment until complete variceal eradication is achieved. Complications associated with EBL occur in 2% to 20% of patients and may include transient dysphagia, retrosternal pain, post-banding bleeding, esophageal strictures, esophageal ulcerations, perforations, and infections [47,66]. Re-bleeding may result from a recurring bleeding vessel or post-banding ulceration, which affects 3.6% to 15% of patients [73].

Esophageal Variceal Sclerotherapy

In contrast to the mechanical approach of EBL, esophageal variceal sclerotherapy (EVS) involves a chemical mechanism [74]. A sclerosant agent, such as sodium tetradecyl sulfate, ethanolamine oleate, sodium morrhuate, polidocanol, or absolute alcohol, is injected into or adjacent to the varix, inducing inflammation and thrombosis [66]. Historically, EVS was shown to be superior to balloon tamponade (BT) and vasoactive drugs in controlling variceal bleeding [75]. However, after the introduction of EBL in the 1990s, EVS became less favored due to its higher complication rates, including re-bleeding episodes and adverse events [76]. Sclerotherapy-related complications in up to 40% of patients include fever, dysphagia, retrosternal discomfort, bleeding from the injection site, esophageal ulceration with bleeding, pleural effusion, pneumothorax, mediastinitis, and infections, including spontaneous bacterial peritonitis [77]. In comparison with EBL, EVS has been associated with a higher risk of pleuropulmonary complications, bleeding, and infection [78].

Endoscopic Tissue Adhesives

Endoscopic tissue adhesives (ETA) are another treatment modality for varices, initially developed for gastric and ectopic varices [79,80]. Cyanoacrylate (CYA) tissue glue induces endothelial injury and venous occlusion, leading to hemostasis [81]. A study involving patients with Child-Pugh class C cirrhosis and AVB demonstrated that bleeding was successfully controlled in 75% of patients treated with CYA. Additionally, a prospective study comparing ETA and EVS in patients who were not suitable for EBL due to severe bleeding found that ETA significantly outperformed EVS in achieving bleeding arrest, although there were no significant differences in re-bleeding rates. Both EVS and ETA are recommended in situations where EBL is technically difficult [7,10,82].

Hemostatic Powders

Hemostatic powders (HP) have emerged as a promising treatment for gastrointestinal bleeding, demonstrating good overall efficacy and safety [83]. These powders can be sprayed using a specialized catheter. Hemospray®, a mineral-based compound, absorbs water upon contact with blood, becoming adherent to the bleeding site. While HP has mainly been studied for ulcer and tumor bleeding, a recent study showed that 7% of patients treated with Hemospray® or Endoclot® had varices [84]. The short-term success rate was 85%, with a long-term success rate of 56%. In a trial of cirrhotic patients with AVB, early application of HP (within 2 hours) showed significantly better hemostasis compared to early elective endoscopy (12–24 hours) [10]. However, given the lack of substantial evidence, HP and ETA cannot be recommended as first-line endoscopic therapies at present [10].

Role of Nursing:

Nurses play a crucial role in the management of esophageal varices (EV), particularly in the prevention, monitoring, and treatment of complications associated with this condition. As part of a multidisciplinary team, nurses are responsible for assessing patients' clinical status, including monitoring vital signs, observing signs of bleeding (such as hematemesis or melena), and evaluating laboratory results for indications of liver dysfunction or coagulopathy. Early identification of potential variceal bleeding is critical for initiating timely interventions. Nurses are integral in the pre-procedural preparation of patients undergoing endoscopic procedures, such as endoscopic variceal ligation (EVL) or sclerotherapy. This includes educating patients on the procedure, providing emotional support, and ensuring that they are

appropriately prepared, such as fasting and obtaining necessary consent. During and after these procedures, nurses monitor for complications, such as bleeding, infection, or perforation, and promptly report any adverse changes to the medical team. Post-procedural care involves close monitoring of the patient's condition, managing pain, administering medications (e.g., vasoactive drugs, antibiotics), and ensuring proper hydration and nutrition. Nurses also educate patients and their families on lifestyle changes, including alcohol avoidance, dietary modifications, and adherence to prescribed medications, to prevent recurrence of variceal bleeding. Moreover, nurses provide emotional and psychological support to patients and families, addressing concerns about the severity of the condition and the need for long-term care. Through their comprehensive involvement, nurses enhance patient outcomes and contribute to the successful management of esophageal varices.

