

Study of endoscopic esophageal variceal ligation cases in Tishreen

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Abstract: Objective: The aim of this study is to estimate the effectiveness and complications of performing EVL in cirrhotic patients, and to assess the outcome of rebleeding events after EVL. Patients and Methods: An Observational Descriptive Study conducted for the period from January 2020 to January 2021 at Tishreen University Hospital in Lattakia- Syria, 45 Cirrhotic patients with esophageal varices who underwent 69 EVL sessions whether done as prophylactic or therapeutic followed up for three weeks. Results: The median age was 57 years, 66.70% of patients were male. The most common etiology was cryptogenic cirrhosis (40%), and 44.4% of patients had esophageal varices grade III. The most common indication for performing EVL was primary prophylaxis (46.4%). Initial control of bleeding was achieved in 95.2% of emergency procedures. The mortality rate during follow-up was 2.2%. Chest pain was the most common complication of EVL (31.9%). The incidence of re-bleeding events after EVL was 7.24%, more frequently in emergency procedures. Re-bleeding was significantly associated with alcoholic liver disease, poor liver condition (Child- Paugh C class), emergency procedures, coagulation disorders (low levels of PLT and high levels of INR) and presence of large varices (grade III and IV). Conclusion: EVL is feasible, safe, and effective for the management of esophageal varices in patients with end stage liver disease.

Keywords: Endoscopic variceal ligation, cirrhosis, esophageal varices.

دراسة لحالات ربط دوالي المري تنظيرياً في مشفى تشرين الجامعي

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المستخلص: هدفت هذه الدراسة إلى تقدير فعالية واختلاطات EVL عند مرضى التشمع الكبدي، وهدفت أيضاً إلى تقييم نتيجة الحوادث النزفية الحاصلة بعد EVL. طريقة البحث: أجريت هذه الدراسة الرصدية الوصفية على مدى سنة واحدة (كانون الثاني 2020- كانون الثاني 2021) في مشفى تشرين الجامعي في اللاذقية- سورية. تمت متابعة 45 مريضاً مصاباً بالتشمع الكبدي أجري لهم 69 جلسة EVL إما كإجراء وقائي أو علاجي لمدة ثلاثة أسابيع. النتائج: بلغ معدل العمر 57 سنة، 66.70% من المرضى هم من الذكور. كان السبب الأشيع لتشمع الكبد هو الألية مجهولة السبب في (40%) من الحالات. (44.4%) من المرضى كان لديهم دوالي مري من الدرجة III. مثلت الوقاية الأولية الاستطباب الأكثر شيوعاً لإجراء EVL (46.4%). تمت السيطرة المبدئية على النزف في (95.2%) من الإجراءات الإسعافية. بلغ معدل الوفيات خلال فترة المتابعة 2.2%. يعتبر الألم الصدري أكثر الاختلاطات تواتراً بعد EVL (31.9%). حدث نكس النزف بعد EVL

في 7.24% من الحالات وكان أكثر تواتراً في الإجراءات الإسعافية. ارتبط نكس النزف بعد EVL بشكل هام مع كل من تشمع الكبد الكحولي، الأذية الكبدية المتقدمة (Child- Paugh Class C)، استطباب الإجراء الإسعافي، اضطرابات التخثر (نقص في الصفائح وارتفاع في قيم INR) بالإضافة إلى دوالي المري الكبيرة (من الدرجة III والدرجة IV). الاستنتاج: يعتبر EVL طريقة سهلة، آمنة وفعالة في علاج دوالي المري عند مرضى تشمع الكبد.

الكلمات المفتاحية: ربط دوالي المري تنظيرياً، تشمع الكبد، دوالي المري.

Introduction.

Cirrhosis is a consequence of chronic liver disease, characterized by replacement of liver tissue by fibrosis, scar tissue and regenerative nodules leading to loss of liver function [1, 2]. Cirrhotic patients are at risk for many serious complications, such as formation of esophageal varices (EVs), the direct result of high blood pressure in the portal vein. The frequency of EVs varies from 60% to 80% in patients with liver cirrhosis [3, 4].

