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2018년 2월

서울대학교 대학원

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A thesis of the Master's Degree

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February 2018

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ABSTRACT

Purpose: This study was performed to compare the long-term outcomes of balloon-occluded retrograde transvenous obliteration (BRTO) for gastric varices using ethanolamine oleate (EO) and sodium tetradecyl sulfate (STS).

Methods: From January 2002 to June 2015, 142 patients underwent BRTO for the treatment of gastric varices using EO (n = 59) or STS (n = 83). We retrospectively reviewed the follow-up data related to the obliteration of gastric varices, rebleeding, and clinical complications. The cumulative recurrence rates of variceal bleeding after BRTO in each group were analyzed using the Kaplan–Meier method and compared using the log-rank test.

Results: The median follow-up periods were 23.9 (range, 0.2–170.7) months in the BRTO with EO group and 19.9 (range, 0.2–84.7) months in the BRTO with STS group. Technical success was achieved in 53 of 59 (89.8%) cases in the BRTO with EO group and 80 of 83 (96.4%) cases in the BRTO with STS group. The clinical success rates were 94.9% (56/59) in the BRTO with EO group and 96.4% (80/83) in the BRTO with STS group. The cumulative 1-, 3-, and 5-year recurrence rates for gastric

varices were 3.8%, 9.4%, and 9.4% in the BRTO with EO group and 1.3%, 2.5%, and 3.8% in the BRTO with STS group, respectively (p = 0.684). The cumulative 1-, 3-, and 5-year rebleeding rates of treated gastric varices were 0%, 3.6%, and 5.4% in the BRTO with EO group and 1.3%, 3.8%, and 3.8% in the BRTO with STS group, respectively (p = 0.863). In terms of minor complications, occlusion balloon rupture after the injection of the sclerosing agent developed in 5 of 59 patients in the only BRTO with EO group.

Conclusion: BRTO using STS can achieve obliteration of gastric varices comparable to that of EO with a similar long-term outcome. In minor complication, occlusion balloon rupture was developed in only BRTO with EO group.

Keywords: Balloon-occluded transvenous obliteration, Gastric varices, Ethanolamine oleate, Sodium tetradecyl sulfate

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LIST OF ABBREVIATIONS

BRTO	Balloon-occluded transvenous obliteration
EO	Ethanolamine oleate
STS	Sodium tetradecyl sulfate
CT	Computed tomography
HBV	Hepatitis b virus
HCV	Hepatitis c virus
CFV	Common femoral vein
IJV	Internal jugular vein

INTRODUCTION

Bleeding of gastric varices is one of the fatal complications of portal hypertension in patients with liver cirrhosis. Although bleeding from gastric varices is less common than bleeding from esophageal varices, the clinical outcome is poor, with a higher mortality rate, and the conditions is difficult to manage with endoscopy (1-3). Balloon-occluded retrograde transvenous obliteration (BRTO) is a widely accepted, safe, effective method for treating the bleeding of gastric varices, and it is associated with low recurrence and rebleeding rates (4-10).

In the BRTO procedure, the most important step is the stagnation of the sclerosing agent in the gastric varices without reflux into either the portal or systemic circulation. The choice of sclerosing agent is quite different between Asian countries and American or European countries because of the availability of the agents. Since BRTO was first developed, ethanolamine oleate (EO) has been most commonly used sclerosing agent in Asia. Although EO is effective for the treatment of gastric varices, its potential toxicity has been well documented in many studies (11-13). Since sodium tetradecyl sulfate (STS) was introduced as an alternative sclerosing agent for

BRTO in the United States in 2006, several studied have revealed that the result of BRTO with STS is comparable to that with EO, but it has a lower complication rate (7, 8, 14-16).

At our institution, the sclerosing agent for BRTO was first changed in 2009, and it completely switched from 5% EO to 3% STS in 2010. To the best of our knowledge, few studies have focused on comparing the long-term outcomes of BRTO with EO versus STS for the treatment of gastric varices. The purpose of this retrospective study was to evaluate and compare the long-term outcomes of BRTO with EO against BRTO with STS.

MATERIALS AND METHODS

1. Patients

Beginning in January 2000, all data related to interventional procedures performed at our hospital were prospectively registered in an electronic database (Microsoft Access; Microsoft, Redmond, WA). From January 2002 to June 2015, 182 patients underwent BRTO for the treatment of bleeding from gastric varices or other porto-systemic shunts at our hospital. Records of the following patients were excluded from the study: (1) 3 patients who underwent BRTO of other porto-systemic shunts, 1 involving a spleno-renal shunt, 1 involving duodenal varices, and 1 involving a mesentero-caval shunt; (2) 30 patients who did not undergo contrast-enhanced computed tomography (CT) scans after the BRTO; (3) and 4 patients who underwent BRTO using other embolic materials, 2 patient receiving N-butyl-2-cyanoacrylate, and another 2 patients with vascular plugs; (4) 3 patients who underwent BRTO and combined percutaneous transhepatic or transsplenic gastric variceal embolization. With the first introduction of BRTO, 5% EO (Keuk Dong, Incheon, Korea) was the only available sclerosing agent at our

hospital. Starting in 2009, in the transition period, either 5% EO or 3% STS (Trombojet; Omega Laboratories, Montreal, QC, Canada) was used. In June 2010, we completely switched the sclerosing agent from 5% EO to 3% STS. In total, 142 patients who underwent BRTO for the treatment of gastric varices using 5% EO (n = 59) or 3% STS (n = 83) were included this study.

The BRTO with EO group comprised 59 patients (43 men, 16 women; age range, 32–76 years), and the group treated with STS comprised 83 patients (61 men, 21 women; age range, 33–85 years). The clinical characteristics of the patients in each group are summarized in Table 1. Thirty-two patients (54.2%) in the BRTO with EO group underwent emergency BRTO to manage bleeding from gastric varices within 24 hours of a bleeding episode. The other 27 patients (45.8%) in this group underwent elective BRTO after 24 hours. In the BRTO with STS group, 53 patients (63.9%) underwent emergency BRTO, and the other 30 patients (36.1%) underwent elective BRTO.

Table 1. Baseline patient characteristics

Characteristic	Ethanolamine Oleate (n=59)	Sodium Tetradecyl Sulfate (n=83)	*P*
Sex			
Male	43(72.9%)	61(73.5%)	0.958
Female	16(27.1%)	22(26.5%)	
Age			
Mean ± SD	58.9 ± 8.6	58.6 ± 13.7	0.801
Range	32 – 76	33 – 85	
Cause of liver disease			
Alcohol	11(18.6%)	20(24.1%)	
HBV	37(62.7%)	35(42.2%)	0.061
HCV	7(11.9%)	14(16.9%)	
Alcohol + HBV	0(0.0%)	5(6.0%)	
Unknown	4(6.8%)	9(10.8%)	
Child-Pugh classification			
A	17(28.8%)	25(30.1%)	0.180
B	30(50.8%)	51(61.4%)	
C	12(20.3%)	7(8.4%)	
Emergency			
Elective (>24hr)	27(45.8%)	30(36.1%)	0.169
Emergency (≤24hr)	32(54.2%)	53(63.9%)	
Follow-up period (months)			
Median	23.9	19.9	0.493
Range	0.2 – 170.7	0.2 – 84.7	

