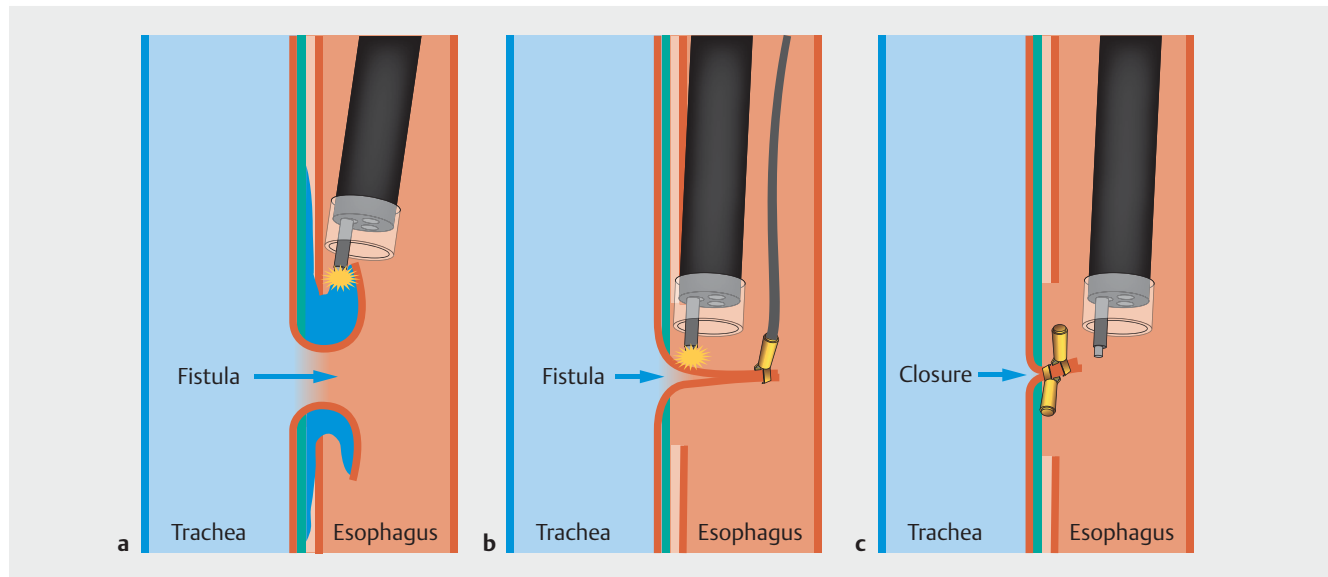


## Deep endoscopic submucosal dissection of a refractory tracheoesophageal fistula using clip-and-line traction: a successful closure



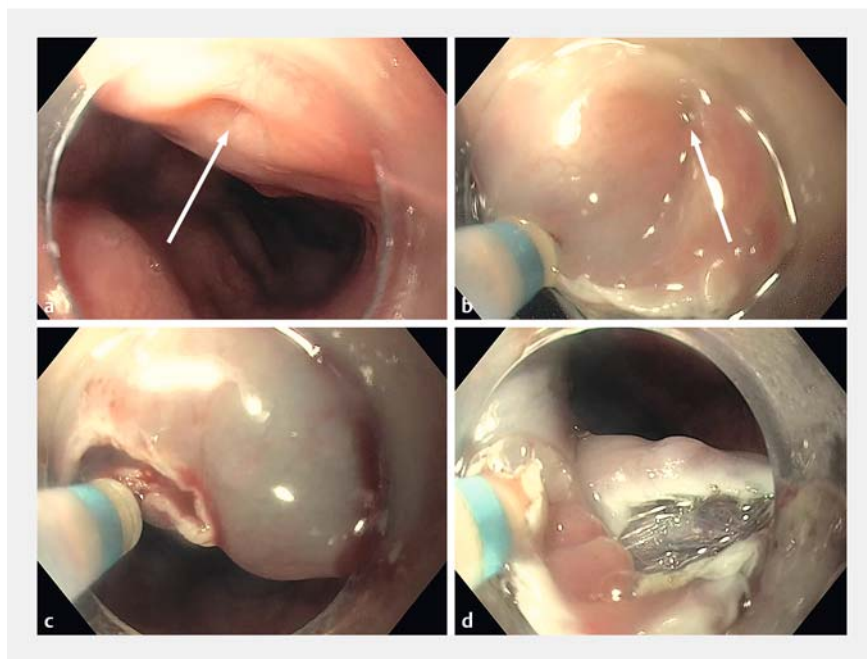
► **Fig. 1** Refractory tracheoesophageal fistula: schematic of closure using endoscopic submucosal dissection with clip-and-line traction. **a** Dissection of a 1-cm patch. **b** Clip-and-line traction of the dissected patch and deep section. **c** Clip closure of the resected area.

Chronic tracheoesophageal fistula is a rare disease presenting a therapeutic challenge. Unlike the case with most digestive fistulas, drainage with a pigtail stent [1] is not possible.

We present here the case of a 47-year-old man referred for a chronic 2-mm tracheoesophageal fistula (23 cm from mouth) of unknown cause. His past history revealed several pulmonary infections since childhood.

