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Transjugular retrograde obliteration for gastric varices

F. Chikamori,[1] **S. Shibuya,**[1] **Y. Takase,**[2] **A. Ozaki,**[3] **K. Fukao**[1]

[1] Department of Surgery, Institute of Clinical Medicine, University of Tsukuba, Tsukuba City, Ibaraki 305, Japan
[2] Department of Surgery, Tamananbu Regional Hospital, Tama City, Tokyo, Japan
[3] Department of Surgery, Kinu Medical Association Hospital, Mitsukaido City, Ibaraki, Japan

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Abstract
We evaluated the transjugular retrograde obliteration (TJO) in treatment of gastric varices with gastrorenal shunt. Twenty patients with posthepatitic cirrhosis were included in this study. A cobra-shaped 5 French occlusive balloon catheter was inserted into the gastric varices or gastrorenal shunt through the internal jugular vein. As the sclerosants, absolute ethanol and 5% ethanolamine oleate with iopamidol were injected into the varices to make thrombi. In all cases, gastric varices were obliterated successfully. Endoscopic examination 3 months after treatment revealed the complete eradication of gastric varices in all cases. No major complications during or after therapy were observed. We think that TJO can be an effective method for the treatment of gastric varices with gastrorenal shunt.

Key words: Gastric varices—Gastrorenal shunt—Transjugular retrograde obliteration.

Although endoscopic injection sclerotherapy (EIS) is a well-established operation for esophageal varices [1, 2], obliteration of gastric varices by employing the same method is not successful in most cases. A direct intravariceal injection sclerotherapy for gastric varices has a risk of variceal bleeding at the puncture site or it may ulcerate the tissue [3]. Hassab's operation could be too dangerous for patients with liver cirrhosis classified as Child's C. Until now, there have been only a few reports of the treatment for gastric varices [4, 5]. We propose a new method, transjugular retrograde obliteration of gastric varices (TJO). By applying this technique, we were able to extinguish large gastric varices in 20 patients.

Correspondence to: F. Chikamori

Materials and Methods

Patients

Twenty (10 male, 10 female; age range = 42–76 years old, mean = 58 ± 9) patients with gastric varices were admitted to our hospital from September 1991 to December 1993. All suffered from posthepatitic cirrhosis, and three patients had hepatocellular carcinoma. Classification of Child's cirrhosis and profiles of the patients are shown in Table 1. Eleven patients had a previous history of EIS for esophageal varices. Diagnosis of gastric varices was made endoscopically. All patients had spontaneous gastrorenal shunt, which was confirmed by superior mesenteric arterial portography or percutaneous transhepatic portography. Patients 10 and 16 had active bleeding at the time of admission, and temporary hemostasis was obtained with emergency sclerotherapy by using cyanoacrylate with lipiodol. TJO was performed 7 days after treatment.

Technical Aspects

Through the right internal jugular vein, a 6 French, long, cobra-shaped sheath catheter was inserted into the left renal vein via the inferior vena cava. Another 5 French occlusive balloon catheter was inserted into the gastric varices via spontaneous gastrorenal shunt through a previously introduced sheath. The balloon was inflated with 0.7 ml of air to occlude the gastrorenal shunt. A varicography was acquired using iopamidol to ascertain the presence of varices. When the top of the catheter was inserted into varices (Fig. 1A), we called this a super-selective access. When the top could not be inserted beyond the bifurcation of inferior phrenic vein (Fig. 1B), this is defined was a selective access. In the case of super-selective access, 1–6 ml of absolute ethanol was injected to obliterate the other blood-draining routes of varices such as retroperitoneal or azygos veins. In selective access, more than 2 ml of absolute ethanol was required to obliterate the inferior phrenic vein. After the procedure, 5–15 ml of 5% ethanolamine oleate with iopamidol (5% EOI) was injected, which visualized gastric varicography and obliterated varices at the same time. The 5 French catheter was left in the vein for 24 h. The catheter was

Table 1. Characteristics of patients with gastric varices who underwent transjugular retrograde obliteration for gastric varices

