

Appendix 1 Surgical technique of Minimally Invasive transCervical Esophagectomy (MICE)

With MICE the patient is positioned in a supine position with a slight extension of the neck, followed by a left collar incision. Thereafter the strap muscles are lateralized to expose the thyroid and trachea. After carefully dissecting the left cervical para-esophageal lymph nodes, the left recurrent laryngeal nerve (RLN) is located and assessed by using an intraoperative nerve monitoring system to preserve the nerve.

The cervical esophagus is mobilized, whereafter a single-port platform (GelPoint Mini, Applied Medical, Rancho Santa Margarita, CA, USA) is positioned, and three trocars can be inserted. Pneumomediastinum (8mmHg) is then induced, allowing blunt and sharp dissection to expose the plane outside the meso-esophagus. The development of this plane is further aided by pneumodissection within the confined mediastinal space, enabling radical en bloc resection of the upper and middle esophagus along with its lymph nodes. During the procedure, critical structures such as the RLN, the thoracic duct, azygos vein and the pleurae are preserved with careful dissection. Refer to *Figure S1* for a laparoscopic view during the transcervical approach in MICE.

During the transcervical phase, lymph node dissection includes bilateral para-esophageal, paratracheal, subcarinal, and bilateral recurrent laryngeal nodes. This dissection plane can easily be developed beyond the inferior pulmonary vein approximating of the diaphragm, which facilitates the rendezvous with the transhiatal dissection. Proximal lymph nodes near the left RLN are accessed through the left collar incision. Right RLN lymph nodes are dissected from the retro tracheal plane, by following the vagal nerve cranially, until encountering the branching of the right RLN encircling the right subclavian artery.

A laparoscopic transhiatal approach connects the transcervical and mediastinal dissection planes. After mobilizing the stomachs lesser and greater curvatures, abdominal lymph nodes are dissected en bloc, including the following lymph node stations: paracardial, lesser curvature, left gastric, hepatic artery, portal vein, celiac trunk and splenic artery. A gastric conduit is formed and brought to the cervical incision for a handsewn end to side anastomosis (9,16,20). By avoiding a transthoracic approach, ventilation of both lungs (even with positive pressure) can be maintained during surgery and the placement of a chest drain postoperatively is not required. This prevents damage to the intercostal nerves, leading to reduced postoperative pain. As a result, patients are better able to cough and mobilize, which may contribute to a lower incidence of postoperative pulmonary complications and enhanced recovery (18,21).

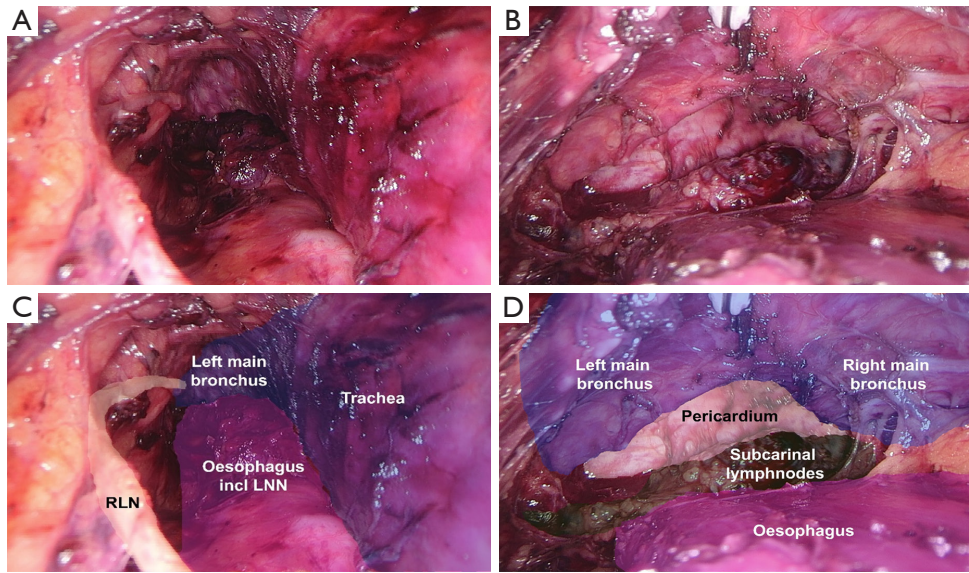


Figure S1 Intraoperative view of the transcervical approach during Minimally Invasive transCervical Esophagectomy (MICE). (A) Transcervical view of the upper mediastinum (paratracheal lymph node station 106L); (C) same image as (A) with annotated highlighting of the esophagus including lymph nodes (LN), right laryngeal nerve (RLN), left main bronchus and trachea; (B) transcervical view of the mid mediastinum (subcarinal lymph node station 107L); (D) same image as (B) with annotated highlighting of the esophagus, left- and right main bronchus, pericardium and subcarinal lymph nodes.