

INTRODUCTION

Introduction

Robot-assisted thoracoscopic lobectomy (RATS) has become increasingly adopted for the treatment of early-stage lung cancer¹. Several port strategies for robot-assisted pulmonary lobectomies have been proposed and described in the literature².

Among these, the conventional look-up approach has been widely adopted, whereas an anterior “confronting” approach has recently been introduced and reported to facilitate anatomical orientation and surgical manipulation³. However, evidence directly comparing these two approaches remains limited, and no multicenter study has evaluated their relative safety and perioperative outcomes. Therefore, this study aimed to compare the safety and short-term surgical outcomes between the conventional look-up approach and the anterior confronting approach in patients undergoing RATS lobectomy.

METHODS

Patients and Methods

684 patients with clinical stage 0-I non-small cell lung cancer (NSCLC) who underwent RATS lobectomy between 2019 and 2024 across six institutions.

All institutions utilized either the da Vinci X or Xi system. Two institutions adopted the anterior approach, while four institutions used the conventional approach. Perioperative factors and short-term postoperative outcomes were compared between the two groups. Differences in baseline characteristics between the two groups were adjusted using propensity score matching.

Anterior approach:

(Anterior chest wall access)

Camera: 4th ICS (AAL)

robotic arms:

3rd ICS (axilla)

6th ICS (MAL)

7th–9th ICS (MAL–PAL)

assistant port : 7th–9th ICS (AAL)

With CO₂ insufflation

Conventional Approach:

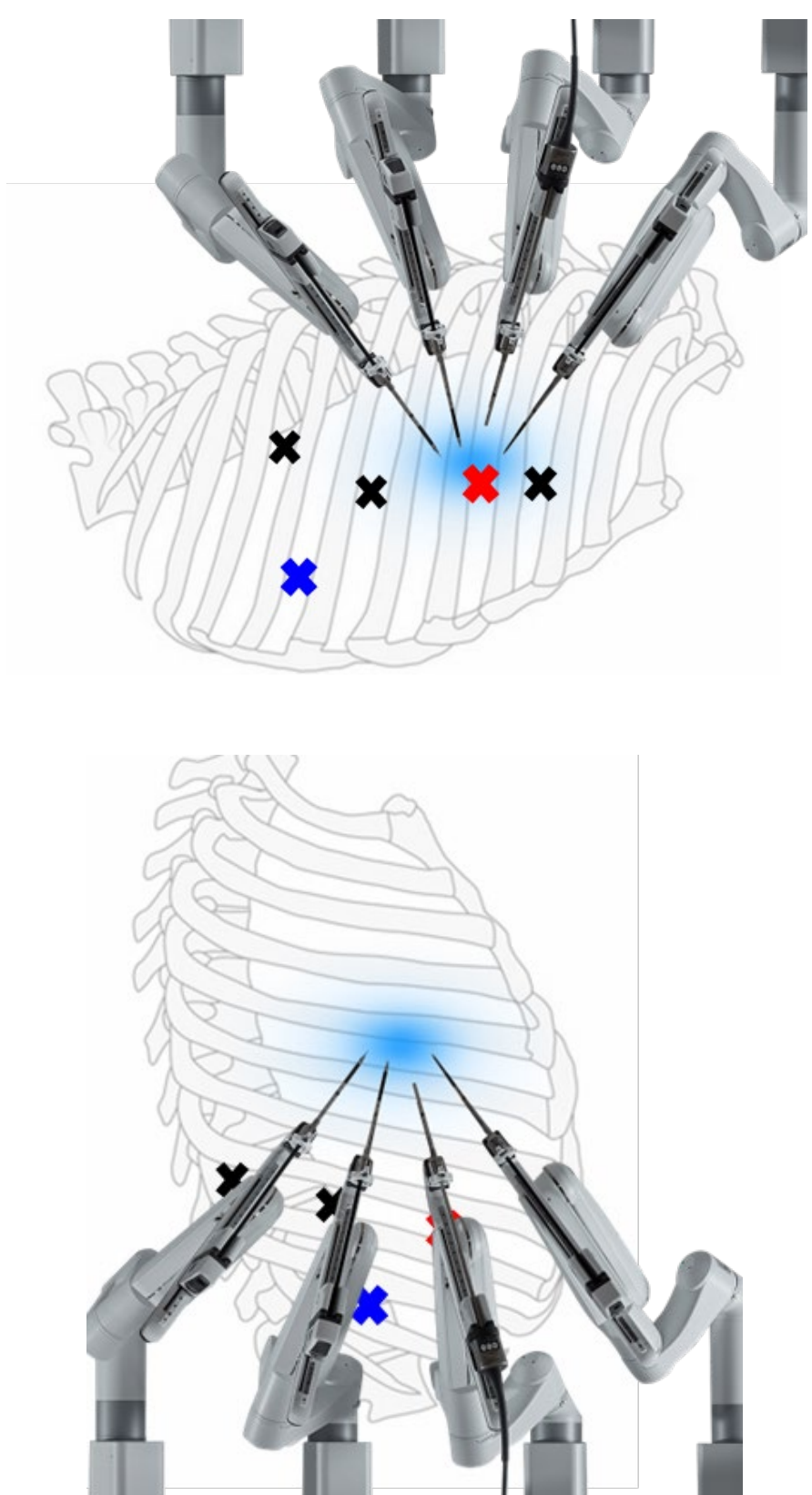
(Caudal port placement)

