Efficacy and safety of endoscopic submucosal dissection for superficial colorectal tumors more than 50 mm in diameter

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Background and Aims: The feasibility of endoscopic submucosal dissection (ESD) for large superficial colorectal tumors is undefined. The aim of this study was to assess the outcomes for patients undergoing ESD of superficial colorectal tumors larger than 50 mm.

Methods: A total of 472 patients who underwent ESD for superficial colorectal tumors from 2010 to 2014 were enrolled. We retrospectively reviewed their records.

Results: We compared patients with 20-mm to 50-mm lesions and those with lesions >50 mm regarding demographics, the ESD procedure, and histopathology. Among patients with lesions >50 mm, laterally spreading tumors nongranular and protruded types were uncommon. Histopathologically, deeply invasive (≥1000 μm) submucosal carcinomas were more frequent in lesions >50 mm (14% [10/70] vs 5% [20/402], $P < .01$). Technically, en bloc resection was successfully accomplished in 99% of patients (69/70). Although the total dissection time for lesions >50 mm was significantly longer than for lesions 20 mm to 50 mm (mean ± SD, 157 ± 114 minutes vs 68 ± 50 min; $P < .01$), dissection speed for lesions >50 mm was significantly faster than for lesions 20 mm to 50 mm ($P < .01$). There were no significant differences in en bloc R0 resection rate comparing both groups (>50 mm, 83% vs 20 mm to 50 mm, 87%; $P = .31$). No perforations or postoperative bleeding occurred in patients with lesions >50 mm. Post-ESD colorectal strictures requiring intervention did not develop in any patient.

Conclusions: ESD for superficial colorectal tumors >50 mm is feasible. ESD of these lesions had a high R0 resection rate and a low adverse event rate. En bloc resection by ESD provides adequate pathological specimens and may limit the need for surgical intervention. (Gastrointest Endosc 2016;83:602-7.)

At the end of the 20th century, we began performing endoscopic submucosal dissection (ESD) for colorectal neoplasms.[1,2] Our institution is a pioneer in performing colorectal ESD. Colorectal ESD is considered more difficult than gastric ESD because the colon wall is thinner than the stomach. It is even more difficult when the tumor is located on a prominent fold and/or an area with sharp bending, which can result in loss of control of the endoscope.[3] These factors may increase the rate of adverse events. A recent prospective study[4] revealed that colorectal lesions >50 mm are an independent risk factor for the occurrence of adverse events.

We performed ESD for 1223 colorectal lesions from June 1998 to October 2014. Colorectal ESD was recognized as an advanced medical treatment by the Japanese government in April 2010. We have treated large tumors regardless of their size as long as a curative resection was expected. Technological improvements in the devices used to perform ESD over the past decade have led to a safe and reliable procedure. In our experience, ESD for colorectal lesions

Abbreviations: LST-G, laterally spreading tumor–granular type; LST-NG, laterally spreading tumor–nongranular type; PEG, polyethylene glycol.

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>50 mm in size is feasible. The aim of this study was to assess the safety and outcomes of patients undergoing ESD for superficial colorectal tumors, especially focusing on tumors >50 mm in diameter. The hypothesis of this study was that the resection rates are lower for lesions >50 mm.

METHODS

We retrospectively reviewed all of the consecutive colorectal lesions treated by ESD between April 2010 and October 2014 at the Division of Gastroenterology of Jichi Medical University. To perform an up-to-date analysis, we used data from procedures after the recognition of colorectal ESD by the Japanese government. We reviewed patient records, operative records, and pathological findings. This study was approved by our institutional review board. Full written informed consent for ESD of the colorectal lesions was obtained from all patients.

The indications for ESD of colorectal lesions included lesions considered difficult to treat with EMR in an en bloc fashion and image-enhanced magnifying endoscopy and magnifying chromoendoscopy not demonstrating submucosal invasion of ≥1000 μm. EUS using a miniprobe was performed for lesions with findings suspicious for invasive carcinoma by magnified endoscopy. When EUS clearly demonstrated tumor invasion to the muscularis propria, surgical resection was indicated. We did not preclude ESD due to technical difficulties such as large size, location, or endoscopic instability.

