

Table S1 The description of the anastomosis site

Anastomosis site	Description
Oropharynx	The oropharynx is behind the oral cavity, below the soft palate and above the epiglottis. Anastomosis in the oropharynx is performed at the tongue base level, resulting in the removal of the tracheal inlet, which necessitates the need for a permanent tracheostomy
Pharynx	It refers to the hypopharynx or laryngopharynx. The hypopharynx is located behind the larynx and extends to the esophagus. Anastomosis in the hypopharynx is performed at the commencement site of the esophagus, beyond the epiglottis and tracheal inlet. This surgical procedure does not require a permanent tracheostomy; however, it necessitates a more extensive dissection for adequate exposure of the target area
Cervical esophagus	Anastomosis in the cervical esophagus involves pulling out the esophagus through a standard cervical incision and performing an anastomosis without the need for deep dissection towards the proximal portion of the esophagus
Thoracic esophagus	It refers to the esophagus located within the thoracic cavity

Table S2 Anastomotic leakage rate according to anastomosis site, conduit, conduit length, neoadjuvant therapy, abdominal approach, and pathologic stage

Variables	Leakage (-)	Leakage (+)	%	P value
Anastomosis site				0.042
Thoracic esophagus	260	22	7.8	
Cervical esophagus	194	8	4.0	
Pharynx	10	2	16.7	
Oropharynx	3	1	25.0	
Conduit				<0.001
Stomach	452	27	5.6	
Colon	13	6	31.6	
Jejunum	2	0	0.0	
Conduit length				0.55
Not short	425	29	6.4	
Short	42	4	8.7	
Neoadjuvant therapy				0.007
(-)	368	19	4.9	
(+)	113	14	12.4	
Abdominal approach				0.26
Laparoscopic	325	20	5.8	
Robotic	90	6	6.3	
Laparotomy	52	7	11.9	
Pathologic stage				0.63
0-I	312	24	7.1	
II	89	6	6.3	
III-IV	92	4	4.3	

Table S3 Anastomotic stricture rate according to anastomosis site, conduit, conduit length, neoadjuvant therapy, abdominal approach, and pathologic stage

Variables	Stricture (-)	Stricture (+)	%	P value
Anastomosis site				<0.001
Thoracic esophagus	254	28	9.9	
Cervical esophagus	152	50	24.8	
Pharynx	5	7	58.3	
Oropharynx	1	3	75.0	
Conduit				0.69
Stomach	393	86	18	
Colon	17	2	10.5	
Jejunum	2	0	0.0	
Conduit length				0.001
Not short	382	72	15.9	
Short	30	16	34.8	
Neoadjuvant therapy				0.001
(-)	307	80	20.7	
(+)	105	8	7.1	
Abdominal approach				0.98
Laparoscopic	285	60	17.4	
Robotic	79	17	17.7	
Laparotomy	48	11	18.6	
Pathologic stage				0.65
0-I	279	57	17.0	
II	79	16	16.7	
III-IV	51	15	21.7	

Table S4 Vocal cord palsy rate according to anastomosis site, conduit, cervical node dissection (CND), neoadjuvant therapy, recurrent laryngeal lymph node (RLN LN) dissection and pathologic stage

Variables	VCP (-)	VCP (+)	%	P value
Anastomosis site				<0.001
Thoracic esophagus	216	66	23.4	
Cervical esophagus	129	73	36.1	
Pharynx	4	8	66.7	
Oropharynx	3	1	25.0	
Conduit				0.57
Stomach	338	141	29.4	
Colon	12	7	36.8	
Jejunum	2	0	0.0	
CND				0.001
(-)	302	109	14.2	
(+)	50	39	26.4	
Neoadjuvant therapy				0.41
(-)	276	111	28.7	
(+)	76	37	32.7	
Harvested RLN LN				0.22
None	30	12	28.6	
Unilateral	158	55	25.8	
Bilateral	163	81	33.2	
Pathologic stage				0.74
0-I	240	96	28.6	
II	64	31	32.6	
III-IV	48	21	30.4	

VCP, vocal cord palsy; CND, cervical node dissection; RLN, recurrent laryngeal nerve; LN, lymph node.

Table S5 Re-operation within 90 days according to learning periods

Re-operation within 90 days	Learning phase (Case 1–50)	Developing phase (Case 51–150)	Stable phase (Case 151–500)
Thoracic duct ligation	2 (4.0)	6 (6.0)	2 (0.6)
Primary closure of leakage or fistula	4 (8.0)	0 (0.0)	5 (1.4)
Neck wound debridement and revision	2 (4.0)	1 (1.0)	5 (1.4)
Conduit take-down	4 (8.0)	0 (0.0)	2 (0.6)
Empyemectomy	0 (0.0)	0 (0.0)	5 (1.4)
Bleeding control	2 (4.0)	1 (1.0)	0 (0.0)
Diaphragmatic hernia repair	1 (2.0)	0 (0.0)	1 (0.3)
Bullectomy due to pneumothorax	0 (0.0)	0 (0.0)	2 (0.6)

Values were presented as numbers (%).

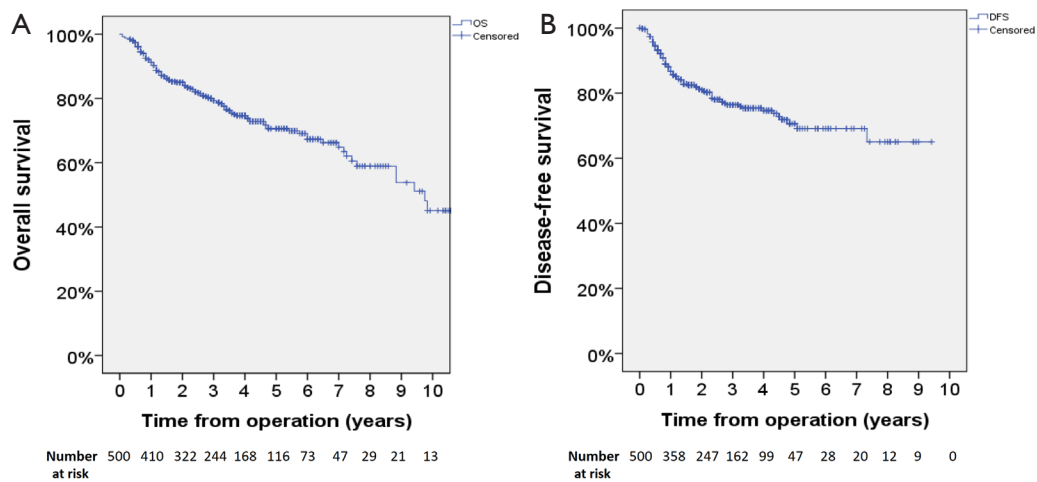


Figure S1 Kaplan-Meier curves for overall survival and disease-free survival for robot-assisted minimally invasive esophagectomy. The rate of 5-year overall survival and 5-year disease-free survival were 70.6% and 70.2%, respectively.

Table S6 Anastomotic leakage rates for intrathoracic and cervical anastomosis according to the learning periods

Anastomosis site	Learning period	Anastomotic leakage event/total
Intrathoracic anastomosis	Learning phase	3/6 (50.0%)
	Developing phase	2/25 (8.0%)
	Stable phase	17/251 (6.8%)
	Total	22/282 (7.8%)
Cervical anastomosis	Learning phase	2/44 (4.5%)
	Developing phase	0/73 (0.0%)
	Stable phase	6/85 (7.1%)
	Total	8/202 (4.0%)

Values were presented as numbers (%).