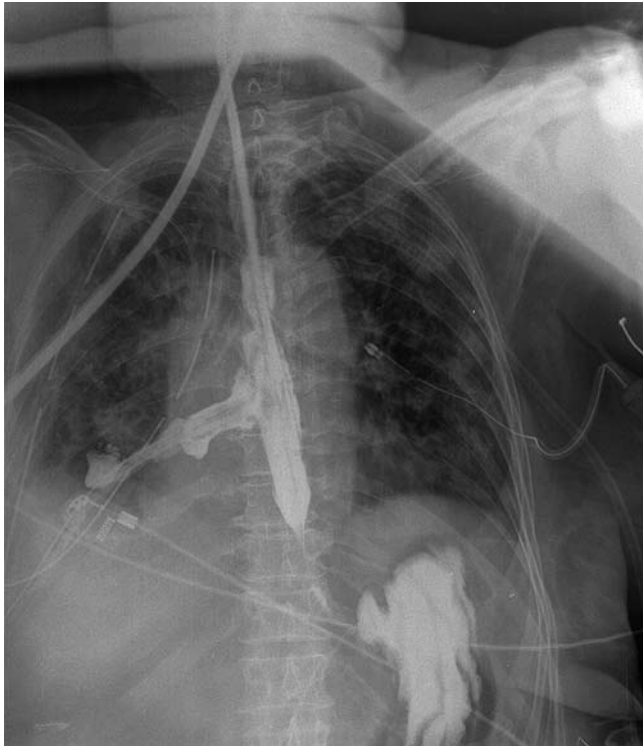


## Endoscopic closure of esophageal fistula using a novel “clips and loop” method



**Fig. 1** Esophago-graphy with a water-soluble contrast agent shows an esophago-mediastinal fistula.



**Fig. 3** Clips positioned at the edges of the fistula opening.



**Fig. 4** Endoloop attached to the heads of the clips.



**Fig. 5** Endoscopic view showing complete healing of the fistula.

Fistula can develop rarely between the esophageal lumen and other mediastinal structures. The majority of cases are caused by malignancy. Benign causes include infections, other inflammatory conditions, postsurgical trauma, and prolonged periods of endotracheal intubation or tracheostomy tube placement. In most cases of fistula, surgery is required. There are, however, a number of reports

in the literature of endoscopic methods of attempting fistula closure: the application of fibrin glue, use of covered esophageal stents, and clipping have been described, for closure of esophagotracheal, bronchoesophageal, and esophagopleural fistulas [1–4].

We report the case of a patient who developed an esophagomediastinalbronchial fistula (Fig. 1) after a pulmonary resection (sleeve lobectomy).

An external mediastinal drain was inserted, and esophagogastroduodenoscopy (EGD) promptly identified a large fistula opening of 25 mm in diameter in the middle part of the esophagus (Fig. 2).

Another EGD was done 2 days later, with attempted closure of the fistula by clipping. However placement of the clips using the traditional method was very difficult, because the edges of the fistula were fibrotic and because of the large diameter of the opening. For these reasons, five clips (Resolution; Microvasive, Boston Scientific, Natick, Massachusetts, USA) were positioned at the edges of the opening (Fig. 3) and an endoloop (Olympus, Tokyo, Japan) was looped and



**Fig. 2** Opening of the fistula.

tightened round the heads of the clips in order to close the opening (● Fig. 4). Another EGD performed 1 month later revealed complete healing of the fistula with formation of scar tissue (● Fig. 5). To the best of our knowledge, this is the first report of an endoscopic approach that combined clips and endoloop to treat a fistula. Because of the limited width of an open clip, it is difficult or impossible to close a large mucosal defect, so we believe that in such situations the technique described could be a useful procedure when traditional clip application fails.

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