

Thoracoscopic enucleation of a large spiral esophageal leiomyoma using a pre-tied loop ligature (Endoloop)

Osamu Hachiya, Hiroto Fujimoto, Mitsuhiro Yano, Tamie Sato,
Takehito Yamagishi, Naoki Takasu, Wataru Kimura

*Department of Gastroenterological, General, Breast and Thyroid Surgery,
Yamagata University Faculty of Medicine*

(Accepted November 12, 2014)

ABSTRACT

Thoracoscopic enucleation has been first choice for surgical treatment of esophageal benign submucosal tumors (SMTs). However, intraoperative perforation of the esophagus can sometimes occur, causing serious complications. The risk is especially high for large or annular tumors, as they are difficult to grasp sufficiently well during thoracoscopic instrumentation, and this tends to hinder identification of the correct dissection plane. Therefore, for tumors more than 5 cm diameter, open thoracotomy is generally recommended. Here we describe a large spiral leiomyoma of the esophagus that was successfully enucleated by thoracoscopic surgery using a pre-tied loop ligature (Endoloop). Endoloop was very useful for grasping and pulling up the large tumor, and we were easily able to achieve adjustable countertraction for accurate and safe dissection of the tumor from the submucosal layer of the esophageal wall.

Key words : Esophageal leiomyoma, SMT, Thoracoscopic enucleation, Endoloop

Introduction

The most common esophageal submucosal tumor (SMT) is benign leiomyoma, accounting for 67% of all such tumors¹⁾. Enucleation of esophageal leiomyoma is a standard procedure for surgical treatment^{2), 3)}. Instead of traditional thoracotomy for enucleation, a thoracoscopic approach has recently been reported³⁾⁻⁷⁾. Thoracoscopic enucleation results in less operative trauma and postoperative pain, and shortens the postoperative hospital stay in comparison with thoracotomy³⁾⁻⁵⁾.

However, it has been reported that large or annular tumors present difficulty during thoracoscopic enucleation because the endoscopic instrumentation often injures the tumor, thus complicating enucleation^{2), 8)}. Bardini et al.⁵⁾ considered that thoracoscopic

enucleation was indicated for esophageal leiomyomas less than 5 cm in diameter.

Here we report a case of a large spiral esophageal leiomyoma that was enucleated successfully by thoracoscopic surgery using a pre-tied loop ligature (Endoloop).

Case report

A 33-year-old man presented at our hospital because of an abnormal shadow that had been found by chest roentgenography during a medical examination.

Endoscopic examination revealed a SMT in the mid-thoracic esophagus (Fig.1a), and a barium esophagogram showed that the tumor was 7 cm in size with a smooth outline (Fig.1b). Enhanced computed tomography demonstrated a solid homogeneous tumor

