

Intentional Sublobectomy Versus Lobectomy for Non-Small Cell Lung Cancer ≤ 3 cm Including Solid Ground-Glass Nodule: A Real-World Study

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Background & Methods

Background

- Lobectomy has been the gold standard for early NSCLC since 1995; sublobar resection is increasingly used for selected patients.
- JCOG0802: segmentectomy showed superior OS in ≤ 2 cm, CTR 0.5–1 tumors; JCOG1211 confirmed favorable survival for GGO-dominant (≤ 3 cm, CTR ≤ 0.5).
- Controversy remains for tumors ≤ 3 cm with CTR ≤ 1 (including part-solid/solid nodules) regarding 10-year survival and perioperative outcomes.
- **This study compares intentional sublobectomy vs. lobectomy in**

Methods

Design: Retrospective single-center, Sir Run Run Shaw Hospital, Jan 2014–Dec 2015.

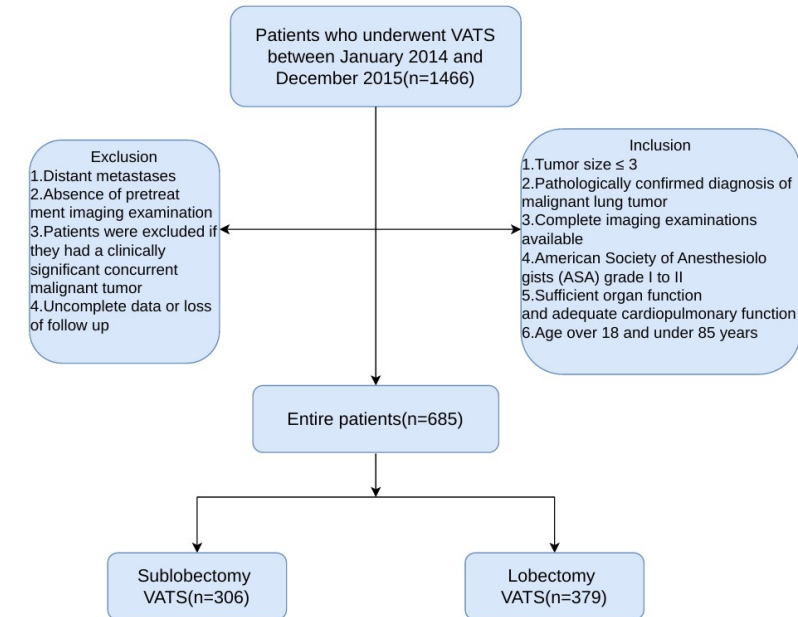
Inclusion: NSCLC ≤ 3 cm, CTR ≤ 1 , pathologically confirmed, ASA I–II, age 18–85.

Groups: Intentional VATS sublobectomy (wedge/segmentectomy) vs. VATS lobectomy.

Analysis: 1:1 propensity score matching (PSM); SPSS 27.0; R/ggplot2.

Endpoints: Primary: 10-yr OS, RFS. Secondary: perioperative indicators & complications.

Patient Enrollment Flowchart



Cohort Overview

Total enrolled: 685 patients | Sublobectomy: 306 | Lobectomy: 379

After 1:1 PSM: 458 patients (229 matched pairs)

Events: 34 deaths (7 lung cancer), 49 recurrences/metastases

Results: Baseline Characteristics & Perioperative Outcomes

Baseline Characteristics (After PSM, n=458)

Variable	Sublobectomy (n=229)	Lobectomy (n=229)	P
Age ≤70 / >70, n (%)	197 (86.0) / 32 (14.0)	193 (84.3) / 36 (15.7)	0.599
Male / Female, n (%)	85 (37.1) / 144 (62.9)	86 (37.6) / 143 (62.5)	0.923
BMI (kg/m ² , mean±SD)	22.57 ± 2.88	22.47 ± 2.72	0.707
Adenocarcinoma, n (%)	217 (94.8)	217 (94.8)	0.827
Tumor ≤1 / 1–2 / 2–3 cm	64 / 140 / 25	65 / 143 / 21	0.824
CTR 0–0.25 / 0.25–0.5 / 0.5–<1 / =1	83 / 36 / 47 / 63	70 / 49 / 53 / 57	0.289
TNM IA, n (%)	215 (93.9)	216 (94.3)	0.626
FEV1 (L, mean±SD)	2.16 ± 0.73	2.14 ± 0.80	0.731
FVC (L, mean±SD)	3.04 ± 0.71	3.03 ± 0.70	0.939

All variables well balanced after PSM (all P > 0.05).