Acute variceal bleeding is a devastating complication with high morbidity and mortality rates. The first bleeding episode has a mortality rate of 10- 30%, depending on severity of the liver disease. Survivors of an episode of active bleeding have a 70% risk of recurrent hemorrhage within one year of bleeding episode [5]. Many treatment options are available including endoscopic, radiographic, and surgical strategies. All of these modalities carry risks of complications, however, are lower compared to the risk of mortality from esophageal bleeding. Endoscopic variceal ligation (EVL) and endoscopic variceal sclerosis (EVS) are the two forms of endoscopic therapy. EVL is a standard endoscopic procedure in the management of acute variceal bleeding and is beneficial in the primary and secondary prophylaxis of bleeding [6, 7]. The main complications of variceal banding are pain, dysphagia, fever, bleeding during the procedure and post- banding ulcer bleeding. The reported incidence of post- banding ulcer bleeding is low (2.3%- 7.3%) [8, 9].

There are scanty data on the short term outcomes of EVL for esophageal varices; Shrestha et al. [10] found that EVL is an effective therapy in controlling acute variceal bleeding, in preventing future variceal bleeding as well as in eradicating esophageal varices with very few complications. Also, Javed et al. [11] demonstrated that that EVL is an effective modality for control of esophageal variceal bleeding, and rebleeding after EVL was 6.4%. Anyway, only a few studies have reported the possible predictive factors for rebleeding events after EVL; Vanbiervliet et al. [8] have suggested that previous upper variceal digestive bleeding, peptic esophagitis, high AST to platelet ratio index (APRI) score, and low prothrombin time (PT index) are the risk factors for EVL- induced ulcer bleeding.

According to our knowledge, limited work has been performed to identify the outcomes and complications of EVL in our population, and there are only a few studies relating the rebleeding events after EVL to the procedure indication or to the bleeding source. Therefore, the primary objective of the study was to estimate the effectiveness and complications of performing EVL in cirrhotic patients. The

secondary objectives were to assess the outcome of rebleeding events after EVL and to identify the risk factors associated with this complication.

Patients and Methods:

This is an Observational Descriptive Study (Cross- sectional) of a group of cirrhotic patients with EVs who attending Department of Gastroenterology at Tishreen University Hospital in Lattakia- Syria during a one year period (January 2020 to January 2021) and subjected to EVL. The inclusion criteria were: all cirrhotic patients with EVs who underwent EVL whether done as prophylaxis or therapeutic. The exclusion criteria were: patients with history of non- cirrhotic portal hypertension and who refused the medical procedure.

The following data were recorded: demographic data (age, sex), laboratory parameters including: complete blood count and liver function tests. The etiology of cirrhosis was determined according to clinical findings, laboratory tests, imaging studies and histopathologic examination of the liver biopsy. Cirrhosis with unknown etiology was considered as cryptogenic. Severity of liver disease was evaluated by Child- Pugh classification score. Endoscopic severity of esophageal varices was graded either I, II, III, or IV. EVL was performed using an endoscope (pentax EPK- 1) and endoscope ligator (Boston 7 shooters) under the general anesthesia. Variceal ligation was performed beginning at the most distal discernible variceal column and then proceeding to the next proximal varix in elective cases whereas in emergent cases, variceal ligation was done starting from the point of recent bleeding. Patients were followed up for 21 days, during which we gathered the results of variceal ligation (complications, rebleeding events and survival).

Ethical consideration: All patients were provided a complete and clear informed consent after discussion about advantages, complications and the risks associated with procedure. This study was performed in accordance with the Declaration of Helsinki.

Definitions:

Child- Pugh classification: It is a universal scoring system of the degree of liver failure in patients with cirrhosis. Variables measured by this system include ascites, encephalopathy, serum albumin, bilirubin, and prothrombin time (PT). Child- Pugh score corresponds to the total of points for each item, and patients can be categorized to grade A (5- 6 points), B (7- 9 points), C (10- 15 points) [12].

