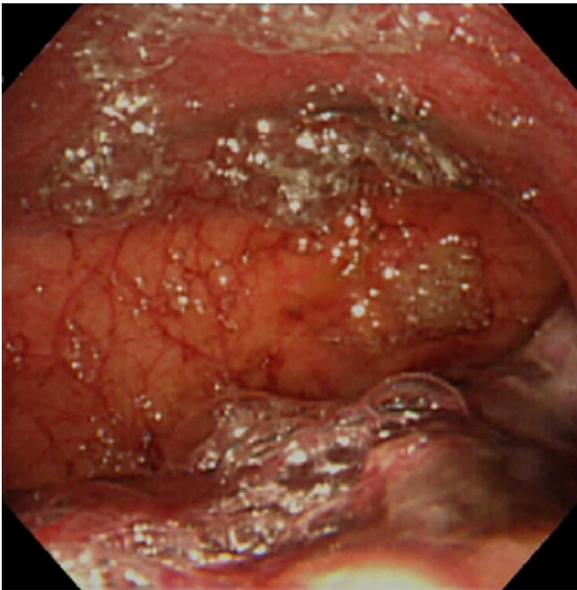


## Correspondence

### A neonate with pneumoperitoneum and cyanosis of lower limbs skin during esophagogastroduodenoscopy



A girl at 16 h after birth who was born in Week 39 of pregnancy, with a height, body weight, and hemoglobin level of 51 cm, 3400 g, and 14 g/dL, respectively, was referred to our hospital with fresh hematemesis and melena. Two mg of Vitamin K was intravenously injected, and gastrolavage was conducted. However, the hematemesis and melena persisted and laboratory tests showed a hemoglobin level of 5.9 g/dL. Erythrocyte transfusion at 150 mL

