

Figure S1 Esophageal balloon position confirmation by chest X-ray. Red arrow shows the iron ring in the gastric tube just above the balloon.

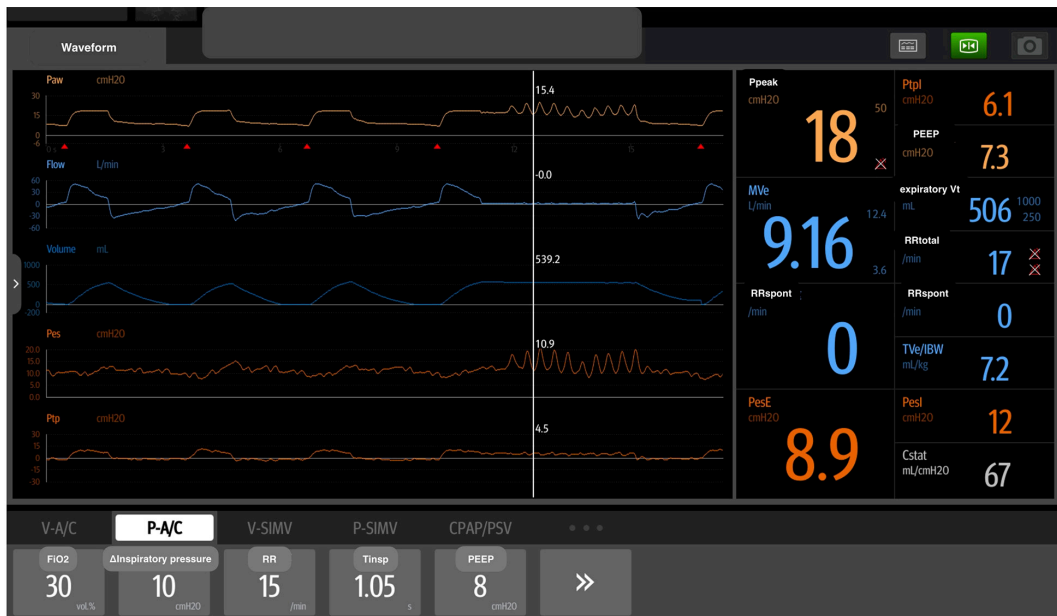


Figure S2 Esophageal balloon position confirmation by presence of cardiac oscillation and occlusion test. Paw, airway pressure; Pes, esophageal pressure; Ptp, transpulmonary pressure; FiO₂, fraction of inspiratory oxygen; RRspont, spontaneous respiratory rate; RR total, total respiratory rate; Tinsp, inspiratory time; PEEP, positive end-expiratory pressure. Ppeak, airway peak pressure; MVe, expiratory minute ventilation; TVe, expiratory tidal volume; IBW, ideal body weight; Cstat, static compliance; PesI, inspiratory esophageal pressure; Vt, tidal volume; PSV, pressure support ventilation; CPAP, continuous positive airway pressure; P-SIMV, pressure control-simultaneous intermittent mandatory ventilation; V-SIMV, volume control-simultaneous intermittent mandatory ventilation; P-A/C, pressure-assist/control ventilation; V-A/C, volume-assist/control ventilation; PesE, expiratory esophageal pressure.



Figure S3 In the PEEP-dependent type patient, P_{es} changed with PEEP adjustment, and in the PEEP-independent type patient, P_{es} did not change with PEEP adjustment. A and B show that the end-expiratory P_{es} decreased from 7.8 to 6.6 cmH₂O when PEEP was decreased from 10 to 8 cmH₂O in the PEEP-dependent patient. C and D show that the end-expiratory P_{es} remained constant at 16.9 and 16.6 cmH₂O when PEEP was increased from 8 to 15 cmH₂O in the PEEP-independent patient. P_{aw} , airway pressure; P_{es} , esophageal pressure; P_{tp} , transpulmonary pressure; FiO_2 , fraction of inspiratory oxygen; RR, respiratory rate; T_{insp} , inspiratory time; PEEP, positive end-expiratory pressure; Exp Vt, expiratory tidal volume; $M\dot{V}_E$, expiratory minute ventilation; RRspont, spontaneous respiratory rate; Ppeak, airway peak pressure; Pmean, mean airway pressure. RR total, total respiratory rate; C_{dyn} dynamic compliance; R_i , inspiratory resistance; P_{esI} , inspiratory esophageal pressure; P_{tpI} , inspiratory transpulmonary pressure; T_{Ve} expiratory tidal volume; IBW, ideal body weight; PSV, pressure support ventilation; CPAP, continuous positive airway pressure; P-SIMV, pressure control-simultaneous intermittent mandatory ventilation; V-SIMV, volume control- simultaneous intermittent mandatory ventilation; P-A/C, pressure-assist/control ventilation; V-A/C, volume-assist/control ventilation; AMV, assist mechanical ventilation; PRVC, pressure regulated volume control; APRV, airway pressure release ventilation; Cstat, static compliance; P_{esI} , inspiratory esophageal pressure.