Esophageal varices classification (Paquet's classification)

Grade I: Microcapillaries located in distal esophagus or esophago- gastric junction

Grade II: One or two small- sized varices located in the distal esophagus

Grade III: Medium- sized varices of any number

Grade IV: Large- sized varices in any part of esophagus [13].

Variceal bleeding: is defined as bleeding from an esophageal varix at the time of endoscopy or the presence of large esophageal varices with blood in the stomach and no other potential source of bleeding.

Rebleeding events: is defined as new hematemesis or melena within 3 weeks of EVL and/or fall in hemoglobin of 2gms or more of pre- discharge level within 3 weeks post EVL.

Hemostasis: Control of bleeding within 24 hour of performing EVL.

Statistical Analysis

Statistical analysis was performed by using IBM SPSS version20. Basic Descriptive statistics included means, standard deviations (SD), median, frequency and percentages. Independent t student test was used to compare 2 independent groups. Differences of distribution examined by using chi- square test or Fisher exact test if it need. One way Anova to compare between the three groups. P value <0.05 was considered as statistically significant.

Results.

Sixty nine endoscopic variceal ligation procedures were performed in 45 patients during the period of study. The median age was 57 years, 66.70% of patients were male and 33.30% were female. The most common causes of liver cirrhosis were cryptogenic cirrhosis (40%) and alcoholic liver disease (17.8%). According to the Child- Pugh classification, 26.7% were classified as grade A, 28.9%as grade B and 44.4% as grade C. Among the complications of liver cirrhosis, ascites was present in 55.6%, Table (1).

Table (1) Demographic characteristics and laboratory parameters of the study population

Variables	
Age (years)	57 (19- 90)
<u>Sex</u>	
Male	30 (66.70%)
Female	15 (33.30%)
<u>Causes of cirrhosis (n%)</u>	
Cryptogenic cirrhosis	18 (40%)
Alcoholic liver disease	8 (17.8%)
Hepatitis C	7 (15.6%)
Autoimmune hepatitis	7 (15.6%)
Hepatitis B	5 (11.1%)
<u>Severity of cirrhosis</u>	
Child –Paugh A	12 (26.7%)
Child –Paugh B	13 (28.9%)

Variables	
Child –Paugh C	20 (44.4%)
<u>Ascites</u>	
Present	25 (55.6%)
Absent	20 (44.4%)
<u>Laboratory parameters</u>	
WBC	3.9 (1.50- 10.40)
Hb	9.1 (4.7- 12)
PLT	74000 (19000- 234000)
INR	1.9 (1.2- 4.8)
Albumin	3.1 (2- 3.9)
Total bilirubin	1.9 (0.6- 7.1)

The baseline characteristics of patients enrolled at the first presentation, there were no patients with grade I esophageal varices, 5 patients (11.1%) with grade II, 30 (66.7%) grade III, and 10 patients (22.2%) with grade IV. Red spots were found in 89.9% with presence of gastric varices in 37.8%. The indication of EVL was mainly primary prophylaxis (46.4%) followed by emergency indication (30.4%) due to acute esophageal variceal bleeding. The success rate of hemostasis achieved by ligation during 24 hours was 95.2% (20/21) in emergency procedures. Out of 69 EVL sessions chest pain developed in 31.9 % of cases, followed by dysphagia in 11.6%. Bleeding from ligation ulcers was occurred in 2.9%, Table (2). Some patients may have more than one complication for performing EVL.

Table (2) Endoscopic findings, indications and complications of EVL of the study population

Variable	
<u>Grade of esophageal varices</u>	
Grade II	5 (11.1%)
Grade III	30 (66.7%)
Grade IV	10 (22.2%)
<u>Indications of EVL</u>	
Primary prophylaxis	46.4%
Secondary prophylaxis	23.2%
Emergency	30.4%
<u>Complications of EVL</u>	
<u>Minor</u>	
Chest pain	22 (31.9%)
Dysphagia	8 (11.6%)
Fever	2 (2.9%)

Variable	
Major	
Bleeding from esophageal ulcers	2 (2.9%)
Rebleeding events	5 (7.2%)
Ligation ulcers	2 (2.9%)
Recurrent varices	3 (4.3%)

Only 5 episodes of rebleeding events occurred. There were 2 cases of post- banding ulcer bleeding (2.9%) with a mean of 6 ± 1.4 days and 3 cases from recurrent varices (4.3%) with a mean of 16 ± 2.6 days. Mortality rate was 2.2%.

