

Table S1 Comparative analysis of robotic lobectomy patients at MCC between 2010–2017 and their chronological peers with open lobectomy from the NCDB (by intention to treat) in the unmatched and matched datasets

Variable	Unmatched dataset				Matched dataset 1:3			
	MCC RL (N=667)	NCDB OL (N=122,467)	SD	P	MCC RL (N=499)	NCDB OL (N=1,497)	SD	P
Age, years	68.62±9.22	68.92±9.94	0.01	<0.001*	68.43±9.20	67.87±9.93	0.015	0.267
Sex			0.011	<0.001*			0.018	0.414
Males	269 (40.3)	58,214 (47.5)			194 (38.9)	613 (40.9)		
Females	398 (59.7)	64,253 (52.5)			305 (61.1)	884 (59.1)		
Race/ethnicity			0.02	<0.001*			0.02	0.934
White	631 (94.6)	104,380 (85.2)			467 (93.6)	1,385 (92.5)		
Black	15 (2.2)	10,602 (8.7)			15 (3.0)	54 (3.6)		
Hispanic	6 (0.9)	32,89 (2.70)			6 (1.2)	20 (1.3)		
Asian	10 (1.5)	1,900 (1.6)			8 (1.6)	25 (1.7)		
Other	5 (0.7)	2,296 (1.9)			3 (0.6)	13 (0.9)		
Charlson score			0.016	<0.001*			0.023	0.795
0	348 (52.2)	65,604 (53.6)			260 (52.1)	805 (53.8)		
1	188 (28.2)	38,970 (31.8)			144 (28.9)	428 (28.6)		
2	80 (12.0)	13,247 (10.8)			57 (11.4)	168 (11.2)		
3+	51 (7.6)	4,646 (3.8)			38 (7.6)	96 (6.4)		
Histology			0.028	<0.001*			0.053	0.131
Adenocarcinoma	456 (68.4)	68,753 (56.1)			336 (67.3)	1,010 (67.5)		
SCC	124 (18.6)	33,805 (27.6)			94 (18.8)	270 (18.0)		
Neuroendocrine	76 (11.4)	8,528 (7.0)			59 (11.8)	155 (10.4)		
Other	11 (1.6)	11,318 (9.3)			10 (2.0)	62 (4.1)		
Grade			0.032	<0.001*			0.033	0.531
Well diff.	198 (29.7)	19,392 (15.8)			160 (32.1)	460 (30.7)		
Moderately diff.	286 (42.9)	51,507 (42.1)			208 (41.7)	619 (41.3)		
Poorly diff.	168 (25.2)	40,765 (33.3)			119 (23.8)	362 (24.2)		
Missing	15 (2.2)	10,803 (8.8)			12 (2.4)	56 (3.7)		
Side			0.077	<0.001*			0.018	0.411
Right	430 (64.5)	73,948 (60.4)			325 (65.1)	1,005 (67.1)		
Left	233 (34.9)	48,519 (39.6)			174 (34.9)	492 (32.9)		
Missing	4 (0.6)	0 (0.0)			0 (0.0)	0 (0.0)		
Lobe			0.012	<0.001*			0.015	0.797
Upper	411 (61.6)	69,495 (56.7)			297 (60.9)	889 (59.4)		
Middle	58 (8.7)	7,277 (5.9)			46 (9.4)	139 (9.3)		
Lower	198 (29.7)	45,695 (37.3)			145 (29.7)	469 (31.3)		
T stage			0.138	<0.001*			0.025	0.348
Tis	1 (0.1)	358 (0.3)			1 (0.2)	1 (0.1)		
T1	363 (54.4)	59,088 (48.2)			361 (75.7)	1,083 (72.3)		
T2	54 (8.1)	35,925 (29.3)			53 (11.1)	146 (9.7)		
T3	44 (8.6)	8,784 (7.2)			44 (9.2)	133 (8.9)		
T4	183 (27.4)	2,326 (1.9)			18 (3.8)	82 (5.5)		
Tx	22 (3.3)	15,986 (13.1)			0 (0.0)	52 (3.5)		
N stage			0.031	<0.001*			0.04	0.199
N0	512 (76.8)	92,080 (75.2)			413 (82.8)	1,273 (85.0)		
N1	62 (9.3)	8,988 (7.3)			34 (6.8)	105 (7.0)		
N2	93 (13.9)	8,643 (7.1)			52 (10.4)	117 (7.9)		
Nx	0 (0.0)	12,756 (10.4)			0 (0.0)	2 (0.1)		
TNM stage			0.036	<0.001*			0.035	0.251
Stage 0	0 (0.0)	389 (0.3)			0 (0.0)	0 (0.0)		
Stage I	410 (61.5)	75,790 (61.9)			312 (62.5)	911 (60.9)		
Stage II	131 (19.6)	18,624 (15.2)			102 (20.4)	271 (18.1)		
Stage III	123 (18.4)	11,982 (9.8)			82 (16.4)	267 (17.8)		
Stage IV	3 (0.4)	95 (0.1)			3 (0.6)	1 (0.1)		
Unstageable	0 (0.0)	15,587 (12.7)			0 (0.0)	47 (3.1)		
Neoadjuvant systemic	15 (2.2)	7,301 (6.0)	0.012	<0.001*	13 (2.6)	49 (3.3)	0.017	0.456
Neoadjuvant radiation	3 (0.4)	4,756 (3.9)	0.013	<0.001*	3 (0.6)	15 (1.0)	0.019	0.812