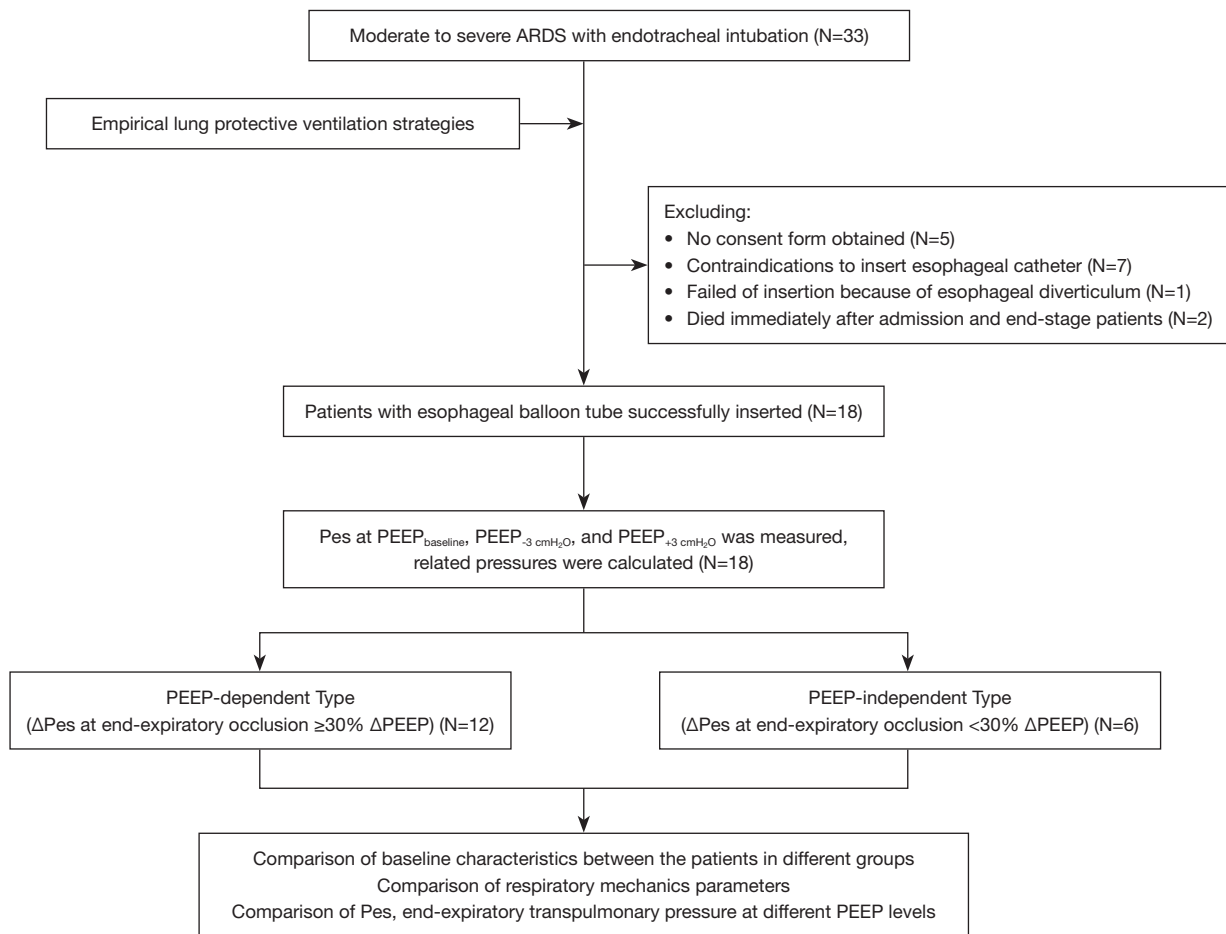


Figure S4 Enrollment flowchart. ARDS, acute respiratory distress syndrome; Pes, esophageal pressure; PEEP, positive end-expiratory pressure; PEEP_{-3 cmH₂O}, decrease 3 cmH₂O from the baseline PEEP level; PEEP_{+3 cmH₂O}, increase 3 cmH₂O from the baseline PEEP level.

Table S1 Pes and end-expiratory P_L at different PEEP levels of all the patients

Types	No.	Initial PEEP			PEEP-			PEEP+			ΔPEEP	ΔPes
		PEEP	Pes	P _L	PEEP	Pes	P _L	PEEP	Pes	P _L		
PEEP-dependent type	Pts-1	15	14.8	0.2	12	12.9	-0.9	20	19.6	0.4	(-3, +5)	(-1.9, +4.8)
	Pts-2	14	14.9	-0.9	11	11.1	-0.1	18	18.3	-0.3	(-3, +4)	(-3.8, +3.4)
	Pts-3	12	12.7	-0.7	9	10	-1	14	14.3	-0.3	(-3, +2)	(-2.7, +1.6)
	Pts-4	14	13.1	0.9	11	11.3	-0.3	16	15.2	0.8	(-3, +2)	(-1.8, +2.1)
	Pts-5	10	10.1	-0.1	7	6.2	0.8	15	14.3	0.7	(-3, +5)	(-3.9, +4.2)
	Pts-6	16	16.7	-0.7	12	12.6	-0.6	18	18.3	-0.3	(-4, +2)	(-4.1, +1.6)
	Pts-7	8	8.2	-0.2	5	4.8	0.2	12	12.1	-0.1	(-3, +4)	(-3.4, +3.9)
	Pts-8	15	15.7	-0.7	12	11.6	0.4	18	18.7	-0.7	(-3, +3)	(-4.1, +3)
