3D-printed model in the guidance of tumor resection: a novel concept for resecting a large submucosal tumor in the mid-esophagus

Although most large submucosal tumors in the esophagus such as leiomyomas are benign, obstructive symptoms may develop owing to their size [1]. Endoscopic resection of large tumors in the esophagus remains difficult [2], and exophytic tumors in the mid-esophagus are the worst. The main problem is the presence of important adjacent organs such as bronchus, aorta, and spine. We report a novel concept for facilitating endoscopic resection: 3D-printed model in the guidance of tumor resection (3DM-GTR). The 3D-printed model, based on enhanced computed tomography, could clearly display the tumor anatomy and details of adjacent structures, playing a role in planning and implementing endoscopic resection.

A 47-year-old man with intermittent dysphagia for 2 months was diagnosed with a large submucosal tumor in the mid-esophagus (▶Fig. 1). Enhanced computed tomography showed that the lesion was close to the bronchus, aorta, and spine (▶Fig. 2). The 3D-printed model directly demonstrated the tumor and its adjacent organs (▶Fig. 3). Under the guidance of the model (▶Video 1), we successfully resected the tumor (▶Fig. 4), without obvious intraoperative bleeding or other injuries to adjacent organs (▶Fig. 5). The mucosal entry was closed using endoclips. The pathology confirmed the diagnosis of leiomyoma. Fasting and prophylactic antibiotics were prescribed for 2 days. Proton pump inhibitors and nutritional support were given. The mild cervical subcutaneous emphysema detected during the procedure resolved spontaneously. The patient began drinking after 3 days and was discharged on postoperative Day 5. At 3-month follow-up, the patient had not experienced discomfort and upper endoscopy confirmed healing of the mucosa.

3DM-GTR seems a good and promising method, especially for large tumors in complex locations. The simulation model can remind the endoscopist in real time about what to expect in the next step; thus, it could reduce unexpected injuries to important adjacent organs.
Endoscopy_UCTN_Code_TTT_1AO_2AN

Competing interests
The authors declare that they have no conflict of interest.

The authors
Liansong Ye1,*, Dan Yang2,*, Yong Huang3, Ke Liao1, Xianglei Yuan1, Bing Hu1
1 Department of Gastroenterology, West China Hospital, Sichuan University, Chengdu, Sichuan, China
2 Department of Radiology, West China Hospital, Sichuan University, Chengdu, Sichuan, China
3 Sichuan Farsoon Turing Additive Manufacturing Technology Co., Ltd., Chengdu, Sichuan, China

Acknowledgment
We acknowledge the support from Sichuan Province Science and Technology Department (China) (2017SZ0009).

The exposed aorta after tumor resection (arrows).

Fig. 5

References

Bibliography
DOI https://doi.org/10.1055/a-1090-6940
Published online: 2020
Endoscopy
© Georg Thieme Verlag KG
Stuttgart · New York
ISSN 0013-726X

ENDOSCOPY E-VIDEOS
https://eref.thieme.de/e-videos

Endoscopy E-Videos is a free access online section, reporting on interesting cases and new techniques in gastroenterological endoscopy. All papers include a high quality video and all contributions are freely accessible online.

This section has its own submission website at https://mc.manuscriptcentral.com/e-videos

Corresponding author
Bing Hu, MD
West China Hospital, Sichuan University, No. 37 Guo Xue Alley, Wu Hou District, Chengdu City, 610041, Sichuan Province, China
Fax: +86-28-85423387
hubingnj@163.com

* These authors contributed equally to this work.