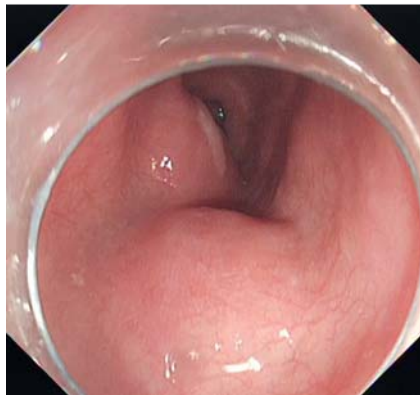
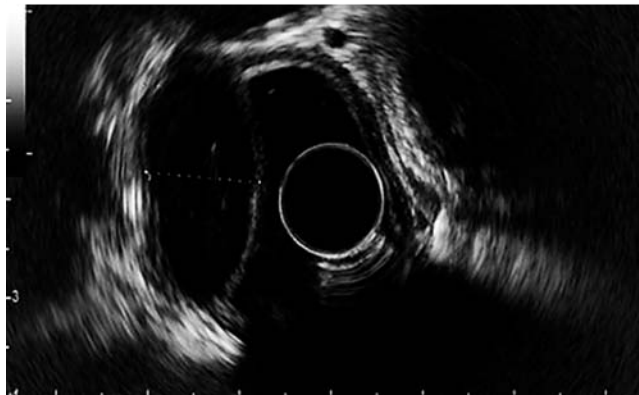


## Submucosal tunneling endoscopic resection for multiple esophageal leiomyomas



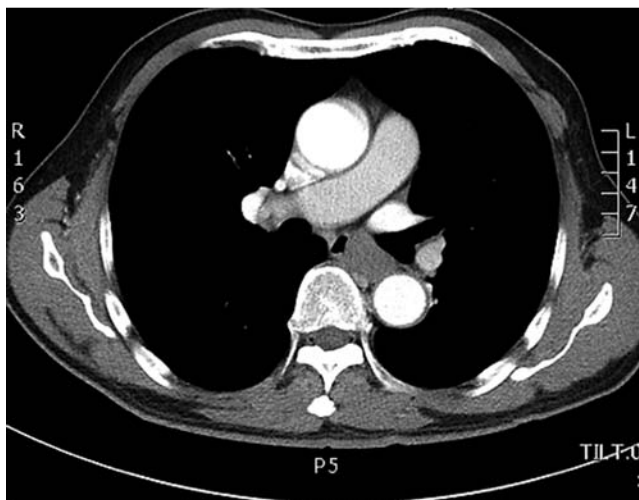
**Fig. 1** Endoscopic view showing two protruding lesions in the mid-esophagus.



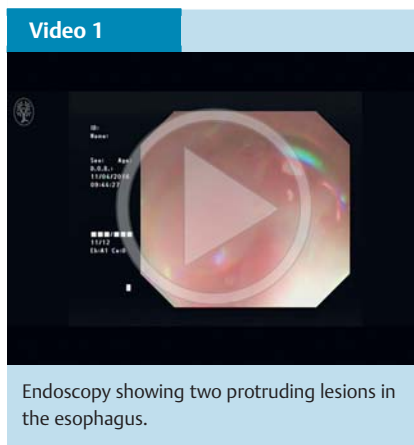
**Fig. 2** Endoscopic ultrasonography (EUS) view showing that the tumors were originating from the muscularis propria layer.

A 61-year-old man presented for treatment of esophageal submucosal tumors (SMTs). The SMTs had been found 1 month previously at his local hospital during a health examination. Upon presentation, his physical examination and laboratory tests were unremarkable. Esophago-gastroduodenoscopy (EGD) revealed two protruded lesions in the middle of the esophagus (Fig. 1; Video 1). Endoscopic ultrasonography (EUS) revealed that the tumors were originating from the muscularis propria layer (Fig. 2). Computed tomography (CT) also showed the lesions in the mid-esophagus, which were suspected to be benign tumors (Fig. 3; Video 2).

