Obliteration of Esophageal Varices by PTP

A Follow-up of 43 Patients

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The percutaneous transhepatic portal vein catheterization (PTP) with selective obliteration of the coronary vein and/or the short gastric veins in treating bleeding esophageal varices was introduced in 1974. In order to prevent recanalization of the vessels Bucrylate® (isobutyl-2-cyano-acrylate) has been used in 43 patients 55 times during a period of 34 months (October 1975 to July 1978). The obliterative treatment was followed by rebleeding in 35% of the cases and continued bleeding occurred in two patients. Fourteen patients were treated on 16 occasions during acute bleedings, and five of these (36%) died within two months from a portal vein thrombosis caused by the obliterative procedure. Because of these findings PTP with obliteration of the veins feeding the esophageal varices is not recommended as an elective way of treatment. It should only be used in the acute bleeding patient when transesophageal sclerosering therapy, continuous vasopressin infusion and balloon tamponade have failed. Fifty-six per cent of the patients acutely treated stopped bleeding for more than one week, thus avoiding an emergency shunt or devascularization operation which are associated with a high mortality rate.

THE TREATMENT OF PORTAL hypertension and bleeding esophageal varices is very controversial. Several prospective randomized controlled studies show no convincing life-prolonging effect with shunting procedures as compared to more conservative methods of treatment.[6,11,15,16] An increasing reluctance among surgeons to accept shunt operations is mainly due to the fact that shunted patients have a higher incidence of and a more severe form of liver encephalopathy than unshunted controls.[12] Transesophageal sclerotherapy of the varices[4,7,14] and various types of devascularization procedures[5,18] are methods of treatment often advocated today. Sclerosing of esophageal varices by means of percutaneous transhepatic portal vein catheterization (PTP) with selective catheterization of the coronary and short gastric veins has also been tried.[8] We introduced the method in 1974 and have previously reported our earlier experiences with the method.[9,10] A rapid recanalization of the obliterated veins was early observed. In an attempt to eliminate or reduce this development Bucrylate® (isobutyl-2-cyanoacrylate: Johnson and Johnson, Sollentuna, Sweden) has been used for the obliterations since 1975. This is a follow-up of the patients treated since then.

Materials and Methods

During the period October 1975 through July 1978 (34 months) 43 patients were treated in our hospital with transhepatic Bucrylate obliteration of esophageal varices. They had all had at least one major bleeding episode requiring two bottles of blood transfusion or more. Endoscopy was used to confirm the diagnosis in all patients. The catheterization, portography and injection procedure was performed as described in a previous publication.[10] The Bucrylate injection was proceeded and followed by manometric studies. The procedure was done under local anesthesia in all but two patients—a 15-year-old boy who was under general anesthesia and a 60-year-old man who was unconscious and on a ventilator during the examination.

Twenty-five of the patients were men and 18 were women. The mean age for the men was 56 years (median 57) with a range from 15 to 69 years of age. The corresponding figures for the women were—mean age 62 (median 63) and range 34–81.

The PTP examination was always preceeded by arterial angiography to show patency of the portal vein in the venous phase and to exclude concomitant hepatoma. During the time for this study three patients with bleeding varices (two women and one man) were

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shown to have portal vein thrombosis and could not have a PTP performed. All intended PTP examinations resulted in catheterization of the portal vein system and all primary examinations also resulted in selective coronary and/or short gastric vein catheterizations and Bucrylate injections.

In 19 of the patients the PTP examination was repeated (once or more), either after three months as control examination with possible additional sclerosing injection or because of an episode of rebleeding. The 43 patients had in all 68 PTP examinations performed during this study. Bucrylate injection of coronary and/or short gastric veins was performed in 55 of the 68 examinations. On 13 occasions when no Bucrylate was injected remaining esophageal collateral flow could either not be shown, or the vessels feeding the collaterals could not be reached. In the latter instance it was always collaterals originating from the splenic hilus that were the problem. In the 34 month period 24 patients had one PTP examination, 15 had two, two had three and another two had four examinations.

The type of cirrhosis is given in Table 1. Among the men 88% had alcoholic cirrhosis while among the women the cryptogenic group was the largest (39%). All patients had cirrhosis histologically confirmed by a percutaneous needle biopsy of the liver.