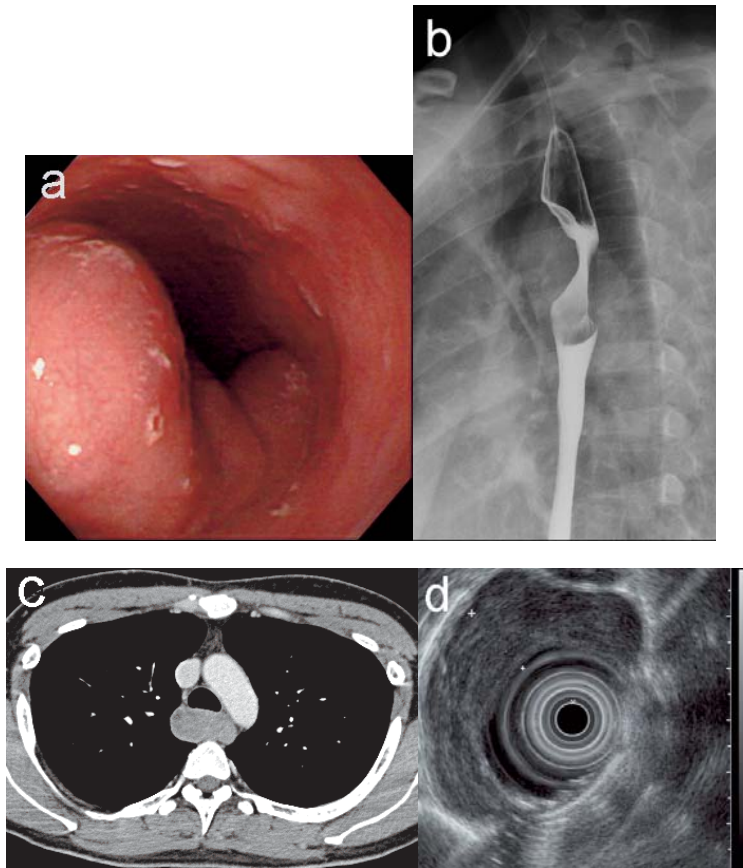


Fig.1a Endoscopy revealed a spiral multinodular SMT.

b A barium esophagogram demonstrated that the tumor measured 7 cm and had a smooth outline.

c Enhanced CT demonstrated a solid homogeneous tumor that compressed the trachea.

d EUS visualized a homogeneous hypoechoic tumor originating from the longitudinal muscle layer of the esophagus and occupying two thirds of the circumference of the esophageal wall.

that compressed the trachea (Fig.1c). Endoscopic ultrasonography (EUS) visualized a homogeneous hypoechoic tumor originating from the longitudinal muscle layer of the esophagus and occupying two thirds of the circumference of the esophageal wall (Fig.1d).

An EUS-guided needle biopsy was performed about 3 weeks before surgery. Pathological examination of the biopsy sample revealed that the tumor consisted of spindle-shaped cells with immunohistochemical positivity for α -SMA and desmin, and negativity for S-100 protein, c-kit and CD34, suggesting leiomyoma of the esophagus.

Thoracoscopic enucleation was indicated for surgical treatment. The operation was performed

under differential lung ventilation with a double-lumen endotracheal tube, keeping the patient on the left lateral position. Five ports were placed in the intercostal space. Artificial pneumothorax was not applied. The tumor was easily detected by thoracoscopy in the upper to middle thoracic esophagus. The longitudinal muscle layer over the tumor was divided, exposing the tumor surface.

Because it was very difficult to secure the tumor with a grasper, we used a pre-tied loop ligature (Ethicon PDS II Endoloop Ligature) (Fig.2a). Then, during dissection of the tumor from the submucosal layer of the esophagus, one more Endoloop was utilized to pull the tumor up sufficiently, allowing clarification of the dissection plane (Fig.2b, c).

