

Endoscopic Sclerotherapy for Varices in Children

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Summary: Thirty-one children with variceal bleeding due to portal hypertension (extrahepatic obstruction 19, non-cirrhotic portal fibrosis five, and cirrhosis of liver seven patients) were treated with endoscopic sclerotherapy with absolute alcohol. Acute variceal bleeding was successfully controlled in 10 patients by emergency sclerotherapy. A 3 weekly schedule of sclerotherapy could achieve obliteration of varices in all the patients. The mean (\pm SD) number of sclerotherapy courses and the time required for variceal eradication was 4.5 ± 1.7 and 14.4 ± 3.9 weeks, respectively. During a mean follow-up of 23.3 ± 11.4 months, variceal recurrence was seen in three (9.7%) patients, two with cirrhosis and one with noncirrhotic portal fibrosis. Recurrence was not seen in any patient with extrahepatic obstruction. Five (16.1%)

patients had a rebleed that could be controlled with emergency sclerotherapy. Esophageal stricture developed in four (12.9%) patients and could be dilated easily in all of them. The other complications of sclerotherapy included retrosternal pain, dysphagia, and fever; these were mild and short lasting. Survival in patients with extrahepatic obstruction and noncirrhotic portal fibrosis was 100%. The only death was in a cirrhotic, who died due to terminal hepatic failure. In conclusion, endoscopic sclerotherapy can be recommended as a safe and effective treatment in children for the control of acute variceal bleeding and for variceal obliteration. **Key Words:** Portal hypertension—Variceal bleeding—Esophageal varices—Sclerotherapy.

Bleeding from gastroesophageal varices is a common medical emergency in children as well as adults (1-4). The treatment for this potentially fatal condition has been relatively unsatisfactory in the pediatric age group. A number of difficulties have been reported in performing portasystemic shunts on children (5), namely, creating and maintaining an effective portasystemic anastomosis, high incidence of rebleeding, and development of hepatic encephalopathy (5,6). Up to a third of operated patients with extrahepatic portal vein block may develop encephalopathy despite good liver functions (7). Splenectomy or esophageal transaction has also not found wide acceptance in pediatric patients (8). Therefore, a safe and effective treatment for variceal bleeding is required for these patients.

Endoscopic sclerotherapy for esophageal varices is an accepted mode of treatment in adults for the control of acute variceal bleeding as well as for the

prevention of rebleeding (9,10). In children there are however a few reports supporting these claims (11,12). In a recent review only ~100 infants and children were reported to have been treated by sclerotherapy (1). In a few previous studies we have shown encouraging results with sclerotherapy (10,13-17). The present communication reports our experience of sclerotherapy in children with cirrhosis of liver, noncirrhotic portal fibrosis (NCPF), and extrahepatic portal obstruction (EHO).

MATERIALS AND METHODS

A total of 351 consecutive patients underwent endoscopic sclerotherapy between February 1983 and May 1987 at our center. Fifty-seven of these patients were ≤ 15 years old. Twenty-six of these patients had been part of different sclerotherapy trials reported earlier (Table 1) (10,15-17). The remaining 31 patients who had received 3 weekly sclerotherapy with absolute alcohol constitute the patient material for this study. The demographic profile of these patients is presented in Table 2. The diagnosis

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TABLE 1. *Distribution of sclerotherapy patients*

Total patients	351
Patients \leq 15 years	57
Earlier trials of EST in children with	
IV absolute alcohol (weekly) (20,21) ^a	10
IV 50% alcohol (3 weekly) (22) ^a	5
PV 50% alcohol (3 weekly) (22) ^a	4
IV Ethanolamine oleate (3 weekly) ^b	7
Present study, 3 weekly IV absolute alcohol	31

Abbreviations: IV, intravariceal; PV, paravariceal; EST, endoscopic sclerotherapy.

^a Indicates reference numbers of published series.

^b Indicates unpublished data.

of NCPF was made on the basis of the criteria described earlier (18), which in brief included presence of dilated and patent splenic and portal veins, demonstrated at splenoportovenography, and no evidence of cirrhosis on liver biopsy. The diagnosis of cirrhosis was made by liver biopsy or clinical features and that of EHO by splenoportovenography and ultrasonography. Three of the patients with EHO had earlier undergone unsuccessful surgery for the control of variceal bleeding.