The liver function of each patient was scored according to Hobbs' modification of the Child grouping system.[9] Fourteen patients belonged to group A, 16 to group B and 13 to group C. The patients were all consecutive cases admitted to the hospital either with actively bleeding esophageal varices or with a recent history of variceal bleeding. For the duration of the study the transhepatic sclerotherapy was used for both acute and elective treatment. In the acute situation however, it was only used if vasopressin infusion and/or balloon tamponade failed to control the bleeding. Electively other types of treatment were not considered until the transhepatic way of sclerotherapy had obviously failed, *i.e.* PTP sclerotherapy was not considered to be a preoperative procedure to bring the patient to electively surgery. The treatment was performed during acute bleeding in 14 patients on 16 different occasions. One patient was treated during acute bleeding three times. Thirty patients were electively treated. One patient had both an acute treatment and a later elective one.

Results

Portal Pressures and Direction of Flow

Of the 43 patients with patent portal vein, 40 had a portal flow towards the liver (hepatopetal) and three had a total reversal of flow direction (hepatofugal). Another three had partial hepatofugal flow intrahepatically while the flow in the main stem of the portal vein was hepatopetal.

TABLE 1. *Type of Cirrhosis*

	Number of Patients	Per Cent of Patients	Number of Men	Number of Women
Alcoholic	25	58	22 (88%)	3
Cryptogenic	10	23	3	7 (39%)
Postnecrotic	3	7		3
Chronic aggressive hepatitis	3	7		
Primary biliary cirrhosis	1	2		1
Secondary biliary cirrhosis	1	2		1
	43		25	18

Portal vein pressure was recorded in all 43 patients before injection therapy. The mean value was 34 ± 7 cm H_2O (mean ± 1 S.D.) and the range was 21–50. In five patients pressure recording was not possible after the treatment because of occlusion of the catheter. Those 38 patients who had pressure measurements both before and after Bucrylate injection had a pressure of 34 ± 7 cm H_2O before and 38 ± 7 after the obliteration.

Treatment During Acute Bleeding

Fourteen patients were on 16 occasions treated during acute bleeding (one patient three times). In spite of the obliterating procedure bleeding continued in two patients. In 12 patients (14 occasions) the treatment stopped bleeding for one or more days. In five of these patients rebleeding occurred within one to seven days. In seven patients (nine occasions) the bleeding was stopped for more than seven days. Of these seven patients three rebled, after eight days, four weeks and five months respectively. One patient has been treated three times for acute bleeding. She has rebled twice (12 months and 6 weeks) after the first two treatments. However, after her last acute treatment she has not bled for 15 months. One patient was unconscious on a ventilator during the treatment and died after two weeks in liver failure. Two acutely treated patients have not rebled for eight and 21 months respectively.

Of the 14 acutely treated patients six are now dead. Two were alive without additional treatment and without further bleeding. One is alive after two additional bleeds and after two additional PTP embolizations. In five patients, who are still alive, additional therapy was necessary because of rebleeding—splenectomy in one and mesocaval interposition shunt in four. In three of the latter patients transesophageal sclerotherapy was

TABLE 2. *Complications*

	Mortalities	
	No.	Died After
Cause of mortality		
Intra-abdominal bleeding	1	2 days
Portal vein thrombosis	6	9 days, 2 weeks, 4 weeks, 6 weeks, 9 weeks, 2 years

	Without Mortality	
	No.	Treatment
Intra-abdominal bleeding	2	Blood transfusion
Intrapleural bleeding	1	Blood transfusion and thoracocentesis

tried but because of continued bleeding a shunt was performed. Of the six patients who died the cause of death was uncontrollable continued varixbleeding in one and liver insufficiency secondary to portal vein thrombosis in five. The latter five patients did within two months after the obliteration.

Elective Treatment

The treatment has been carried out electively in thirty patients on 38 different occasions (one patient was treated both acutely and electively). Of the thirty patients 17 were alive at the termination of the study —11 without additional bleeding and six after additional bleeding. Thirteen patients were dead.

Of the eleven patients who were alive and without further bleeding the observation time was less than six months in five patients, between six and twelve months in three and more than one year in another three.

Six patients who were alive at the end of the study rebled and required additional therapy consisting of mesocaval shunt in one, transesophageal sclerotherapy in two, embolization of the splenic artery in one and blood transfusions only in two.