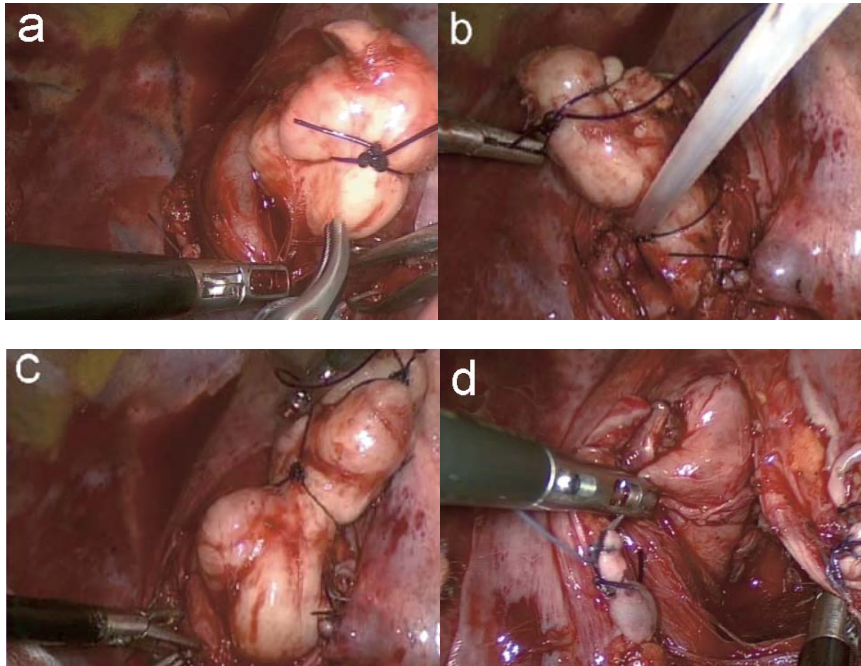


Fig.2a Pulling up the tumor using Endoloop allowed adjustable countertraction for efficient and safe dissection.
b One more Endoloop was easily applied.
c Adequate retraction of the tumor by the Endoloop was stably achieved.
d The enucleation of the large spiral tumor was completed without perforation of the esophageal mucosa.

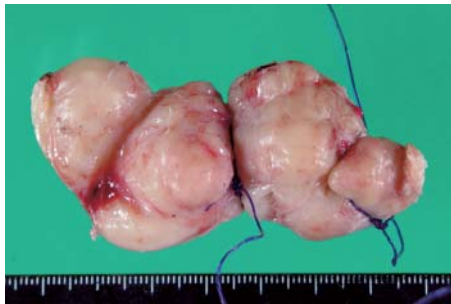


Fig.3 The resected specimen was a multinodular tumor measuring 7.0 × 3.5 cm.

Using two Endoloops, we could completely remove the large spiral tumor without any tumor injury (Fig.2d). The specimen was placed in a specimen retrieval bag and delivered via the extended port incision.

Intraoperative endoscopy revealed no injury to the esophageal mucosa, which had a good color and was airtight. Finally, the longitudinal muscle layer and pleura were closed with absorbable sutures.

The resected tumor specimen was multinodular

and had a cream-colored cut surface, measuring 7.0 × 3.5 cm (Fig.3). Pathologically the tumor consisted of spindle-shaped cells with rich capillary vessels, but no mitosis was evident. The tumor cells were immunohistochemically positive for α -SMA and desmin, and negative for S-100 protein, c-kit and CD34, in accordance with the preoperative biopsy. The final pathological diagnosis was angioleiomyoma of the esophagus.

Postoperative esophagography showed good passage of gastrografin. The patient took clear water on the third day and was discharged on the 12th day after the operation. At 3 years after the operation, there were no signs of tumor recurrence or postoperative symptoms.

Discussion

SMT of the esophagus accounts for less than 1% of all esophageal neoplasms. The most common esophageal SMT is benign leiomyoma, accounting for 67%¹¹.

Enucleation of esophageal leiomyoma is the first choice for surgical treatment^{2), 3)}. Recently, instead of enucleation via a thoracotomy, thoracoscopic enucleation has been performed successfully³⁾⁻⁷⁾. It has been reported that thoracoscopic enucleation is indicated for esophageal leiomyomas less than 5 cm in diameter⁵⁾. Jiang et al.⁸⁾ have also strongly recommended thoracoscopic enucleation for tumors 1 to 5 cm in diameter, irrespective of whether they are symptomatic, whereas they consider observation alone to be preferable for asymptomatic tumors measuring less than 1 cm because of the difficulty locating them during surgery.

In the present case, although the tumor occupied two thirds of the circumference of the esophageal wall and was 7 cm in size, thoracoscopic enucleation was performed successfully. Few reports have described successful thoracoscopic enucleation for annular esophageal leiomyomas larger than 7 cm because of the risk of the procedure becoming technically difficult, increasing the likelihood of tumor injury or perforation of the mucosal layer of the esophagus.