Several endoscopic treatments were attempted with clip closure and then hot biopsy forceps abrasion of the surrounding mucosa, but complete closure was not obtained. We therefore proposed endoscopic submucosal dissection (ESD) of the surrounding mucosa, namely a 1-cm mucosal patch (► **Fig. 1** and ► **Fig. 2**, ► **Video 1**) centered on the fistula, as previously described [2].

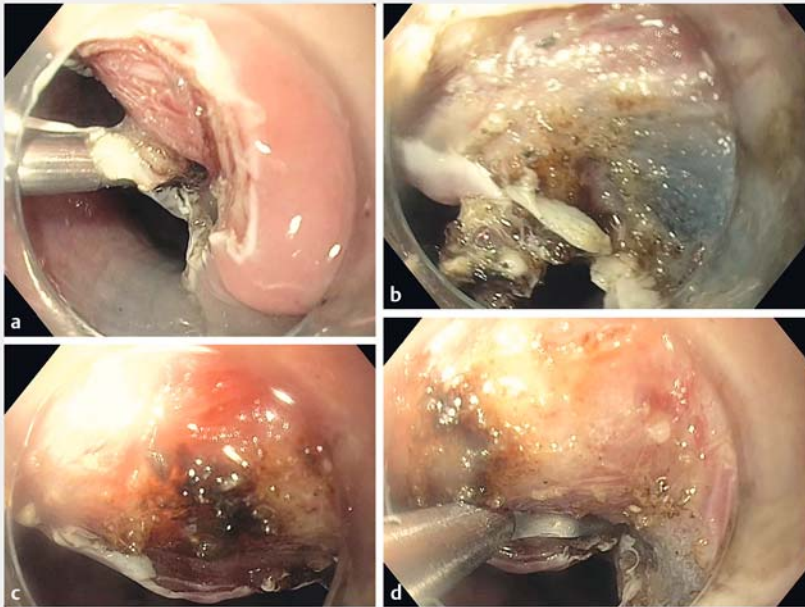
The patient underwent tracheal intubation with balloon placement just under the fistula. To allow deep dissection of the fistula tract we added a clip-and-line traction (► **Fig. 3**) [3] to pull the fistula



► **Fig. 2** Endoscopic submucosal dissection (ESD) of a refractory tracheoesophageal fistula. **a** Appearance of the fistula before ESD. **b** Incision of lower edge. **c** Incision of upper edge. **d** Lateral incisions.



**▶ Video 1** Treatment of a refractory tracheoesophageal fistula by endoscopic submucosal dissection of the surrounding mucosa, with clip-and-line traction, and clip closure



**▶ Fig. 3** Clip traction and closure of tracheoesophageal fistula. **a, b** Clip-and-line traction of the dissected patch. **c** Resected area with burnt fibrosis (black area). **d** Clip closure.

out of the wall. The fistula tract was then sectioned at the deepest possible point. Finally, we closed the resected area with four clips anchored into the submucosa (▶ **Fig. 4 a, b**). A radiographic check was done at the end of the endoscopic procedure, and opacification showed no sign of fistula in the tracheal tract. The patient's course was rapidly favorable, without pain and with disappearance of aspiration coughing. At 2 months,

radiographic monitoring with opacification showed no residual fistula. The last clinical follow-up after 4 months confirmed complete resolution of the coughing and aspiration. Currently the management of tracheoesophageal fistula is not well codified [4], and the role of endoscopy is not defined. Endoscopic abrasion with argon plasma and stents are not very effective with a cure rate of only 53% [5]. ESD

might be a good option to reduce scarring and to allow definitive resolution of these fistulas.

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### Competing interests

None

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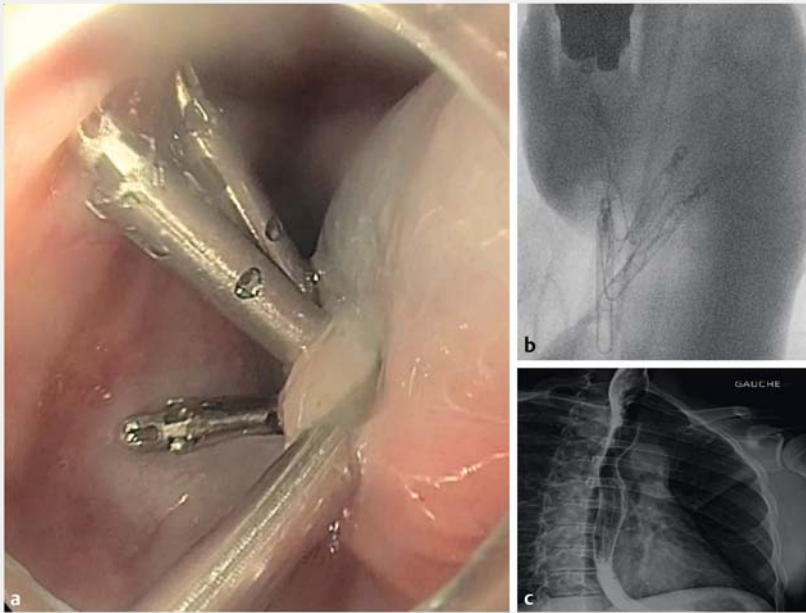
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► **Fig. 4** End of the procedure for closure of tracheoesophageal fistula. **a** Endoscopic appearance, with four clips. **b** Radiographic view showing the clips. **c** Appearance at radiographic check 2 months later.

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