

## Endoscopic sclerotherapy using absolute alcohol

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**SUMMARY** To assess the efficacy of absolute alcohol as a sclerosant, endoscopic sclerotherapy was carried out using a conventional endoscope and an indigenously designed injector. Forty three patients with portal hypertension who had presented with history of variceal bleeding were included in the study. Portal hypertension was caused by cirrhosis in 30 (69.8%), non-cirrhotic portal fibrosis in eight (18.6%) and extra-hepatic obstruction in five (11.8%). Acute bleeding was successfully controlled in all 11 patients, seven with a fresh bleed and four who rebled while on endoscopic sclerotherapy regimen. All patients with fresh, recent, or old bleeding were treated with a weekly endoscopic sclerotherapy schedule. Reduction in variceal size of two or more grades was achieved in all 20 patients who had completed at least four endoscopic sclerotherapy courses with total eradication of varices in 16 (80%). The mean ( $\pm$ SD) number of endoscopic sclerotherapy courses and time required for variceal eradication was 6.06 ( $\pm$ 1.87) and 9.1 ( $\pm$ 4.69) weeks respectively. None of these patients has shown appearance of fresh varices in a follow up of  $18.47 \pm 8.50$  weeks (range six to 38 weeks). Six patients died; all deaths were caused by progressive hepatic encephalopathy. Complications usually seen were dysphagia, retrosternal pain and fever; these were mild and easily tolerated by the patients. Rebleeding occurred in four patients who had received less than four endoscopic sclerotherapy courses. Absolute alcohol appears to be an effective, safe, economical, and freely available sclerosant. We advocate endoscopic sclerotherapy as the first line of treatment for acute variceal bleeding and recommend a weekly schedule for the early eradication of varices.

Endoscopic sclerotherapy for oesophageal varices is now an accepted mode of treatment for the management of acute variceal bleeding as well as for the prevention of recurrent bleeding.<sup>1-7</sup> This procedure is carried out with the help of sclerosants such as ethanolamine oleate,<sup>3 4 8</sup> sodium morrhuate,<sup>7 9</sup> sodium tetradecyl sulphate<sup>10</sup> and polydocanol.<sup>11</sup> Although these solutions are very effective, they are expensive and are not easily available in developing countries such as India. In search for an effective and freely available agent we have assessed the efficacy and safety of absolute alcohol as a sclerosant in the treatment of oesophageal varices.

There is at present no uniformity in the technique of endoscopic sclerotherapy and various workers have used different equipment modifications and treatment schedules. In the present study we describe our experience using a standard fibre-optic

endoscope without any modifications, an easy to design injector, use of absolute alcohol as a sclerosant, and a weekly schedule of sclerotherapy.

### Methods

#### PATIENTS

Forty three consecutive patients with upper gastrointestinal haemorrhage caused by oesophageal varices seen between March and November 1983, were included in the study. Oesophageal varices were shown by endoscopy in all patients at the time of admission. None had any associated lesion such as peptic ulcer or erosive gastritis responsible for the upper gastrointestinal bleeding. Two patients had undergone splenectomy and another two had portocaval shunt done in the past for the control of variceal bleeding.

There were 29 men and 14 women with an age range of 9-72 years and a mean ( $\pm$ SD) age of 32.7 ( $\pm$ 14.5) years. Portal hypertension was the result of alcoholic cirrhosis in nine, cryptogenic cirrhosis in

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21, non-cirrhotic portal fibrosis in eight and extra-hepatic portal obstruction in five. According to Child's classification,<sup>12</sup> 16 patients were in Child's A, 13 in Child's B, and 14 in Child's C.

All patients had a history of moderate to severe upper gastrointestinal haemorrhage<sup>13</sup> with a mean ( $\pm$ SD) of  $2.8 \pm (1.01)$  bleeds per patient. Patients were classified according to their bleeding status at the time of sclerotherapy into: active bleeders (seven) – patients with endoscopically proven active variceal bleeding despite balloon tamponade; recent bleeders (nine) – patients who had bled seven days or less before admission, and old bleeders (27) – patients with variceal haemorrhage more than seven days before admission.

