

**Table S1** Conversion factors

Characteristic	Phase I (n=179)	Phase II (n=50)	Phase III (n=53)
Surgical approach	M-VATS	U-VATS	U-VATS
Conversion (%)	4 (2.2)	13 (26.0)	0 (0)
M-VATS	0	13	0
Thoracotomy	4	0	0
Factors			
Severe adhesions	2	4	0
Whole thoracic cavity	1	4	0
Vascular sheath	1	0	0
Air leak after extubation	0	1	0
Poor interlobar fissure	0	2	0
Bleeding	1	3	0
Bronchoplasty	1	0	0
Middle lobe lobectomy	0	2	0
Poor differential lung ventilation	0	1	0

M-VATS, conventional multiportal video-assisted thoracoscopic surgery; U-VATS, uniportal video-assisted thoracoscopic surgery.

**Table S2** Univariate analysis of patients operated by the chief surgeon before propensity score match

Characteristic	M-VATS (n=102)	U-VATS (n=90)	P value
Phase	I	II and III	
Age, median [IQR]	71 [65-75]	70 [65-76]	0.58
Sex, man (%)	73 (71.6)	43 (47.8)	0.0011
BMI, median [IQR]	23.2 [20.4-25.1]	23.1 [20.9-25.0]	0.68
Hypertension (%)	59 (57.8)	41 (45.6)	0.11
Hyperlipidemia (%)	42 (41.2)	41 (45.6)	0.56
Diabetes (%)	29 (28.4)	22 (24.4)	0.62
Smoking history (%)	73 (71.6)	45 (50.0)	0.0029
eGFR (mL/min), median [IQR]	71.2 [61.4-80.6]	69.7 [58.5-78.0]	0.16
Interstitial pneumonia (%)	26 (25.5)	11 (12.2)	0.027
Obstructive airway disorder (COPD or asthma) (%)	40 (39.2)	33 (36.7)	0.77
Emphysema (%)	39 (38.2)	23 (25.6)	0.066
Diseased side, right (%)	59 (57.8)	55 (61.1)	0.66
Tumor size (mm), [IQR]	22 [18-31]	20 [15-30]	0.075
Clinical N1/2(%)	16 (5.6)	5 (5.6)	0.035
Preoperative use of hypnotic medication (%)	46 (45.1)	26 (28.9)	0.025
Procedure			
Segmentectomy (%)	25 (24.5)	25 (27.8)	0.62
Lobectomy (%)	78 (76.5)	65 (72.2)	0.51
Intraoperative bleeding (mL), median [IQR]	30 [1-93]	1 [1-50]	0.0004
Operative time (min), median [IQR]	188 [159-224]	138 [118-160]	<0.0001
Operation starting time (min), median [IQR]	65 [59-74]	63 [55-69]	0.065
Operating room time (min), median [IQR]	288 [254-326]	228 [209-250]	<0.0001
Chest tube duration (day), median [IQR]	1 [1-3]	1 [1-1]	0.0040
Complications (%)			
Total	39 (37.8)	17 (18.9)	0.0041
Prolonged air leak	20 (19.2)	9 (10.0)	0.072
Pneumonia	7 (6.9)	7 (7.8)	0.70
Arrythmia	8 (7.8)	3 (3.7)	0.22
Delirium	5 (4.9)	0 (0)	0.062
ARDS	0 (0)	1 (1.1)	0.47
Others	5 (6.1)	3 (3.3)	0.73
Postoperative hospitalization (day), median [IQR]	8 [6-9]	5 [4-7]	<0.0001

M-VATS, conventional multiportal video-assisted thoracoscopic surgery; U-VATS, uniportal video-assisted thoracoscopic surgery; IQR, interquartile range; BMI, body mass index; eGFR, estimated glomerular filtration rate; COPD, chronic obstructive pulmonary disease; ARDS, acute respiratory distress syndrome.