Camera: 8th–9th ICS (MAL)

Robotic arms: 7th–9th ICS

assistant port : 10th ICS (PAL)

With CO₂ insufflation



DISCUSSION AND CONCLUSION

Discussion

The anterior confronting approach significantly reduced operative and console times while maintaining perioperative outcomes comparable to those of the conventional look-up approach.

Although fewer lymph nodes were dissected, the extent of lymph node dissection and nodal upstaging rates were comparable, suggesting that oncologic quality was preserved.

Actionable Take Away Message

The anterior confronting approach is a safe and efficient alternative for robotic lobectomy. It improves operative efficiency without compromising perioperative safety or surgical quality.

Future Direction for Research

Future prospective multicenter studies with long-term follow-up are warranted to validate these findings and evaluate long-term oncologic and functional outcomes to define the optimal indications for each robotic approach.

REFERENCES & ACKNOWLEDGEMENTS

References

- Kent MS, Hartwig MG, Vallières E, et al. Pulmonary Open, Robotic, and Thoracoscopic Lobectomy (PORTal) Study: Survival Analysis of 6646 Cases. Ann Surg. 2023;277:1002-1009.
- Parini S, Massera F, Papalia E, et al. Port Placement Strategies for Robotic Pulmonary Lobectomy: A Narrative Review. J Clin Med 2022;11:2612.
- Yamazaki K, Toyokawa G, Kozuma Y, et al. Cumulative experience of the anterior approach in robot-assisted thoracic surgery for lung cancer patients. J. Thorac. Dis. 2021;13:5487–5495.

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RESULTS

Overall Cohort (*n* = 684)

