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OBLITERATION OF GASTRIC VARICES GUIDED BY ECO-ENDOSCOPY WITH COILS INSERTION COATED WITH EXPANDABLE HIDROGEL POLYMERS.

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ABSTRACT

Introduction

Gastric varices haemorrhage is a severe complication of portal hypertension, with high mortality rates and few management alternatives, especially when there is a contraindication to TIPS. The usual therapeutic options are the injection of cyanoacrylate, the insertion of coils or both.

The Hydrocoils™, are special coils coated with different types of expandable hydrogel polymers conventionally used in neurovascular interventionism. They allow rapid

occlusion of vessel forming a mesh that favours the local formation of thrombus and the development of a neointima on the gel cover. We consider the EUS-guided hydrocoil insertion in gastric varices, without using cyanoacrylate.

Objective

This study aims to evaluate the safety and effectivity of the application of USE-guided hydrocoils in patients with gastric varices haemorrhage with TIPS contraindication.

Material and methods

Retrospective case series including four patients with TIPS contraindication after interventional radiologist evaluation. It used linear echoendoscopes, fluoroscopy, 19G needles and hydrocoils (AZUR, Terumo)™, Progreat™ 3Fr microcatheters. Interventional radiologist expert advised the procedures. Endoscopic ultrasound confirmed the varix obliteration.

Results

Technical and clinical success was in all patients involved in this study. There were no adverse effects related to the procedure or endoscopic equipment damage.

Conclusions

The application of USE-guided Hydrocoils can be a safe and effective method in the short term in gastric varices bleeding in patients not candidates for TIPS. Besides, It could ensure a complete obliteration of the vascular lumen and thus dispense with the use of cyanoacrylate. Further studies are needed to corroborate these preliminary results.

Keywords

Endoscopic ultrasound, therapeutic endoscopy, gastrointestinal hemorrhage, gastric varices.

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INTRODUCTION

Portal hypertension is the haemodynamic abnormality associated with the most severe complications of cirrhosis. Acute variceal bleeding is a medical emergency associated with a high mortality that, in spite of recent progress, is still in the order of 10-20 % at 6 weeks (1-3). Current guidelines recommend endoscopic therapy with tissue adhesive (e.g. N-butylcyanoacrylate) as initial treatment for isolated gastric varices (IGV) and those gastroesophageal varices (GEV) extending beyond the cardia (3). Endovascular coils have also shown good results, in a multicentre cohort study comparing EUS-guided cyanoacrylate application with EUS-guided coiling there was no significant difference in the obliteration rate of gastric varices (95 % of the cyanoacrylate group versus 91 % of the coil group), with a higher number of sessions in the cyanoacrylate group. Adverse events were higher in the cyanoacrylate group (58 % vs. 9 % respectively, $P<0.01$) (4). EUS-guided application of sclerosing substances or coils allows visualization and puncture of varices even in the presence of active bleeding or clots, increases the sensitivity to detect gastric varices compared with esophagogastroduodenoscopy and permits the identification of the responsible vessel or the perforating vein (4-7).

Transjugular intrahepatic portosystemic shunts(TIPS) is a rescue therapy in refractory variceal hemorrhage, secondary prevention of variceal bleeding (8). The use of TIPS is not innocuous, serious adverse events such as encephalopathy or liver ischemia with fulminant liver failure are described (9). Relative contraindications include anatomic issues that can complicate the creation of the shunt or reduce the technical success including portal or hepatic vein thrombosis, hepatic masses, and multiple cysts (9).

The hydrogel-platinum coil or Hydrocoils (AZUR, Terumo)™ combine a platinum coil and a biocompatible expandable hydrogel polymer. These material expands predictably in volume when exposed to blood, thrombus organization and the formation of "neointima" in the vessel (10-12). Due to its capacity for expansion and its hydrophilic properties, it forms a mesh that progressively occludes the vessel, leading to complete lumen obliteration (11,12). Hydrocoils have been used in neurovascular and peripheral vascular interventions and their safety and effectiveness have been demonstrated in some studies

(11,12).

We report our initial experience in EUS-guided deployment of hydrocoils in gastric variceal bleeding in patients not suitable for TIPS.

METHODS

Retrospective case series, including all consecutive EUS-guided application of hydrocoils (AZUR, Terumo) ™ for GV bleeding performed between June 2014 and June 2018. Follow-up was retrospectively retrieved until death, liver transplantation or the 30th of June 2018. Collected data included: patient's demographics; symptoms, comorbidities, size of varix, size and number of hydrocoils deployed, early and late side effects.

