

Endoscopically visualized features of gastric submucosal tumors on submucosal endoscopy

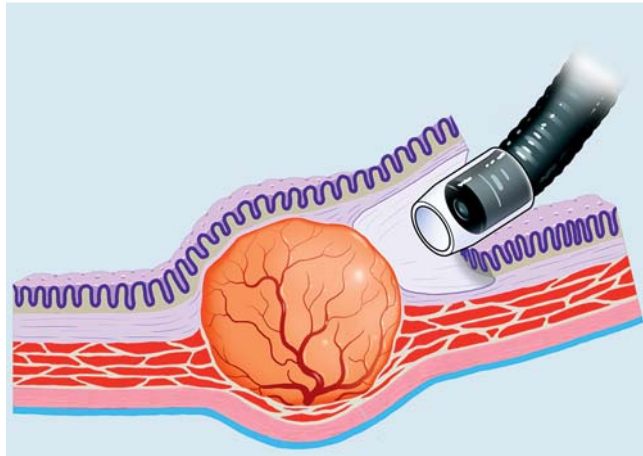


Fig. 1 Bloc biopsy with the submucosal endoscopy mucosal flap method. A short tunnel is created, via an additional submucosal dissection, to access the tumor. The endoscopically visualized features of the submucosal tumor can be identified in the submucosa.

Difficulties in the preoperative diagnosis of gastrointestinal submucosal tumors by endoscopic ultrasonography and errors of tissue sampling may make invasive surgery [1] or endoscopic resection [2] inappropriate for their removal. Better methods of diagnosing submucosal tumors are therefore needed. We have found that bloc biopsy and use of the submucosal endoscopy with a mucosal flap (SEMF) method [3] under direct vision can assist in the diagnosis of submucosal tumors [4,5]. This method has the advantage of assessing the macroscopic characteristics of submucosal tumors. These endoscopically visualized features, identified by

endoscopic imaging under direct view through a dissected submucosal tunnel, include the color, clarity, shape, and solidity of the tumor. Here, we describe the representative endoscopically visualized features of different types of gastric submucosal tumors.

Bloc biopsy with the SEMF method consists of five major steps: SEMF, endoscopic submucosal dissection, bloc biopsy to acquire a specimen of sufficient size, tissue collection, and clip closure of the entry point. After the creation of a tunnel into the submucosa toward the tumor, the endoscopically visualized features of a submucosal tumor can be identified in the submucosa (▶ **Fig. 1**). The solidity of a submucosal tumor can be assessed by using a needle-knife (KD-441Q; Olympus Medical Systems Corporation, Tokyo, Japan) to apply pressure to the tumor in the area of the bloc biopsy. Different types of submucosal tumors can be classified according to four endoscopically visualized features: color, clarity, shape, and solidity. Gastrointestinal stromal tumors (GISTs) are white, cloudy, round, rigid tumors (▶ **Fig. 2**); leiomyomas are white, clear, round, elastic but hard tumors (▶ **Fig. 3**); heterotopic pancreatic tissue masses are yellowish, multinodular, soft tumors with surface features specific to pancreatic tissue (▶ **Fig. 4**); gastric cysts are bluish, clear, round, soft tumors with wet surfaces (▶ **Fig. 5**); and lipomas are yellow, soft tumors with adipose tissue-like characteristics.

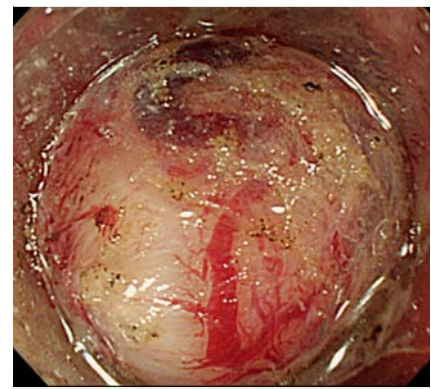


Fig. 2 Gastrointestinal stromal tumor (GIST) characteristics at submucosal endoscopy: typically white, cloudy, round, rigid tumors.