No.	Age	Sex	Underlying disease[a]	Child's classification	History of EIS[b]	Bleeding from gastric varices
1	49	F	LC	C	Yes	Yes
2	71	F	LC with HCC	C	No	No
3	43	M	LC	B	Yes	No
4	62	F	LC	B	Yes	No
5	58	M	LC with HCC	B	Yes	No
6	65	F	LC	B	Yes	No
7	50	M	LC	C	No	Yes
8	42	M	LC	B	No	No
9	52	M	LC	C	No	Yes
10	76	F	LC	C	No	Yes[c]
11	52	M	LC	C	Yes	No
12	59	M	LC	C	No	No
13	57	M	LC	C	Yes	No
14	51	F	LC	B	Yes	No
15	62	F	LC	B	No	No
16	53	F	LC	C	No	Yes[c]
17	58	M	LC	B	Yes	No
18	58	M	LC with HCC	C	Yes	Yes
19	68	F	LC	B	Yes	No
20	58	M	LC	B	No	No

[a] LC = Liver cirrhosis, HCC = hepatocellular carcinoma
[b] Endoscopic injection sclerotherapy
[c] Active bleeding on admission

removed after the retrograde inferior phrenic venography was finished, which was routinely taken the next day. A follow-up endoscopic examination was performed to evaluate the size of gastric varices at 1 week, 1 month, and 3 months. A computed tomography (CT) of the abdomen was performed 1 week before and after the operation. The patients were followed-up 4–33 months later (mean 17 ± 9).

Case Reports

Case 1

An endoscopic examination revealed large gastric varices located at fundus in a 58-year-old male (patient 20 in Table 1) (Fig. 2A). TJO was performed by super-selective access. Gastric varicography was obtained by using 1 ml of absolute ethanol and 7 ml of 5% EOI, (Fig. 2B). A retrograde inferior phrenic venogram taken the next day showed the obliteration of gastric varices and gastrorenal shunt, but the inferior phrenic vein remained unaffected (Fig. 2C).

Case 2

A 53-year-old female presented with acute bleeding from gastric varices (patient 16 in Table 1). Emergency endoscopy revealed large gastric varices located at the cardia and the fundus, with a rupture at one point. After endoscopic sclerotherapy with 1 ml of cyanoacrylate monomer and 1 ml of lipiodol, bleeding was controlled (Fig. 3A). CT of the abdomen performed the next day disclosed the partial obliteration of cardiac varices, but the large fundic varices remained unaffected (Fig. 3B). TJO was performed with selective access (Fig. 3C). After the obliteration of the inferior phrenic vein with 9 ml of absolute ethanol, 11 ml of 5% EOI was injected to obliterate varices, getting varicography at the same time. CT after 1 week of TJO revealed complete obliteration of fundic varices (Fig. 3D). CT and endoscopy 3 months after TJO proved the eradication of gastric varices (Fig. 3E,F).

Results

Obliteration of gastric varices and gastrorenal shunt was achieved in all cases. However, super-selective access was applied in 10 of 20 cases because of technical difficulty or inadequate visualization of angiography (Table 2). In the case of super-selective access the quantity of absolute ethanol required for obliteration was significantly less (3.5 ± 2.9 ml) than the case of selective access (7.8 ± 2.7 ml) ($p < 0.01$, Student's t test). But the quantity of 5% EOI was no different between the two accesses (11.3 ± 2.9 ml vs. 9.7 ± 2.5 ml).

In all cases, varices were eradicated, and patients were discharged from hospital within 2 weeks after treatment. A retrograde inferior phrenic venogram performed on the next day revealed obliteration of gastrorenal shunt in all cases. CT of the abdomen 1 week after treatment disclosed the complete obliteration of gastric varices with thrombus in 19 cases. The remaining patient had a reduction of the size of varices 1 week after the procedure but had a complete obliteration 1 month later. CT 3 months after the treatment revealed the eradication of gastric varices in all cases. Although the size of gastric varices appeared unchanged on endoscopic examination 1 week after the procedure, the size was much smaller after 1 month. When examined endoscop-

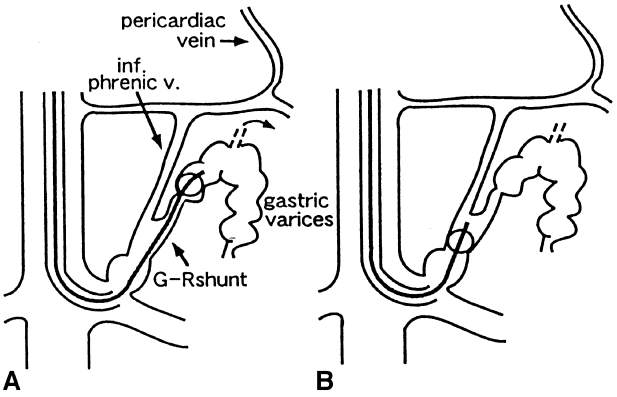

Fig. 1. Manner of catheterization: (**A**) super-selective access and (**B**) selective access.

ically 3 months later, varices were extinguished in all cases.

