



A Matched-Pair Analysis of Sublobar Resection and Stereotactic Body Radiotherapy (SBRT) for Stage I NSCLC

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Background

- In 1960s, lobectomy with mediastinal lymph node dissection became standard operation for NSCLC
- Investigation into sublobar resection started in 1970s for patients with limited pulmonary function
- Eventually, sublobar resection proposed as appropriate treatment for Stage I instead of lobectomy
- Lung Cancer Study Group (Ginsberg et al.) Phase III randomized—
 - Lobectomy vs sublobar for T1 N0 NSCLC able to tolerate lobectomy
 - 75% increase in recurrence rates for limited resection arm (p=0.02)
- Ginsberg, Keenan et al., and Japanese groups showed improved preservation of pulmonary function for sublobar resection compared with lobectomy
- For inoperable Stage I NSCLC, conventional radiotherapy 5-yr OS rates 15-30%
 - Clinically staged patients
 - Often 2D era data quoted
 - Never been formally compared to SBRT, but higher LF rates
- SBRT advantages
 - Radiobiologic—higher BED
 - Precise Targeting—frame immobilization/abdominal compression
 - IU Phase I and Japanese studies show excellent local control
 - Convenience—3 to 4 fractions
- Inherent differences in co-morbidity profiles of operable and inoperable patients
- Only 1 small retrospective series (35 pts) of conventional RT (5-yr OS = 14%) vs sublobar (5-yr OS = 55%)
- In 402 lobectomy patients (Iizasa et al.)
 - Tumor size most significant prognostic factor for survival from lung cancer
 - Age, sex, and FEV1 independent prognostic factors for survival from death by nonprimary lung cancer-related causes

Purpose

To compare survival and recurrence between patients with Stage I NSCLC treated with **sublobar** resection matched to patients treated with **SBRT**.

Methods

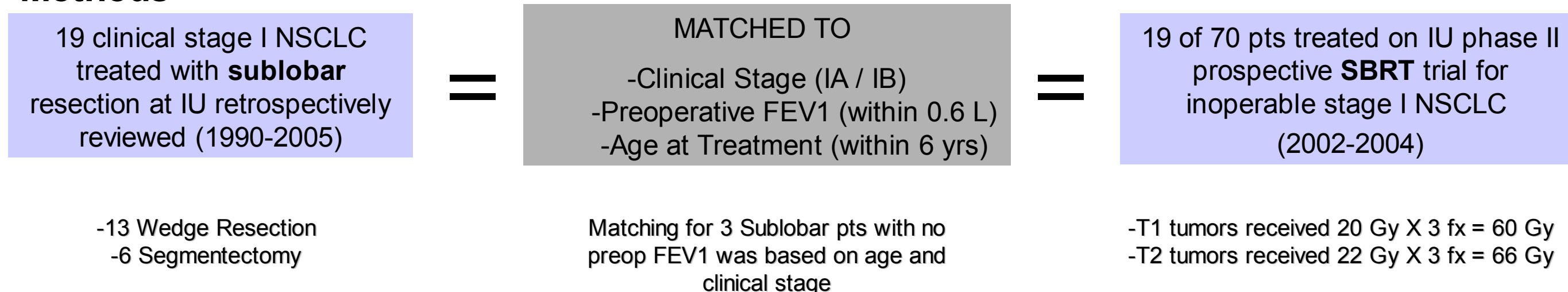


Table 1. Patient Characteristics

Characteristic	SUBLOBAR	SBRT
Clinical Stage		
IA	15 (79%)	15 (79%)
IB	4 (21%)	4 (21%)
Age (years)		
Median	67	66
Range	49-80	51-80
FEV1 (L)		
Median	1.55	1.22
Range	0.70-2.55	0.55-2.12
FEV %		
Median	63	43.5
Range	28-104	23-111
Gender		
Male	8 (42%)	9 (47%)
Female	11 (58%)	10 (53%)
Histology		
Adenocarcinoma	7 (36%)	6 (32%)
Squamous Cell	3 (16%)	6 (32%)
NSCLC/unidentified	9 (48%)	7 (36%)
Tumor Midline		
Medial	2 (22%)	8 (44%)
Peripheral	7 (78%)	10 (56%)
Tumor Sagittal		
Left	11 (58%)	9 (47%)
Right	8 (42%)	10 (53%)
History of tobacco use		
Yes	16 (84%)	18 (95%)
No	3 (16%)	1 (5%)
Oxygen dependence		
Yes	0 (0%)	5 (26%)
No	10 (100%)	14 (74%)

Results

Staging

- All SBRT pts staged with PET
- 42% of Sublobar pts had mediastinal lymph nodes sampled (median 6 LN's, range 1-16)
- 2 Sublobar pts had positive LN's and 3 were upstaged at surgery (pIB, pIIA, and pIIIA)