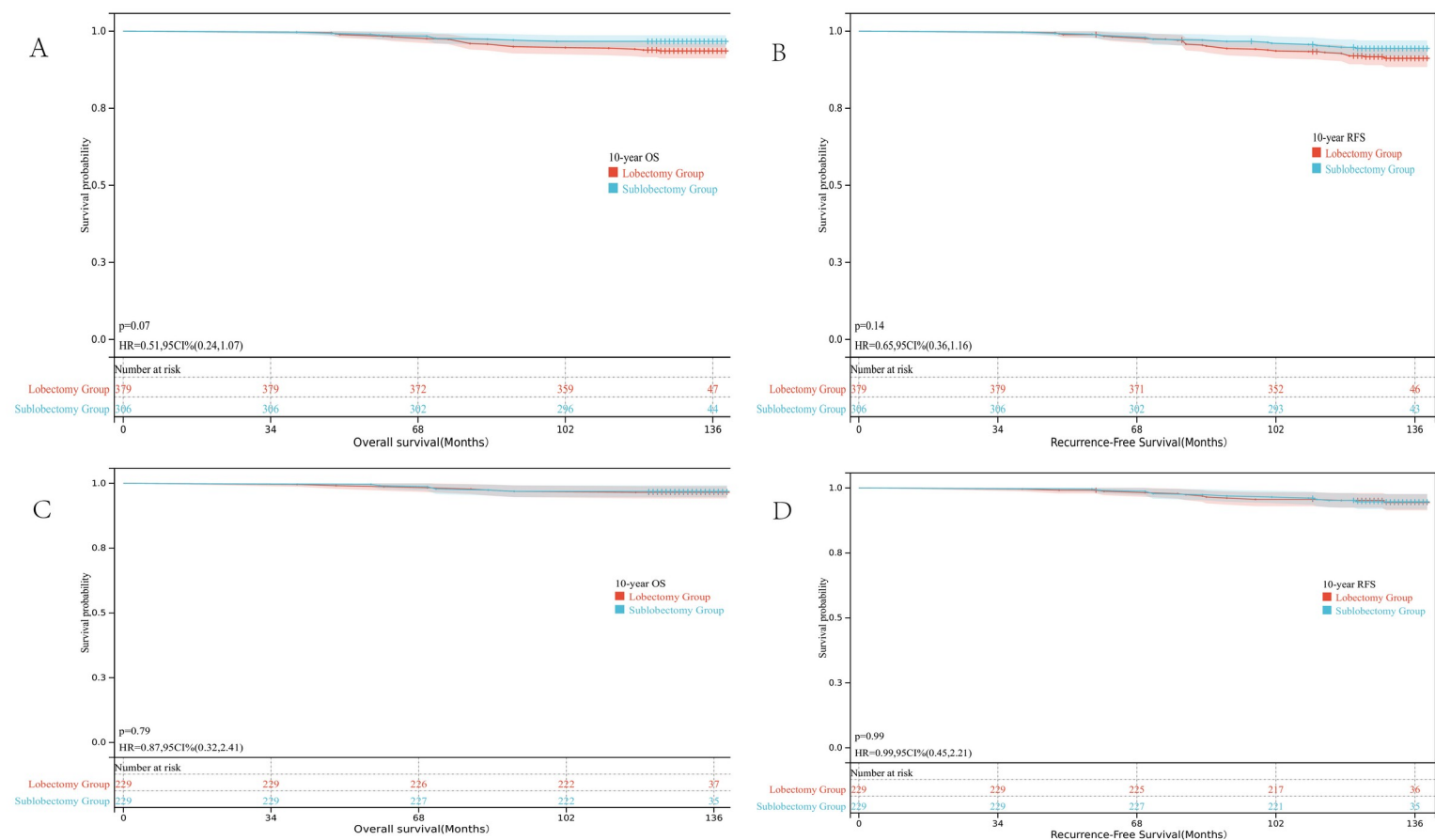
Perioperative Outcomes (After PSM)