To analyze the colorectal ESD results for a more homogeneous group of lesions, we included only superficial neoplastic lesions (adenomas and early carcinomas) with a diameter of ≥20 mm in this retrospective study.

Bowel preparation was routinely performed by using oral sodium picosulfate 0.75% 10 mL on the night before the procedure and 2 L of polyethylene glycol (PEG) solution on the day of the ESD procedure. When the stool became watery and clear, bowel preparation was complete even if the dose of PEG solution had not reached 2 L. If the stool was not watery and clear after the routine preparation, another 1 to 2 L of PEG solution or 0.9 to 1.8 L of isotonic magnesium citrate solution were administered. Midazolam and pethidine were used for sedation in most patients, and butyl scopolamine or glucagon were used to decrease colonic peristalsis. An endoscope with a water jet instrument (EC-580RD/M; Fujifilm, Tokyo, Japan), carbon dioxide insufflation, and a small-caliber tip transparent (ST) hood (DH-15GR or DH-28GR; Fujifilm, Tokyo, Japan) fitted to the tip of the endoscope were used. When we could not maintain adequate maneuverability using a standard colonoscope, we used a balloon-assisted endoscope (EC-450BI5 and TS-13101; Fujifilm).[5] Mucosal incision and submucosal dissection were performed by using a Flush knife BT (DK2618JB-15; Fujifilm) or a DualKnife (KD-650Q; Olympus, Tokyo, Japan) with an electrosurgical generator (VIO300D; ERBE Elektromedizin Ltd, Tübingen, Germany). Hot hemostasis forceps (HOYA Corporation, Tokyo, Japan) were used to control bleeding.

We divided the resected colorectal tumors into 2 groups based on size (20 mm-50 mm and >50 mm). We analyzed the size, shape, location, dissection time, and pathological findings for each lesion. The area of the resected specimen (mm^2) was calculated using the following formula: major axis (mm)/2 × minor axis (mm)/2 × 3.14. The dissection time (minutes) was defined from the start of cutting the mucosa to completion of the resection. The dissection speed (mm^2/min) was calculated by using the area of resected specimen (mm^2)/dissection time (minutes). For submucosal injection, 0.4% sodium hyaluronate (MucoUp; Seikagaku, Tokyo, Japan) was used.

En bloc resection was defined as resection of the entire specimen in a single piece. En bloc R0 resection was pathologically defined by fulfilling an en bloc resection, with tumor-free vertical and horizontal margins. En bloc curative resection was pathologically defined by fulfilling en bloc R0 resection, a differentiated carcinoma or adenoma, with <1000 μm of submucosal invasion and no lymphovascular invasion, based on the 2014 Japanese Society for Cancer of the Colon and Rectum Guidelines for the treatment of colorectal cancer.[6]

The definition of perforation includes perforations during and after the ESD procedure. Postoperative bleeding was defined as overt bleeding within 14 days after ESD requiring endoscopic hemostasis.

Statistical analysis

Sample size was calculated by estimating R0 resection rates of 90% and 70% for lesions 20 mm to 50 mm and >50 mm, respectively. The R0 resection rate for lesions 20 mm to 50 mm was estimated referring to previous literature showing an 88% en bloc resection rate and an 89% histopathological curative resection rate for carcinoma portions of lesions.[4] The R0 resection rate limited to lesions >50 mm was estimated to be lower (70%), considering the technical difficulties. The calculated sample size was 150 for lesions 20 mm to 50 mm and 30 for lesions >50 mm determined with an allocation ratio of 5:1, an α error of 5%, and a power of 80%. Statistical analysis was performed by using Microsoft Excel 2013 (Microsoft Corp, Redmond, Wash) with add-in software Statcel 3 (OMS Publishing Inc, Saitama, Japan). Data are expressed as the median. Independent continuous variables were compared using the Mann–Whitney U test. Categorical data were compared using the χ^2 test or the Fisher exact test. Differences were considered statistically significant with a P value <.05.

RESULTS

A total of 583 colorectal ESD procedures in 540 patients were performed during the study period. For the final