Data are shown as mean ± standard deviation or number (percentage). *, statistically significant. MCC, Moffitt Cancer Center; NCDB, National Cancer Database; OL, open lobectomy; RL, robotic lobectomy; SCC, squamous cell carcinoma; SD, standard deviation.

Table S2 Comparison of short-term outcomes between MCC robotic lobectomy patients and their matched chronological historic cohorts from NCDB with open lobectomy between 2010–2017 (by intention to treat)

Postoperative Outcome	MCC RL (N=499)	NCDB OL (N=1,497)	HR (95% CI)	P
Examined nodes, mean ± standard deviation	14.66±6.83	9.74±7.38	0.671 (0.315–0.925)	0.001*
Mediastinal lymphadenectomy, n (%)	496 (99.4)	1,126 (75.2)	0.241 (0.108–0.525)	<0.001*
30-day mortality, n (%)	5 (1.0)	24 (1.6)	1.610 (0.859–2.436)	0.176
LOS in days, median [interquartile range]	4 [3–6]	6 [4–8]	1.573 (1.228–1.893)	<0.001*

*, statistically significant. CI, confidence interval; HR, hazard ratio; MCC, Moffitt Cancer Center; NCDB, National Cancer Database; OL, open lobectomy; RL, robotic lobectomy; LOS, length of stay.

Table S3 Comparative analysis of robotic lobectomy patients at MCC between 2010–2017 and their chronological peers with thoracoscopic lobectomy from the NCDB (by intention to treat) in the unmatched and matched datasets