Note. HBV = hepatitis b virus, HCV = hepatitis c virus

2. The BRTO procedure

Contrast-enhanced CT scans were obtained for all patients before BRTO to confirm the presence of a gastrorenal shunt or efferent vein, such as the inferior phrenic vein or pericardiophrenic vein. A balloon catheter (Boston Scientific, Cork, Ireland, or Clinical Supply, Gifu, Japan) was advanced into the gastrorenal shunt or another equivalent efferent venous channel. When the balloon was placed into the proximal part of the shunt or efferent vein, it was inflated to occlude the outflow of the gastric varices. Retrograde venography was performed via the catheter to demonstrate the gastric varices and afferent and collateral veins communicating with the shunt. If the collateral veins were demonstrated, they were embolized with microcoils or gelatin sponge particles to prevent leakage of the sclerosing agent into the systemic circulation. After embolization of the collateral veins, retrograde venography was reperformed to confirm the opacification of the varices and occlusion of the gastrorenal shunt and collateral veins. The sclerosing agent was then injected into the gastric varices through the balloon catheter until it filled the gastric varix and afferent veins. As sclerosing agent, we used 5% EO mixed with iodized oil (Lipiodol Ultrafluide; Laboratoire Andre Guerbet, Aulnay-sous-Bois, France) in a 5:1 ratio or 5% EO

mixed with water-soluble contrast medium (Pamiray; Dongkook, Jincheon, Korea). When using STS foam, the sclerosing agent consisted of a mixture of 3% STS, contrast media, and room air in 1:1:2 ratios. Their contents were mixed until homogeneous foam was obtained. The patients were monitored for 1 hour under fluoroscopy in the angiography suite and then transferred to the ward, where balloon inflation was maintained overnight. In the early morning of the next day, we evaluated the presence of regurgitated fresh blood from the occlusion balloon catheter. If complete thrombosis was achieved without regurgitated blood, the balloon catheter was removed immediately in the angiography suite. If blood was regurged from the balloon catheter, additional sclerosing agent was injected under fluoroscopy, and the balloon catheter was maintained for approximately 6–8 hours. The balloon was then slowly deflated, with careful observation of the movement of the sclerosing agent in the varices.

3. Follow-up

After the BRTO procedure, follow-up contrast-enhanced CT or endoscopy was performed 1–4 weeks later, and then every 3–6 months, depending on the patients' circumstances and the discretion

of the referring physician. Follow-up data related to the obliteration of gastric varices, rebleeding, and clinical complications were obtained from patient medical records.

4. Definition and statistical analysis

Technical success was defined as complete occlusion of gastric varices without any residual gastric varix on first follow-up CT. Clinical success was defined as control of active bleeding from gastric varices and absence of evidence that rebleeding from the treated gastric varices on endoscopic examination during the follow-up period. Recurrence of gastric varices was defined as recanalization of gastric varices with contrast enhancement on regular follow-up CT in patients with technical success. The development of recurrence was evaluated by two authors (H.H.C. and H.C.K.), and differences in interpretation were resolved by consensus. Complications were classified as either major or minor according to the guidelines of the Society of Interventional Radiology Standards of Practice Committee [17]. A major complication was defined as an event that increased the level of care needed by patient or lengthened a patient's hospital stay and that resulted in permanent adverse sequelae or death. A minor

complication was defined as an event that required no therapy or nominal therapy, including overnight admission for observation.

All statistical analyses were performed with SPSS software (version 22.0 for Windows; IBM SPSS, Armonk, New York). We reported the values as mean or median ± standard deviation (SD) and range, numbers, or percentages, as applicable. We compared the BRTO with EO and BRTO with STS groups using the Mann–Whitney U test or chi–square test with Yates correlation, as appropriate. The Kaplan–Meier method was used to analyze the cumulative recurrence rate after BRTO in each group, and the expected 1–, 3–, and 5–year recurrence rates were compared using the log–rank test. We also analyzed the cumulative recurrence and rebleeding rates in the elective procedure and emergency procedure groups. Values of $p < 0.05$ were considered statistically significant in all tests.

RESULTS

We evaluated the baseline clinical characteristics, including the age, sex, cause of liver disease, and Child–Pugh classification, and none of the clinical parameters were significantly different between the two groups. The median follow-up periods were 23.9 (range, 0.2–170.7) months in the BRTO with EO group and 19.9 (range, 0.2–84.7) months in the BRTO with STS group (Table 1). We determined the access routes based on the comprehensive information about the gastric varices from preprocedural CT imaging. Most procedures involved right common femoral vein ccess in both groups, with 47 of 59 cases in the BRTO with EO group and 73 of 83 cases in the BRTO with STS group. Other access routes, including the internal jugular vein, basilic vein, percutaneous transhepatic or trans-splenic access, and combinations of these were selected for better technical and clinical outcomes of the procedure.

Technical success was achieved in 53 of 59 (89.8%) cases in the BRTO with EO group. Six patients showed residual contrast enhancement of the treated gastric varices on the first follow-up CT. In the BRTO with STS group, technical success was achieved in 80 of

83 (96.4%) cases. The first follow-up CT revealed incomplete occlusion of the gastric varices in three patients. The bleeding from the gastric varices was successfully controlled in 56 of 59 (94.9%) patients in the BRTO with EO group and in 80 of 83 (96.4%) patients in the BRTO with STS group. All the clinically failed BRTO procedures in both groups involved rebleeding from treated gastric varices detected on regular follow-up endoscopic examination.

The overall recurrence of gastric varices was 5 of 53 (9.4%) patients in the BRTO with EO group and 3 of 80 (3.8%) patients in the BRTO with STS group (Figure 1, Figure 2). The cumulative 1-, 3-, and 5-year recurrence rates of gastric varices were 3.8%, 9.4%, and 9.4% in the BRTO with EO group and 1.3%, 2.5%, and 3.8% in the BRTO with STS group, respectively ($p = 0.684$; Table 2; Fig. 3). The cumulative 1-, 3-, and 5-year rebleeding rates of treated gastric varices were 0%, 3.6%, and 5.4% in the BRTO with EO group and 1.3%, 3.8%, and 3.8% in the BRTO with STS group, respectively ($p = 0.863$; Table 2, Figure 3).

Comparing elective and emergency procedures, technical success was achieved in 52 of 57 (91.2%) and 76 of 85 (89.4%) patients, respectively. The bleeding from gastric varices was successfully controlled in 56 of 57 (98.2%) patients for elective BRTO and in 80

of 85 (94.1%) patients for emergency BRTO. The cumulative recurrence and rebleeding rates of gastric varices were not significantly different between the two groups (Table 3, Figure 4).

Major procedure-related complications did not develop in either group. In terms of minor complications, occlusion balloon rupture after the injection of the sclerosing agent developed in 5 of 59 patients in the BRTO with EO group. In contrast, it was not developed in BRTO with STS group.

Figure 1. A 59-year old man presented with hematemesis from gastric varices and underwent emergency BRTO with EO. (A) Endoscopic examination showed jetting of blood (arrow) from gastric fundal varices.

