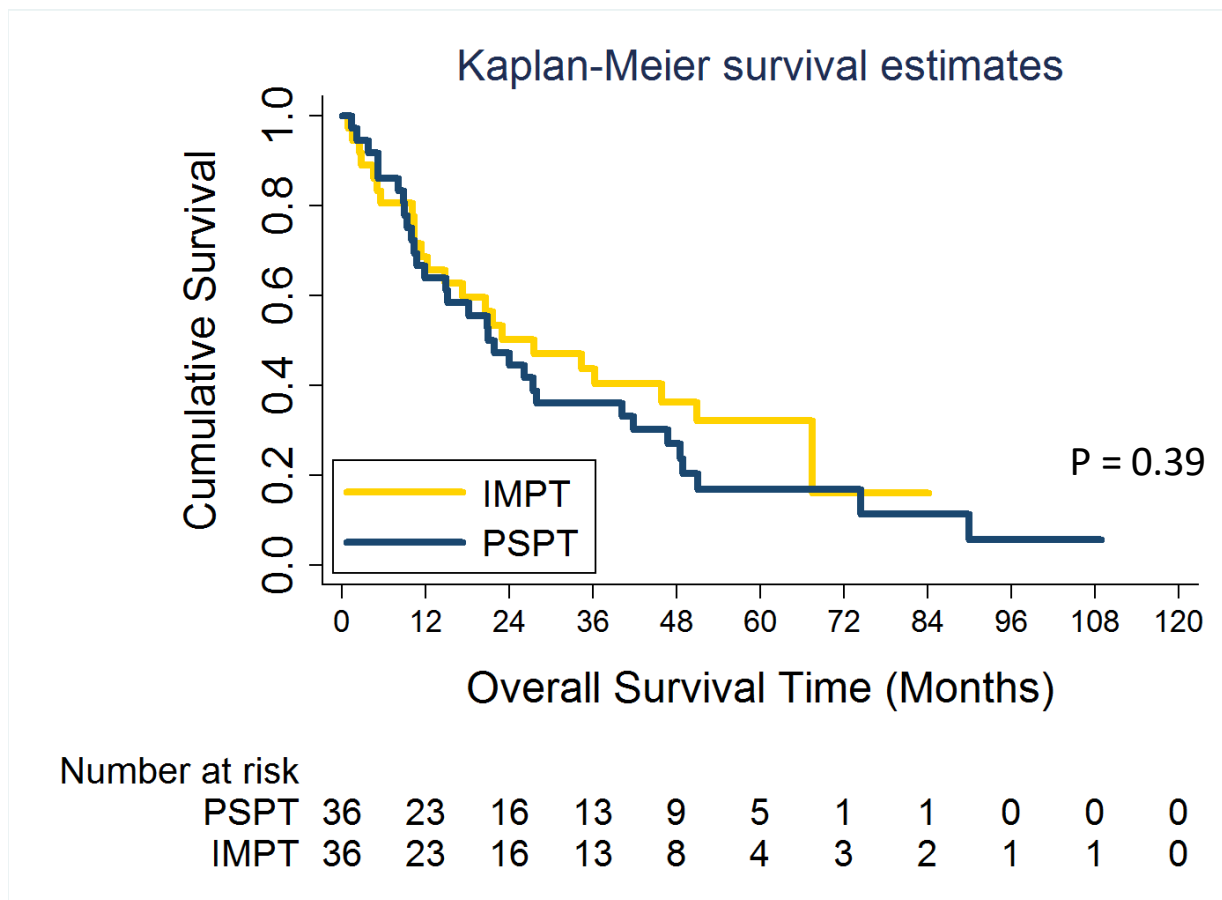


**Supplementary Figure e1.** Toxicity profiles of matched patients. Rates of grade 2 (yellow) and grade  $\geq 3$  (blue) toxicity to critical organs at risk for patients treated with passive scattering proton therapy (PSPT) or intensity-modulated proton therapy (IMPT). The P values above each set of bars correspond to differences in the rates of grade  $\geq 3$  toxicity only.  $P < 0.05$  was the threshold for statistical significance.