#### TECHNIQUE

##### *Injector*

The injector was specially designed. The terminal 5 mm of a 21 gauge disposable needle was sawn off and firmly fixed to the metal tipped end of the Teflon washing tube supplied with the endoscope. The fixation of the needle was mechanically ensured. The sharp bevelled tip of the needle was rubbed off to make it somewhat blunt.

##### *Procedure*

No sedation in the form of premedication, or local anaesthetic spray was used. The procedure was done on an outpatient basis. The injector was flushed clean with alcohol, care being taken to remove all air bubbles. A conventional Olympus (GIF-Q or D<sub>3</sub>) endoscope was used. The variceal size was graded as 1+ to 4+ according to Conn's classification.<sup>14</sup> The assessment was made by an independent endoscopist and recorded. In addition, a careful search was made for gastric varices.

Endoscopic sclerotherapy was started from the lowest point in the variceal column near the cardiac end of the oesophagus and the injections were made circumferentially. The endoscope was withdrawn by 1–2 cm and another set of injections was made. The injector needle was first introduced into a varix and then withdrawn by a millimetre or two to ensure that the injector tip had not pierced the oesophageal wall. About 0.52 ml of absolute alcohol was injected at each site with a total of 3–18 ml per endoscopic sclerotherapy session. The quantity decreased as the varices became obliterated. After completion of a course of injections, the endoscope was pushed into the stomach in order to decompress it by aspirating the air and secretions and then withdrawn after ensuring complete haemostasis. Sengstaken tube was not used and the patients were allowed food after about an hour. Fifteen to 30 ml liquid antacid was

administered every four hours.

In patients with active variceal bleeding, the endoscopic field was first cleared by repeated suction and flushing and the bottom end of the variceal column at the gastroesophageal junction was identified and injected. A search was then made for any bleeding point on the varix and if visible injections were made around it until complete haemostasis was achieved.

Endoscopic sclerotherapy was repeated at regular weekly intervals. Repeat injections were given at a distance of about 2 cm from previous injection sites, avoiding ulcerated areas. Endoscopic sclerotherapy was, however, deferred when ulcers were present diffusely over the varices.

#### Results

One hundred and fifty nine sclerotherapy sessions were given to 43 patients.

##### CONTROL OF ACUTE HAEMORRHAGE

All seven patients with acute bleeding uncontrolled by balloon tamponade and four patients with a rebleed after the first course of elective sclerotherapy were successfully controlled by a single course of endoscopic sclerotherapy, giving an overall success rate of 100%. In acute bleeders, the indigenously designed injector was found to be especially useful as the injections could be made rapidly. None of these patients rebled. No patient has required emergency surgery since the introduction of endoscopic sclerotherapy at our centre.

##### VARICEAL REDUCTION AND ERADICATION

Because the success of endoscopic sclerotherapy depends on the adequacy of variceal sclerosis and the results are likely to improve with repeated courses we arbitrarily separated our patients into two groups. Group I received four or more courses of endoscopic sclerotherapy and group II received less than four courses (Table 1). In group I, reduction in variceal size by two or more grades was achieved in all the patients while total eradication of varices was seen in 80% patients (Table 2). By contrast, in group II, reduction in variceal size was seen in only one (2.4%) patient who completed three courses of endoscopic sclerotherapy.

To check for recurrences, patients with complete obliteration of varices were re-endoscoped by an independent observer on at least two occasions spaced one month apart. None of the patients have shown appearance of fresh varices either in the oesophagus or in the stomach during a mean follow up of  $18.47 \pm 8.50$  weeks with a range of six to 38 weeks (Table 2).

Table 1 Results of endoscopic sclerotherapy using absolute alcohol.

Endoscopic sclerotherapy courses (no)	Patients (no)	Reduction in variceal size by 2 grades or more	Eradication of varices	Rebleeding	Mean ( $\pm$ SD) follow up (weeks)	Deaths/drop out
$\geq 4$	20	20 (100%)	16 (80%)	0	25.25 $\pm$ 8.04	0
<4	23	1 (2.4%)	0	4 (9.5%)	3.08 $\pm$ 0.96	6/2

**REBLEEDING**

Rebleeding did not occur in any patient belonging to group I. All the four patients who rebled (bleeding before the next course of endoscopic sclerotherapy), had received only one course each of endoscopic sclerotherapy and all were successfully controlled by emergency sclerotherapy.