	Pts-9	10	9.8	0.2	7	6.3	0.7	12	11.8	0.2	(-3, +2)	(-3.5, +2)
	Pts-10	12	11.6	0.4	9	9.5	-0.5	14	12.7	1.3	(-3, +2)	(-2.1, +1.1)
	Pts-11	12	12.2	-0.2	9	8.5	0.5	15	14.5	0.5	(-3, +3)	(-3.7, +2.3)
	Pts-12	12	11.6	0.4	9	8.8	0.2	15	14.5	0.5	(-3, +3)	(-2.8, +2.9)
PEEP-independent type	Pts-13	12	14.9	-2.9	9	15.1	-6.1	15	15.3	-0.3	(-3, +3)	(+0.2, +0.4)
	Pts-14	15	22.9	-7.9	12	23.3	-11.3	18	23	-5	(-3, +3)	(+0.4, +0.1)
	Pts-15	14	16.1	-2.1	11	15.9	-4.9	16	16.7	-0.7	(-3, +2)	(-0.2, +0.6)
	Pts-16	10	11.6	-1.6	7	10.9	-3.9	12	11.5	0.5	(-3, +2)	(-0.7, -0.1)
	Pts-17	12	16	-4	9	15.6	-6.6	15	15.6	-0.6	(-3, +3)	(-0.4, -0.4)
	Pts-18	10	11.5	-1.5	7	11.5	-4.5	12	11.8	0.2	(-3, +2)	(0, +0.3)

The unit of PEEP, Pes, P_L, ΔPEEP and ΔPes were cmH₂O. Pes, esophageal pressure; PEEP, positive end-expiratory pressure; P_L, Transpulmonary pressure; PEEP-, decrease from baseline PEEP level; PEEP+, increase from the baseline PEEP level; ΔPEEP, the changes of PEEP levels from baseline PEEP; ΔPes, the change of Pes levels from baseline Pes.