No major complications during or after the treatment were observed. Minor complications included transient epigastric pain (one patient), transient hypertension (one patient), fever (more than 37.5°C; seven patients), and a small amount of pleural effusion (one patient). A significant deterioration of liver function was not observed in any patients after TJO. Neither recurrences of gastric varices nor gastric bleeding were seen within the follow-up period. In three patients, esophageal varices appeared during follow-up period, and all of them were treated with sclerotherapy. Two patients died, one from hepatocellular carcinoma 9 months after TJO, the other from liver failure with sepsis due to arthritis 5 months after treatment (Table 2).

Discussion

Although esophageal varices have been treated successfully by EIS recently, bleeding from gastric varices is still difficult to control and has a high mortality rate [3, 6]. It is preferable to treat the varices prophylactically before bleeding by using noninvasive methods. Gastric varices are divided in two gross types: one drains into esophageal varices, and the other makes gastrorenal shunt [7]. During the period of our study, we had 10 patients of the former type and 20 patients of the latter type. In only two patients, gastric varices drained into pericardiophrenic vein. The patients with esophageal varices are usually controlled by EIS; however, the patients with the gastrorenal shunt make larger varices and EIS is not effective in most of these cases [8, 9]. The gastrorenal shunt is formed as a dilated communication route from gastric to renal vein via inferior phrenic vein. Because the flow of this shunt is rapid, it is difficult to obtain the obliteration of varices by EIS. It is a good