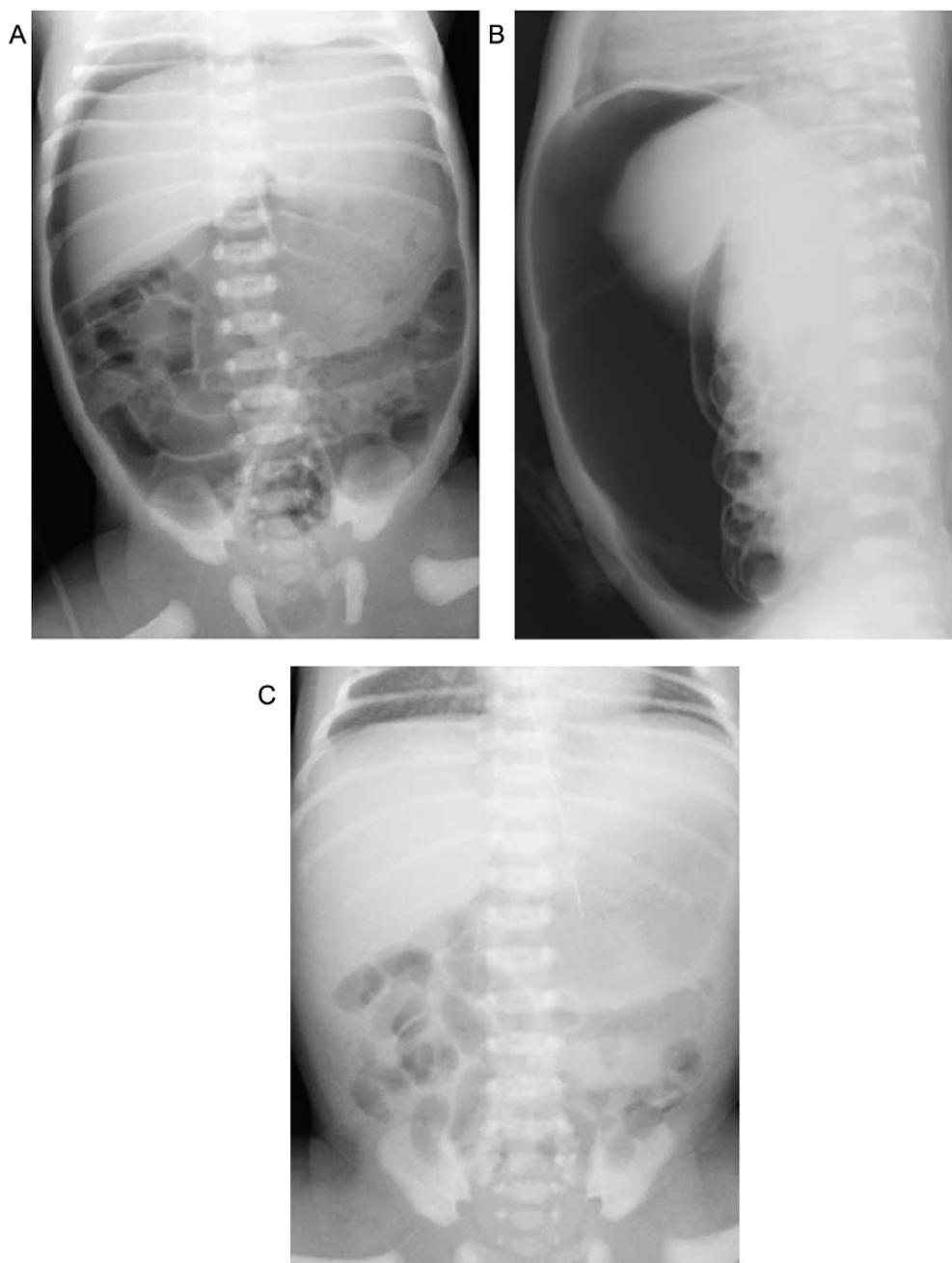


**Fig. 1.** On inserting the endoscope, the stomach was filled with large clots, and redness of gastric mucosa was observed.

was administered, and the hemoglobin level was increased to 12.1 g/dL. To identify the etiology of hemorrhage, esophagogastroduodenoscopy with CO<sub>2</sub> supply was performed. On inserting the endoscope, the stomach was filled with clots, and redness of gastric mucosa was observed (Fig. 1). During clot removal, abdominal swelling and cyanosis of the lower-limb skin suddenly appeared. Therefore, esophagogastroduodenoscopy was discontinued. Endoscopy did not reveal any gastrointestinal perforation. As a radiography showed free-air in the abdominal cavity (Fig. 2A, B), a nasogastric tube was inserted. Radiography after 3 h confirmed the disappearance of free-air (Fig. 2C). The appearance of free-air may have been related to CO<sub>2</sub> leakage from the thin gastric mucosa into the abdominal cavity. Subsequently, there was no progression of anemia, suggesting that hemostasis had been achieved. This event was finally diagnosed as gastrointestinal hemorrhage related to acute gastric mucosal lesion (AGML). She was discharged 17 days after admission. To date, her growth has been favorable.

The most frequent etiological factor for neonatal melena is an AGML. In most cases, conservative treatment is sufficient, but shock-related death has also been reported. In severe-status patients, endoscopy is required [1–4]. Recently, therapeutic endoscopy for children has been increasingly reported [2]. However, few studies have investigated neonates; its safety remains to be clarified.

It was reported that endoscopy under CO<sub>2</sub> supply was useful for relieving abdominal swelling in adults [5]. In neonates, the gastric mucosa is thin and may be easily damaged. In this case, endoscopy showed redness of the gastric mucosa, suggesting the risk of gastric mucosal injury. Therefore, to avoid excessive air supply-related gastrointestinal perforation, endoscopy was performed under CO<sub>2</sub> supply. However, CO<sub>2</sub> leaked from the thin gastric mucosa into the abdominal cavity. For neonates, endoscopy should be performed carefully while adjusting the CO<sub>2</sub> supply or degasification using a nasogastric tube.



**Fig. 2.** (A, B) Radiography after esophagogastroduodenoscopy showed free-air in the abdominal cavity. (C) Radiography after 3 h confirmed the disappearance of free-air.

**Conflict of interest**  
None declared.

**Informed consent**

Informed consent was obtained for this case report.

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## Hybrid resection with ESD and FTRD: Could this be a rescue treatment in the presence of severe submucosal fibrosis?



### 1. Introduction

Endoscopic submucosal dissection (ESD) is currently the endoscopic procedure of choice for the treatment of gastrointestinal neoplasms as it allows en bloc resection and accurate histological evaluation of the lesions and results in a low rate of local recurrence [1]. ESD, a time-consuming technique, requires specific training and a high level of skill in order to be safely performed. The presence of fibrosis makes the procedure more difficult and it is associated with low complete resection rates during colorectal ESD [1,2]. Factors that may predict the degree of submucosal fibrosis include tumour size, histology, depth of invasion, and pit pattern [2]. The FTRD<sup>®</sup> (full thickness resection device; Ovesco Endoscopy, Tübingen, Germany) is an over-the-scope device that allows EFTR with a clip-and-cut technique. In Europe, it was granted the CE Mark and the approval for lower gastrointestinal (GI) tract resection in September 2014 [3]. We describe the first hybrid technique case series using endoscopic submucosal dissection (ESD) and endoscopic full-thickness resection (EFTR) with FTRD (Fig. 1) in patients with severe fibrosis in order to achieve en bloc resection.