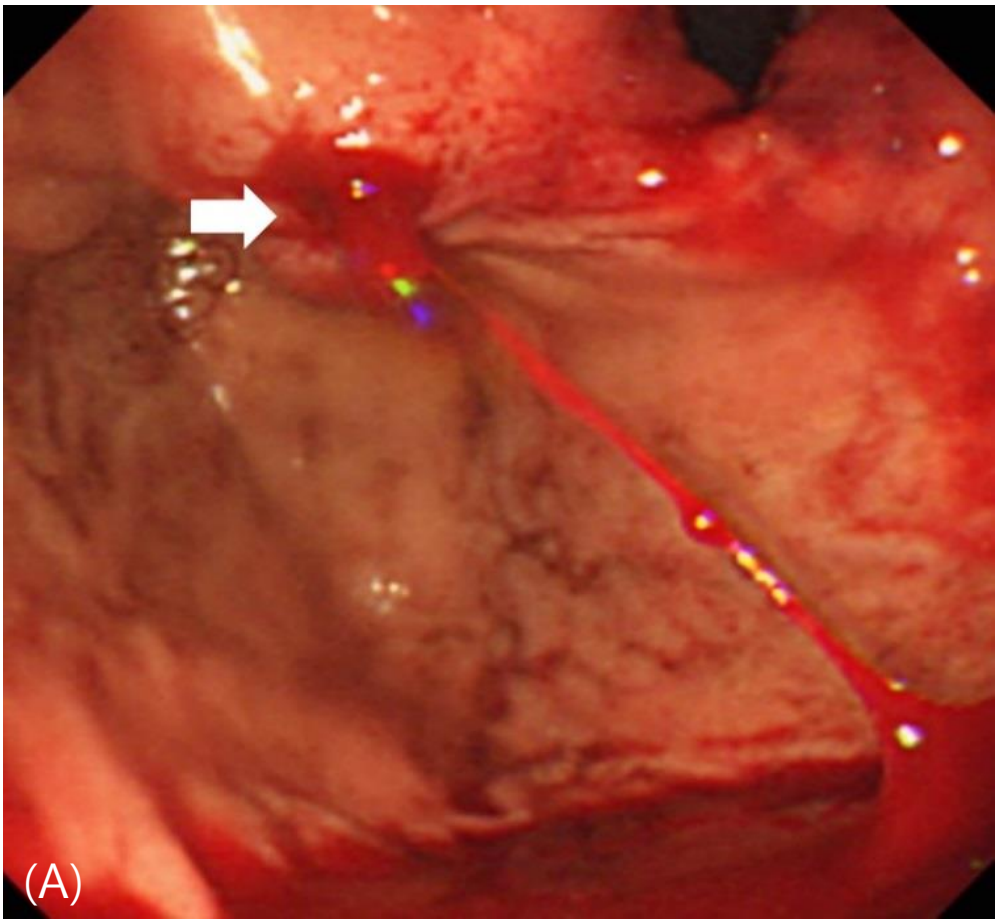


Figure 1. A 59-year old man presented with hematemesis from gastric varices and underwent emergency BRTO with EO. (B) Contrast-enhanced CT scan obtained before BRTO demonstrate the dilated gastric fundal varices (arrow).

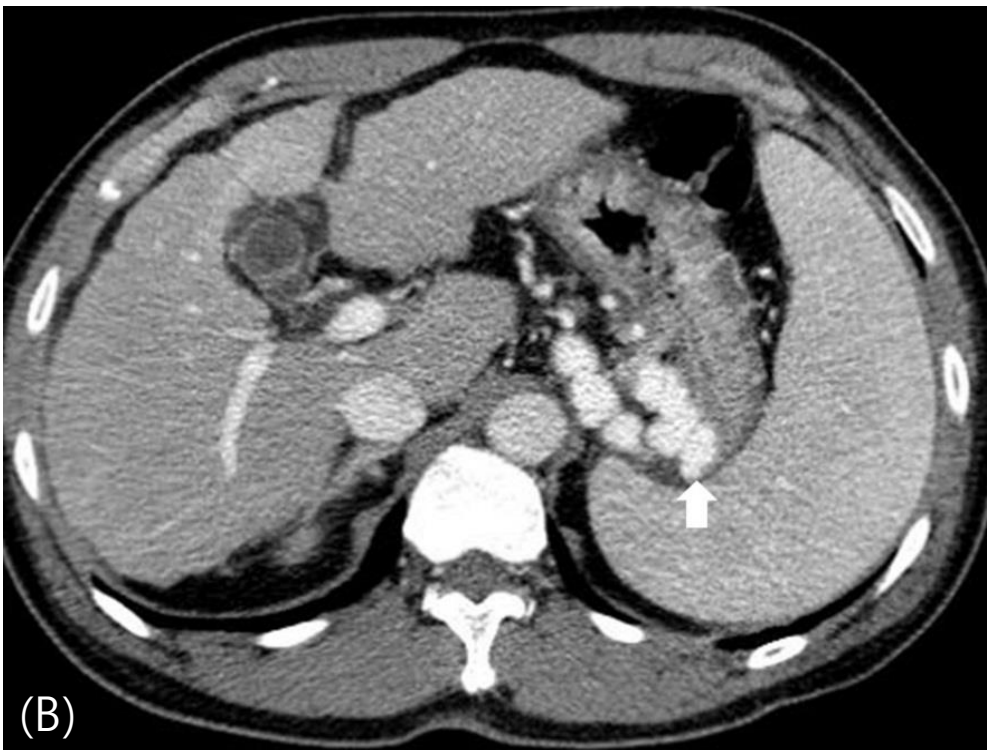


Figure 1. A 59-year old man presented with hematemesis from gastric varices and underwent emergency BRTO with EO. (C) Fluoroscopic image showed complete filling of gastric varices with mixture of EO and contrast medium.