Patterns of Failure

- Sublobar**
- 2 local failure (LF) alone at 35 and 37 mo after surgery
 - 1 both LF and distant failure (DF) at 60 mo
 - 3 regional failure (RF) alone at 3, 16, and 92 mo
 - 1 both RF and DF at 11 mo
- SBRT**
- 1 LF and DF at 10 mo
 - 3 RF alone at 13, 14, and 20 mo
 - 1 DF alone at 31 mo
 - 2 second NSCLC primaries treated with another SBRT course at 16 and 25 mo after their initial treatment

Toxicity

- Postop complications for **Sublobar** group:
- 1 cardiac
 - 1 sepsis
 - 1 pneumonia
 - 2 air leaks
- Median postop hospital stay was 8 days (range 3-49 days)
- There were no grade III toxicities in the **SBRT** group.

Kaplan Meier median survival

Sublobar – 55 mo (CI = 33-95)

SBRT – 37 mo (CI = 25-56)

-Direct comparison could not be made between treatment methods using Kaplan-Meier analysis for median survival since aggregated group data from the two different studies was analyzed rather than paired data.

-Among 9 pairs with **3-yr survival data**, no difference between **Sublobar** and **SBRT** on McNemar's (p=0.38)

Cause Specific Deaths

- 2/10 deaths in the **Sublobar** group were from lung cancer (but 5/10 patients had no cause of death identified). . . 3 of these 5 patients had previously documented disease failure
- 2/9 **SBRT** pts died of lung cancer