### 2. Patients and methods

From December 2017 to September 2018, 28 consecutive patients with colorectal lesions were referred for ESD to our tertiary center; five of them underwent combined ESD and EFTR. Previous biopsies revealed high-grade dysplasia in two patients and carcinoma in situ in one patient. Written informed consent was obtained from all patients. The data were collected retrospectively. Before resection, the lesions were characterized using white light and narrow band imaging (NBI) or blue laser imaging (BLI). All procedures were performed under deep sedation with propofol. ESD was performed using a HybridKnife, a new system that combines electrosurgical technology with a water-jet system (ERBEJET2; ERBE, Tübingen, Germany). A transparent hood was attached to the tip of the endoscope (short ST hood; Fujifilm Medical Co). A VIO generator (VIO 300D and VIO3; ERBE) was used. A saline solution containing epinephrine (0.01 mg/ml) and minimal indigo carmine was used in all cases. Circumferential cutting and submucosal dissection were performed by using the T-type HybridKnife or the I-type HybridKnife. Severe fibrosis was defined as the appearance of a white muscular structure without a blue transparent layer in the submucosa, as previously reported [1]. In the presence of severe fibrosis, the ESD procedure was interrupted (Fig. 2C). Then, the colonoscope with the mounted FTRD was advanced to the lesions (Fig. 2D). Once the colonoscope had reached the lesion with partial resection, the

lesion was pulled into the cap by using the FTRD grasper (Ovesco Endoscopy) until the muscular layer was visible inside. After OTSC deployment, the lesion was resected with a preloaded snare; subsequently the specimen was put in the cap and extracted with the scope. The resection site was again inspected for complications (Fig. 2E). In the presence of diverticula or colonic shrinkage, a colonoscopy with a proVE CAP (Ovesco Endoscopy, Tübingen, Germany), a cap similar in size to the FTRD cap, was performed in order to evaluate the accessibility of the target lesion. Histological classification was performed according to the Vienna staging system for epithelial neoplasms of the gastrointestinal tract [4]. Information about size, margins and other criteria for malignant polyps were provided.

The patients were hospitalized for 2 nights and monitored. The patients were started on clear liquids 24 h after the procedure once signs of bleeding or peritonitis had been excluded. The patients were scheduled for a follow-up endoscopy at 3 and 6 months after the procedure. In the absence of residual or recurrent adenoma, as determined by using white light and BLI, we performed biopsies of the scar.

### 3. Results

All lesions were resected successfully with the FTRD (Table 1). We did not observe any immediate or delayed perforations. The lesions were located in the sigmoid colon (n=1), the transverse colon (n=1) and the ascending colon (n=3). The mean diameter of the resection specimens was 27.8 mm (range 25–31 mm). The mean age of the patients was 68.8 years (range 57–77 years). The mean procedure time was 127.4 min (range 90–165 min). Histology confirmed full-thickness resection in all cases. Complete (R0) resection was achieved in all cases. Histological evaluation showed two adenomas with high grade dysplasia, one of adenocarcinoma T1/G2/SM1, one adenocarcinoma T1/G1/SM2 and one adenocarcinoma T1/G2/SM3; this latter patient underwent surgical resection: histopathology demonstrated pT1N0. At 3 months follow-up colonoscopy we were able to observe a spontaneous clip dislocation in three out of four patients. We did not observe any local recurrence in four patients at three months. Six months follow-up is available in only two patients and none of them showed disease recurrence.

### 4. Discussion

ESD is not widely used in colorectal lesions because of the technical difficulty, the risk of perforation and the resultant peritonitis and the greater time required to carry out the procedure. Difficulties in ESD result in incomplete en bloc resection and perforation. The presence of fibrosis has been demonstrated to be related to perforation, and severe fibrosis is related to incomplete resection. Yoshida et al. showed that severe fibrosis was the most important risk factor for incomplete resection [5]. A recent report showed that submucosal invasion and carcinomatous histology were independent risk factors for severe fibrosis [2]. According to previous studies, a wide range of perforation rates has been found in the presence of fibrosis, from 1.4% to 14% [6]. This great variability may be due both to the incomplete lift of the tumour after submucosal injection in cases where fibrosis is present and the inadequately secured dissection margin. EFTR with FTRD has been shown to be a valid technique to treat non-lifting lesions [7–9]. This device, using a clip-and-cut technique, reportedly allows a full-thickness and complete resection of lesions up to 3 cm in size; however, in our previous study, the maximum diameter of the EFTR specimens was 42 mm [7]. Previous literature data described a hybrid EFTR for the resection of large non-lifting colorectal lesions [10]; how-