Supplementary Material

Developing a predictive nomogram and web-based survival calculator for locally advanced hypopharyngeal cancer: A propensity score-adjusted, population-based study
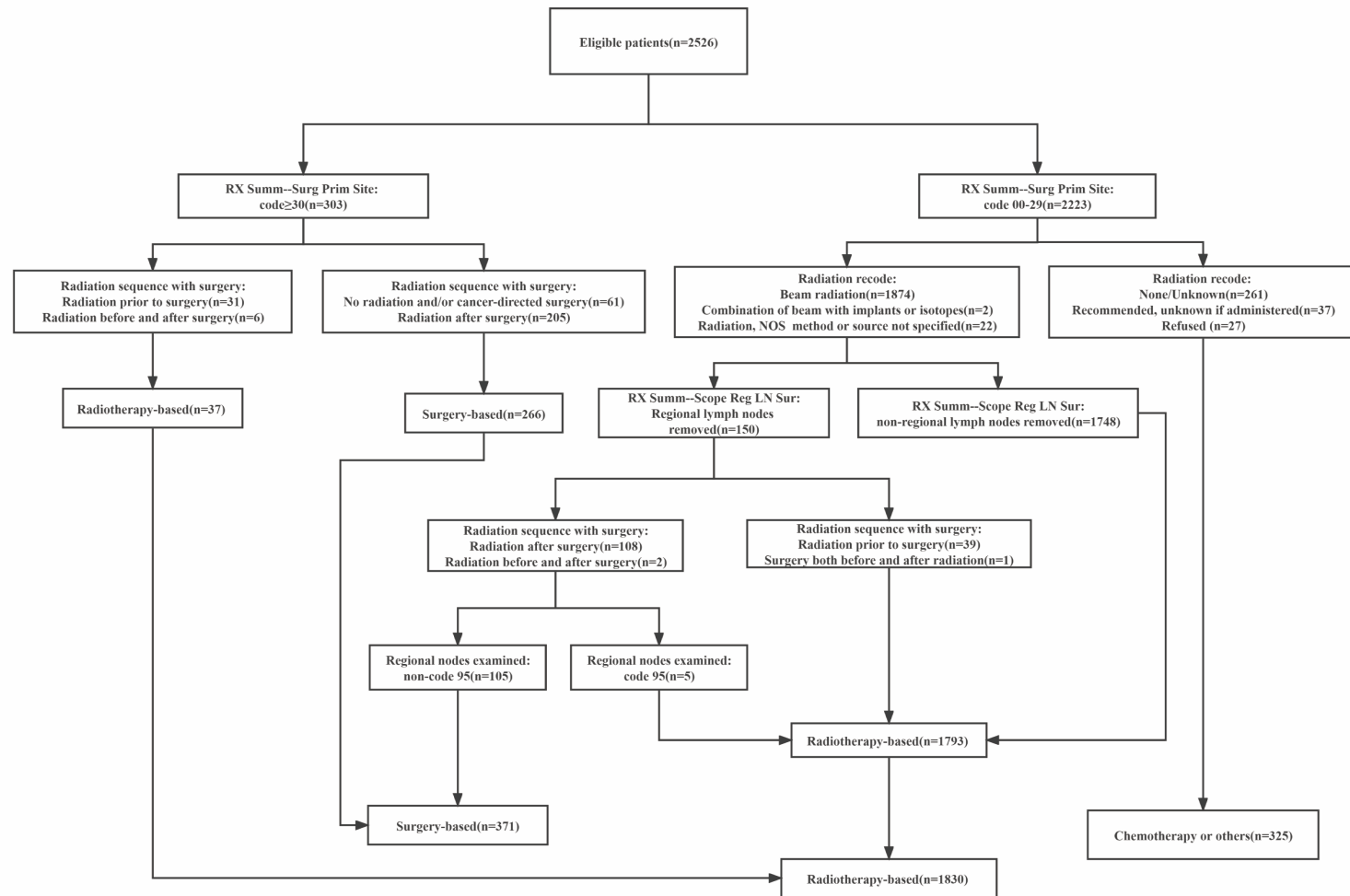
Figure S1. Screening criteria for treatment modalities

Table S1. Characteristics of the 276 LA-HPSCC patients in the external validation group.