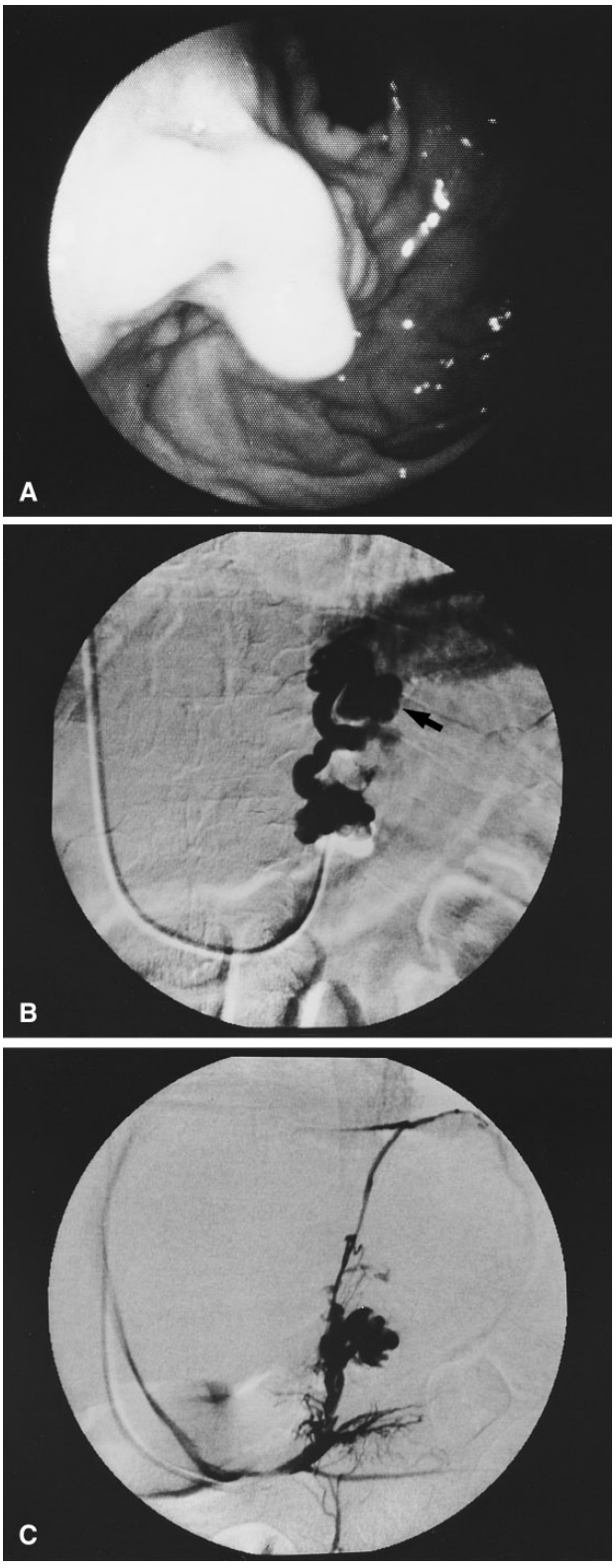

Fig. 2. A Endoscopic picture shows large gastric varices. **B** With super-selective access, TJO was performed and gastric varicography was obtained (*arrow*). **C** Retrograde inferior phrenic venogram. Gastric varices and gastrorenal shunt were obliterated, but the inferior phrenic vein remained unaffected.

Fig. 3. A Endoscopic picture shows large gastric varices located at the cardia and the fundus. **B** CT of the abdomen shows obliteration of cardiac varices with cyanoacrylate and lipiodol (*small arrow*), although fundic varices remained unaffected (*large arrow*). **C** Retrograde inferior phrenic venogram shows the gastric varices (*small arrow*), gastrorenal shunt, and inferior phrenic vein (*large arrow*). TJO was performed by selective access. **D** CT 1 week after TJO shows obliteration of fundic varices with thrombi. **E** CT 3 months after TJO shows the eradication of gastric varices. **F** Endoscopic picture 3 months after TJO shows no gastric varices.

Table 2. Manner of catheterization and volume of sclerosants for TJO

No.	Manner of catheterization	Volume of sclerosants (ml)		Follow-up (months)
		Ethanol	5% EOI	
1	Selective	2	13	33 Alive
2	Selective	6	12	32 Alive
3	Selective	6	6	32 Alive
4	Selective	12	10	26 Alive
5	Selective	6	10	9 Died
6	Super-selective	8	5	24 Alive
7	Selective	10	10	21 Alive[a]
8	Selective	3	10	21 Alive
9	Super-selective	5	13	18 Alive[a]
10	Super-selective	2	8	18 Alive
11	Super-selective	3	9	17 Alive
12	Super-selective	4	14	16 Alive
13	Super-selective	2	15	5 Died
14	Super-selective	4	12	14 Alive
15	Super-selective	8	10	13 Alive
16	Selective	9	11	11 Alive[a]
17	Selective	8	10	10 Alive
18	Super-selective	5	15	8 Alive
19	Selective	9	10	6 Alive
20	Super-selective	1	7	4 Alive

[a] Underwent EIS for appearance of esophageal varices

principal to stop the flow of gastrorenal shunt in treating gastric varices.

Olson et al. [4] reported a case of gastric varices treated with retrograde obliteration of gastroesophageal varices with absolute ethanol and coils via the gastrorenal shunt through femoral vein. Kanagawa et al. [5] also reported variceal obliteration with 5% EOI with the same route, but they used 40 ml of EOI. Our method of TJO approaches the gastrorenal shunt through a jugular vein. This route is easier than the femoral one to reach at the gastrorenal shunt with either super-selective or selective access. Because absolute ethanol has stronger potency of obliterate of vein than 5% EOI, it was used to obliterate the draining routes of varices such as inferior phrenic vein and azygos veins. By using absolute ethanol, we could reduce the volume of 5% EOI as compared with the report of Kanagawa et al. [5]. However, the volume of absolute ethanol should be smaller, because it causes epigastric pain. Super-selective access is more desirable than selective access because the required volume of absolute ethanol is smaller (Table 2). The quantity of 5% EOI should be less than 0.5 ml/kg because its excess volume can cause renal injury or lung congestion [10]. With our method, the volume was smaller than 0.3 ml/kg.

Complications with TJO were minor and transient because we used the super-selective as often as possible and we used two different sclerosants to compensate for the demerit of two drugs. The mechanism of eradication of gastric varices by TJO is the same as that of EIS for the esophageal varices described by Takase et al. [11, 12]. The thrombi formed with TJO are considered to be organized and absorbed within 3 months after treatment. However, the effect of the obliteration of the gastrorenal shunt and gastric varices on portal circulation in patients with portal hypertension is not clear at the present time. The eradication of gastric varices may cause the appearance or recurrence of esophageal varices, although they can easily be treated with sclerotherapy. Further investigations on long-term results of TJO are required. Because TJO is safe and effective treatment for gastric varices, we recommend it as the first choice of operation for patients who suffer from gastric varices with gastrorenal shunt.

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