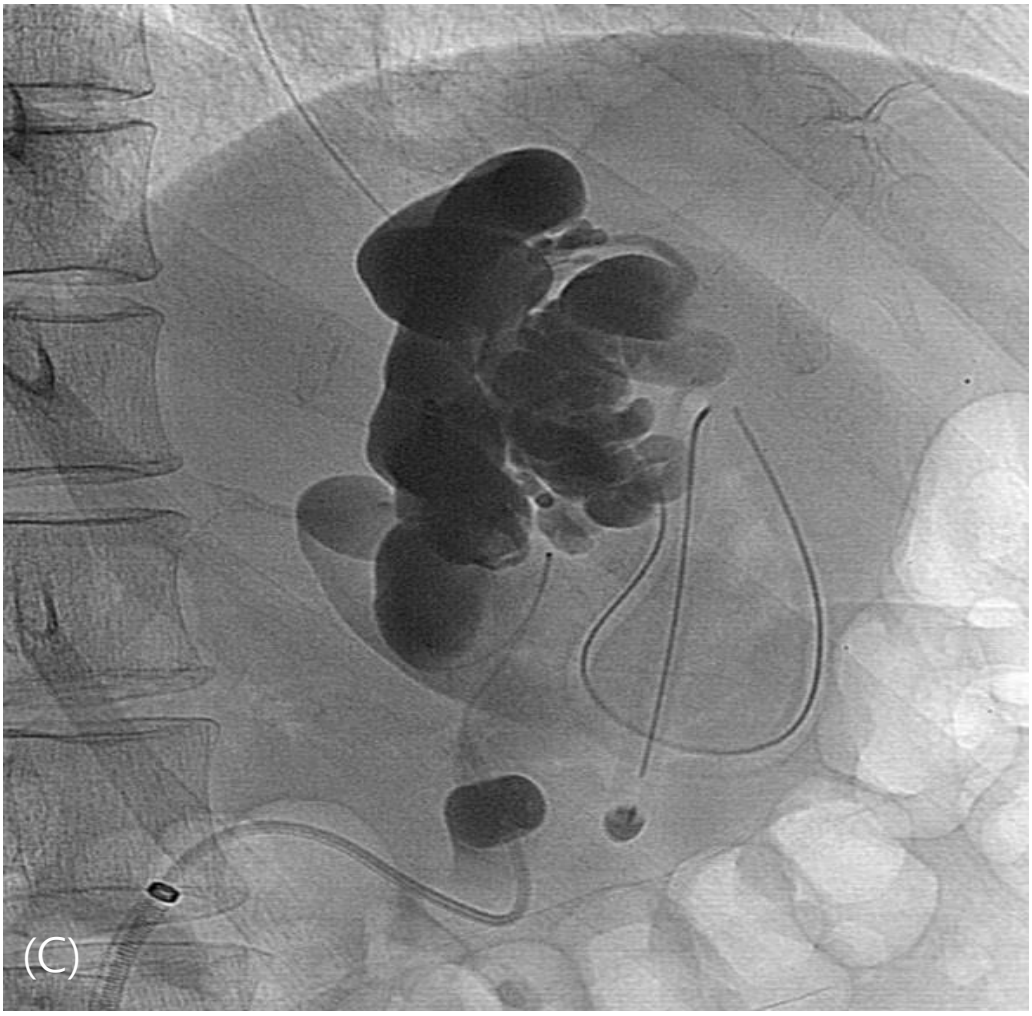


Figure 1. A 59-year old man presented with hematemesis from gastric varices and underwent emergency BRTO. (D) A first follow-up CT scan obtained 4 weeks after the BRTO, confirmed the complete thrombotic occlusion of gastric varices.

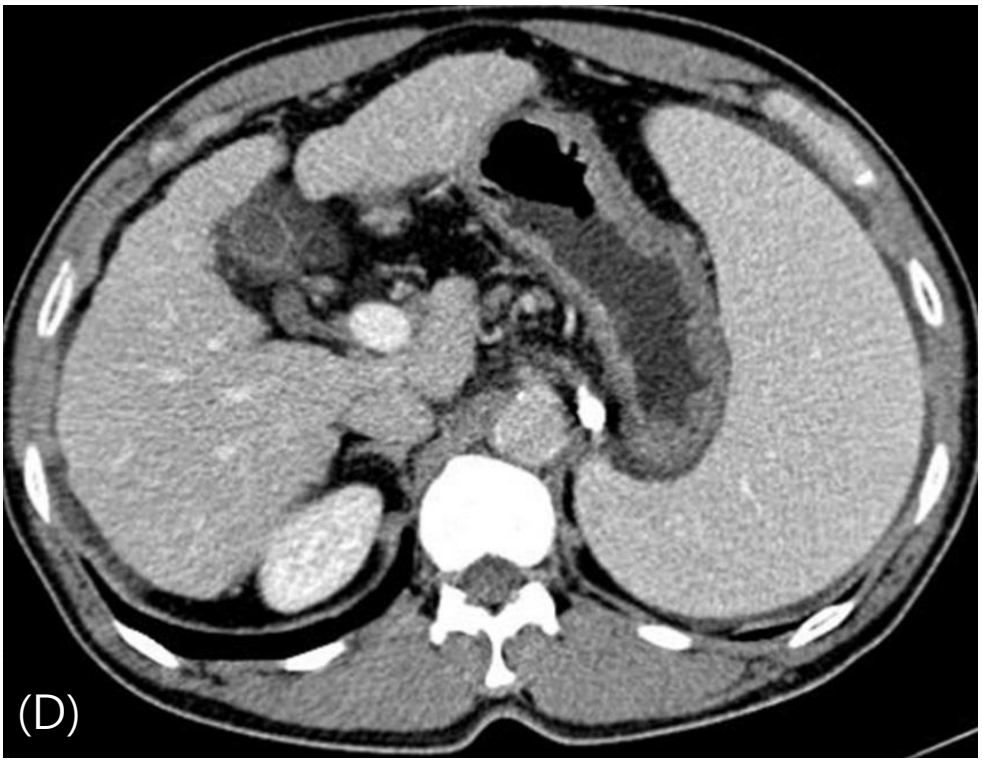


Figure 1. A 59-year old man presented with hematemesis from gastric varices and underwent emergency BRTO. (E) However, about 23 months later, small recurrent gastric varices (arrow) was revealed on contrast enhanced CT.

Figure 1. A 59-year old man presented with hematemesis from gastric varices and underwent emergency BRTO. (F) Endoscopic image showed dilated veins (arrow) at gastric fundus.

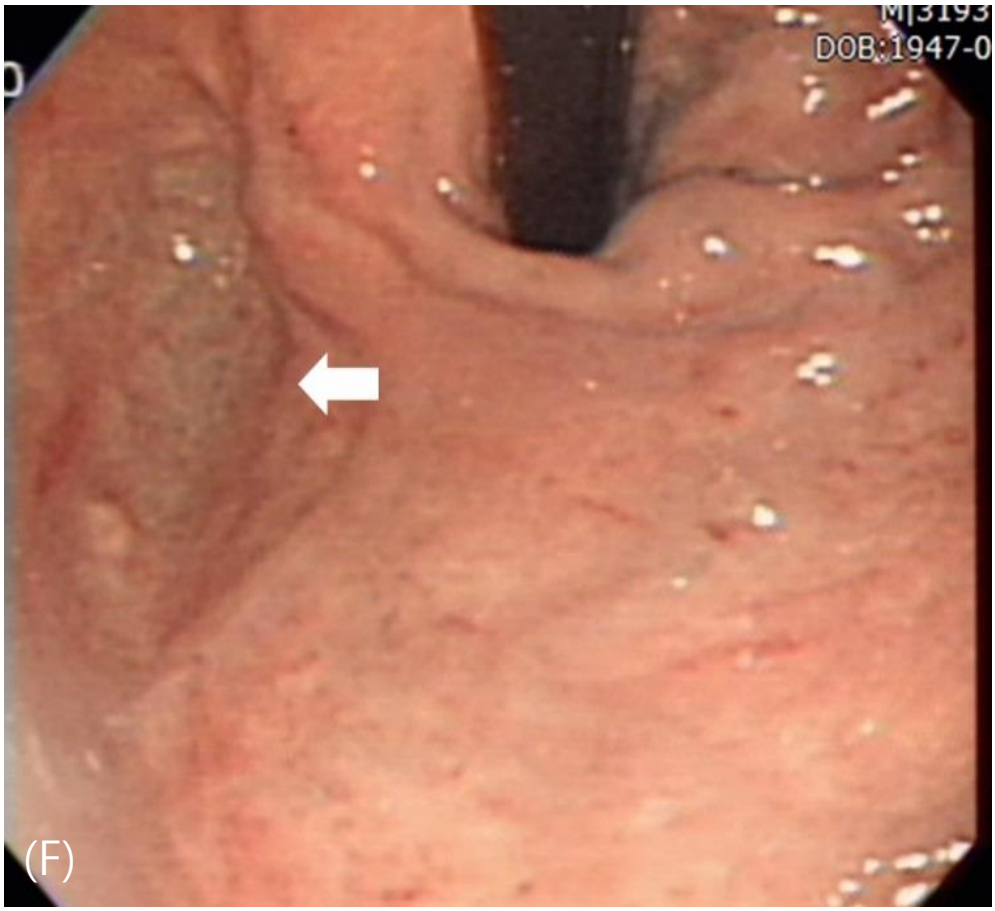


Figure 2. A 50-year old man presented with hematemesis and underwent emergency BRTO. (A) Endoscopic examination showed fresh blood from gastric varices (arrow).