Thirteen electively treated patients were dead when this study was terminated. The cause of death was intra-abdominal bleeding in one, rebleeding varices in five, bleeding gastric ulcer in one, liver failure in four, liver cancer in one and portal vein thrombosis and intestinal gangrene in one.

Time for Rebleeding After Treatment

If both acutely and electively treated patients are considered together it was found that 19 obliterative treatments were followed by rebleeding (24 were not) and continued bleeding occurred in two acutely treated patients. The time interval between treatment and rebleeding was less than one week on six occasions, between one and two weeks on three, two to four weeks on three, one to three months on six, three to six months on four, six to nine months on two, nine to twelve months on three. No rebleeding has occurred after more than one year. Forty per cent of the rebleedings occurred within one month.

Complications

Complications of the procedure are given in Table 2. Death was due to intra-abdominal bleeding arising from a tear in the liver parenchyma in one case. The patient was operated on but succumbed due to blood loss. Portal vein thrombosis was considered the cause of death in another six cases. These patients died after nine days, two weeks, four weeks, six weeks, nine weeks and two years respectively. Nonfatal complications occurred in another three patients. In two patients intra-abdominal bleeding requiring blood transfusion occurred but no laparotomy was required. Intrapleural bleeding demanding blood transfusion and thoracocentesis occurred in one patient.

Survival

The survival rate calculated according to the life table method[2] for all 43 patients are given in Figure 1. The survival rate at 34 months (the termination of the study) was 26% for all patients treated and 43% for the patients in group A and B according to the modified Child grouping system.

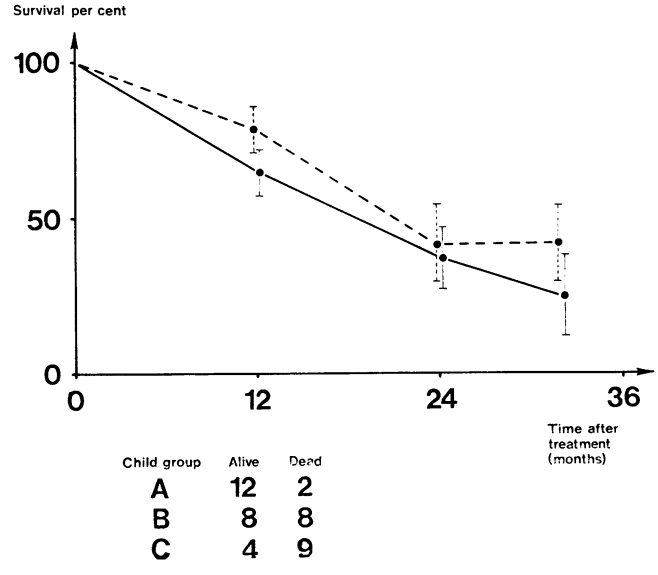

FIG. 1. Survival (life table). Solid line: all patients. Broken line: patients belonging to child Group A and B.