Characteristics	External validation group (n = 276) n (%)
Median follow-up time (months)	81 (64.3-97.6)
Age (years)	
< 65	164 (59.4)
65-75	96 (34.8)
76-85	16 (5.8)
> 85	0 (0)
Sex	
Female	15 (5.4)
Male	261 (94.6)
Race	
White	0 (0)
Others	276 (100)
Black	0 (0)
Insurance	
Yes	276 (100)
No/Unknown	0 (0)
Marital status	
Married	276 (97.1)
Others	8 (2.9)
Primary site	
Pyriform sinus	179 (64.8)
Postcricoid region	9 (3.2)
Aryepiglottic fold	16 (5.8)
Posterior wall	62 (22.6)
Overlapping lesion	10 (3.6)
NOS	0 (0)
Pathological grade	
I-II	135 (48.9)
III-IV	131 (47.5)
Unknown	10 (3.6)
T stage	
T1	15 (5.4)
T2	63 (22.8)
T3	68 (24.6)
T4a	62 (22.6)
T4b	68 (24.6)
N stage	
N0	24 (8.7)
N1	55 (19.9)
N2	150 (54.3)

N3	47 (17.1)
AJCC stage	
III	46 (16.7)
IVa	124 (44.9)
IVb	106 (38.4)
Treatments	
Surgery-based	36 (13.1)
Radiotherapy-based	124 (44.9)
Chemotherapy or others	116 (42.0)