Factors	conventional (n=298)	anterior (n=386)	p-value
Age	70 (31-89)	70 (34-90)	0.455
Sex			
male	148 (50%)	196 (51%)	0.773
female	150 (50%)	190 (49%)	
Smoking status			
no	125 (42%)	165 (43%)	0.834
yes	173 (58%)	221 (57%)	
Histology			
adenocarcinoma	258 (87%)	334 (87%)	0.293
squamous	23 (8%)	38 (10%)	
others	17 (6%)	14 (4%)	
Resected lobe			
RUL	148 (50%)	161 (42%)	<0.001
RML	32 (11%)	35 (9%)	
RLL	66 (22%)	68 (20%)	
LUL	20 (7%)	65 (17%)	
LLL	32(11%)	57 (15%)	
LN dissection			
ND1	24 (8%)	11 (3%)	<0.001
ND2a-1	227 (76%)	239 (62%)	
ND2a-2	47 (16%)	136 (35%)	
Operative time (min)	253 (105-493)	200 (108-482)	<0.001
Console time (min)	189 (63-452)	119 (54-292)	<0.001
Blood loss (min)	33 (0-730)	39 (0-2418)	<0.001
Chest tube duration (days)	2.9 (1-23)	2.7 (1-20)	<0.001
Postoperative stay (days)	9.5 (4-103)	9.6 (3-42)	0.828
Open conversion	1 (0.3%)	5 (1.7%)	0.049
Complications			
no	255 (86%)	326 (85%)	0.686
yes	43 (14%)	60 (15%)	
30 days mortality	0	1 (0.3%)	0.379
No. of dissected N1 LNs	7.8 (0-28)	5.7(0-17)	<0.001
No. of upstaged pN1	20 (7%)	20 (5%)	0.400
No. of dissected N2 LNs	8.2 (0-36)	9.0 (0-44)	0.098
No. of upstaged pN2	16 (6%)	15 (4%)	0.355
Total No. of dissected LNs	16.1 (1-57)	14.7 (0-53)	0.023
p-stage			
0, I	258 (87%)	351 (91%)	0.240
II	27 (9%)	25 (6%)	
III	12 (4%)	10 (3%)	
IV	1 (0.3%)	0 (0%)	

Key findings

- In the overall cohort, baseline differences in tumor location and lymph node dissection were observed between the two groups.
- After propensity score matching, these baseline differences were effectively balanced between the two groups.
- Operative time, console time, and the number of dissected lymph nodes remained significantly different, whereas all other perioperative outcomes were comparable.

Propensity Score–Matched Cohort (*233 matched pairs*)

Factors	conventional (n=233)	anterior (n=233)	p-value
Age	69 (33-88)	70 (35-90)	0.692
Sex			
male	121 (50%)	117 (50%)	0.711
female	112 (50%)	116 (49%)	
Smoking status			
no	94 (40%)	99 (43%)	0.638
yes	139 (60%)	134 (57%)	
Histology			
adenocarcinoma	204 (87%)	212 (91%)	0.108
squamous	16 (7%)	16 (7%)	
others	14 (6%)	5 (2%)	
Resected lobe			
RUL	137 (59%)	136 (58%)	0.893
RML	18 (8%)	23 (9%)	
RLL	32 (14%)	34 (14%)	
LUL	19 (8%)	17 (8%)	
LLL	27 (12%)	23 (11%)	
LN dissection			
ND1	8 (3%)	11 (5%)	0.677
ND2a-1	179 (77%)	172 (74%)	
ND2a-2	46 (20%)	50 (21%)	
Operative time (min)	258 (105-493)	195 (113-364)	<0.001
Console time (min)	193 (63-452)	116 (54-251)	<0.001
Blood loss (min)	35 (0-730)	31 (0-380)	0.487
Chest tube duration (days)	3 (1-23)	2.8 (1-20)	0.388
Postoperative stay (days)	9.8 (4-103)	9.8 (3-26)	0.995
Open conversion	3 (1%)	1 (1%)	0.31
Complications			
no	196 (84%)	204 (88%)	0.288
yes	37 (16%)	29 (12%)	
30 days mortality	0 (0%)	1 (0.3%)	0.317
No. of dissected N1 LNs	8.1 (1-28)	5.9 (0-17)	<0.001
No. of upstaged pN1	15 (6%)	13 (6%)	0.697
No. of dissected N2 LNs	9.0 (0-36)	8.7 (0-25)	0.577
No. of upstaged pN2	13 (6%)	8 (3%)	0.264
Total No. of dissected LNs	17.1 (1-57)	14.6 (0-31)	<0.001
p-stage			
0, I	204 (88%)	213 (91%)	0.372
II	18 (8%)	25 (6%)	
III	10 (4%)	5 (2%)	
IV	1 (0.4%)	0 (0%)	