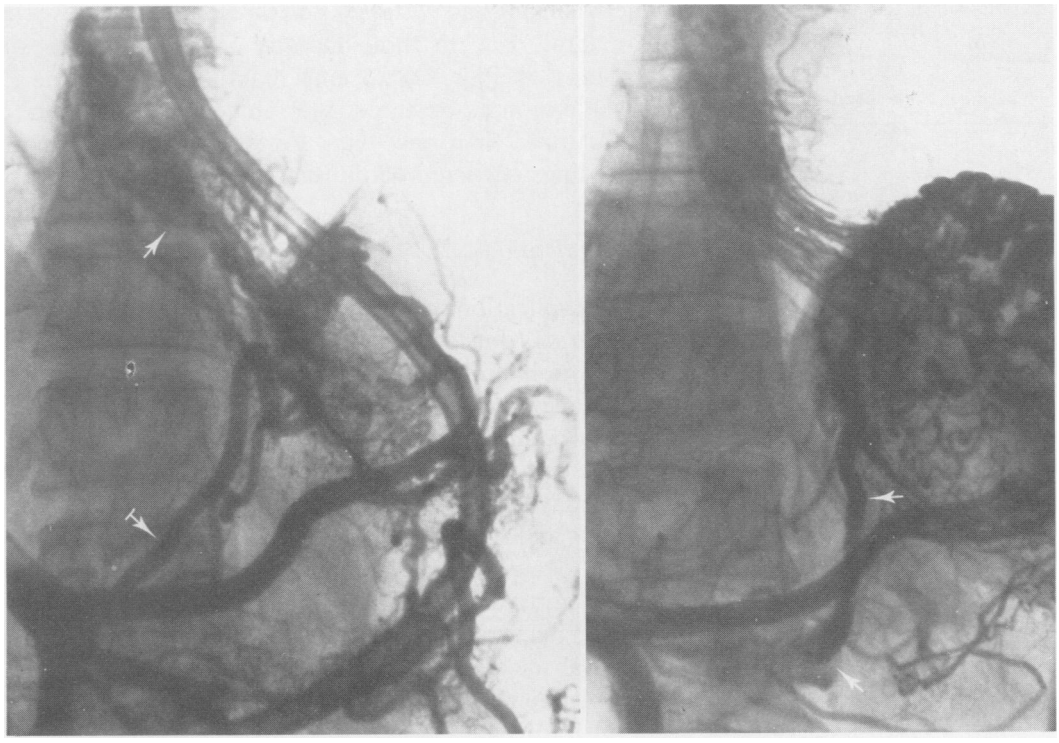

FIG. 2. A 53-year-old woman with liver cirrhosis and portal hypertension. (left) Percutaneous transhepatic portography. Hepatofugal flow in portal vein and its tributaries. Via left gastric vein (→) flow to esophageal varices (→). (right) PTP 4 months later. Left gastric vein occluded with Bucrylate. Flow to gastric and esophageal varices via veins close to splenic hilum. Spontaneous spleno-renal shunt (→).

Discussion

This method of treating bleeding esophageal varices has the theoretical advantage of not diverting any portal flow from the liver and would consequently not results in an increased rate of encephalopathy. Our study confirms this. The objective of the treatment has been to stop the bleeding and to block the dangerous esophageal collaterals while new collateral pathways in other places have time to develop—splenorenal ones etc. This has often happened in our patients (Fig. 2) but the size of these new collaterals is not sufficient to prevent further bleeding. The rate of rebleeding in our study has been unacceptably high (55%), at least for the method to be advocated as a difinitive way of treatment.

The results in the acutely treated group are more satisfactory, as 56% of the patients stopped bleeding for more than seven days and thus were spared an emergency shunt procedure. Only those patients, whose bleeding could not be controlled by vasopressin infusion and/or balloon tamponade, were acutely treated. There was one immediate death due to continued variceal bleeding in this group. The value of this success is however reduced as development of a fatal portal vein thrombosis occurred in five patients (36%).

In the group treated electively however, only one patient developed portal vein thrombosis. She did well for one and a half year after treatment but then she developed signs of deteriorating liver function. A portal vein thrombosis was then demonstrated angiographically. In this case the connection between the thrombosis and the given therapy is not so evident as the development of portal vein thrombosis is a known risk in the progression of a cirrhotic liver disease.[1]

Portal vein thrombosis as a complication of PTP sclerotherapy has not been considered a major risk in earlier reports.[3,17,19] We can not explain the high rate of this complication in our acutely treated group. The catheter manipulations in the portal vein, introduction of a foreign material (Bucrylate) in a vessel close to the portal vein or altered flow conditions obviously play a role. Of the five acutely treated patients developing portal vein thrombosis four belonged to the modified Child group C and one to group B. Portal pressure before and after the Bucrylate injections were 50/55, 40/37, 47/-, 28/37 and 42/44 cm H_2O respectively. A possible explanation could be that in these patients with severely damaged livers and a considerable part of the portal flow bypassing the liver through the coronary vein, the occlusion of that vessel could result in a very slow flow in the portal vein, which combined with small intimal lesions could result in thrombosis. Spill over of Bucrylate into the portal vein is probably not the reason as the examiner was very aware of the risk and the procedure was performed in a way to minimize that risk.[10]