As shown below Table (3), all alcoholic liver disease cases were in males. Cryptogenic, hepatitis B, and hepatitis C were more frequently in males, and Autoimmune hepatitis was more frequently in females but without significant differences. Gastric varices were more frequently in cirrhotic patients due to autoimmune hepatitis (57.1%). The mean values of INR were higher in cirrhotic patients due to hepatitis B, hepatitis C and autoimmune hepatitis ($p:0.04$).

Table (3) Demographic, clinical features, and outcome according to etiology of cirrhosis

Variable	Causes of cirrhosis					p-value
	Alcoholic liver disease	Cryptogenic	Hepatitis B	Hepatitis C	Autoimmune hepatitis	
<u>Age</u>	52 (28- 90)	65 (19- 73)	55 (45- 63)	54 (24- 63)	53 (37- 65)	0.06
<u>Sex</u>						
Male	8 (100%)	11 (61.1%)	4 (80%)	6 (85.7%)	2 (28.6%)	0.09
Female	0 (0%)	7 (38.9%)	1 (20%)	1 (14.3%)	5 (71.4%)	
<u>Grade of esophageal varices</u>						
Grade II	1 (12.5%)	3 (16.7%)	0 (0%)	0 (0%)	1 (14.3%)	0.7
Grade III	4 (50%)	12 (66.7%)	3 (60%)	6 (85.7%)	5 (71.4%)	
Grade IV	3 (37.5%)	3 (16.7%)	2 (40%)	1 (14.3%)	1 (14.3%)	
<u>Gastric varices</u>	3 (37.5%)	6 (33.3%)	2 (40%)	2 (28.6%)	4 (57.1%)	0.8
<u>Laboratory parameters</u>						
PLT	71250±16237	90166±38573.4	86285±83891	68285±48510	79333.3±44404	0.6
INR	1.9±0.8	1.8±0.3	2.6±1.4	2.4±1	2.09±1.05	0.04
<u>Severity of cirrhosis</u>						
Child –Paugh A	2 (25%)	5 (27.8%)	1 (20%)	1 (14.3%)	3 (42.9%)	0.6
Child –Paugh B	3 (37.5%)	6 (33.3%)	0 (0%)	3 (42.9%)	1 (14.3%)	0.5
Child –Paugh C	3 (37.5%)	7 (38.9%)	4 (80%)	3 (42.9%)	3 (42.9%)	0.1

There was a significant correlation between indication of EVL and laboratory parameters. In emergency procedures, the mean values of PLT were lower ($p:0.02$) and mean values of INR were higher ($p:0.04$). 95.2 % of the emergency procedures were in patients with esophageal varices grade III ($p:0.03$), IV ($p:0.007$), and 66.7% of emergency procedures were in patients with Child –Paugh C ($p:0.03$).

Table (4) Demographic, clinical features, and outcome according to indication of EVL

Variable	Indication of EVL		
	Prophylaxis	Emergency	p- value
<u>Sex</u>			
Male	35 (72.9%)	12 (57.1%)	0.1
Female	13 (27.1%)	9 (42.9%)	0.2
<u>Age</u>	55 (19- 72)	57 (28- 90)	0.2
<u>Laboratory parameters</u>			
PLT	86166.7±50406.9	71476.2±37747.3	0.02
INR	1.8±0.7	2.3±0.8	0.04
<u>Grade of esophageal varices</u>			
Grade II	5 (10.4%)	1 (4.8%)	0.4
Grade III	35 (72.9%)	10 (47.6%)	0.03
Grade IV	8 (16.7%)	10 (47.6%)	0.007
<u>Gastric varices</u>	16 (33.3%)	11 (52.4%)	0.1
<u>Severity of cirrhosis</u>			
Child –Paugh A	14 (29.2%)	4 (19%)	0.3
Child –Paugh B	15 (31.3%)	3 (14.3%)	0.1
Child –Paugh C	19 (39.6%)	14 (66.7%)	0.03