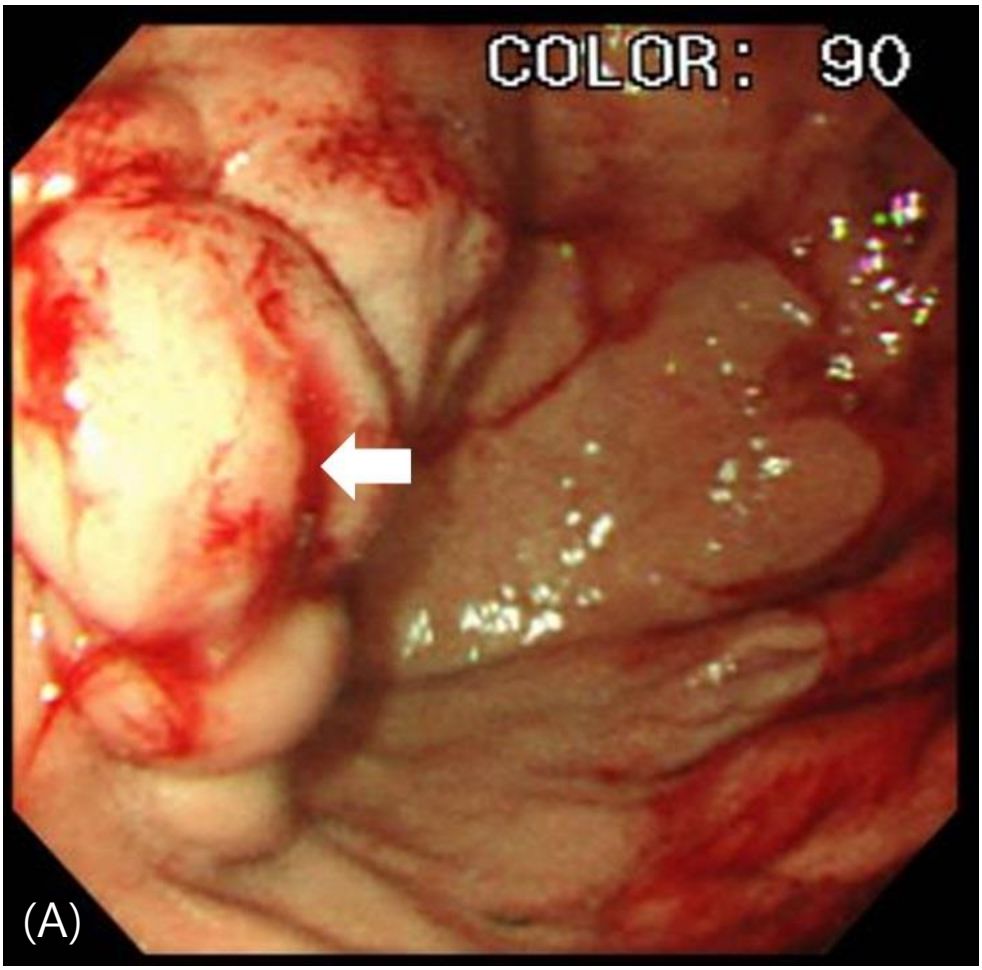


Figure 2. A 50-year old man presented with hematemesis and underwent emergency BRTO. (B) Contrast-enhanced CT scan obtained before BRTO demonstrate the dilated gastric fundal varices (arrow).

Figure 2. A 50-year old man presented with hematemesis and underwent emergency BRTO. (C) Fluoroscopic image showed complete filling of gastric varices with mixture of STS and contrast medium.

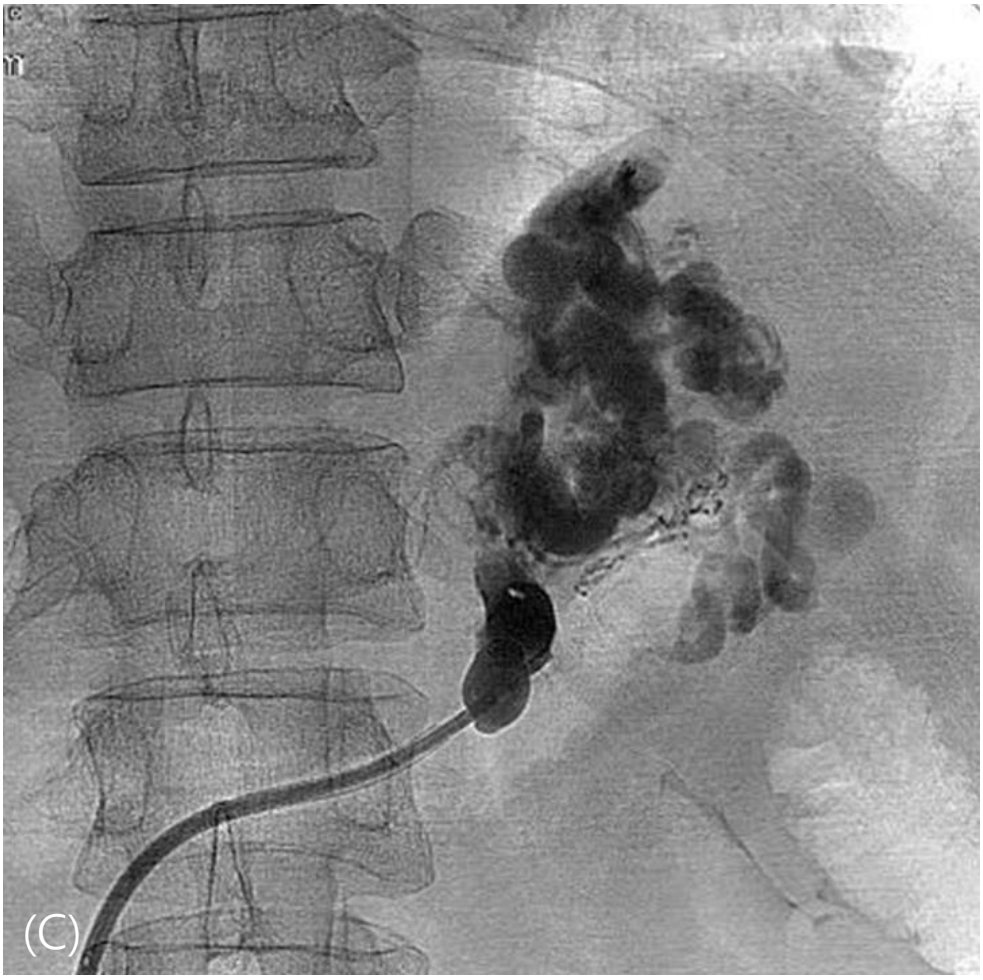


Figure 2. A 50-year old man presented with hematemesis and underwent emergency BRTO. (D) A first follow-up CT scan obtained 3 weeks after the BRTO, showed complete occlusion and collapse of gastric varices.

Figure 2. A 50-year old man presented with hematemesis and underwent emergency BRTO. (E) About 25 months later, recanalization of gastric varices (arrow) was developed on follow-up contrast enhanced CT.

Figure 2. A 50-year old man presented with hematemesis and underwent emergency BRTO. (F) Endoscopic image showed recurrent varices (arrow) at gastric fundus.