The present study was approved by the institutional review board.

Procedure description

First an upper digestive endoscopy was performed to confirm the diagnosis of gastric variceal bleeding. EUS-guided procedures were performed using a therapeutic echoendoscope (GF-UCT 140 and GF-UCT 180; Olympus Medical)®. The responsible vessel was identified either through the presence of active bleeding or high-risk endoscopic findings, the size of the varix and permeability was confirmed using doppler examination. The varix was punctured using a 19G needle and a small amount of iodinated contrast was administered to further delineate the vessel, draw a vascular "road map" and assess the presence of vascular shunts. After careful vasculature assessment, 0.018'' hydrocoils (AZUR, Terumo)™ of sizes between 10-15mm x 20-30cm were deployed under simultaneous endosonographic and fluoroscopic control (image 1A-1D). Hydrocoils were placed into the lumen of 2.9 and 3Fr microcatheters (PROGREAT, Terumo)™**.** The AZUR CX 35 peripheral spiral system was used to slowly advance the coil out the tip of the microcatheter into the varix under fluoroscopic guidance until optimal deployment is achieved. The interventional radiologist supervised the whole process. An endosonographic control was performed to confirm the varix obliteration.

Definitions

Technical success was defined as the adequate release of the hydrocoils.

Clinical success was defined as the stop of bleeding and the varix obliteration corroborated by EUS, without recurrent variceal haemorrhage during the first 4 weeks of follow-up.

Adverse events were defined as any procedure-related event appearing during the procedure or within 4 weeks after its completion. They were described according to the ASGE lexicon's severity grading system (13).

RESULTS

A total of four patients with gastric variceal bleeding were included. Patients' baseline characteristics are summarized in table 1. Contraindication of TIPS was due to Budd Chiari syndrome in two cases and portal vein thrombosis in the other two.

The procedures' details are presented in table 2. Complete variceal obliteration was confirmed in all patients. Available follow-up ranged between 41-87 days. There were no early or late complications of the procedure during the follow-up.

DISCUSSION

At present, the guidelines recommend cyanoacrylate as a first-line endoscopic treatment in bleeding from EGV and IGV [4]. However, this method leads to a substantial risk of embolization, increasing morbidity and mortality [4,14]. Embolization with USE-guided coils was reported for the first time by Levy and al [15]. The effectiveness in controlling bleeding and reducing the theoretical adverse effects of cyanoacrylate, coils have been considered as a response to glue limitation. The coils have synthetic fibres that could slow the blood flow and promote the formation of clots generating occlusion of the vessel. Under this premise, it was hypothesized that the application of cyanoacrylate after coil placement would prevent embolization at a distance from the glue [6,14]. EUS-guided application of cyanoacrylate and coil combined is highly effective for haemostasis in active varicose bleeding, this appears to be safe and may reduce the risk of cyanoacrylate embolization [6].

The Hydrocoils combines a platinum coil and a biocompatible expandable hydrogel polymer. Initial retrospective analysis of their performance in the management of aneurysms suggested hydrocoils might achieve a complete occlusion better than bare platinum coils (BPC) (16-18). This hypothesis was further supported by the results of a large multicenter trial comparing BPC vs hydrocoils in the management of cerebral aneurysms (18). This study showed lower recurrences in patients managed with hydrocoils 8.6 % (OR 0.7, 0.4-1, P=0.049), with no differences in side effects [18]. All is based on the hypothesis of the mechanical advantage of "neointima" formation, and complete obliteration of vessels, according to the reported experience in neurovascular scenarios (10-12,16-18). We consider using this device in the setting of GV as a compassionate strategy in not candidates for TIPS patients. This method maybe better because dispenses with the use of cyanoacrylate, which allows shortening the time of the procedure, minimize the morbidity and mortality associated with distant migration of the vascular glue and eliminate the risk of damage to endoscopy equipment [4,5]. The limitations of our study: the small number of cases; the retrospective analysis of the data; in the early cases is necessary an interventional radiologist with experience with the device.

Our study supports the feasibility of EUS-guided hydrocoils insertion in bleeding GV. Among the four cases included, technical and clinical success were achieved in all cases. These preliminary positive results need to be confirmed in larger case series. Finally, large multicentre trials are required to identify the optimal treatment of GV bleeding. It is essential to look for therapeutic options or materials that are effective and with less risk than cyanoacrylate in the scenario of variceal bleeding.