**MORTALITY AND DROP-OUT RATE**

Six patients (13.95%) belonging to group II died during the trial period. Four had received only one course of endoscopic sclerotherapy, while the other two, two courses each. The cause of death in all patients was progressive hepatocellular failure and encephalopathy. Five of these were in Child's C and one in Child's B category. None died because of endoscopic sclerotherapy procedure or rebleeding. There was no mortality in group I. Two patients (5%) dropped out from the trial after one and two courses of endoscopic sclerotherapy respectively because of difficulty in travelling long distances to the hospital.

**COMPLICATIONS**

The commonest complication was dysphagia (74%). It was generally transitory, lasting from a few hours to seven days. Dysphagia was limited to solid foods and was completely relieved after metal dilatation in two patients while the third is undergoing repeated dilatations.

Retrosternal pain and fever were recorded in 64% and 36% patients respectively. Both these complications were of short duration, from 24 hours to a maximum of 72 hours. Retrosternal pain was seen

more frequently after the initial one or two courses of endoscopic sclerotherapy or whenever large quantities of alcohol (more than 10 ml/session) was injected and gradually decreased as the varices became obliterated. No obvious correlation of retrosternal pain to the presence of oesophageal ulcers was observed. Fever was generally in the range of 37.2–38.5°C, appearing a few hours after endoscopic sclerotherapy.

Oesophageal ulcers were seen in 61% patients at the end of one week of endoscopic sclerotherapy. The ulcers appeared as yellow or grayish black plaques on the surface of the varices, measuring 2–15 mm in size. None of the ulcers bled during reinjection.

Oliguria developed within six to eight hours of sclerotherapy in four patients. It lasted for 12–48 hours and normal urine output returned in all the patients after a short course of parenteral frusemide. Blood urea values remained within normal limits. All the four patients had moderate ascites, three were in Child's C and one in Child's B category. A sudden increase in ascites was also noted in one of the patients during the period of oliguria.

**Discussion**

Absolute alcohol was found to be an effective and safe sclerosant. Using this agent, acute variceal bleeding was successfully controlled in 11 patients; seven with fresh bleed and four with a rebleed while on endoscopic sclerotherapy regimen. Reduction in variceal size of two or more grades was achieved in all 20 patients who had received four or more endoscopic sclerotherapy courses. Total eradication of varices was achieved in 16 (80%) of these patients. These results are comparable with other sclerosants.<sup>1 2 7 8 11</sup> Besides efficacy, alcohol has a number of advantages; it is economical – a complete course of endoscopic sclerotherapy costs less than two rupees (approximately 13 pence), there is no problem of sterilisation of the injector or the sclerosant because alcohol is itself a strong disinfectant, and above all it is freely available; an important consideration in the third world countries.

Table 2 Patients with total eradication of varices.

Parameter	Mean $\pm$ SD
Total patients	16
Minimum EST courses needed	4
Total EST courses given per patient	6.06 $\pm$ 1.87
Total number of variceal injections per patient	38.13 $\pm$ 13.30
Total alcohol (ml) used per patient	42.8 $\pm$ 15.56
Time required for eradication (weeks)	9.1 $\pm$ 4.69
Follow up after eradication (weeks)	18.47 $\pm$ 8.50 (Range 6–38)

EST = endoscopic sclerotherapy

The injector devised by us is simple to prepare and was found to be superior to the more expensive commercial one (Olympus NM-1K Injector). It is easier to introduce through the biopsy channel, its 21 gauge needle allows more rapid introduction of the sclerosant and the injections are made under direct vision because the sclerosant can be seen through the transparent Teflon tube.