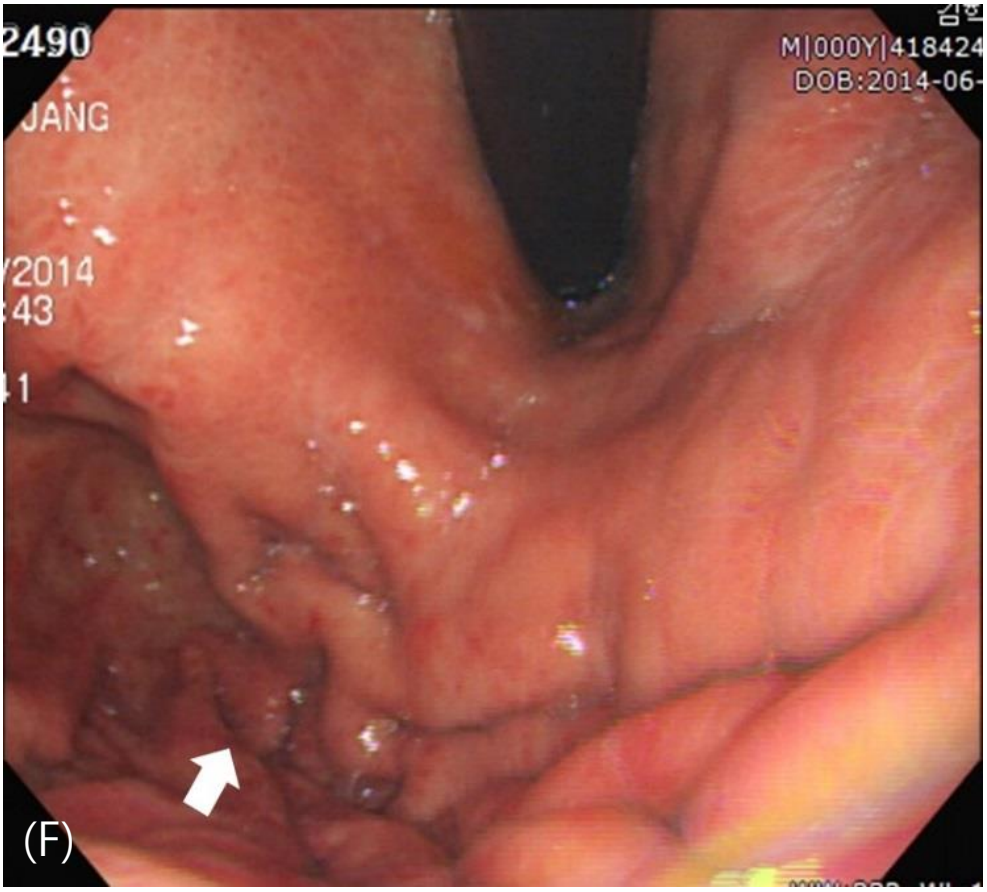


Table 2. Comparison of the result after balloon-occluded retrograde transvenous obliteration for gastric varices with ethanolamine oelate and sodium tetradecyl sulfate.

	Ethanolamine Oleate (n=59)	Sodium Tetradecyl Sulfate (n=83)	*P*
Access route			
Right CFV	47(79.7%)	73(88.0%)	
Right IJV	10(16.9%)	7(8.4%)	
Left IJV	1(1.7%)	0(0.0%)	0.656
Left basilic vein	0(0.0%)	1(1.2%)	
Right CFV + IJV	1(1.7%)	2(2.4%)	
Technical success rate	53(89.8%)	80(96.4%)	0.668
Clinical success rate	56(94.9%)	80(96.4%)	0.917
Cumulative recurrence rate			
1-year	2(3.8%)	1(1.3%)	
3-year	5(9.4)%	2(2.5%)	0.684
5-year	5(9.4)%	3(3.8%)	
Cumulative rebleeding rate			
1-year	0(0.0 %)	1(1.3%)	
3-year	2(3.6)%	3(3.8%)	0.863
5-year	3(5.4)%	3(3.8%)	

Note. CFV=common femoral vein, IJV=internal jugular vein.

Figure 3. (A) The cumulative recurrence rate of gastric varices in BRTO with EO and BRTO with STS by Kaplan-Meier analysis.

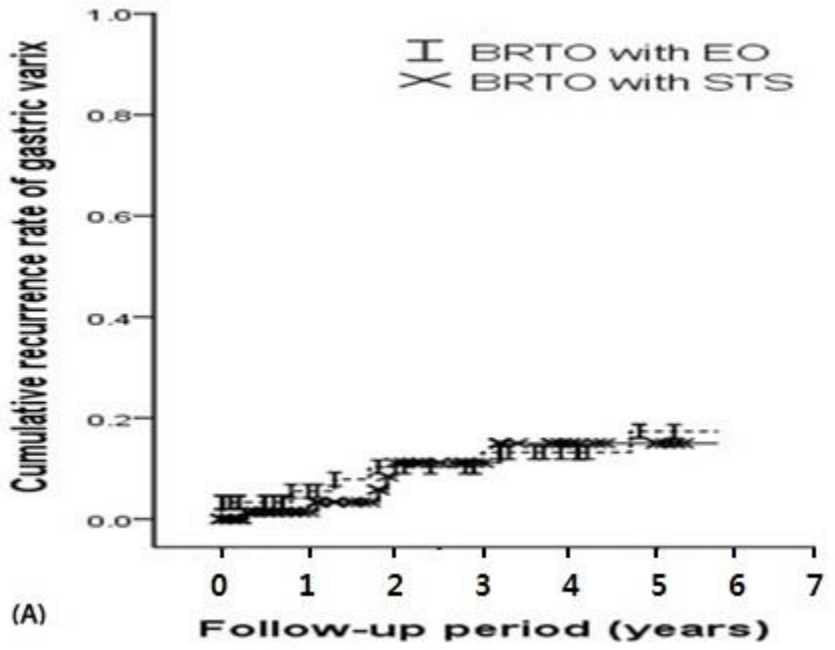


Figure 3. (B) The cumulative rebleeding rate of gastric varices in BRTO with EO and BRTO with STS by Kaplan-Meier analysis.

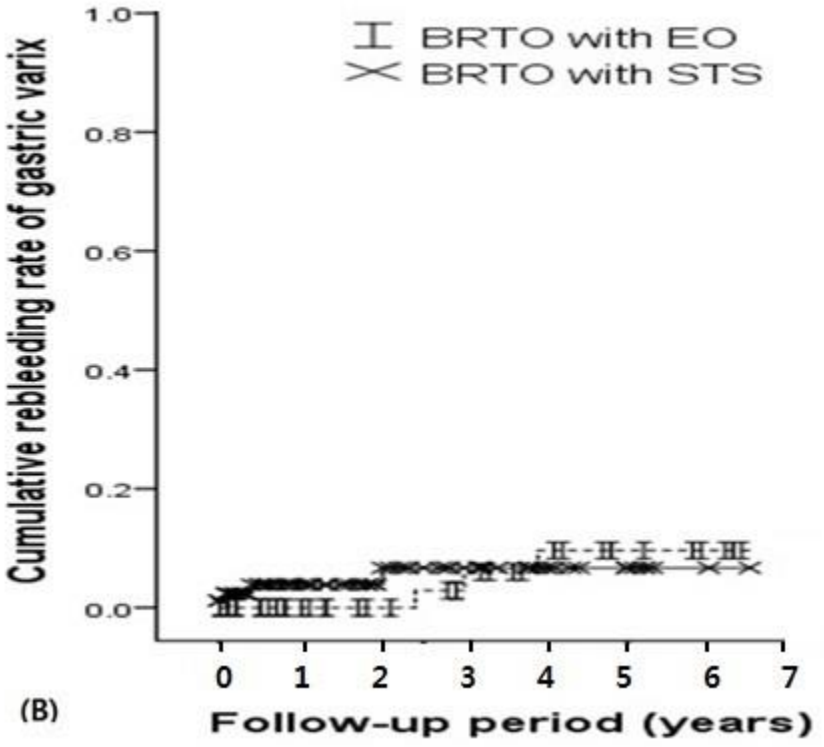


Table 3. Long-term outcome of balloon-occluded retrograde transvenous obliteration for gastric varices in comparison of elective and emergency procedure.