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Table 1: Baseline characteristics

Case	1	2	3	4
Age	19	32	46	50
Sex	Male	Male	Male	Female
Baseline disease	Liver cirrhosis	Liver cirrhosis	Liver cirrhosis	Recurrent pancreatitis
MELD in cirrosis	16	11	12	
Hemoglobin at admission	9 g/dL	11 g/dl	6.6 g/dL	11,2 g/dl
Active bleeding at the procedure	Yes	No	Yes	No
Transfusion	Yes	No	Yes	No
TIPS contraindication	Budd-Chiari syndrome	Budd-Chiari syndrome	Portal cavernoma	Portal cavernoma

MELD: Model for End-Stage Liver Disease, TIPS: Transjugular intrahepatic portosystemic shunt

Table 2. Data of procedure and follow-up.

Case	1	2	3	4
Variceal size (mm)	14 mm	14 mm	13 mm	13 mm
Number of coils	2	2	2	2
First coil size	10mmx19cm	10 mm x 20 cm	13 mm x 24 cm	13 mm x 24 cm
Second coil size	10mmx19cm	15 mm x 30 cm	10 mm x 19 cm	16 mm x 24 cm
Rebleeding	No	No	No	No
Transplant	Yes	Yes	No	No
Death	No	No	No	No

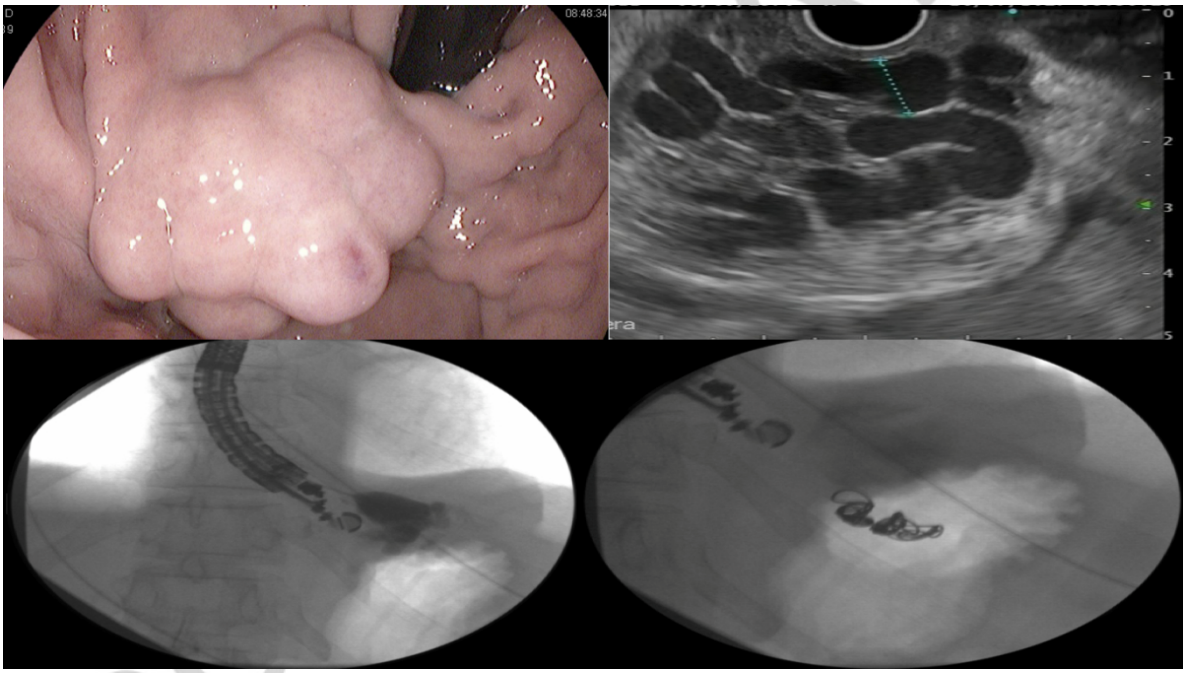

Figure 1: 1A. Gastric varix with high risk stigmata in a 32 year old male 1B. Echoendoscopic view displaying a tortuous varicose vein in the subcardial area, 1C. Fluoroscopic view of the vascular "road map" 1D. Fluoroscopic view showing the gastric aerogram and the two hydrocoils deployed.