As shown below Table (5), rebleeding events were more frequently in cirrhotic patients due to alcoholic liver disease ($p:0.02$). All cases of rebleeding were in patients with the classification Child – Paugh C ($p:0.004$), and most cases (80%) were in the emergency procedures ($p:0.0001$). The mean values of PLT were lower ($p:0.01$) and values of INR were higher ($p:0.04$) in presence of bleeding. Bleeding incidence was increased with increasing the grade of esophageal varices ($p<0.05$).

Table (5) Demographic, clinical features, and outcome according to presence of bleeding

Variable	Rebleeding events		p- value
	Present	Absent	
<u>Age</u>	55 (50- 70)	57 (19- 90)	0.7
<u>Sex</u>			
Male	4 (80%)	42 (65.6%)	0.3
Female	1 (20%)	22 (34.4%)	

Variable	Rebleeding events		p- value
	Present	Absent	
<u>Causes of cirrhosis (n%)</u>			
Cryptogenic causes	1 (20%)	26 (40.6%)	0.1
Alcoholic liver disease	3 (60%)	12 (18.8%)	0.02
Hepatitis C	0 (0%)	13 (20.3%)	-----
Autoimmune hepatitis	1 (20%)	5 (7.8%)	0.08
Hepatitis B	0 (0%)	8 (12.5%)	----
<u>Severity of cirrhosis</u>			
Child –Paugh A	0 (0%)	19 (29.7%)	----
Child –Paugh B	0 (0%)	19 (29.7%)	-----
Child –Paugh C	5 (100%)	26 (40.6%)	0.004
<u>Indications of EVL</u>			
prophylaxis	1 (20%)	47 (73.4%)	0.0001
Emergency	4 (80%)	17 (26.6%)	0.0001
<u>Laboratory parameters</u>			
PLT	62142.8±28731.1	83903±48441.1	0.01
INR	2.4±0.9	1.9±0.7	0.04
Total bilirubin	2.7±1.3	2.2±1.5	0.4
<u>Grade of esophageal varices</u>			
Grade II	0 (0%)	8 (12.5%)	-----
Grade III	2 (40%)	42 (65.6%)	0.04
Grade IV	3 (60%)	14 (21.9%)	0.03
<u>Gastric varices</u>	3 (60%)	24 (37.5%)	0.8
<u>Red spots</u>	5 (100%)	55 (85.9%)	0.3
<u>Number of bands</u>	6.5±0.5	6.03±0.7	0.08

Discussion.

This study describes our experience with EVL in 45 cirrhotic patients with esophageal varices.

Our study demonstrated that initial control of bleeding was achieved in 95.2%. It was similar to that reported in other studies as with Lahbabi et al. [14] who found that EVL controlled bleeding in 96.5%, and Khan et al. [15] also demonstrated that EVL controlled bleeding in 97.34%.

Chest discomfort was occurred in 31.9% in our study. This adverse event is transient and the mechanism is due to an abnormal process, esophageal spasm or esophageal hypersensitivity. The

percentage of occurrence in our study is high in comparison with other studies, in which Lahbabi et al. [14] and Disbrow et al. [16] showed that chest pain was occurred in 8.4% and 0.76% respectively.

Dysphagia was occurred in 11.6% in the present study. This complication may be secondary to transient alterations in esophageal motility and engorged banded varices. Shrestha et al. [10] also found that dysphagia was occurred in 8.4%, whereas the percentage was lower in Lahbabi et al. study 3.7% [14].

Fever was occurred in the present study in 2.9%. Shrestha et al. [10] also found that fever was occurred in 1.7%. However, all patients in our study were given a short course of prophylaxis antibiotics.

