Supplementary

Table S1 Penetration-Aspiration Scale description

PAS score	Definition	Categorization
1	Material does not enter the airway	Not impaired
2	Material enters the airway, remains above the vocal folds, and is ejected from the airway	
3	Material enters the airway, remains above the vocal folds, and is not ejected from the airway	Penetration
4	Material enters the airway, contacts the vocal folds, and is ejected from the airway	
5	Material enters the airway, contacts the vocal folds, and is not ejected from the airway	
6	Material enters the airway, passes below the vocal folds, ejected into larynx or out of airway	Aspiration
7	Material enters the airway, passes below the vocal folds, not ejected from trachea despite effort	
8	Material enters the airway, passes below the vocal folds, and no effort is made to eject	

Rosenbek JC, Robbins JA, Roecker EB, Coyle JL, Wood JL. A penetration-aspiration scale. Dysphagia. 1996;11(2):93-98. doi: 10.1007/BF00417897. PAS, Penetration-Aspiration Scale.

Table S2 Laboratory values and arterial blood gas

Variable	Safe swallow (N=48)	Airway invasion (N=70)	P value
Laboratory			
Hemoglobin(g/dL)	10.6±2.8	10.7±2.9	0.75
WBC (1,000/mm^3)	9.6±3.5	10±3.9	0.66
PLT (1,000/mm^3)	243.9±87.7	246.3±109.1	0.90
Na (mEq/L)	139.9±4.4	140.4±3.2	0.42
BUN (mg/dL)	17.1±8.0	17.8±10.1	0.71
Creatinine (mg/dL)	0.74±0.26	0.73±0.26	0.78
AST (U/L)	22.3±7.0	24.3±13.2	0.34
ALT (U/L)	20.1±11.3	17.4±11.8	0.22
Albumin (g/dL)	3.8±0.5	3.8±0.6	0.64
Total bilirubin (mg/dL)	0.6±0.3	0.6±0.5	0.76
INR	1.1±0.1	1.1±0.2	0.70
PRA	25 (52.1%)	29 (41.4%)	0.34
Arterial blood gas			
pH	7.39±0.07	7.37±0.07	0.36
$PaCO_2$	51.1±13.8	51.8±14.2	0.80
PaO_2	247.3±117.8	262.1±122.3	0.57

Continuous data are shown as mean ± standard deviation (SD). WBC, white blood cells; PLT, platelets; BUN, blood urea nitrogen; AST, aspartate aminotransferase; ALT, alanine transaminase; INR, international normalized ratio; PRA, panel reactive antibody.

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Table S3 Univariate logistic regression for risk factors associated with airway invasion (PAS ≥3)

Variable	Univariate		P value
	OR	95% CI	
Recipient factors			
Age (years)	1.02	0.99–1.05	0.17
Male	0.74	0.35–1.56	0.43
BMI (kg/m^2)	0.91	0.83–0.99	0.02
BSA (m^2)	0.13	0.02–0.76	0.02
Smoking history	1.62	0.77–3.40	0.21
Hypertension	2.47	1.14–5.33	0.02
Diabetes	0.75	0.34–1.66	0.47
CKD	5.22	0.62–43.9	0.13
GERD	1.29	0.62–2.69	0.51
OSA	0.79	0.31–2.00	0.61
Pre-ECMO use	0.75	0.31–1.80	0.52
Bilateral	0.74	0.32–1.74	0.49
LAS	0.99	0.98–1.01	0.46
Etiology			
COPD	0.87	0.35–2.18	0.76
ILD	2.29	0.92–5.70	0.07
ARDS (COVID-19)	0.63	0.28–1.40	0.26
PAH	0.81	0.23–2.81	0.74
Others	0.93	0.35–2.52	0.89
Intra-operative outcomes			
Operative time	0.95	0.80–1.13	0.59
Intra-op blood transfusion; pRBC	1.03	0.97–1.10	0.34
Intra-op blood transfusion; FFP	1.04	0.94–1.16	0.42
Intra-op blood transfusion; PLT	1.08	0.88–1.32	0.47
Ischemic time	0.88	0.72–1.09	0.26
VA ECMO use	0.97	0.36–2.58	0.95
VA ECMO time	1.09	0.77–1.54	0.62
Post-operative outcomes			
Post-transplant swallow study (days)	>0.99	0.98–1.03	0.65
CLAD	0.16	0.02–1.47	0.11

PAS, Penetration-Aspiration Scale; OR, odds ratio; CI, confidence interval; BMI, body mass index; BSA, body surface area; CKD, chronic kidney disease; GERD, gastroesophageal reflux disease; OSA, obstructive sleep apnea; ECMO, extracorporeal membrane oxygenation; LAS, lung allocation score; COPD, chronic obstructive pulmonary disease; ILD, interstitial lung disease; ARDS, acute respiratory distress syndrome; COVID-19, coronavirus disease 2019; PAH, pulmonary artery hypertension; pRBC, packed red blood cells; FFP, fresh frozen plasma; PLT, platelets; CLAD, chronic allograft dysfunction.

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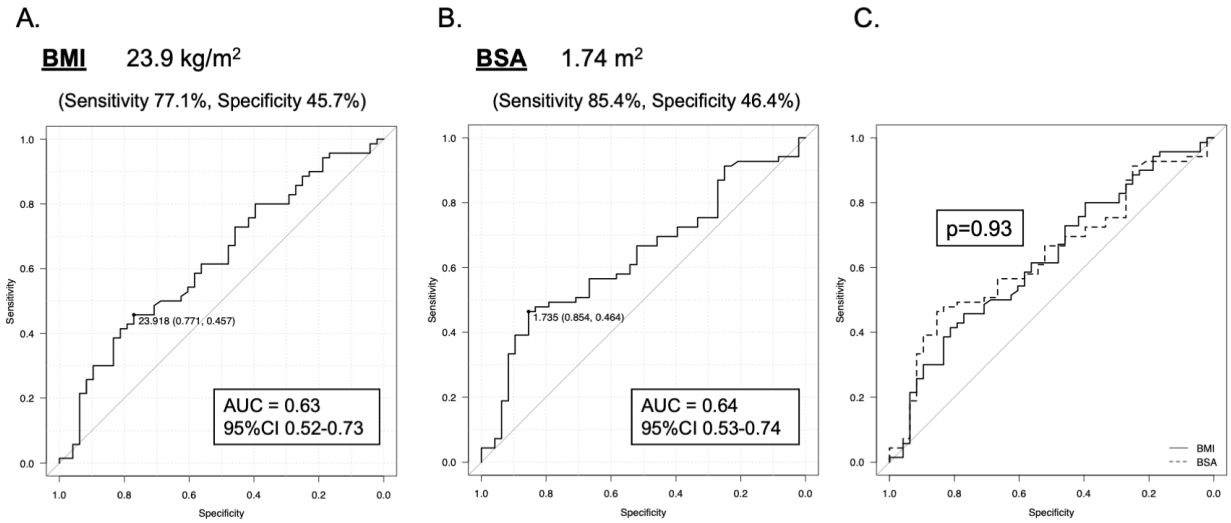

Figure S1 ROC curves to identify cut-off value for airway invasion. (A) BMI gave an AUC of 0.63 (95% CI: 0.52–0.73) with cut off 23.9 kg/m^2. (B) BSA gave an AUC of 0.64 (95% CI: 0.53–0.74) with cut off 1.74 m^2 for predicting airway invasion. (C) There was no significant difference between the two ROC curves (P=0.93).

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