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## **Gastro-esophageal Varices: Endoscopic Band Ligation, Alcohol Injection and Cyanoacrylate Injection**

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The aim of present study was to compare three different endoscopic methods in the management of Type I and II gastric varices (GV): (I) gastric variceal obturation using cyanoacrylate, (II) gastric variceal sclerotherapy using absolute alcohol and (III) gastric variceal ligation by rubber (O) bands. The comparison regards the technical ease, efficacy, complications and number of sessions needed to eradicate varices. To fulfill this aim we studied 115 patients with chronic liver disease and gastric varices presented to the central endoscopy unit Ain Shams University Hospital. The patients were categorized into (3) groups: Group I included 45 patients who underwent GV obturation using cyanoacrylate, Group II included 30 patients who underwent GV sclerotherapy using alcohol injection and Group III included 40 patients who underwent GV band ligation. All patients were age and sex matched. We excluded patients with Type III GV, hepatic encephalopathy, hepatocellular carcinoma and prior history of sclerotherapy, band ligation or shunt operation. Present results showed that cyanoacrylate obturation of gastric varices was more effective in controlling gastric variceal bleeding (95.6%) than other methods with low number of sessions and low rebleeding rate than GV Ligation (35%) or alcohol injection (46.7%). So We conclude that gastric variceal obturation by cyanoacrylate proved more effective and safer than gastric variceal ligation or injection sclerotherapy using absolute alcohol in the management of Type I and II gastric varices.

**Key words:** Gastric varices, obturation, band ligation, sclerotherapy

## INTRODUCTION

The commonest causes for development of gastric varices are portal hypertension and splenic vein thrombosis mainly due to pancreatic diseases Fumorgen, 1999.

The magnitude of the problem of gastric varices reported as low as 6% (Thakeb *et al.*, 1994). while a much higher incidence reaching up to 70% was reported in other publication (Jacobs *et al.*, 1999).

GV are classified according to the time of first examination (Sarin *et al.*, 1992). into primary gastric varices (present at the time of initial examination before any therapeutic intervention) and secondary gastric varices which could be further classified on the basis of its location in the stomach and its relationship to esophageal varices into three groups. Type I gastro-esophageal varices (GOVs): appear as continuation of esophageal varices and extend for 2 to 5 cm below the GO junction. Type II GOVs: extend beyond the gastro-esophageal junction into the fundus of the stomach. They are long, tortuous veins continuous with esophageal varices. Type III: isolated gastric varices include isolated fundal varices and isolated ectopic varices and appear anywhere in the stomach as in body, antrum or pylorus.

Several modalities had been developed for stoppage of active variceal bleeding including splanchnic vasoconstrictors and vasopressin analogues, somatostatin or octeriotides (Burroughs *et al.*, 1999). Yet, endoscopic treatment is still of importance including injection sclerotherapy and band ligation (Dhiman and Chawla, 2003). Another modalities for management of GOVs include transjugular intrahepatic portosystemic shunt (TIPS). It's done under radiological guidance (Zemal *et al.*, 1991). Also balloon-occluded retrograde transvenous obliteration where a balloon catheter is inserted via gastroduodenal shunt and inflated (Sonomura *et al.*, 1998).

Yet, endoscopic management of esophageal or gastric varices still the most appropriate line of intervention especially after its wide use and feasibility of the technique and accessories needed (Akahoshi *et al.*, 2002).

The aim of the study was to compare three different endoscopic modalities for the management of type I and II gastric varices (obturation using cyanoacrylate, sclerotherapy using absolute alcohol and variceal band ligation using rubber O bands).

## MATERIALS AND METHODS

A total number of 115 consecutive patients, 78 males and 37 females, with Type I and II gastric varices who met the inclusion criteria were enrolled in this study during 2004. These patients were selected from the gastrointestinal endoscopy unit in Ain Shams University hospital, where they were presented with past history of haematemesis of GV origin.

**Inclusion criteria:** Consecutive patients with portal hypertension were included if they had a confirmed past history of gastric variceal bleeding; it was defined as endoscopic evidence of i) Active spurting or oozing from GV, ii) Presence of clot over GV and iii) Absence of any source of bleeding such as esophageal varices, portal hypertensive gastropathy, or gastric antral vascular ectasia.

**Exclusion criteria:** Patients with gastric varices were excluded if they have Type III GV; a prior history of shunt operation; hepatorenal syndrome or higher than grad II hepatic encephalopathy; or undergoing endoscopic sclerotherapy /banding for esophageal varices.

Patients were subdivided into three equal groups;

**Group I:** Included 45 patients who undergone gastric variceal obturation using cyanoacrylate. They were 29 males (64.4%) and 16 females (35.6%) with a mean age of  $57.6 \pm 4.2$  years.

**Group II:** Included 30 patients who undergone gastric variceal sclero-therapy using absolute alcohol. They were 19 males (63.3%) and 11 females (36.7%) with a mean age of  $56.7 \pm 6.2$ .

**Group III:** Included 40 patients who undergone gastric variceal band ligation using rubber O bands. They were 30 males (75%) and 10 females (25%) with a mean age of  $55.2 \pm 4.5$ .