Variable	Sublobectomy (n=229)	Lobectomy (n=229)	P
Operation time (min)	102.94 ± 46.37	109.88 ± 35.67	0.074
Blood loss (ml)	32.62 ± 35.10	34.61 ± 36.07	0.550
Drainage duration (days)	3.72 ± 1.33	4.50 ± 2.53	0.002*
Drainage volume (ml)	572.88 ± 304.18	712.07 ± 551.39	0.005*
Hospital stay (days)	5.87 ± 2.22	5.89 ± 2.46	0.921
R0 resection, n (%)	229 (100)	229 (100)	NA
Conversion to open, n (%)	0 (0)	0 (0)	NA
Pulmonary infection, n (%)	26 (11.4)	30 (13.1)	0.568
Pleural effusion, n (%)	18 (7.9)	23 (10.0)	0.441
Any complication	~24%	~28%	NS

* P < 0.05. Sublobectomy: shorter drainage duration & less drainage volume.

Key Finding: Before PSM, sublobectomy also had shorter operation time (100.7 vs 110.8 min, P=0.002). After PSM, drainage advantages remain significant. 100% R0 resection & no conversion in both groups.

Results: 10-Year Survival Outcomes

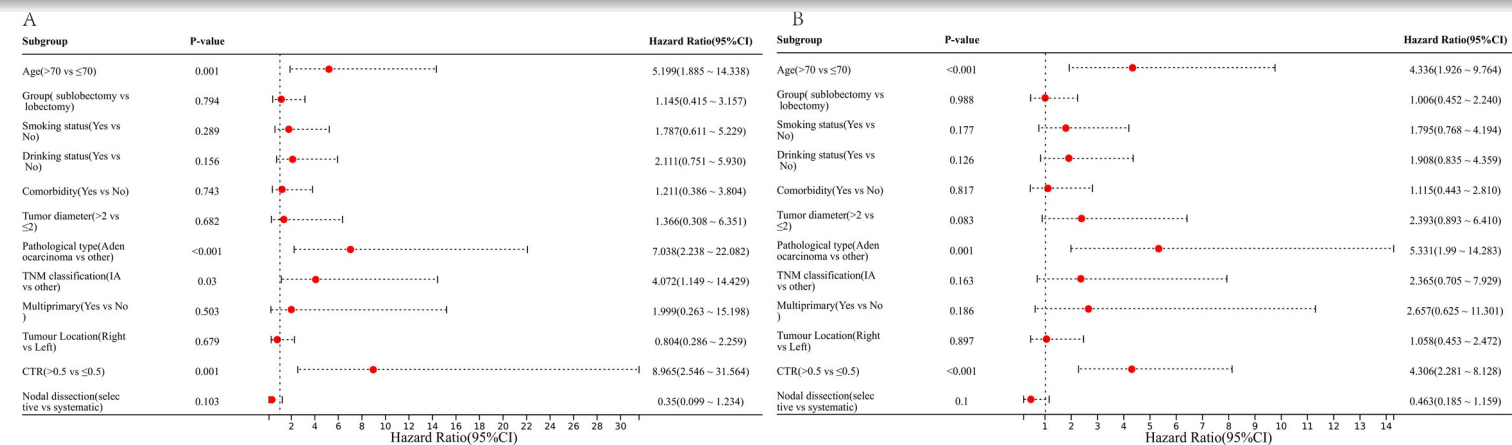


Analysis	Endpoint	Sublobectomy Rate	Lobectomy Rate	HR (95% CI)	P
Before PSM	10-yr OS	96.7%	93.7%	0.51 (0.24–1.07)	0.07
Before PSM	10-yr RFS	94.4%	91.6%	0.65 (0.36–1.16)	0.14
After PSM	10-yr OS	—	—	0.87 (0.32–2.41)	0.79
After PSM	10-yr RFS	—	—	0.99 (0.45–2.21)	0.99