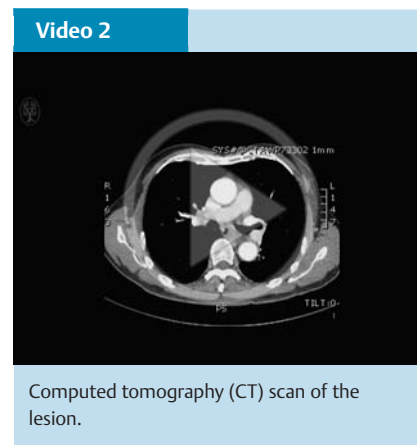
A submucosal tunneling endoscopic resection (STER) was performed. After a longitudinal mucosal incision had been made, a submucosal tunnel was created, which allowed us to see the first SMT. Submucosal injection of methylene blue was performed to help locate the second tumor, and two separate tumors about 2 cm apart from each other could then be seen (Fig. 4a; Video 3). The tumors were carefully dissected off the muscularis propria layer (Fig. 4b). The tunnel entry had to be enlarged to allow successful extraction of the larger SMT (Video 4). The mucosal entry was then closed. The STER procedure was completed uneventfully within 110 minutes. The resected SMTs measured 3.8×3.2 cm and 1.5×0.9 cm (Fig. 5) and, histopathologically, they were both leiomyomas.



**Fig. 3** Computed tomography (CT) scan of the lesion, which was suggestive of benign tumors.



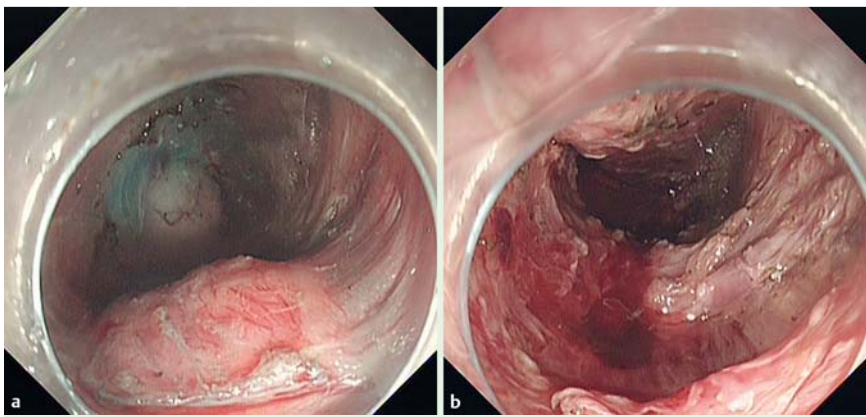
Endoscopy showing two protruding lesions in the esophagus.



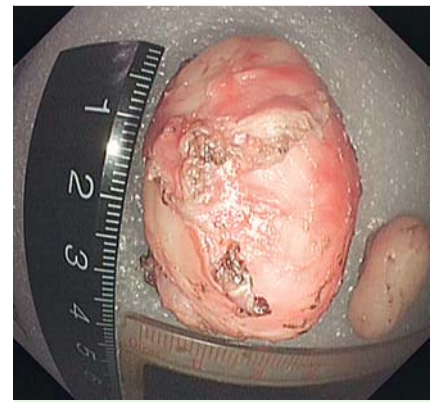
Computed tomography (CT) scan of the lesion.

STER has been demonstrated to be safe and effective for treating upper gastrointestinal SMTs; most of the reported cases were with solitary and small SMTs ( $\leq 3.5$  cm) [1]. Although several cases/studies have been reported regarding STER for multiple SMTs and large SMTs,

the procedure is technically difficult and has a higher rate of complications [2–5]. In the present case, two SMTs were found, which were not strictly in a straight plane and one of them was larger than 3.5 cm. We successfully removed them both using the STER technique uneventfully within a



**Fig. 4** Endoscopic views showing: **a** the two tumors found in the submucosal tunnel; **b** the wound surface after removal of the tumors.



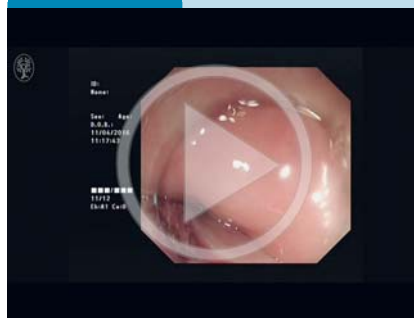
**Fig. 5** Macroscopic appearance of the resected tumors.

### Video 3



After the first tumor had been successfully exposed, the second one could not be seen so methylene blue was injected submucosally to help locate it.

### Video 4



En bloc extraction of the larger tumor was difficult, so the mucosotomy was enlarged, the tumor then dropped into the stomach allowing it to be extracted en bloc with a snare.

single submucosal tunnel after locating the second tumor with methylene blue and enlarging the tunnel entry.

Endoscopy\_UCTN\_Code\_TTT\_1AO\_2AG

**Competing interests:** None

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### Bibliography

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