Conclusion:

Esophageal varices (EV) remain a major cause of morbidity and mortality, particularly in patients with cirrhosis and portal hypertension. As a leading cause of upper gastrointestinal bleeding (UGIB), they require careful monitoring, timely diagnosis, and effective management strategies to prevent life-threatening complications such as acute variceal bleeding (AVB). The management of EV involves a combination of pharmacological treatments, endoscopic procedures, and regular surveillance. One of the most effective approaches to managing esophageal varices is primary prophylaxis, especially for patients with clinically significant portal hypertension (CSPH). Nonselective beta-blockers (NSBBs) like propranolol, nadolol, and carvedilol, along with endoscopic band ligation (EBL), have proven to be effective in reducing the risk of variceal bleeding in at-risk patients. Carvedilol, in particular, is recommended for patients with compensated cirrhosis due to its superior ability to lower the hepatic venous pressure gradient (HVPG) and improve patient survival outcomes. However, these interventions must be monitored closely, especially in patients with decompensated cirrhosis or those with other contraindications. From a diagnostic perspective, esophagogastroduodenoscopy (EGD) remains the gold standard for detecting EV and assessing their severity, although non-invasive methods like elastography and artificial intelligence-based tools are emerging as useful alternatives, offering higher diagnostic accuracy and reducing the need for frequent invasive procedures. The integration of these technologies into clinical practice can help optimize screening protocols and reduce unnecessary endoscopic procedures. Nurses play a pivotal role in the management of esophageal varices, providing continuous patient monitoring, administering medications, and educating patients on lifestyle modifications to prevent variceal bleeding. Their involvement extends to the prevention of complications through the monitoring of vital signs, early identification of bleeding signs, and patient education on the importance of compliance with prescribed medications and follow-up appointments. In conclusion, the management of esophageal varices requires a multidisciplinary approach, with nursing interventions being essential to improving patient outcomes. By leveraging advances in diagnostic technology and employing effective pharmacological and endoscopic treatments, healthcare providers can better manage the risks associated with EV, ultimately reducing mortality rates from variceal bleeding.

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الملخص:

الخلفية: تُعد دوالي المريء (EV) أحد الأسباب الرئيسية للنزيف الهضمي العلوي (UGIB) وتمثل مشكلة صحية هامة على مستوى العالم. تنشأ عادة نتيجة للضغط المرتفع في الوريد البابي، الذي قد يكون ناتجًا عن تليف الكبد أو حالات أخرى مثل داء البلهارسيا وتخثر الوريد البابي. يُعد النزيف الحاد من الدوالي (AVB) من المضاعفات التي تهدد الحياة، ويتطلب تشخيصًا وإدارة في الوقت المناسب لتقليل معدل الوفيات. في حين يُعتبر التنظير الداخلي هو المعيار الذهبي لتشخيص وتقييم دوالي المريء، إلا أن الأساليب غير الغازية مثل الإيلاستوجرافيا والذكاء الاصطناعي قيد الاستكشاف.

الهدف: تهدف هذه المراجعة إلى تقييم التشخيص، استراتيجيات الإدارة، ودور التدخلات التمريضية في إدارة دوالي المريء، مع التركيز على الوقاية والعلاج والمراقبة.

الطرق: تم إجراء مراجعة شاملة للأدبيات، حيث تم فحص تقنيات التشخيص المختلفة، بما في ذلك التنظير الهضمي العلوي(EGD) ، والإيلاستوجرافيا، والتقنيات الناشئة مثل الذكاء الاصطناعي. كما تم تقييم استراتيجيات الإدارة، بما في ذلك التدخلات الدوائية والتنظيرية، مع إيلاء اهتمام خاص للتدخلات التمريضية في إدارة النزيف الناجم عن الدوالي.

النتائج: تشمل النتائج الرئيسية أهمية التشخيص المبكر وتصنيف المخاطر لدوالي المريء، حيث يلعب التنظير الهضمي العلوي والإيلاستوجرافيا أدوارًا محورية. الوقاية الأولية من خلال حاصرات بيتا غير الانتقائية والرباط التنظيري للدوالي ضرورية لمنع النزيف لأول مرة. تعتبر التدخلات التمريضية، بما في ذلك مراقبة علامات النزيف، وتثقيف المرضى، وإعطاء الأدوية، أمرًا حيويًا في إدارة المرضى المصابين بدوالي المريء.

الخلاصة: تُعد دوالي المريء حالة طبية خطيرة تتطلب استراتيجيات إدارة شاملة. يلعب الممرضون دورًا حاسمًا في إدارة ووقاية ومراقبة هؤلاء المرضى، مع التركيز على أهمية الكشف المبكر، والعلاج الدوائي، والتدخلات التنظيرية.

الكلمات المفتاحية: دوالي المريء، الضغط البابي المرتفع، النزيف الحاد من الدوالي، التنظير الداخلي، التدخلات التمريضية، حاصرات بيتا، الإيلاستوجرافيا.