Ten-years follow-up after multiple pulmonary resection for multiple primary lung cancer from two high volume Chinese centers

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INTRODUCTION

We previously reported favorable mid-term outcomes after multiple pulmonary resections (MPR) for multiple primary lung cancers (MPLC). With extended ten years follow-up, we present updated oncologic and surgical outcomes, re-evaluate prognostic factors, comparing synchronous versus metachronous patterns of recurrence and survival to inform clinical decision-making and surveillance.

METHODS

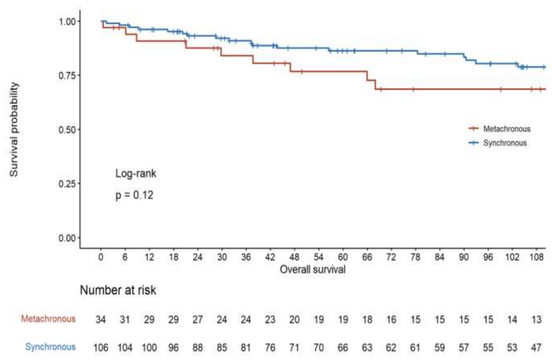
We conducted a retrospective cohort study of consecutive persons with MPLC who underwent MPR at two tertiary centers (2007-2016). Cohort characteristics and surgical strategies followed prior methodology; database lock was 2025-Aug-31 Primary endpoints were overall survival (OS) and disease-free survival (DFS) measured from the second operation (or completion staged bilateral thoracotomy). Secondary endpoints included recurrent incidences, 30-/90-day mortality and major complications(Clavien-Dindo≥II).Survival was estimated by Kaplan-Meier; prognostic factors by multivariable Cox models using prespecified covariates (tumor size, nodal status, disease-free interval(DFI) for metachronous disease, histologic/radiographic profile, extent of resection). Competing-risk methods were applied for recurrence subtype.

CONCLUSION

With ten-year follow-up, MPR for MPLC at experienced centers yields durable oncologic outcomes and low perioperative mortality. These contemporary endorse MPR as a cornerstone in carefully staged patients providing benchmarks for surveillance and trial design.

REFERENCES & ACKNOWLEDGEMENTS

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RESULTS

We analyzed 142 patients (synchronous n=106; metachronous n=36; 54.9% female; median age 63 years). The synchronous group had more female never-smokers with pure adenocarcinoma (p=0.005). Adenocarcinoma predominated (125 patients,88%). In synchronous cases 22% underwent bilateral MPR (median 26 days); tumors were mainly pure-solid (68%), and the commonest procedure was lobectomy+sublobar resection(47%). In metachronous, lesions were 94% pure-solid, (median 37 months) and second procedures were usually sublobar (72%). Adjuvant therapy was given after index operation in 61% of metachronous patients and after second in 11% (p=0.141). Median follow-up from second operation was 117 months (IQR 105-124). Five- and ten-year OS were 84.0% and 76.4% overall (synchronous 86.3% and 78.9%; metachronous 76.7% and 68.6%). Five- and ten-year DFS were 69.3% and 57.6% overall (synchronous 69.2% and 54.9%; metachronous 71.3% and 62.0%).

Ten-year cumulative incidence of local recurrence was 35.1% and distant recurrence 13.9% (synchronous: local 31.6%, distant 19.7%; metachronous: local 38.8%, distant 3.8%). Ninety-day mortality was 0%; major complications occurred in 12%. On multivariable modeling greater T-stage predicted worse OS in synchronous disease (p=0.006), whereas longer DFI predicted improved OS in metachronous (p=0.048).These findings are partially consistent with our prior 5-year results: in synchronous disease, disease burden remained prognostically relevant with higher T-stage predicted worse OS while regional nodal involvement was no longer associated with OS (p=0.204); in metachronous disease longer DFI associated with improved OS but not DFS (p=0.195).

Table 1. Demographic and Clinicopathologic Characteristics of Lung Cancer Patients Undergoing Multiple Pulmonary Resections (n = 142)

Characteristic	Total	Synchronous MPR	Metachronous MPR	*P* Value
Age, y	63 (34-82)	63.5 (34-81)	62 (40-82)	.187
Sex				.003[a]
Male	64 (45)	40 (38)	24 (67)	
Female	78 (55)	66 (62)	12 (33)	
Smoking history				.005[a]
Present	48 (34)	29 (27)	19 (53)	
Absent	94 (66)	77 (73)	17 (47)	
Location distribution				.0001[a]
Unilateral	99 (70)	83 (78)	16 (44)	
Bilateral	43 (30)	23 (22)	20 (56)	
Radiographic feature of dominant nodule				.005[a]
Pure solid nodule	106 (75)	72 (68)	34 (94)	
Semisolid nodule	21 (15)	18 (17)	2 (6)	
Pure GGO	15 (10)	16 (15)	0 (0)	
Histologic type				.002[a]
ADC	97 (69)	76 (72)	21 (58)	
ADC + non-ADC	16 (11)	11 (10)	5 (14)	
Non-ADC + non-ADC	17 (12)	7 (7)	10 (28)	
ADC + benign conditions	12 (8)	12 (11)	0 (0)	
Sum of tumor size, mm	35 (8-85)	35.5 (9-83)	35 (8-85)	.302
Nodal status				.203
Positive	36 (25)	24 (23)	12 (33)	
Negative	106 (75)	82 (77)	24 (67)	
Visceral pleural invasion				
Present	57 (40)	43 (41)	14 (39)	
Absent	85 (60)	63 (59)	22 (61)	
Lymphatic vessel invasion				.742
Present	14 (10)	11 (10)	3 (8)	
Absent	128 (90)	95 (90)	33 (92)	
Extent of resection				.014[a]
Lobectomy + lobectomy	42 (29)	33 (31)	9 (25)	
Lobectomy + sublobar resect.	72 (51)	50 (47)	22 (61)	
Sublobar resect. + sublobar resect.	18 (13)	18 (17)	0 (0)	
Other procedures	10 (7)	5 (5)	5 (14)	
Induction therapy				1.000
Yes	11 (8)	8 (8)	3 (8)	
No	131 (92)	98 (92)	33 (92)	
Adjuvant therapy				.042[a]
Yes	35 (25)	31 (29)	4 (11)	
No	107 (75)	75 (71)	32 (89)	

[a] $P < .05$ statistically significant.

Values are median (range) or n (%);

ADC, adenocarcinoma; GGO, ground glass opacity; MPR, multiple pulmonary resections; resect., resection.