Rebleeding after EVL was observed in 7.2%. Petrasch et al. [17] found rebleeding in 7.8%. Also Lahbabi et al. [14] found rebleeding in 8.7%, whereas rates of rebleeding were 2% and 4.8% in studies conducted by Disbrow et al. [16] and Drolz et al. [18] respectively. These differences in occurrence are because of the fact we included every patient with indication for EVL but these studies were performed for prophylaxis EVL [18], emergent EVL [14], and prophylaxis and emergency EVL [16, 17].

In the present study, the rate of rebleeding events from ligation ulcers was lower than from recurrent varices (2.9% and 4.3%) respectively, which agree with Petrasch et al. [17] study (3.6% and 3.9%), whereas ligation ulcers were the most common sites of rebleeding events in Lahbabi et al. [14] study (5%). Whereas in study of Disbrow et al. [16] the exact source of rebleeding was not determined. This may be explained by the difference of risk factors associated with ligation ulcer bleeding between studies and the time interval between sessions.

There are many risk factors associated with rebleeding events after EVL in the present study: presence of alcoholic liver disease (p: 0.02), Child- Paugh C class (p:0.004), emergency procedures (p:0.0001), coagulation disorders (p<0.05) and presence of large varices (p:0.03). In our study, we found that the presence of alcoholic liver disease is a risk factor for rebleeding, while Drolz et al. [18] didn't observed significant difference in cirrhosis etiology between patients with and without bleeding events after EVL. In this study, poor liver condition (Child- Paugh C class) was identified as a risk factor of rebleeding in cirrhotic patients, we can explain that due to reduced coagulation ability and presence of hypoalbuminemia, this result consistent with previous studies done by Javed et al. [11] and Xu et al. [19]. We found that the emergency procedure was identified as a risk factor of rebleeding, this could be explained by the technical difficulty, this result consistent with the study done by Petrasch et al. [17] which found that rebleeding was more frequently after emergency procedures. Although, changes in coagulation tests results are common in cirrhotic patients, the association of coagulopathy with bleeding events after EVL remains controversial. In our study, we found that low levels of PLT and high levels of INR are risk factors of rebleeding, we can explain that because of the high levels of INR suggest a lack of coagulation factors. In contrast, Drolz et al. [18] failed to find significant association between PLT counts or INR and bleeding events after EVL. We also found that large varices (grade III and grade IV) are risk factors of rebleeding events after EVL, as large varices indicate more venous pressure, which is consistent with the

study done by Drolz et al. [18]. Previously reported risk factors for the bleeding events after EVL such as high serum bilirubin [18, 19], presence of gastric varices [19], presence of red spots [11, 19] and the number of bands applied [17, 18, 19] were not risk factors in our study.

Mortality rate was 2.2% in our study. This rate is consistent with that reported in other studies (2.4%) by Disbrow et al. [16] and (5%) by Lahbabi et al. [14]. This slightly lower mortality rate in our study is may be due to short period of follow up (21 days) in comparison to 30 days in Disbrow et al.[16] study and because of we included both of the prophylaxis and emergency procedures, in contrast of the Lahbabi et al.[14] study who included only the emergency procedures.

Conclusion.

EVL is an effective method for management esophageal varices in cirrhotic patients, with low rates of complications. The risk of rebleeding events is higher after emergency EVL than after prophylaxis EVL. This study pointed out at five risk factors for the rebleeding events after EVL: presence of alcoholic liver disease, Child- Paugh C class, emergency procedures, coagulation disorders and presence of large varices. Therefore, we propose to keep patients who have undergone emergency EVL under medical surveillance for at least 7 days, and a special care should be undertaken in patients with these risk factors to reduce the possibility of rebleeding events after EVL.

Conflict of interest

The authors declare that they have no conflict of interest.

References.