**Supplementary Figure e2. Overall survival of propensity score matched patients.**

Structure	Constraint
Normal Lung (right lung + left lung - GTV)	$V_{20} \leq 37\%$
Mean Lung Dose	$\leq 20\text{Gy(RBE)}$
Esophagus	$V_{45} \leq 100\%$
	$V_{55} \leq 66\%$
	$V_{65} \leq 30\%$
	$V_{70} \leq 10\%$
	$V_{75} \leq 5\%$
	$V_{78} \leq 1.0\text{cc}$
Brachial Plexus	$V_{66} \leq 2.0\text{cc}$
	$V_{70} \leq 1.0\text{cc}$
	$V_{74} \leq 0.5\text{cc}$
	$V_{75} \leq 0.1\text{cc}$
Spinal Cord	$V_{50} < 2.0\text{cc}$
Heart Total	$V_{30} \leq 100\%$
	$V_{45} \leq 66\%$
	$V_{60} \leq 33\%$
Atria (right + left)	$V_{30} < 50\%$
	$V_{40} < 40\%$
	$V_{45} < 30\%$
	$V_{50} < 20\%$
	$V_{60} < 15\%$
	$V_{70} < 8\%$
	$V_{74} < 4\%$
	$V_{78} < 1\%$
Ventricles (right + left)	$V_{30} < 30\%$
	$V_{40} < 20\%$
	$V_{45} < 15\%$
	$V_{50} < 10\%$
	$V_{60} < 1\%$
	$V_{70} = 0\%$
Liver	$V_{\leq 25} = 100\%$
	$V_{\leq 35} = 50\%$

$V_x$ , volume of tissue exposed to a dose at least x [in Gy(RBE)]

**Supplementary Table e1. Organs at risk dose constraints**

Parameter	Matched patients (n = 72)			
	All	PSPT	IMPT	P-value
<b>Sex, No. (%)</b>				0.81
Female	34 (47)	16 (44)	18 (50)	
Male	38 (53)	20 (56)	18 (50)	
<b>Median age, y (range)</b>	68 (42-81)	70 (48-80)	68 (49-81)	0.84
<b>Age group, No. (%)</b>				0.48
< 70	40 (56)	18 (50)	22 (61)	
≥ 70	32 (44)	18 (50)	14 (39)	
<b>Smoking history, No. (%)</b>				1.00
Never	6 (8)	3 (8)	3 (8)	
Ever	66 (92)	33 (92)	33 (92)	
<b>Clinical disease stage, No. (%)</b>				0.88
II	8 (11)	4 (11)	4 (11)	
IIIA	26 (36)	14 (39)	12 (33)	
IIIB	38 (53)	18 (50)	20 (56)	
IV	0 (0)	0 (0)	0 (0)	
Recurrence	0 (0)	0 (0)	0 (0)	
<b>Tumor Location, No. (%)</b>				0.54
RUL	21 (29)	13 (36)	8 (22)	
RML	7 (10)	2 (6)	5 (14)	
RLL	7 (10)	4 (11)	3 (8)	
LUL	21 (29)	9 (25)	12 (33)	
LLL	8 (11)	5 (14)	3 (8)	
Mediastinum	8 (11)	3 (8)	5 (14)	
<b>Induction chemotherapy</b>				1.00
Yes	24 (33)	12 (33)	12 (33)	
No	48 (67)	24 (67)	24 (67)	
<b>Radiation dose, No. (%)</b>				0.20
< 66Gy	13 (18)	9 (25)	4 (11)	
66-68Gy	19 (26)	7 (19)	12 (33)	
68-78Gy	40 (56)	20 (56)	20 (56)	
<b>Radiation dose, median (range)</b>	70 (54-78)	74 (54-75)	70 (60-78)	0.83

**Supplementary Table e2. Patient characteristics with matched analysis.** Left pane depict the patient characteristics for the overall population as shown in **Table 1**, while right panel depicts the baseline patient characteristics for a subset of patients whom were matched through propensity scoring for age, tumor stage, tumor location, type of systemic chemotherapy, adaptive plan, and total prescribed radiation dose. PSPT, passive scattering proton therapy; IMPT, intensity-modulated proton therapy.