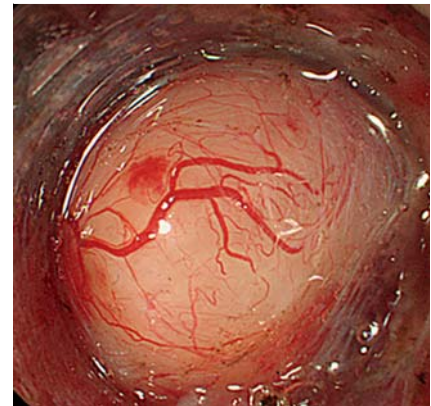


Fig. 3 Leiomyoma characteristics at submucosal endoscopy: typically white, clear, round, elastic but hard tumors.

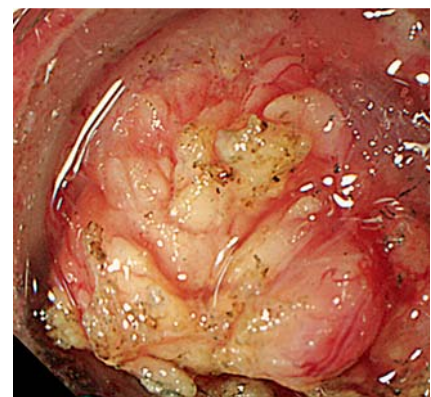


Fig. 4 Heterotopic pancreatic tissue characteristics at submucosal endoscopy: typically yellowish, multinodular, soft tumors, with surface features specific to pancreatic tissue.

Submucosal tumors may be classified on the basis of features seen at submucosal endoscopy. These features may have diagnostic value that allows avoidance of unnecessary surgery (▶ **Video 1**).

Video 1

First, a bloc biopsy is obtained with the submucosal endoscopy mucosal flap method, which creates a short tunnel via an additional submucosal dissection to access the tumor. Next, the endoscopically visualized features of each submucosal tumor can be visually identified in the submucosa. The video shows representative endoscopically visualized features of different types of gastric submucosal tumors. Gastrointestinal stromal tumors are white, cloudy, round, rigid tumors; the latter feature is determined by applying pressure to the tumor with the needle-knife. Leiomyomas are white, clear, round, elastic but hard tumors. Heterotopic pancreatic tissue tumors are yellowish, multinodular, soft tumors with surface features specific to pancreatic tissue. Gastric cysts are bluish, clear, round, soft tumors with wet surfaces. Lipomas are yellow, soft tumors with adipose tissue-like characteristics.

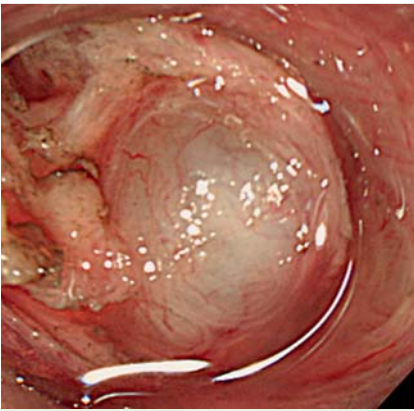


Fig. 5 Gastric cyst characteristics at submucosal endoscopy: typically bluish, clear, round, soft tumors with wet surfaces.

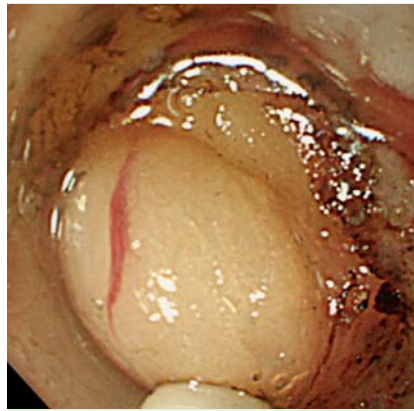


Fig. 6 Lipoma characteristics at submucosal endoscopy: typically yellow, soft tumors with adipose tissue-like characteristics.

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Competing interests: None

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