- 1- Asrani SK, Devarbhavi H, Eaton J (2019). Burden of liver diseases in the world. *J Hepatol.*70:151- 171.
- 2- Roth GA, Abate D, Abate KH (2018). Global, regional, and national age- sex- specific mortality for 282 causes of death in 195 countries and territories, 1980- 2017: a systematic analysis for the Global Burden of Disease study. *Lancet.*392:1736- 1788.
- 3- Garcia- Tsao G, Abraldes JG, Berzigotti (2017). Portal hypertensive bleeding in cirrhosis: Risk stratification, diagnosis, and management: Practice guidance by the American Association for the study of liver disease. *Hepatology.*65:310.
- 4- Abby Philips C, Sahney A (2016). Oesophageal and gastric varices: historical aspects, classification and grading: everything in one place. *Gastroenterology Report.*4 (3):186- 195.
- 5- Garcia- Tsao G. Bosch J (2015). Varices and variceal hemorrhage in cirrhosis: A New View of an old problem. *Clin Gastroenterol Hepatol.* 13 (12):2109.
- 6- Garcia- Tsao G. Bosch J (2010). Management of varices and variceal hemorrhage in cirrhosis. *N Engl J Med.*362 (9):823.

- 7- Hwang JH, Shergill AK, Acosta RD (2014). The role of endoscopy in the management of variceal hemorrhage. *Gastrointest Endosc.*80 (2):221.
- 8- Vanbiervliet G, Guiudicelli- Bornard S, Piche T, Berthier F, Gelsi E, Filippi J (2010). Predictive factors of bleeding related to post- banding ulcer following endoscopic variceal ligation in cirrhotic patients: a case- control study. *Aliment Pharmacol Ther.*32:225- 32.
- 9- Tierney A, Toriz BE, Mian S (2013). Interventions and outcomes of treatment of post- banding ulcer hemorrhage after endoscopic band ligation: a single- center case series. *Gastrointest Endosc.*77:136- 40.
- 10- Barun Shrestha, Sudhamshu KC, Sitaram Chaudhary (2017). Outcome of endoscopic variceal band ligation. *J Nepal Med Assoc.*56 (206):198- 202.
- 11- Farwah Javed, Ghias Hassan, Shafqat Rasool (2015). Frequency of re- bleeding after esophageal variceal banding in cirrhotic patients at 3 weeks. *PJMHS.*11 (3):832- 836.
- 12- Shetty K, Rybicki L, Carey WD (1997). The Child- Pugh classification as a prognostic indicator for survival in primary sclerosing cholangitis. *Hepatology.*25:1049- 1053.
- 13- Paquet KJ (1982). Prophylactic endoscopic sclerosing treatment of the esophageal wall in varices. A prospective controlled randomized trial. *Endoscopy.* 14:4- 5.
- 14- Mounia Lahabi, Mounia Elyousfi, Nouredin Aqodad (2013). Esophageal variceal for hemostasis of acute variceal bleeding: efficacy and safety. *Pan African Medical Journal.*14:95.
- 15- Abbas Khan, Fazal Manan, Rahman UD Din (2013). Outcome of endoscopic band ligation for esophageal variceal bleed in patients with chronic liver disease. *Gomal Journal of Medical Science.*11 (1):84- 87.
- 16- Molly Disbrow, Yu Hui Chang, Bashar Aqel (2015). Outcomes of Endoscopic variceal ligation in patients with ESLD: A Single –centre experience. *The American Journal of Gastroenterology.*110:709.
- 17- Petrasch Florian, Johannes Grothaus, Ingolf Schiefke (2010). Differences in bleeding behavior after endoscopic band ligation: a retrospective analysis. *BMC Gastroenterology,* 10:5.
- 18- Andreas Drolz, Christoph Schramm, Oliver Seiz (2020). Risk factors associated with bleeding after prophylactic endoscopic variceal ligation in cirrhosis. *Endoscopy.* 53 (3):226- 234.
- 19- Liang Xu, Feng Ji, Qin- Wei Xu (2011). Risk factors for predicting early variceal rebleeding after endoscopic variceal ligation. *World Journal of Gastroenterology.*28:3347- 52.