Organ at Risk	All patients (n = 139)				Matched Patients (n = 72)			
	Toxicity Grade	PSPT No. (%)	IMPT No. (%)	Cumulative No. (%)	Toxicity Grade	PSPT No. (%)	IMPT No. (%)	Cumulative No. (%)
Lung	G0	55 (64)	36 (68)	91 (66)	G0	21 (58)	26 (72)	47 (65)
	G1	4 (5)	9 (17)	13 (9)	G1	0 (0)	3 (8)	3 (4)
	G2	12 (14)	7 (13)	19 (14)	G2	5 (14)	6 (17)	11 (15)
	G3	15 (17)	1 (2)	16 (12)	G3	10 (28)	1 (3)	11 (15)
	G4	0 (0)	0 (0)	0 (0)	G4	0 (0)	0 (0)	0 (0)
	G5	0 (0)	0 (0)	0 (0)	G5	0 (0)	0 (0)	0 (0)
RP + Fibrosis	G0	59 (68)	52 (98)	111 (80)	G0	22 (61)	27 (75)	49 (68)
	G1	6 (7)	0 (0)	6 (4)	G1	2 (6)	3 (8)	5 (7)
	G2	12 (14)	0 (0)	12 (9)	G2	4 (11)	6 (17)	10 (14)
	G3	9 (11)	1 (2)	10 (7)	G3	8 (22)	0 (0)	8 (11)
	G4	0 (0)	0 (0)	0 (0)	G4	0 (0)	0 (0)	0 (0)
	G5	0 (0)	0 (0)	0 (0)	G5	0 (0)	0 (0)	0 (0)
Heart	G0	63 (73)	46 (87)	109 (78)	G0	24 (67)	30 (83)	54 (75)
	G1	9 (11)	3 (6)	12 (9)	G1	5 (14)	2 (6)	7 (10)
	G2	4 (5)	4 (7)	8 (6)	G2	2 (6)	4 (11)	6 (8)
	G3	4 (5)	0 (0)	4 (3)	G3	2 (6)	0 (0)	2 (3)
	G4	2 (2)	0 (0)	2 (2)	G4	0 (0)	0 (0)	0 (0)
	G5	4 (5)	0 (0)	4 (3)	G5	3 (8)	0 (0)	3 (4)
Esophagus	G0	28 (32)	6 (11)	34 (25)	G0	12 (33)	5 (14)	17 (24)
	G1	9 (11)	19 (36)	28 (20)	G1	2 (6)	12 (33)	14 (19)
	G2	35 (41)	24 (45)	59 (42)	G2	12 (33)	17 (47)	29 (40)
	G3	14 (16)	4 (8)	18 (13)	G3	10 (28)	2 (6)	12 (17)
	G4	0 (0)	0 (0)	0 (0)	G4	0 (0)	0 (0)	0 (0)
	G5	0 (0)	0 (0)	0 (0)	G5	0 (0)	0 (0)	0 (0)
Skin	G0	28 (33)	16 (30)	44 (31)	G0	12 (33)	11 (31)	23 (32)
	G1	32 (37)	17 (32)	49 (35)	G1	13 (36)	11 (31)	24 (33)
	G2	17 (20)	17 (32)	34 (25)	G2	8 (22)	13 (36)	21 (29)
	G3	(11)	3 (6)	12 (9)	G3	3 (8)	1 (3)	4 (6)
	G4	0 (0)	0 (0)	0 (0)	G4	0 (0)	0 (0)	0 (0)
	G5	0 (0)	0 (0)	0 (0)	G5	0 (0)	0 (0)	0 (0)
Pain	G0	59 (69)	18 (34)	77 (55)	G0	21 (58)	13 (36)	34 (47)
	G1	11 (13)	20 (38)	31 (22)	G1	7 (19)	12 (33)	19 (26)
	G2	15 (17)	15 (28)	30 (22)	G2	7 (19)	11 (31)	18 (25)
	G3	1 (1)	0 (0)	1 (1)	G3	1 (3)	0 (0)	1 (1)
	G4	0 (0)	0 (0)	0 (0)	G4	0 (0)	0 (0)	0 (0)
	G5	0 (0)	0 (0)	0 (0)	G5	0 (0)	0 (0)	0 (0)
Fatigue	G0	26 (30)	4 (8)	30 (22)	G0	10 (28)	4 (11)	14 (19)
	G1	27 (31)	33 (62)	60 (43)	G1	12 (33)	22 (61)	34 (47)
	G2	22 (26)	15 (28)	37 (27)	G2	6 (17)	9 (25)	15 (21)
	G3	11 (13)	1 (2)	12 (9)	G3	8 (22)	1 (3)	9 (13)
	G4	0 (0)	0 (0)	0 (0)	G4	0 (0)	0 (0)	0 (0)
	G5	0 (0)	0 (0)	0 (0)	G5	0 (0)	0 (0)	0 (0)

**Supplementary Table e3.** Details of Toxicity Severity and Rates between Treatment Groups. Left panel shows toxicity rate by site and toxicity grade for all patients included in this study before PSM, while the right panel depicts the rates after PSM. PSPT, passive scattering proton therapy; IMPT, intensity-modulated proton therapy.