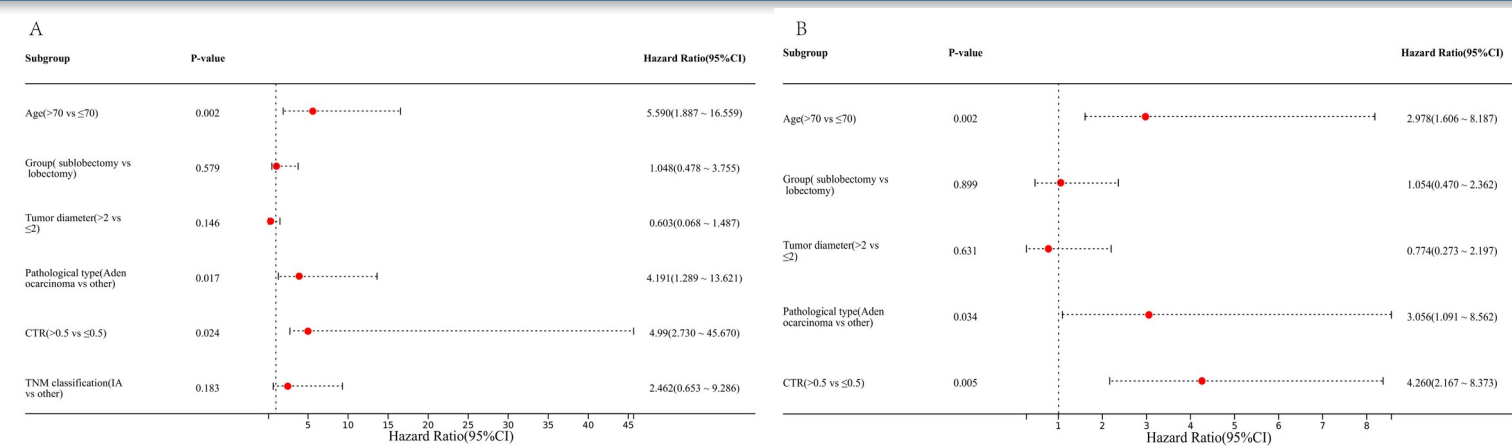
No significant difference in 10-year OS or RFS between sublobectomy and lobectomy, before or after PSM.

Results: Univariate & Multivariate Cox Regression

Univariate Cox Analysis (OS & RFS)



Multivariate Cox Analysis (OS & RFS)



Independent prognostic factors for OS: Age >70 (HR 5.59, P=0.002), Pathological type (HR 4.19, P=0.017), CTR >0.5 (HR 4.99, P=0.024). **Surgical approach NOT significant for OS (P=0.58) or RFS (P=0.89).**

**For NSCLC ≤ 3 cm including solid ground-glass nodule (CTR ≤ 1),
intentional sublobectomy is an appropriate choice:**

Comparable Long-Term Survival

10-yr OS: 96.7% vs 93.7%

(HR 0.87, $P=0.79$ after PSM)

10-yr RFS: 94.4% vs 91.6%

(HR 0.99, $P=0.99$ after PSM)

Multivariate Cox: surgical approach
not an independent prognostic factor

Better Perioperative Outcomes

Shorter drainage duration:

3.72 vs 4.50 days ($P=0.002$)

Less drainage volume:

573 vs 712 ml ($P=0.005$)

100% R0 resection, no conversion
to open in both groups

→ Clinical Implication

Sublobectomy preserves lung function
while achieving oncologic equivalence

Supports intentional sublobectomy for
selected early-stage NSCLC with GGO

CTR and age remain key prognostic
factors for patient selection

Study Limitations: Retrospective single-center design; limited sample size; potential selection bias despite PSM. Future multi-center prospective studies are warranted.

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