Technique of Sclerotherapy

Endoscopic sclerotherapy was carried out as described earlier (16,17). In brief, sclerotherapy was done on an out-patient basis, without any premedication or local anesthesia. In an occasional patient, 10–15 mg i.v. diazepam was required but general anesthesia was not given to any patient prior to sclerotherapy. Injections were given intravariceally up to lower 5–6 cm of the esophagus using Olympus GIF-P2 or XP endoscope and a transparent Teflon injector (indigenous or Olympus NM-13L). Approximately 0.5–1 ml of alcohol was injected at each site and between three and six injections were given per

TABLE 2. *Profile of patients*

Mean \pm SD age (years)	9.2 \pm 4.8
Male:female	19:12
Etiology	
Cirrhosis	7
Noncirrhotic portal fibrosis	5
Extrahepatic portal obstruction	19
Child's grade	
A	25
B	3
C	3
Variceal grade	
2	5
3	16
4	10

sclerotherapy session. "Blanching" or "white discoloration" of the variceal wall around the injection site was considered desirable. Sclerotherapy was repeated at regular 3 weekly intervals. The end-point of the trial was total obliteration of varices (except in the event of the death of the patient), which was accepted only when no variceal column was visible all around the circumference of the lower esophagus. Presence of an occasional tiny remnant, not more than 0.5–1.0 cm in length was considered insignificant and consistent with total variceal eradication (16).

Rebleeding was defined as any variceal bleeding occurring prior to the next course of endoscopic sclerotherapy. The diagnosis of rebleeding from the varix was only considered if active bleeding was identified from a varix or if a clot was seen adherent to a varix and a thorough examination of the stomach and duodenum failed to reveal an alternative cause of bleeding. All episodes of active variceal bleeding were managed by emergency endoscopic sclerotherapy as described earlier (13). After complete obliteration of esophageal varices, follow-up endoscopies were done at regular monthly intervals to detect recurrence of esophageal varices, change in the size of existing gastric varices, and development of new gastric or ectopic varices.

RESULTS

The clinical presentation of the patients is shown in Table 2. The youngest patient who underwent sclerotherapy was 2½ months old, the range being from 2½ months to 15 years. The majority of our patients had extrahepatic obstruction and had good liver functions.

Control of Acute Bleeding

In eight patients, five who presented with fresh variceal bleeding and three (of the total five) who rebled while on elective sclerotherapy program, emergency sclerotherapy was carried out. Emergency sclerotherapy was successful in controlling the bleeding in all the patients. In another two patients, active bleeding from gastric varices could be controlled by emergency sclerotherapy.

Obliteration of Varices

Since total obliteration of varices was the end-point of the trial, it could be achieved in all the

patients. The time taken for variceal eradication, the mean number of injection courses and the amount of sclerosant required per patient are shown in Table 3. The amount of sclerosant required for subsequent sessions after the initial one or two courses of sclerotherapy gradually decreased. A mean of 4.5 injection courses were required for variceal obliteration; the range was from two to nine courses.

Complications

A total of nine episodes of rebleeding occurred in five (16.1%) patients. Five of these episodes occurred in the hospital (three from esophageal and two from gastric varices) and were controlled by emergency endoscopic sclerotherapy (Table 3). The remaining episodes either occurred at home (three) or in another hospital (one) where they were conservatively managed. None of the bleeding episodes was fatal. Rebleeding was not seen in any patient after four courses of endoscopic sclerotherapy.

Other complications included transient dysphagia (45.1%), retrosternal pain (38.7%), and fever (19.4%). Esophageal mucosal ulcers were seen in five (16.1%) patients. None of these ulcers was the cause of overt upper gastrointestinal bleeding. Esophageal strictures requiring one to four dilations developed in four (12.9%) patients. Two of the four patients were those who had undergone emergency sclerotherapy for active variceal bleeding.

There was only one death, which occurred in a young male cirrhotic suffering from advanced liver disease. He died due to hepatic encephalopathy and terminal liver disease. Follow-up endoscopies were done regularly at monthly intervals. During a mean follow-up 23.3 ± 11.4 months, variceal recurrence was seen in three (9.7%) patients, two with cirrhosis

(26.6%) and one with NCPF (20.0%). Bleeding from recurrent varices did not occur in any patient. Recurred veins were, however, reinjected within a short time of detection.

DISCUSSION

Our results clearly indicate that endoscopic sclerotherapy was very effective in both the control of active variceal bleeding as well as in the obliteration of esophageal varices. Unlike the majority of reports in the pediatric patients (5,11,12), sclerotherapy could be successfully carried out with conventional pediatric fiberoptic endoscopes without the additional need for balloon tamponade and general anesthesia. Both the later modalities are known to increase the incidence of complications following sclerotherapy (19,20).

Endoscopic sclerotherapy using absolute alcohol was effective in the control of active bleeding in 10 patients, eight with esophageal and two with gastric variceal bleeding. It was used as the first line of treatment in all our patients without prior use of balloon tamponade or vasopressin. Similar results have been reported by other workers by carrying out sclerotherapy after arrest of acute hemorrhage by balloon tamponade (11,12). The utility of certain technical modifications in the technique of sclerotherapy (13) for performing emergency injections was reaffirmed. Rebleeding episodes after sclerotherapy could also be successfully managed with repeat sclerotherapy as reported earlier (13).