	Elective (n=57)	Emergency (n=85)	*P*
Technical success rate	52(91.2%)	76(89.4%)	0.722
Clinical success rate	56(98.2%)	80(94.1%)	0.231
Cumulative recurrence rate			
1-year	2(3.8%)	1(1.3%)	
3-year	3(5.8%)	3(3.9%)	0.866
5-year	4(7.7%)	3(3.9%)	
Cumulative rebleeding rate			
1-year	0(0.0%)	1(1.3%)	
3-year	1(1.8%)	2(2.5%)	0.126
5-year	1(1.8%)	4(5.0%)	

Figure 4. (A) The cumulative recurrence rate of gastric varices in elective BRTO and emergency BRTO by Kaplan-Meier analysis.

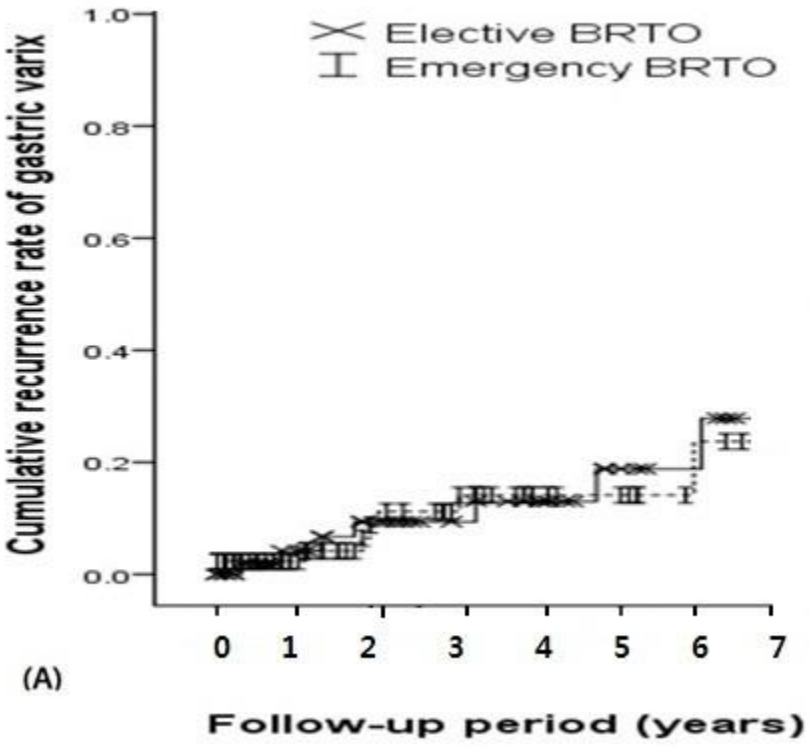
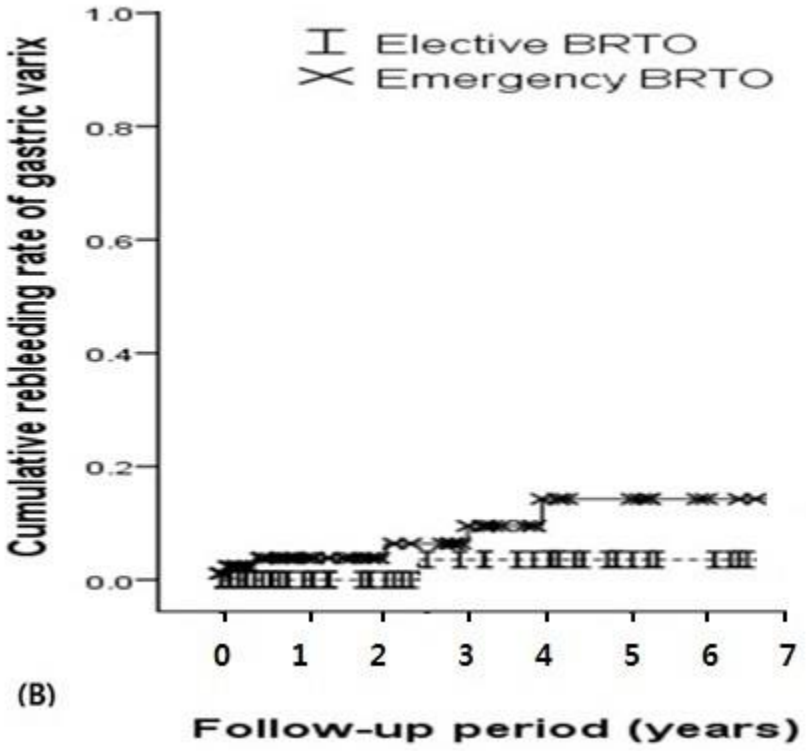


Figure 4. (B) The cumulative rebleeding rate of gastric varices in elective BRTO and emergency BRTO by Kaplan-Meier analysis.



DISCUSSION

In this study, In the current study, we found that BRTO using STS can achieve obliteration of gastric varices comparable to that of EO. The efficacy results of the present study were 95.3% and 90.0% for the technical success rate in each group, with similar clinical success rates of 95.3% and 95.0%, respectively. These results are in accordance with previous studies, which showed a 79–100% technical success rate and a rebleeding rate of less than approximately 5% (9, 12, 15, 16, 18, 19). Recently, Park et al. (20) reported the results of a meta-analysis of BRTO for the treatment of gastric varices. The meta-analysis revealed a technical BRTO success rate, defined as complete thrombosis of gastric varices at the end of the study, of 96.4%.

Since the introduction of 3% STS in 2006, its use for BRTO has gradually become more popular. Several studies have reported the short-term results of BRTO with STS for gastric varices or other portosystemic shunts. Sabri et al. (21) reported that technical success of BRTO with STS for isolated gastric varices was achieved in 91% (21 of 23) of cases, while the rebleeding rate at 12 months

was 0%. A study by Chang et al. (5) demonstrated a 94.1% (16 of 17) technical success rate without rebleeding after BRTO with STS over a 2-year follow-up period. Mukund et al. performed BRTO with STS for large portosystemic shunts with 100% (22 of 22) technical success and 90.1% (20 of 22) clinical success (8). Even in pediatric patients, gastric variceal bleeding was successfully treated with a combination of BRTO with STS and splenic artery embolization by Saad et al. (22).

Another potentially valuable asset in the present study was the comparison of the overall recurrence and rebleeding rates of BRTO using EO and STS, with a relatively long-term follow-up period. The cumulative 1-, 3-, and 5-year recurrence rates of gastric varices were 3.7%, 9.3%, and 9.3% in the BRTO with EO group and 1.2%, 2.5%, and 3.7% in the BRTO with STS group, respectively. The cumulative 1-, 3-, and 5-year rebleeding rates of treated gastric varices were 0%, 3.3%, and 5.0% in the BRTO with EO group and 3.5%, 4.7%, and 4.7% in the BRTO with STS group, respectively. Our results are comparable to those of a previous study reported by Kim et al. (7); in this study, the expected recurrence rates at 6 months, 1 year, and 2-year after the BRTO were 3.2%, 3.2% and 16.5% in EO group and 0% in STS group.