There is no accepted standard technique of endoscopic sclerotherapy and various workers differ in the type of endoscope and sclerosant used, use of balloon tamponade after endoscopic sclerotherapy, urgency of the procedure, site of injection (intra-variceal or paravariceal) and the frequency of reinjections. The different modifications of the endoscope used include the use of a rigid Negus oesophagoscope,<sup>1 2 7</sup> a flexible sheath with a window cut at its distal end used on a side-viewing endoscope,<sup>3</sup> Olympus EFB2 or EFB3 endoscope with a side balloon made of Teflon<sup>15</sup> or use of a 'Lowa' balloon attached to the endoscope.<sup>9</sup> In the present study, we successfully used Olympus G1F-D3 and G1F-Q endoscopes without any of the above modifications.

There is a controversy regarding the use of balloon compression after endoscopic sclerotherapy to retard blood flow and to prolong the contact time of the sclerosant with the variceal wall.<sup>1 16</sup> Barsoum *et al* have shown by adding a contrast agent to the sclerosant that the material is cleared so rapidly from the submucosal varices that it does not allow any time for insertion of the balloon.<sup>17</sup> In the present study, it was not found necessary to use oesophageal tamponade. We simply introduced the endoscope into the stomach after completion of an endoscopic sclerotherapy course and kept it in place for a few minutes. This possibly facilitates haemostasis at the variceal injection sites and in addition allows decompression of the stomach of air. A distended stomach is a source of discomfort to patients, especially those with ascites.

For the management of acute variceal bleeding, most workers recommended an initial control by balloon tamponade or pitressin for 24–48 hours, followed by endoscopic sclerotherapy. This practice is carried out in the belief that endoscopic sclerotherapy is difficult during active bleeding as blood obscures the view. Some workers recommend use of a rigid endoscope in such a situation.<sup>1–3</sup> We, however, encountered no such problem and found it possible to make injections at the bottom of the variceal columns and around the bleeding site. Complete haemostasis was achieved in all seven patients and we recommend endoscopic sclerotherapy as the first (and usually the only) mode of treatment for actively bleeding oesophageal varices.

Contrary to earlier fears, none of the 16 patients in group I with complete eradication of varices showed emergence of gastric or oesophageal varices in a follow up of  $18.47 \pm 8.50$  weeks. Indeed, Terblanche *et al*<sup>2</sup> have described the disappearance of gastric varices after oesophageal variceal sclerosis, perhaps because of retrograde propagation of the thrombus into the stomach.

There is no clear agreement with regard to the ideal interval between endoscopic sclerotherapy courses, and most workers empirically follow a protocol of three to six weeks. It is argued that intervals shorter than these are associated with the problems of oesophageal ulcers, stricture formation, and poor patient compliance.<sup>3</sup> As the risk of rebleeding or death rapidly diminishes over the first few days after a bleed,<sup>18</sup> and the chances of rebleeding are as high as 70% in partially ablated varices,<sup>11</sup> we adopted a policy of weekly injections. Besides reducing the danger of rebleeding and attaining early eradication of varices, we found the weekly schedule acceptable to most patients; our drop out rate was low (5%) and the problem of hospital stay and transport was minimised.

There were no fatal complications in our series and all six mortalities were because of progressive hepatic failure and encephalopathy. The incidence of oesophageal ulcers was higher in our study compared with the previous reports.<sup>3 7 8</sup> This is probably due to the fact that we were recording their presence at the end of one week as against other studies where repeat endoscopy was performed three to six weeks after endoscopic sclerotherapy. The oesophageal ulcers did not, however, interfere with subsequent injections in our patients; we simply avoided the ulcerated areas and injected at sites 1–2 cm away. It is interesting to note that the frequency of retrosternal pain was unrelated to the presence of oesophageal ulcers. Moreover, stricture formation did not necessarily follow oesophageal ulcerations. Only 7% patients developed strictures compared with 61% patients with oesophageal ulcers. Thus, the incidence of oesophageal stricture formation using absolute alcohol on weekly basis was no higher than conventional sclerotherapy schedules.<sup>3 7 8 11</sup> The strictures were easily dilated with metal (Eder-Puestow) dilators and all except one patient recovered completely.

Transient oliguria was seen in four patients. This complication has not been reported with other sclerosants and we are unsure about the mechanism of this defect as there was no rise in the serum urea levels and none of the patients developed hepatorenal syndrome.