A number of sclerosing solutions have been used preferentially in different countries, for example, polidocanol in Germany (21), ethanolamine oleate in the U.K. and South Africa (9,11), sodium tetradecyl sulfate, sodium morrhuate, and ethanol in the U.S.A. (22). Except for some animal studies (23,24), little data are available comparing the efficacy and safety of different sclerosants. Although pulmonary complications can occur with any sclerosant, oily sclerosants such as sodium morrhuate have been reported to produce acute pulmonary edema and adult respiratory distress syndrome (25). However, these observations have not been corroborated in another study (26). Absolute alcohol on the other hand is an aqueous solution, which on intravariceal injection produces transient and minimal effects on pulmonary hemodynamics (27). Besides being highly potent, alcohol is very economical and universally available.

Obliteration of esophagogastric varices is one of

TABLE 3. Results of endoscopic sclerotherapy

Mean time taken for variceal eradication (weeks)	14.4 \pm 3.9
Mean number of injection courses/patient	4.5 \pm 1.71
Mean amount of sclerosant (ml)/patient	20.6 \pm 9.6
Complications	
Retrosternal pain	38.7%
Fever	19.4%
Esophageal mucosal ulcers	16.1%
Dysphagia	45.1%
Stricture	12.9%
Rebleeding	16.1%
Mortality	3.2%

the principle aims of sclerotherapy. This could be achieved in all the patients, with a mean of 4.5 injection courses and after an average of 15 weeks. These figures are almost identical to those obtained by us in adults in a previous study (16). In children, similar data have also been reported by other workers (11,12). The time taken for variceal obliteration and the frequency of rebleeding could have been further decreased using a weekly schedule of sclerotherapy, as has been earlier shown by us in adults (16). Rebleeding was, however, not a major problem in the present series even with a 3 weekly injection schedule.

There were no fatal complications following sclerotherapy. Most of the complications were short lasting and tolerable. Esophageal ulcers were seen in 16.1% patients. We have earlier shown that postsclerotherapy esophageal ulcers are a necessary accompaniment and not a complication of sclerotherapy (28). These observations have been recently confirmed by other workers also (22,29). Esophageal strictures were seen in 12.9% patients. This figure is higher than the incidence of 6.1% observed earlier by us in adult patients treated with sclerotherapy (16). The higher incidence of strictures could possibly be because in two of the four patients who had developed strictures, sclerotherapy had to be done on an emergency basis. It is possible that some inadvertent injections were given to these patients during emergency sclerotherapy.

Recurrence and rebleeding from varices after initial obliteration have been reported to be the major limitations of sclerotherapy (9,11,12). In adults we have previously shown that regular monthly endoscopic follow-up after initial variceal obliteration significantly decreases the frequency of these problems (14). Similar gratifying results could be obtained in children using the same protocol in the present study. It was interesting to note that, even after a mean follow-up of 23.3 ± 11.4 months, variceal recurrence was not seen in any patient with EHO. It is possible that recurrence occurs much later in these patients because of the presence of a larger number of extrahepatic collateral channels in them (14).

Our results bear special significance for patients with EHO and NCPF, since 100% survival could be achieved in them without significant morbidity or encephalopathy. Similar survival rates were also obtained in adult patients with these diseases who were treated with sclerotherapy (14). Patients with

NCPF or EHO are known to have good liver function and often the only fatal complication seen in them is variceal bleeding (29,30). Although portacaval or lienorenal shunt surgery is difficult and has equivocal results in patients with EHO (3), the shunt surgery is accompanied by a fair degree of morbidity and mortality in patients with NCPF (18,31). The encouraging results with sclerotherapy both in children and adults strongly suggest that this treatment modality is far superior to shunt surgery for patients with good liver functions. In fact, the role of prophylactic sclerotherapy needs to be evaluated in patients with EHO and NCPF. Besides the low cost, sclerotherapy is technically simpler and more widely available than the expertise for shunt surgery, important considerations in developing countries such as India.

The majority of people today believe that sclerotherapy does improve the mortality of bleeding esophageal varices in patients with cirrhosis of liver (32). Although we do not have the control data in children, the fact that none of our cirrhotic children died of variceal bleeding indirectly suggests the usefulness of the sclerotherapy technique.

In conclusion, endoscopic sclerotherapy was found to be feasible, safe, and very effective for control of acute variceal bleeding, for variceal obliteration, and for prevention of rebleeding in pediatric patients suffering from portal hypertension.

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