Revisiting gastric varix

Plug-assisted retrograde transvenous obliteration (PARTO)

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Balloon-occluded retrograde transvenous obliteration (BRTO) has been shown to be a suitable therapeutic option for the control of gastric varices (GV) because a natural interventional target is closure of the GV and portosystemic shunt. BRTO has been described with considerable variations in techniques and utilizing variable sclerosants. However, the invariable technical aspect that is central to the procedure is the use of sclerosing agents under indwelling balloon occlusion catheter. Although published studies show that the balloon indwelling time varied from 3 hours to overnight, leaving the indwelling balloon in place for such a protracted amount of time carries the potential risks of increased access bleeding, higher infection rates, and patient inconvenience. Furthermore, balloon rupture during the BRTO procedure can result in symptomatic pulmonary edema, treatment failure, and ultimately, recurrent variceal bleeding. Some reported complications associated with the use of liquid and foam sclerosants include pulmonary edema, cardiogenic shock, disseminated intravascular coagulation, renal failure, and anaphylactic reactions. Therefore, the absence of a balloon occlusion catheter and sclerosants can reduce procedure time, reduce the procedure-related morbidity, and simplify procedure-associated logistics.

Recently, modified BRTO was proposed and reported, where a balloon occlusion catheter and sclerosants were replaced with a vascular plug/coils and gelatin sponge to minimize some of the complications and logistical issues associated with the balloon catheter. A study by Gwon et al. reported that vascular plug-assisted retrograde transvenous obliteration (PARTO) successfully induced thrombosis of the gastrorenal shunt as well as GV without complications and subsequent obliteration. In a recent, prospective study in 73 patients who had undergone PARTO, complete thrombosis of both GV and portosystemic shunt in 72 (98.6%) of 73 patients without procedure-related complications. The thrombosed GV and shunts in 60 patients who had more than 3 month follow-up period were completely obliterated. Therefore, PARTO can be rapidly performed with high technical success rate and durable clinical efficacy for the treatment of GV in the presence of portosystemic shunt.

Compared with BRTO, PARTO has several advantages. First, it prevents procedure-related complications and decreases the procedure time as it does not require an indwelling balloon catheter and sclerosing agents. Due to long balloon indwelling time in BRTO, the indwelling balloon catheter may be nidus for complications such as increased risk of balloon rupture, access site complications, and infection, as well as logistical challenges for hospitals
such as patient inconvenience, intensive care unit or higher level monitoring be requirements, and additional staff. However, the use of a vascular plug, which has been shown to be safe and effective for the treatment of various vascular conditions, provides permanent embolic effect. This suggested that, by using of the vascular plug, the complications, and logistical issues with an indwelling balloon catheter can successfully be resolved. In addition, the use of gelatin sponges instead of sclerosing agents can promote rapid and complete embolization of the portosystemic shunt and GV without complications. In the present study, the mean procedure time from vascular plug placement to vascular plug detachment was 24 minutes, with a range of 11-124 minutes. Further, there were no procedure-related complications in any of our patients.

Second, PARTO does not require selective embolization of efferent veins in most cases as it does not require sclerosing agents. To prevent leakage of the sclerosing agents into the systemic circulation during BRTO, efferent veins should be embolized using a selectively catheterized microcathether system. In the present study, except embolization of prominent efferent vein using microcoils in two patients, we observed that gelfoam sponges themselves were sufficiently embolized efferent veins such as left inferior phrenic and paravertebral veins. During BRTO, maintaining of the indwelling balloon catheter less than 3 hours to reduce the indwelling time can reduce the sclerosing effect, thus, the frequency of complete thrombosis of GV with the first procedure was reported to be lower, ranging from 55% to 100%, and a repeated procedure was often needed. These previous studies have shown that a second or third BRTO procedure may be required to completely obliterate the GV in 10-44% the patients. These repeated BRTO procedures are considered burdensome for patients and result in longer hospitalization. Compared with BRTO, a second PARTO procedure may be impossible due to preexisting vascular plug. In the present study, we observed recanalization of GV in one patient due to incomplete filling of GV with gelatin sponges. Therefore, distal part of afferent vein including left gastric, posterior gastric, and short gastric vein should be completely filled with gelatin sponges to prevent recanalization of the portosystemic shunt and GV.

One key component for BRTO and PARTO is improvement in hepatic function. In previous BRTO reports, the liver function has been shown to be improved by an increase in portal hepatic blood flow. However, improvement of the hepatic function after BRTO was only temporary for 6-12 months and seemed to depend on underlying conditions such as the concomitant existence of hepatocellular carcinoma or primary biliary cirrhosis. A study by Kumamoto et al. provides evidence that BRTO may have a role in preserving liver function. They reported that transient improvement in hepatic function returned to baseline hepatic function up to 3 years and the patients without gastrosystemic shunts had stable hepatic function similar to those patients with BRTO. This suggested that BRTO had a protective long-term role in preserving hepatic function and protecting the liver from portosystemic shunt syndrome. In the present study, improvement in the Child-Pugh score was observed in 24 (40%) of 60 patients within one month after PARTO.
As it is known in common, the major drawback of BRTO and PARTO is potential worsening of EV. The worsening rate of EV has previously reported in 30-68% of patients with bleeding EV occurring in 17-24% of patients who had undergone BRTO, probably because of the increased portal flow and pressures. Differences in the rate of EV aggravation after BRTO are due to differences in how aggravation of EV is defined and in the duration of follow-up. In the present study, the worsening rate of EV was 26.7% which is within what is expected for this type of procedure. EV was newly developed in 6 (10%) of 60 patients without EV prior to PARTO, and EV progressed to a larger size in 10 (16.7%) of 60 patients with EV prior to PARTO. Therefore, close monitoring with/without prophylaxis of EV should be necessary after PARTO. The worsening of ascites and/or hydrothorax after BRTO has been reported to be variable (0-44%), but the modality and timing of evaluation between 24 hours and 4 weeks after BRTO, varying between facilities, and evaluation has not been standardized. In the present study, on three month follow-up CT, ascites was newly developed in nine (15%) of 60 patients without ascites prior to PARTO, and ascites progressed to a larger amount in five (8.3%) of 60 patients with ascites prior to PARTO.

Therefore, PARTO might be considered a first line treatment in appropriate patients.

References