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## Long-term outcomes after endoscopic submucosal dissection for superficial colorectal tumors

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**Background and Aims:** Endoscopic submucosal dissection (ESD) is an effective procedure for en bloc resection of superficial colorectal tumors regardless of tumor size or location. However, there are few reports on long-term outcomes for patients with superficial colorectal tumors after ESD. We therefore aimed to evaluate the long-term outcomes after ESD for superficial colorectal tumors.

**Methods:** ESD was performed on 257 colorectal tumors in 255 consecutive patients at Hiroshima University Hospital between June 2003 and July 2010. We investigated the following variables: patient characteristics, the American Society of Anesthesiologists score, tumor location, tumor size, growth type, histology, en bloc resection rate, achievement of curative resection, procedure time, and adverse events. The 5-year overall survival (OS), 5-year disease-specific survival (DSS), local recurrence, and metachronous tumor occurrence were also analyzed.

**Results:** We identified 224 tumors in 222 patients who were confirmed dead or had follow-up data for more than 5 years. After a median follow-up of 79 months, 5-year OS and DSS rates were 94.6% and 100%, respectively. The local recurrence rate (1.5%) was significantly higher in patients undergoing piecemeal resection (9.1%) compared with en bloc resection (0.6%), in cases of histologic incomplete resection compared with complete resection, and in cases of non-R0 resection compared with R0 resection. The rates of total number of tumors ( $\geq 6$  mm) and carcinoma metachronous tumors after ESD without additional surgical resection were 18.9% (38/201) and 4.0% (8/201), respectively.

**Conclusions:** Long-term outcomes after ESD for superficial colorectal tumors are favorable. Patients should be surveyed for both local recurrence and metachronous tumors after ESD. (Gastrointest Endosc 2017;85:546-53.)

### INTRODUCTION

Endoscopic submucosal dissection (ESD) is an effective procedure for en bloc resection of large superficial colorectal tumors, and is currently being used to treat such malignancies.<sup>1-14</sup> The safety and convenience of this procedure has gradually become accepted; ESD has also

undergone numerous technical refinements. ESD for superficial colorectal tumors is technically more difficult and requires considerable experience compared with EMR; the risk of adverse events, such as perforation, is also greater.<sup>3,15-17</sup> However, clarification of the factors affecting the technical difficulty of ESD,<sup>18-22</sup> improvement of the associated tools and devices,<sup>5</sup> and the

*Abbreviations:* ASA, American Society of Anesthesiologists; DSS, disease-specific survival; ESD, endoscopic submucosal dissection; HMO, horizontal margin negative; JSCCR, Japanese Society for Cancer of the Colon and Rectum; LST, laterally spreading tumor; OS, overall survival; SD, standard deviation; SM, submucosal; VMO, vertical margin negative.

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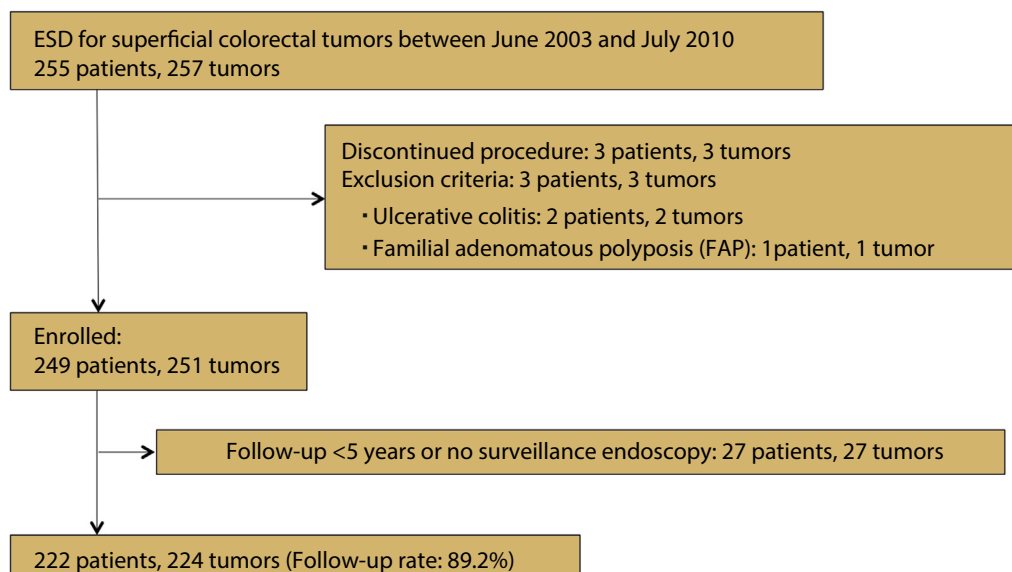
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**Figure 1.** Flowchart of enrolled patients and tumors.

establishment of a training system<sup>23</sup> have increased the safety of the procedure for superficial colorectal tumors. In Japan, ESD for superficial colorectal tumors has been covered under the national health insurance since April 2012.

Several studies have reported the outcomes after ESD for superficial colorectal tumors<sup>3,24-28</sup>; however, their median follow-up periods were relatively short. It is important to reveal the local recurrence rate after ESD for superficial colorectal tumors because radical local excision of all tumors cannot be achieved through ESD. In addition, long-term outcomes after ESD for these tumor types are not clear, and the risk of metachronous tumors has not been determined during surveillance for colorectal tumors after ESD. Hence, the aim of this study was to determine long-term outcomes in patients who underwent ESD for superficial colorectal tumors.

## METHODS

### Patients

A total of 257 colorectal tumors in 255 consecutive patients were resected by ESD at Hiroshima University Hospital between June 2003 and July 2010. The indications for ESD for superficial colorectal tumors at our center were based on the criteria proposed by the Colorectal ESD Standardization Implementation Working Group.<sup>2,4,5,29,30</sup> ESD is indicated for lesions requiring endoscopic en bloc resection for which it is difficult to use the snare technique, including laterally spreading tumor (LST) non-granular type (especially the pseudodepressed type), tumors with type Vi pit pattern, superficial invasive submucosal

carcinoma, large depressed tumors, and large elevated lesions that are probably malignant (eg, large nodular lesions such as LST granular type). In addition, ESD is also indicated for colorectal lesions accompanied by submucosal fibrosis (induced by biopsy or peristalsis of the lesion), sporadic localized tumors that occur because of chronic inflammation such as ulcerative colitis, and local residual early carcinoma after endoscopic resection. At the same time as the ESD procedure, we removed all synchronous lesions completely and patients achieved a clean colon. We excluded patients according to the following criteria: abandoned procedure (3 tumors in 3 patients), ulcerative colitis (2 tumors in 2 patients), familial adenomatous polyposis (1 tumor in 1 patient), and patients with either less than 5 years of follow-up or those who did not undergo endoscopic surveillance colonoscopy after ESD (27 tumors in 27 patients). Ultimately, 224 tumors in 222 patients (89.2%) who were confirmed dead or had follow-up data for more than 5 years were identified and analyzed (Fig. 1).

The study was performed in accordance with the Declaration of Helsinki. All patients were informed of the risks and benefits of ESD, and each patient provided written informed consent for the procedure. This study protocol was approved by the Institutional Review Board of Hiroshima University Hospital. None of the patients refused ESD for colorectal tumors during the study period.

### ESD procedure

ESD was performed by 2 experienced endoscopists (S.T. or S.O.) in this series. An endoscope attached to a transparent tip hood with carbon dioxide insufflation was used. A GIF-Q260J gastroscope for sigmoid colon or rectal

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