In conclusion, we should like to argue in favour of aggressive sclerotherapy. We feel that endoscopic

sclerotherapy should form the first line treatment in acute variceal bleeding. It also appears to be highly effective in preventing rebleeding. A weekly schedule of sclerotherapy was found safe and effective. We recommend absolute alcohol as a sclerosant as it is very effective, economical, safe, and freely available. These are preliminary observations, however, and much more experience with a larger number of patients is required to assess the overall long term benefits of endoscopic sclerotherapy.

#### References

- 1 Anonymous. Bleeding oesophageal varices. [Editorial] *Lancet* 1984; **1**: 139-41.
- 2 Terblanche J, Yakoob HI, Bornman PC, *et al.* Acute bleeding varices: a five year prospective evaluation of tamponade and sclerotherapy. *Ann Surg* 1981; **194**: 521-30.
- 3 Clark AW, Westaby D, Silk DBA, *et al.* Prospective controlled trial of injection sclerotherapy in patients with cirrhosis and recent variceal haemorrhage. *Lancet* 1980; **2**: 552-4.
- 4 Kirkham JS, Qualye JB. Oesophageal varices: evaluation of injection sclerotherapy without general anaesthesia using the flexible fiberoptic gastroscope. *Ann R Coll Surg Engl* 1982; **64**: 401-5.
- 5 Garden OJ, Osborne DH, Blamey SL, Carter DC. The management of acute variceal haemorrhage. *Aust NZ J Surg* 1983; **53**: 197-202.
- 6 Westaby D, Macdougall BRD, Malia W, Theodossi A, William R. A prospective randomized study of two sclerotherapy techniques for oesophageal varices. *Hepatology* 1983; **3**: 681-4.
- 7 Goodale RL, Silvis SE, O'Leary JF, *et al.* Early survival after sclerotherapy for bleeding oesophageal varices. *Surg Gynecol Obst* 1982; **155**: 523-8.
- 8 Hughes RW, Larson DE, Viggiano TR, Adson MA, van Heerden JA, Reeves CB. Endoscopic variceal sclerosis: a one year experience. *Gastrointest Endosc* 1982; **28**: 62-6.
- 9 Lewis J, Chung RS, Allison J. Sclerotherapy of oesophageal varices. *Arch Surg* 1980; **115**: 476-80.
- 10 Sivak MV, Stout DJ, Skipper G. Endoscopic injection sclerosis of oesophageal varices. *Gastrointest Endosc* 1981; **27**: 52-7.
- 11 Kjergaard J, Fisher A, Miskowiak J, Lindahl F, Baden H. Sclerotherapy of bleeding oesophageal varices: long term results. *Scand J Gastroenterol* 1981; **17**: 363-7.
- 12 Child CG, Turcotte JG. Surgery in portal hypertension. In: Child CG, ed. *Major problems in clinical surgery: The liver and portal hypertension*. Philadelphia: W B Saunders, 1964: 1-85.
- 13 Pickard RG, Sanderson I, South M, Kirkham JS, Northfield TC. Controlled trial of cimetidine in acute upper gastrointestinal bleeding. *Br Med J* 1979; **1**: 661-2.
- 14 Conn HO. Ammonia tolerance in the diagnosis of oesophageal varices. A comparison of endoscopic, radiologic and biochemical techniques. *J Lab Clin* 1967; **70**: 442-51.
- 15 Takase Y, Ozaki A, Orii K, Nagoshi K, Okamura T, Iwasaki Y. Injection sclerotherapy of oesophageal varices for patients undergoing emergency and elective surgery. *Surgery* 1982; **92**: 474-9.
- 16 Conn HO. Endoscopic sclerotherapy: an analysis of variants. *Hepatology* 1983; **3**: 769-71.
- 17 Barsoum MS, Khattar NY, Risk-Allah MA. Technical aspects of injection sclerotherapy of acute oesophageal variceal haemorrhage as seen by radiography. *Br J Surg* 1978; **65**: 588-9.
- 18 Smith JL and Graham OY. Variceal haemorrhage. A critical evaluation of survival analysis. *Gastroenterology* 1982; **82**: 968-73.