In all groups, treatment sessions were at 7 to 14 days interval. After eradication of varices or reduction of its size to grade I (successful obliteration), follow up endoscopy was performed at three months interval for one year follow up.

All patients were subjected to: (i) Full history taking with special emphasis on bilharzial affection, jaundice, history of bleeding (haematemesis±melena, blood transfusion and history of hepatic encephalopathy if present). Also any previous management; medical, surgical or endoscopic maneuvers were taken into

consideration; (ii) Thorough clinical examination with special emphasis on stigmata of chronic liver affection, hepatomegaly, splenomegaly, ascites and any abdominal collaterals; (iii) Laboratory assessment including complete blood picture, prothrombin time, liver and kidney function tests. Also, to know the aetiology of chronic liver illness, viral markers for HBV and HCV were done (HBsAg, IgM and IgG anti-HBc Abs and anti-HCV Ab). Also, rectal snips were done for all patients to detect bilharzial affection; (iv) Abdominal ultrasound to detect changes in hepatic parenchyma; spleen size, ascites and portal vein diameter and patency; (v) Upper GIT endoscope (Olympus GIFTT30) for diagnostic and therapeutic purposes.

**Gastric variceal obturation:** This is performed intravariceally, using Histoacryl (n-butyl-2-cyanoacrylate) injection. A mixture of 0.5 mL of Histoacryl with 0.7 mL of Lipiodol was prepared. We injected 1.2-4.6 mL of this mixture into a single GV. An attempt was made to inject all GVs at the same time. Proper precautions for preventing the blockage of the endoscope channel and the injector were taken. These included applying Lipiodol at the tip of the endoscope channel, avoiding suction during injection of the glue and not pulling the injector out through the endoscope channel until the scope was withdrawn from the patient and the injector properly cleaned.

**Gastric variceal sclerotherapy:** Gastric variceal sclerotherapy was carried out with a combination of paravariceal and intravariceal sclerotherapy. It was performed by retroflexing the endoscope with the head end of the patient raised to 30-45°. Often the patient was kept in the right lateral position to allow a better view of the fundus.

The combination technique involved initial paravariceal injections (range = 2-9 injections) of 0.5-1 mL of absolute alcohol at multiple sites to raise blebs along the entire course of the GV. Thereafter, the sclerosant was injected intravariceally (range = 1-3 injections). Attainment of blanching was considered a desirable endpoint for injections. Repeat session was usually performed after one week unless there were diffuse ulcers.

**Gastric variceal band ligation:** Band ligation was done by multi-band ligation (Saeed multi-band ligation, Wilson-Cook). Ligation was begun in the region of the gastroesophageal junction with subsequent ligatures applied more proximally. The mean number of bands used per session was 6.3±0.2.

All statistical calculations were done using computer programs Microsoft Excel version 7 (Microsoft Corporation, NY, USA) and SPSS (Statistical

Package for the Social Science; SPSS Inc., Chicago, IL, USA) statistical program. For comparing categorical data, Chi square ( $\chi^2$ ) test was performed. Yates correction was used instead when the frequency is less than 10. A probability value ( $p < 0.05$ ) was considered significant.

## RESULTS

A total number of 115 consecutive patients, 48 males and 37 females; age ranged from 46 to 66 years with a mean of 56.5±4.9 years were enrolled in this study. There were no significant difference between the three groups as regarding age, gender, aetiology and laboratory data (Table 1).

Successful GV obliteration had been achieved in 43/45 patients in Group I (95.6%), 14/30 patients in Group II (46.7%) and 14/40 patients in Group III (35%). A significantly higher success rate was observed in the first group (obturation by cyanoacrylate) than Group II and III with a  $p < 0.05$ .

A significantly lower number of sessions, needed to obliterate GV, was observed in Group I (3.5±1.8) and III (2.4±0.9) than Group II (9.6±0.6);  $p < 0.05$  (Table 2).

The complications encountered during our study were in the form of rebleeding (28%), ulceration on gastric varices (24%), dysphagia (12%), pyrexia (12%), chest pain (12%), or combination of more than one complication (12%). No mortality was reported. Although the complications were fewer in Group I (20%) than Group II (37%) and Group III (30%), the difference was not statistically significant;  $p > 0.05$ . The most frequent complication was rebleeding (bleeding within 72 h after managing GV). It was observed in 2/45 patients (4%) in Group I; in 3/30 patients (10%) in Group II and in 4/40 patients (10%) in Group III (Table 3).