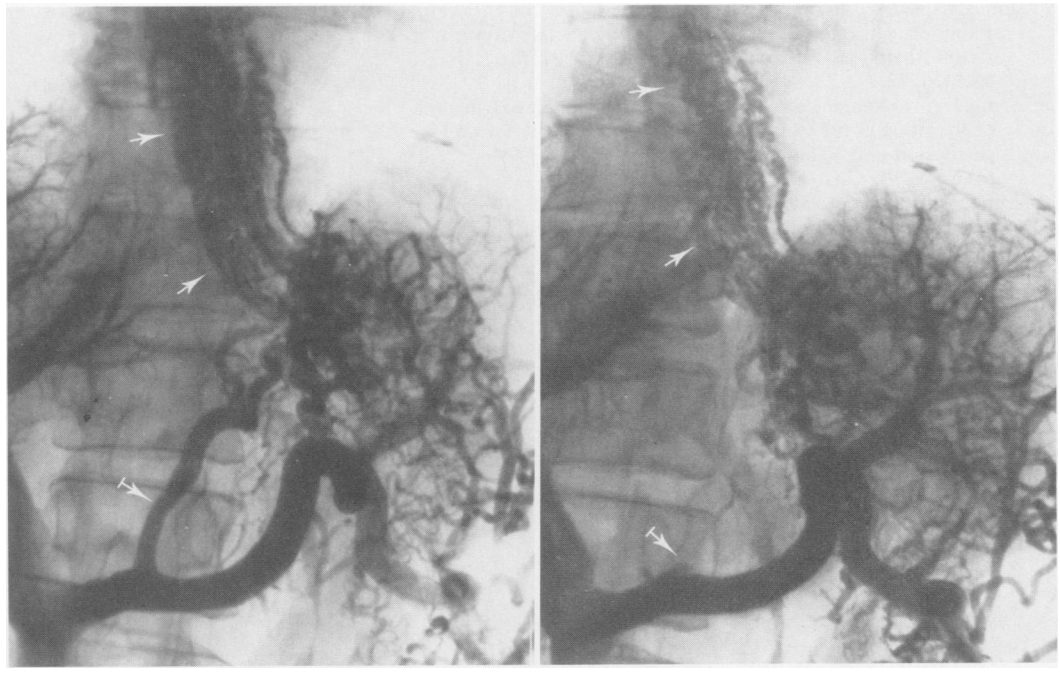

FIG. 3. A 54-year-old woman with liver cirrhosis and portal hypertension. (left) PTP. Injection of contrast medium into splenic vein close to splenic hilum. Via left gastric (→) and short gastric (→) veins flow to esophageal varices. (right) Left gastric vein occluded with Bucrylate (→). Esophageal varices (→) fed by veins originating close to splenic hilum out of reach for transhepatic catheterization.

It is evident that the PTP procedure in these patients with liver damage, coagulopathy, and portal hypertension can be performed at an acceptably low risk. Out of 68 examinations only one patient died due to bleeding from the liver. Another three cases needed blood transfusions because of intraabdominal or intrapleural bleeding.

However, the procedure can not be recommended for routine elective treatment because of the high rate of rebleeding. We had hoped to be able to prevent rebleeding by repetitive PTP obliterations. Is has however become evident to us that this is not possible as new collaterals toward the esophagus develop; all cases and these collaterals frequently originate from the region of the spleen where they can hardly be reached by the percutaneous transhepatic catheterization technique (Fig. 3).

Even for patients with acute bleeding we are, at present, reluctant to recommend this form of treatment because of the high rate of portal vein thrombosis associated with the procedure in our patients in this group. However, if bleeding cannot be stopped by transesophageal sclerotherapy, balloon tamponade or vasopressin infusion, this method should be tried before emergency shunts or devascularization operations are used—procedures which are associated with a mortality rate of around 50%.[13]

Summary

Forty-three patients were treated with percutaneous transhepatic catheterization and Bucrylate injection of gastric coronary and/or short gastric veins for bleeding esophageal varices. Fourteen of the patients were treated during acute bleeding—the others electively. There was one death due to intraabdominal bleeding and five acute treated patients developed portal vein thrombosis (all of these five died within two months). Of the acutely treated patients 56% stopped bleeding for more than one week. In the electively treated group only one patient developed portal vein thrombosis. The main objection to the elective use of the treatment is the high rebleeding rate and the redeveloping of collaterals towards the esophagus after the treatment. These collaterals most frequently originate from the region of the spleen where they can hardly be reached by a repeated transhepatic catheterization procedure.

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