Variable	Unmatched dataset				Matched dataset 1:3			
	MCC RL (N=667)	NCDB VL (N=45,193)	SD	P	MCC RL (N=492)	NCDB VL (N=1,476)	SD	P
Age [#]	68.62±9.22	67.44±9.74	0.015	0.002*	68.44±9.25	68.18±9.74	0.008	0.597
Sex			0.01	0.039*			0.022	0.339
Males	269 (40.3)	20,035 (44.3)			188 (38.2)	600 (40.7)		
Females	398 (59.7)	25,158 (55.7)			304 (61.8)	876 (59.3)		
Race/ethnicity			0.032	<0.001*			0.022	0.919
White	631 (94.6)	38,626 (85.5)			463 (94.1)	1,381 (93.6)		
Black	15 (2.2)	3,510 (7.8)			13 (2.6)	44 (3.0)		
Hispanic	6 (0.9)	1,112 (2.5)			5 (1.0)	22 (1.5)		
Asian	10 (1.5)	898 (2.0)			8 (1.6)	22 (1.5)		
Other	5 (0.7)	1,047 (2.3)			3 (0.6)	7 (0.5)		
Charlson score			0.021	<0.001*			0.022	0.815
0	348 (52.2)	23,898 (52.9)			254 (51.6)	798 (54.1)		
1	188 (28.2)	14,448 (32.0)			143 (29.1)	406 (27.5)		
2	80 (12.0)	4,920 (10.9)			57 (11.6)	167 (11.3)		
3+	51 (7.6)	1,927 (4.3)			38 (7.7)	105 (7.1)		
Histology			0.043	<0.001*			0.015	0.931
Adenocarcinoma	456 (68.4)	26,222 (58.0)			331 (67.3)	1,011 (68.5)		
SCC	124 (18.6)	10,301 (22.8)			92 (18.7)	259 (17.5)		
Neuroendocrine	76 (11.4)	3,474 (7.7)			58 (11.9)	170 (11.5)		
Other	11 (1.6)	5,196 (11.5)			11 (2.2)	36 (2.4)		
Grade			0.044	<0.001*			0.03	0.622
Well diff.	198 (29.7)	8,177 (18.1)			160 (32.5)	447 (30.3)		
Moderately diff.	286 (42.9)	19,473 (43.1)			204 (41.5)	639 (43.3)		
Poorly diff.	168 (25.2)	13,427 (29.7)			117 (23.8)	345 (23.4)		
Missing	15 (2.2)	4,116 (9.1)			11 (2.2)	45 (3.0)		
Side			0.077	<0.001*			0.016	0.465
Right	430 (64.5)	27,709 (61.3)			320 (65.0)	933 (63.2)		
Left	233 (34.9)	17,484 (38.7)			172 (35.0)	543 (36.8)		
Missing	4 (0.6)	0 (0.0)			0 (0.0)	0 (0.0)		
Lobe			0.019	<0.001*			0.03	0.405
Upper	411 (61.6)	25,810 (57.1)			295 (61.3)	942 (63.8)		
Middle	58 (8.7)	2,717 (6.0)			46 (9.6)	115 (7.8)		
Lower	198 (29.7)	16,666 (36.9)			140 (29.1)	419 (28.4)		
T stage			0.259	<0.001*			0.054	0.198
Tis	1 (0.1)	172 (0.4)			1 (0.2)	2 (0.1)		
T1	363 (54.4)	25,696 (56.9)			361 (76.8)	1,068 (72.4)		
T2	54 (8.1)	11,571 (25.6)			53 (1.3)	209 (14.1)		
T3	44 (8.6)	2,428 (5.4)			44 (9.4)	131 (8.9)		
T4	183 (27.4)	504 (1.1)			11 (2.3)	54 (3.7)		
Tx	22 (3.3)	4,822 (10.7)			0 (0.0)	12 (0.8)		
N stage			0.063	<0.001*			0.049	0.258
N0	512 (76.8)	37,274 (82.5)			410 (83.3)	1,260 (85.5)		
N1	62 (9.3)	2,456 (5.4)			34 (6.9)	101 (6.8)		
N2	93 (13.9)	2,157 (4.8)			48 (9.8)	101 (6.8)		
Nx	0 (0.0)	3,306 (7.3)			0 (0.0)	14 (0.9)		
TNM stage			0.079	<0.001*			0.052	0.18
Stage 0	0 (0.0)	164 (0.4)			0 (0.0)	0 (0.0)		
Stage I	410 (61.5)	31,610 (69.9)			310 (63.0)	950 (64.4)		
Stage II	131 (19.6)	5,659 (12.5)			102 (20.7)	285 (19.3)		
Stage III	123 (18.4)	2,898 (6.4)			78 (15.9)	183 (12.4)		
Stage IV	3 (0.4)	13 (0.0)			2 (0.4)	0 (0.0)		
Unstageable	0 (0.0)	4,849 (10.7)			0 (0.0)	18 (1.2)		
Neoadjuvant systemic	15 (2.2)	1,604 (3.5)	0.008	0.071	11 (2.2)	22 (1.5)	0.025	0.265
Neoadjuvant radiation	3 (0.4)	865 (1.9)	0.013	0.006*	3 (0.6)	11 (0.7)	0.007	0.757

Data are shown as mean ± standard deviation or number (percentage). *, statistically significant. VL, VATS lobectomy; MCC, Moffitt Cancer Center; NCDB, National Cancer Database; RL, robotic lobectomy; SCC, squamous cell carcinoma; SD, standard difference; VATS, video-assisted thoracoscopic surgery.

Table S4 Comparison of short-term outcomes between MCC robotic lobectomy patients and their matched chronological historic cohorts from NCDB with VATS lobectomy between 2010–2017 (by intention to treat)

Postoperative outcome	MCC RL (N=492)	NCDB VL (N=1,476)	HR (95% CI)	P
Examined nodes, mean ± standard deviation	14.66±6.83	11.52±8.79	0.725 (0.633–0.817)	<0.001*
Mediastinal lymphadenectomy, n (%)	489 (99.4)	1,234 (83.6)	0.815 (0.702–0.924)	<0.001*
Conversion to open	20 (4.1)	203 (13.8)	3.763 (2.349–6.029)	<0.001*
30-day mortality	5 (1.0)	23 (1.6)	1.542 (0.583–4.077)	0.379
LOS in days, median [interquartile range]	4 [3–6]	4 [3–7]	1.090 (0.865–1.296)	0.351

*, statistically significant. CI, confidence interval; HR, hazard ratio; VL, VATS lobectomy; MCC, Moffitt Cancer Center; NCDB, National Cancer Database; RL, robotic lobectomy; VATS, video-assisted thoracoscopic surgery.