In terms of safety, many studies have reported various adverse effects of EO, including hemolysis, hemoglobinuria, pulmonary edema, and renal failure (23–25). The other serious concern related to using EO is frequent rupture of the occlusion balloon during the procedure. In Park et al.'s (13) study, the overall prevalence of occlusion balloon rupture was 8.7% (6 of 69 patients) during BRTO. We experienced five cases of occlusion balloon rupture in BRTO using EO. Among them, one patient complained of dyspnea immediately after the balloon rupture due to a suspected pulmonary embolism. In comparison with EO, STS is associated with a lower incidence of systemic side effects and faster venous sclerosis (7, 8, 16, 26). Although one case of procedure–related complications, namely a ruptured gastrorenal shunt, developed in BRTO using STS, there were no sclerosing agent–related adverse effects in the present study.

According to the classification of the Japan Society for Portal Hypertension, emergency bleeding from gastric varices is defined as bleeding within 24 hours of initial hemostasis. Compared with elective BRTO, it is sometimes difficult to control the filling of the sclerosing agent in the gastric varices because it can leak into the gastric lumen through the ruptured varices. Moreover, additional treatment, such as endoscopic hemostasis or second–look BRTO, has been required in

this situation. A few studies have reported on the efficacy and safety of emergency BRTO for gastric varices (27–29). In the present study, we defined emergency BRTO as the management of bleeding from gastric varices within 24 hours of a bleeding episode, and we performed emergency BRTO with EO in 32 of 60 (53.3%) patients and BRTO with STS in 55 of 85 (64.7%) patients, respectively. The technical and clinical success rates were not significantly different between the emergency and elective BRTO procedures in our study; the results are also comparable to those of previous reports. A study by Kageyama et al. (19) reported that emergency BRTO was not the risk factor for rebleeding after the procedure, and patients with poor liver function are more prone to recurrent bleeding from gastric varices, even if they undergo emergency BRTO. Similarly, we found that the rebleeding rate of treated gastric varices was 1.7% in elective BRTO and 6.9% in emergency BRTO in the 5–year follow–up period, and there no statistically significant difference between these rates.

Due to the long indwelling of the occlusion balloon catheter in BRTO with EO or STS, the procedure is time consuming and involves several potential risks, such as balloon rupture, infection, patient's complaint of inconvenience, and the need for intensive monitoring systems. Recently, Gwon et al. (30) introduced vascular plug–assisted

retrograde transvenous obliteration (PARTO) for the treatment of gastric varices. They reported that the mean procedure time was 24 minutes (range, 11–124), and technical success rate of 98.6% (72 of 73) was achieved without recurrent gastric variceal bleeding during the follow-up period. Chang et al. (31) also reported that PARTO is safe and effective for gastric variceal hemorrhage in patients with portal hypertension, with 94.7% (18 of 19) technical and clinical success. PARTO has several advantages compared with BRTO with EO or STS, but the long-term outcomes have not been reported. Therefore, further studies are necessary to comprehend both procedures for the treatment of gastric varices.

There were several limitations to this study. First, it was a retrospective nonrandomized study that was carried out at a single institution. Second, the two patient cohorts were not equal in number, and the choice of sclerosing agent was determined by availability, without any consideration of the medical situation. Third, many patients were excluded from our study due to lack of contrast-enhanced CT after the BRTO. Therefore, a multicenter randomized controlled study should be conducted to determine which sclerosing agents in BRTO are more suitable for treatment of gastric varices. Further evaluations are also warranted to improve understating of the

difference between the BRTO using EO or STS and PARTO procedures.

In conclusion, BRTO using STS can achieve obliteration of gastric varices comparable to that of EO with a similar long-term outcome. Moreover, there is no significant difference the long-term results of BRTO between elective and emergency procedures.

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국문 초록

목적: 본 연구의 목적은 역행성 경정맥 풍선 폐쇄술의 정맥류 치료에서 에타놀라민 올레인산과 테트라데실 황산나트륨의 장기 결과를 비교 분석하고자 하였다.

방법: 2002년 1월 부터 2015년 6월까지 총 142명의 환자가 위정맥류 출혈에 대해서 역행성 경정맥 풍선 폐쇄술을 이용하여 치료하였고 그중 59명은 에타놀라민 올레인산을 사용하였고 83명은 테트라데실 황산나트륨을 사용하였다.

후행적 검토를 통해 역행성 경정맥 풍선 폐쇄술 후에 위정맥류 출혈의 재발과 재출혈, 시술과 관련된 합병증 발생을 조사하였다. 에타놀라민 올레인산과 테트라데실 황산나트륨을 이용한 역행성 경정맥 풍선 폐쇄술에 따른 누적 재발률과 재출혈률을 Kaplan-Meier method을 통해 분석하였고, log-rank test을 이용하여 두 그룹 사이의 결과를 비교하였다.

결과: 역행성 경정맥 풍선 폐쇄술 후 추적기간 중앙값은 에타놀라민 올레인산으로 치료한 그룹에서 23.9 개월 (범위, 0.2~170.7) 테트라데실 황산나트륨으로 치료한 그룹은 19.9 개월 (범위, 0.2~84.7)이었다. 기술적 성공률은 에타놀라민 올레인산 치료 그룹에서 89.8% (59명중 53명) 이며, 테트라데실 황산나트륨 치료 그룹에서는 96.4% (83명 중 80명)이었다. 임상적 성공률은 에타놀라민 올레인산 치료 그룹에서 94.9%

(59명중 56명) 테트라데실 황산나트륨 치료 그룹에서는 96.4% (83명 중 80명)이었다. 1년, 3년 및 5년 누적 재발률의 경우 에타놀라민 올레인산 치료 그룹에서는 각각 3.8%, 9.4% 및 9.4%이며 테트라데실 황산나트륨 치료 그룹에서는 1.3%, 2.5% 및 3.8%로 테트라데실 황산나트륨 치료 그룹에서 다소 낮으나 통계적으로 유의한 차이는 없었다 (p=0.684). 1년, 3년 및 5년 누적 위정맥류 재출혈률의 경우, 테트라데실 황산나트륨 치료 그룹에서는 0%, 3.6% 및 5.4%로 테트라데실 황산나트륨 치료 그룹에서 1.3%, 3.8% 및 3.8%로 두 그룹 간에 큰 차이는 없었다 (p=0.863). 안정성과 관련하여 폐색 풍선 파열이 에타놀라민 올레인산 치료 그룹에서는 5개의 사례가 있었으나, 테트라데실 황산나트륨 치료 그룹에서는 발생하지 않았다.

결론: 본 연구를 통해 위정맥류 출혈에 대한 역행성 경정맥 풍선 폐쇄술의 치료에서 테트라데실 황산나트륨은 에타놀라민 올레인산과 비슷한 장기 효율성을 보였으며, 안정성과 관련하여 에타놀라민 올레인산에서 보고된 폐색 풍선의 파열은 발생하지 않았다.

주요어: 역행성 경정맥 풍선 폐쇄술, 위정맥류, 에타놀라민 올레인산, 테트라데실 황산나트륨

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