Figure 1. General Treatment Algorithm For Stage I NSCLC

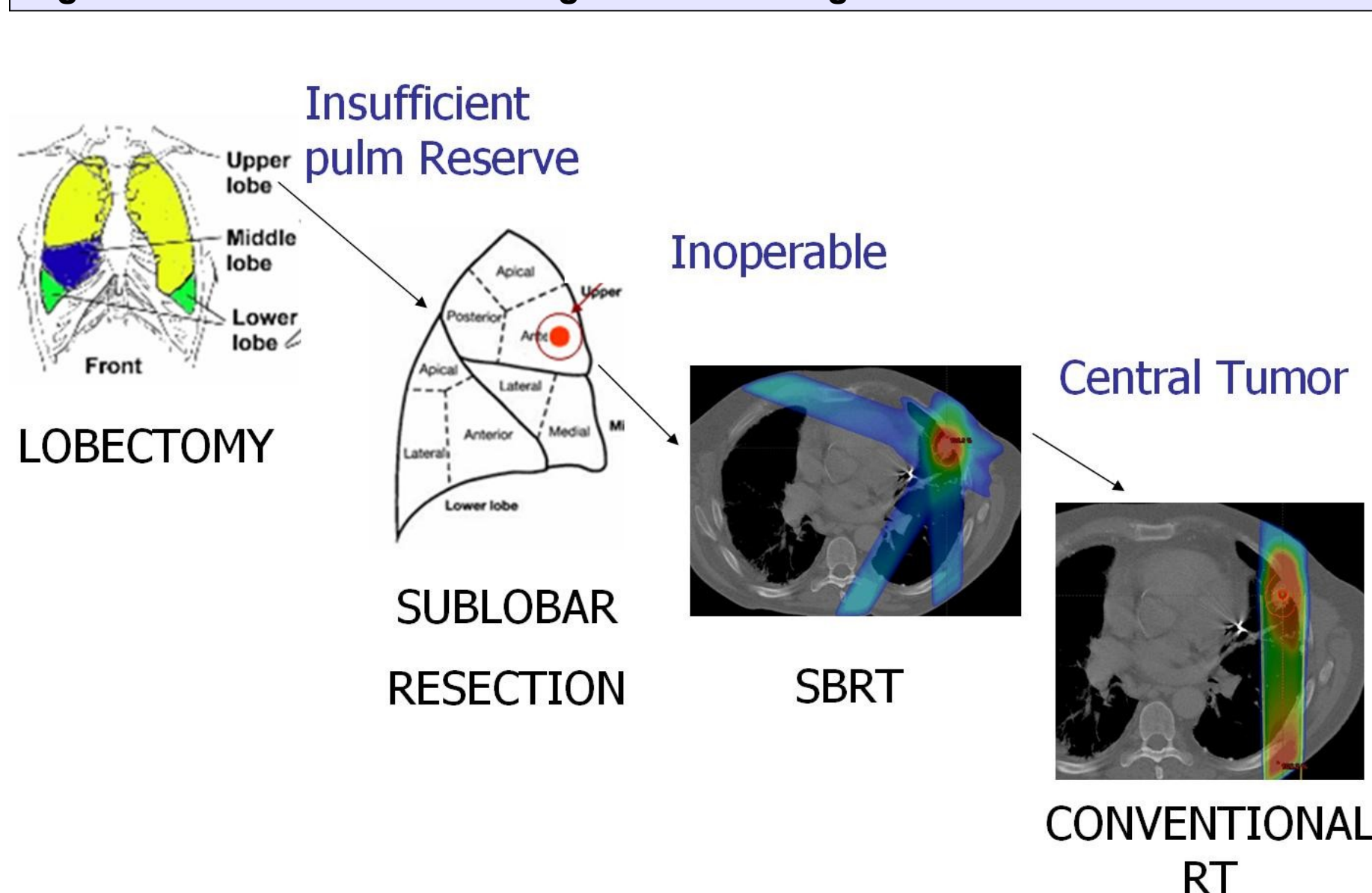
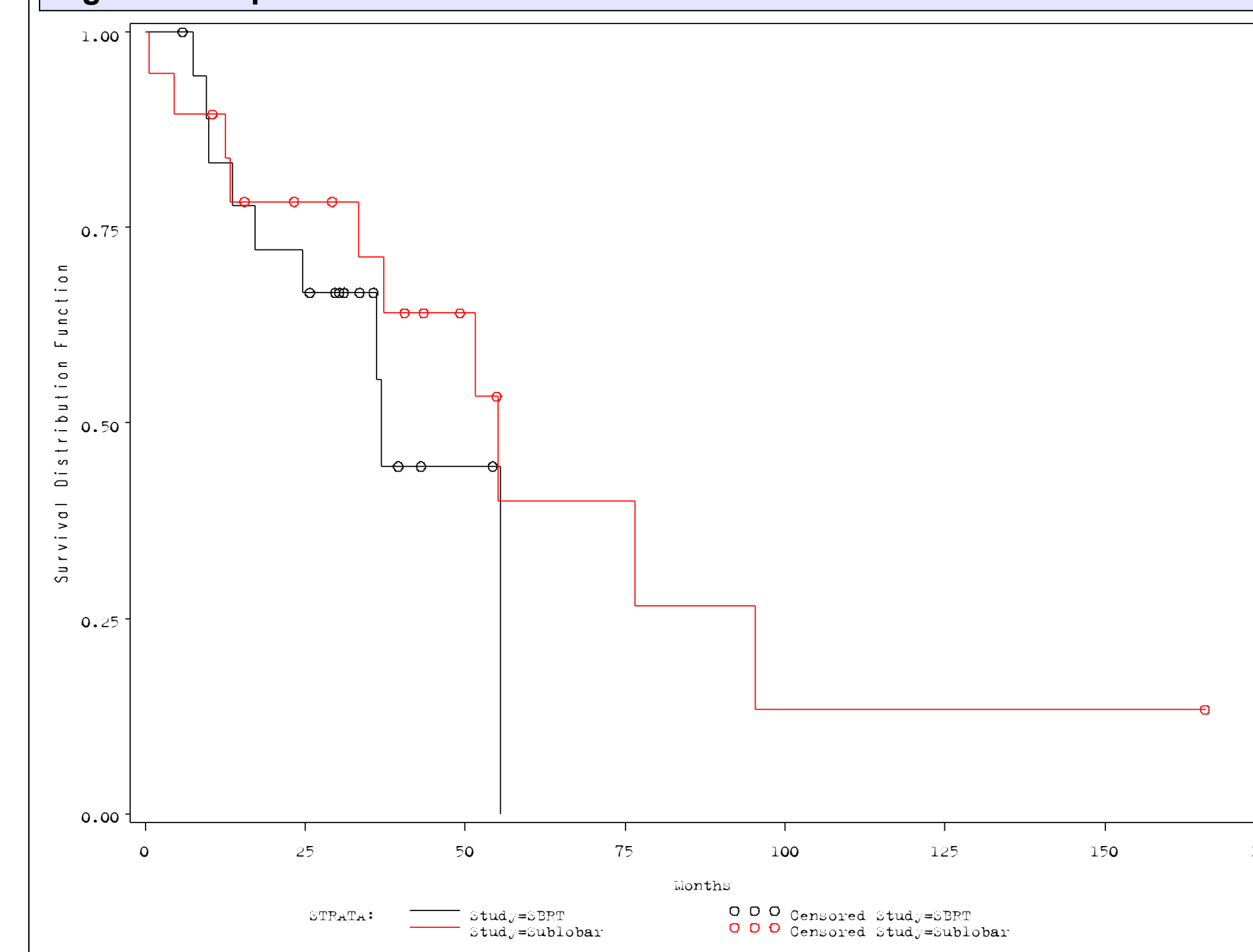


Figure 2. Kaplan Meier Survival Curves



Conclusions

- Our exploratory matched analysis suggests that local control, failure rates, and cancer-related survival are similar for stage I NSCLC treated with SBRT and sublobar resection.
- SBRT has low toxicity and avoids postoperative complications and hospital stays.
- A prospective randomized study comparing SBRT and sublobar resection for stage I NSCLC should be performed for high risk patients whose pulmonary function permits sublobar resection but not lobectomy.