**Table S3** Univariate analysis of all U-VATS patients

Characteristic	Early (n=37)	Late (n=53)	P value
Phase	II	III	
Age, median [IQR]	68 [64.5-75.5]	71 [65.5-76.5]	0.32
Sex, man (%)	16 (43.2)	27 (50.9)	0.52
BMI, median [IQR]	23.0 [20.9-24.5]	23.2 [20.9-25.4]	0.42
Hypertension (%)	16 (43.2)	25 (47.2)	0.83
Hyperlipidemia (%)	18 (48.7)	23 (43.4)	0.67
Diabetes (%)	10 (27.0)	12 (22.6)	0.80
Smoking history (%)	14 (37.8)	31 (58.5)	0.086
eGFR (mL/min), median [IQR]	69.9 [55.9-84.6]	69.6 [59.1-78.6]	0.72
Interstitial pneumonia (%)	6 (16.2)	5 (9.4)	0.35
Obstructive airway disorder (COPD or asthma) (%)	11 (29.7)	22 (41.5)	0.28
Emphysema (%)	7 (18.9)	16 (30.2)	0.33
Diseased side, right (%)	23 (62.2)	32 (60.4)	0.65
Tumor size (mm), [IQR]	17 [14-28]	23 [15-31]	0.17
Clinical N1/2 (%)	0 (0)	5 (9.4)	0.075
Preoperative use of hypnotic medication (%)	9 (24.3)	17 (32.1)	0.48
Procedure			
Segmentectomy (%)	9 (24.3)	16 (30.2)	0.64
Lobectomy (%)	28 (75.7)	37 (69.8)	0.64
Intraoperative bleeding (mL), median [IQR]	1 [1-50]	1 [1-50]	0.82
Operative time (min), median [IQR]	145 [113-179]	136 [122-152]	0.30
Procedure starting time (min), median [IQR]	69 [62-75]	61 [52-65]	<0.001
Operating room time (min), median [IQR]	242 [218-273]	225 [208-239]	0.012
Chest tube duration (day), median [IQR]	1 [1.0-1.5]	1 [0.5-1.0]	0.46
Complications (%)			
Total	6 (16.2)	11 (20.8)	0.79
Prolonged air leak	4 (10.8)	5 (9.4)	0.55
Pneumonia	1 (2.7)	6 (11.3)	0.23
Arrythmia	0 (0)	3 (5.7)	0.27
Delirium	0 (0)	0 (0)	
ARDS	1 (2.7)	0 (0)	0.41
Others	1 (2.7)	0 (0)	0.41
Postoperative hospitalization (day), median [IQR]	6 [4.0-7.0]	5 [4.5-6.5]	0.70

U-VATS, uniportal video-assisted thoracoscopic surgery; IQR, interquartile range; BMI, body mass index; eGFR, estimated glomerular filtration rate; COPD, chronic obstructive pulmonary disease; ARDS, acute respiratory distress syndrome.

**Table S4** Postoperative pain in all patients after propensity score match

Characteristic	M-VATS (n=82)	U-VATS (n=82)	P value
Phase	I	II and III	
VAS-POD			
0	4 [2-7]	4 [2-5]	0.28
1	4 [3-5]	3 [2-4]	0.0028
2	3 [2-5]	3 [2-4]	0.061
3	2 [1-3]	2 [1-2]	0.018
4	1 [0-3]	1 [1-2]	0.93
5	1 [0-3]	1 [1-2]	0.25
Additional analgesics, n (%)	59 (71.9)	49 (59.8)	0.13
Number of analgesic uses (times), median [IQR]	4 [2-6]	2 [1-3]	0.0028
Last day of analgesic use (day) [IQR]	1 [1-3]	0 [0-1]	0.0017
Postoperative neuropathic pain (%)	50 (60.9)	22 (26.8)	<0.0001
Onset (day) [IQR]	6 [4-10]	5 [4-10]	0.62
Duration (day) [IQR]	60 [45-80]	30 [21-56]	0.0016

M-VATS, conventional multiportal video-assisted thoracoscopic surgery; U-VATS, uniportal video-assisted thoracoscopic surgery; VAS, visual analogue scale; POD, postoperative day; IQR, interquartile range.