The complications encountered were treated as; rebleeding was managed by blood transfusion,

Table 1: Demographic profile and laboratory data of all groups

Parameters	Group I n = 40	Group II n = 40	Group III n = 40	p-value
Age	57.6±4.2	56.7±6.2	55.2±4.5	>0.05 (NS)
Gender (M/F)	29/16	19/11	30/10	>0.05 (NS)
Aetiology:				
Bilharziasis	11	5	10	>0.05 (NS)
Viral (B and/or C)	27	15	16	>0.05 (NS)
Mixed	7	10	14	>0.05 (NS)
Laboratory data:				
Haemoglobin	10.1±0.1	9.24±1.2	7.9±1.8	>0.05 (NS)
AST	72±26.8	78.4±34.2	74±22.1	>0.05 (NS)
ALT	75±35.4	87±5.31	89±40.1	>0.05 (NS)
Bilirubin	1.8±0.2	1.9±0.3	1.7±0.2	>0.05 (NS)
Albumin	3±0.1	2.93±0.7	2.91±0.5	>0.05 (NS)
Prothrombin conc. (%)	62.9±6.1	61.2±7.4	63.3±3.1	>0.05 (NS)
Creatinine	0.7±0.3	0.6±0.5	0.74±0.2	>0.05 (NS)

NS: Non-significant

Table 2: Comparative study of successful varices obliteration and number of sessions between all groups

Parameters	Group I n = 40	Group II n = 40	Group III n = 40	p-value
GV obliteration [No. (%)]	43 (95.6%)	14 (46.7%)	14 (35%)	<0.05 (S) Group I Vs II Group I Vs III <0.05 (S) Group I Vs II Group III Vs II
No. of sessions (Mean±SD)	3.5±1.8	9.6±0.6	2.4±0.9	

S: Significant

Table 3: Complications encountered during endoscopic management in all groups

Complication	Group I	Group II	Group III	p-value
Rebleeding	2	3	4	>0.05 (NS)
Ulceration	2	5	0	>0.05 (NS)
Pyrexia	2	0	2	>0.05 (NS)
Pain	2	0	2	>0.05 (NS)
Dysphagia	0	1	2	>0.05 (NS)
>1 complication	1	2	2	>0.05 (NS)
Total	9 (20%)	11 (37%)	12 (30%)	>0.05 (NS)

NS: Non significant

splanchnic vasoconstrictor and/or extra-session after one week. Ulceration was managed by acid suppression therapy namely; H2-blockers, sucralfate and/or proton pump inhibitors. Pain and pyrexia were managed by Paracetamol.

## DISCUSSION

It's generally accepted that bleeding from gastric varices is less frequently encountered than from esophageal varices. Approximately 19-36% of acute variceal bleeding arises from gastric varices (Korula *et al.*, 1991). However, bleeding from gastric varices is usually more severe than from esophageal varices (Lo *et al.*, 1991).

In recent years, EVL has proven to be of value in management of esophageal varices also; preliminary trials have shown that both endoscopic obturation using cyanoacrylate and GVL are promising tools in the management of gastric variceal bleeding (Huand *et al.*, 2000). Although absolute alcohol has been widely used for the treatment of bleeding esophageal varices (Merrelles-Santos *et al.*, 2000). it has not been adequately evaluated for treating gastric varices.

Sclerosing agent causes clotting of the varices and a severe necrotizing inflammation of the wall followed by marked fibrotic inflammation. Tissue adhesive, cyanoacrylate, sticks to the tissues and prevents bleeding. The technique of band ligation is based on strangulation of the varices by the application of small elastic O rings, the varices will eventually necrose and fall (Avunduk, 2002).

Present study was done to compare between GV obturation using cyanoacrylate, GV sclerotherapy using absolute alcohol and GV ligation by rubber O bands.

Present study revealed that mean number of sessions needed to eradicate varices in Group I (GVO) was 3.35±1.8 and eradication of gastric varices was achieved in 95.6% of patients. These results comes in accordance with a previous study done (Sarin *et al.*, 2002). where number of sessions needed to eradicate varices was 2.7±0.8 and variceal obliteration was achieved in 100% of patients.

Also, we found that in Group II (GVS using absolute alcohol) the number of sessions needed to achieve eradication of GV was 9.61±0.6 and eradication of GV was achieved in (46.7%) of patients. These results agree with results of a previous study (Shivk *et al.*, 2002). where eradication was achieved in 44% of patients which could be explained by the large number of cases received absolute alcohol for GV in the previous study. The increased number of sessions needed here explained by high blood flows in GV. So, alcohol is not an efficient sclerosant (Watanabe *et al.*, 1988).

In Group III (GVL) we found that number of sessions needed to eradicate GV was 2.4±0.9 and 35% of patients in this group achieved eradication of gastric varices. These results were similar to data obtained by a previous study (Gin-Holo *et al.*, 2001). in which the number of sessions needed was 2.3±1.0 and eradication was achieved in 45% of patients.

The occurrence of complications from gastric varices after cyanoacrylate was 20% while it was 37% after alcohol sclerotherapy and it was 30% after GV banding. Gin-Holo *et al.* (2001) stated that complications arise from gastric variceal obturation with cyanoacrylate was 31% and 28.7% in band ligation. Also, Sarin *et al.* (2002) stated that it was 35% in alcohol injection group.

## CONCLUSION AND RECOMMENDATIONS

From this study, we can conclude that cyanoacrylate was superior to alcohol sclerotherapy in the elective treatment of Type I and II gastric varices in terms of efficacy and number of sessions needed. Although the sessions needed for gastric varices obliteration with band ligation was lower than obturation, this is limited by the higher efficacy of glue obturation for the obliteration of Type I and II gastric varices. Further multicenter studies are needed to confirm these results.

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