In the present case of multinodular SMT, Endoloop was very useful for grasping and pulling up the large annular tumor. We were easily able to handle two Endoloops, and obtained adjustable countertraction for accurate and safe dissection of the large tumor from the submucosal layer of the esophagus without any tumor injury. Circumferential dissection of the esophagus was not necessary. A number of different techniques for retracting or pushing out the tumor from the esophageal wall have been developed for thoracoscopic enucleation of esophageal SMT. Some have reported that placement of a stay suture on the tumor was useful for pulling up the tumor^{5), 8), 9)}. However, this procedure carries a risk of tumor damage. An esophageal intraoperative balloon dilator may also be useful for pushing out the tumor^{2), 7)}, although its effectiveness might only be partial for an annular-type tumor.

To the best of our knowledge, this is the first report on Endoloop retraction of esophageal leiomyoma in thoracoscopic enucleation. Some groups have reported that Endoloop retraction of the gallbladder in single incision laparoscopic cholecystectomy is useful^{10), 11)}. Augustin et al.¹²⁾ reported the utility of

Endoloop for retracting the appendix in laparoscopic appendectomy.

It is reported that during enucleation of a large leiomyoma, myotomy may create an esophageal condition that resembles achalasia²⁾. In the present case, we thoracoscopically reapproximated the esophageal muscular layer longitudinally, and there were no postoperative symptoms such as dysphagia.

Conflict of interest The authors declare that they have no conflict of interest.

References

1. Seremetis MG, Lyons WS, deGuzman VC, Peabody JW Jr: Leiomyomata of the esophagus. An analysis of 838 cases. *Cancer* 1976; 38: 2166-2177
2. Lee LS, Singhal S, Brinster CJ, Marshall B, Kochman ML, Kaiser LR, et al.: Current management of esophageal leiomyoma. *J Am Coll Surg*. 2004; 198: 136-146
3. Bonavina L, Segalin A, Rosati R, Pavanello M, Peracchia A: Surgical therapy of esophageal leiomyoma. *J Am Coll Surg*. 1995; 181: 257-262
4. von Rahden BHA, Stein HJ, Feussner H, Siewert JR: Enucleation of submucosal tumors of the esophagus: minimally invasive versus open approach. *Surg Endosc*. 2004; 18: 924-930
5. Bardini R, Segalin A, Ruol A, Pavanello M, Peracchia A: Videothoracoscopic Enucleation of Esophageal Leiomyoma. *Ann Thorac Surg*. 1992; 54: 576-577
6. Everitt NJ, Glinatsis M, McMahan MJ: Thoracoscopic enucleation of leiomyoma of the oesophagus. *Br J Surg*. 1992; 79: 643
7. Mafune K, Tanaka Y: Thoracoscopic enucleation of an esophageal leiomyoma with balloon dilator assistance. *Surg Today* 1997; 27: 189-192
8. Jiang G, Zhao H, Yang F, Li J, Li Y, Liu Y, et al.: Thoracoscopic enucleation of esophageal leiomyoma: a retrospective study on 40 cases. *Dis Esophagus* 2009; 22: 279-283
9. Kent M, d'Amato T, Nordman C, Schuchert M, Landreneau R, Alvelo-Rivera M, et al.: Minimally invasive resection of benign esophageal tumors. *J Thorac Cardiovasc Surg*. 2007; 134: 176-181
10. Elazary R, Khalailah A, Zamir G, Har-Lev M, Almogy G, Rivkind AI, et al.: Single-trocar cholecystec-

- tomy using a flexible endoscope and articulating laparoscopic instruments: a bridge to NOTES or the final form? *Surg Endosc.* 2009; 23: 969-972
11. Rabl C, Hutter J, Reich-Weinberger S, Emmanuel K, Oefner-Velano D: Loop retraction of the gallbladder in single incision laparoscopic cholecystectomy. *Eur Surg.* 2011; 43: 229-232
 12. Augustin G, Matosevic P, Majerovic M: The lasso technique'-a simple intracorporeal two-port laparoscopic appendectomy: technical considerations and review of four other intracorporeal two-port techniques. *Hepatogastroenterology.* 2013; 60: 1058-1062