LA-HPSCC: Locally advanced hypopharyngeal squamous cell carcinoma; AJCC: American Joint Committee on Cancer; NOS: Not otherwise specified
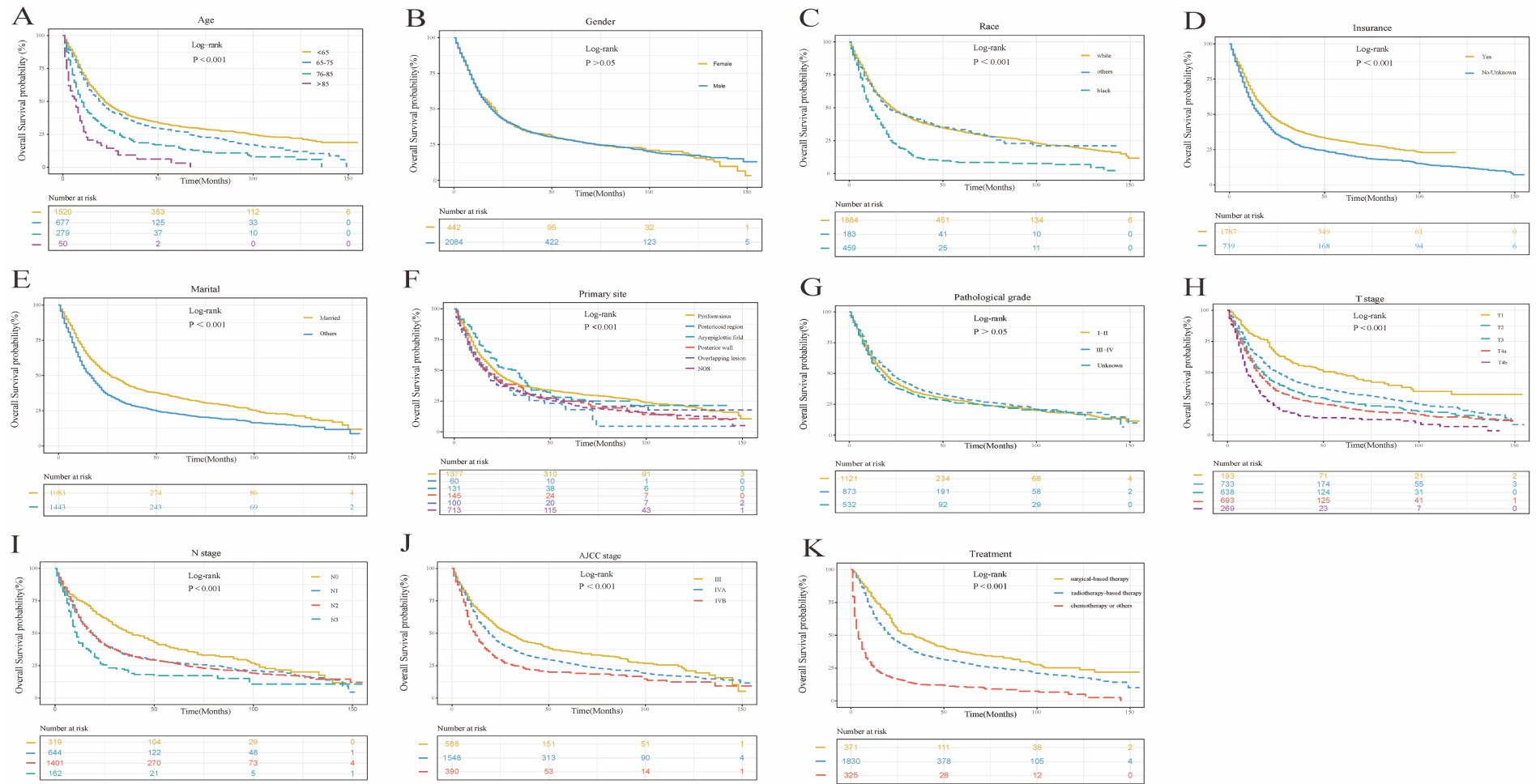
Figure S2. Kaplan-Meier survival curves for overall survival in the total sample. AJCC: American Joint Committee on Cancer; NOS: Not otherwise specified.
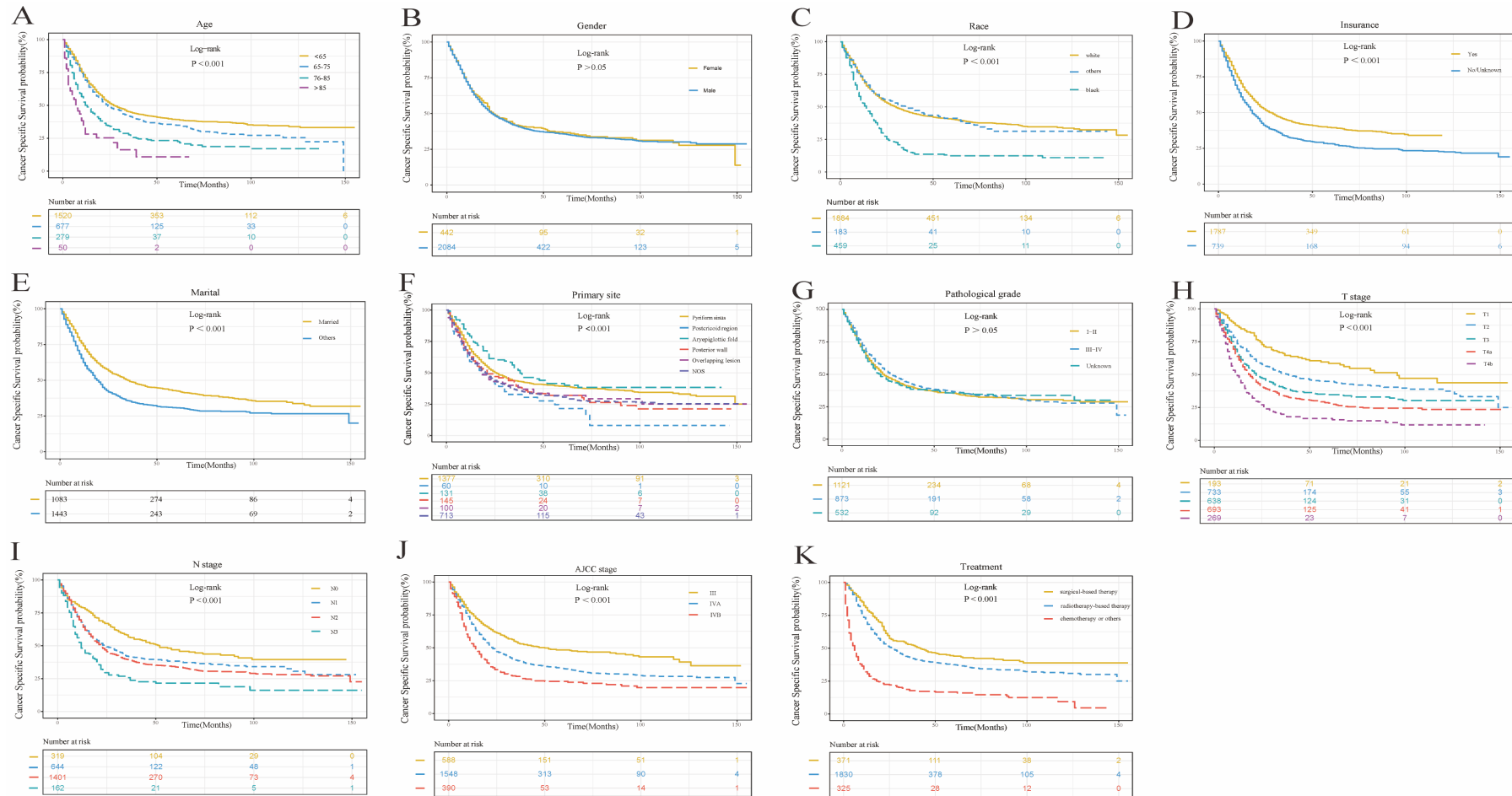
Figure S3. Kaplan-Meier survival curves for cancer-specific survival in the total sample. AJCC: American Joint Committee on Cancer; NOS: Not otherwise specified

Table S2. Comparison of C-index between nomogram model and AJCC staging

Groups	C-index (± SD)	
	OS	CSS
Training group	0.750 ± 0.025	0.709 ± 0.025
The Nomogram model	0.631 ± 0.029	0.639 ± 0.027
The AJCC Staging		
Validation group	0.756 ± 0.038	0.698 ± 0.038
The Nomogram model	0.631 ± 0.045	0.621 ± 0.040
The AJCC Staging		
External validation group		
The Nomogram model	0.757 ± 0.061	—
The AJCC Staging	0.666 ± 0.066	—

C-index: Concordance index; AJCC: American Joint Committee on Cancer; OS: Overall survival; CSS: Cancer-specific survival.
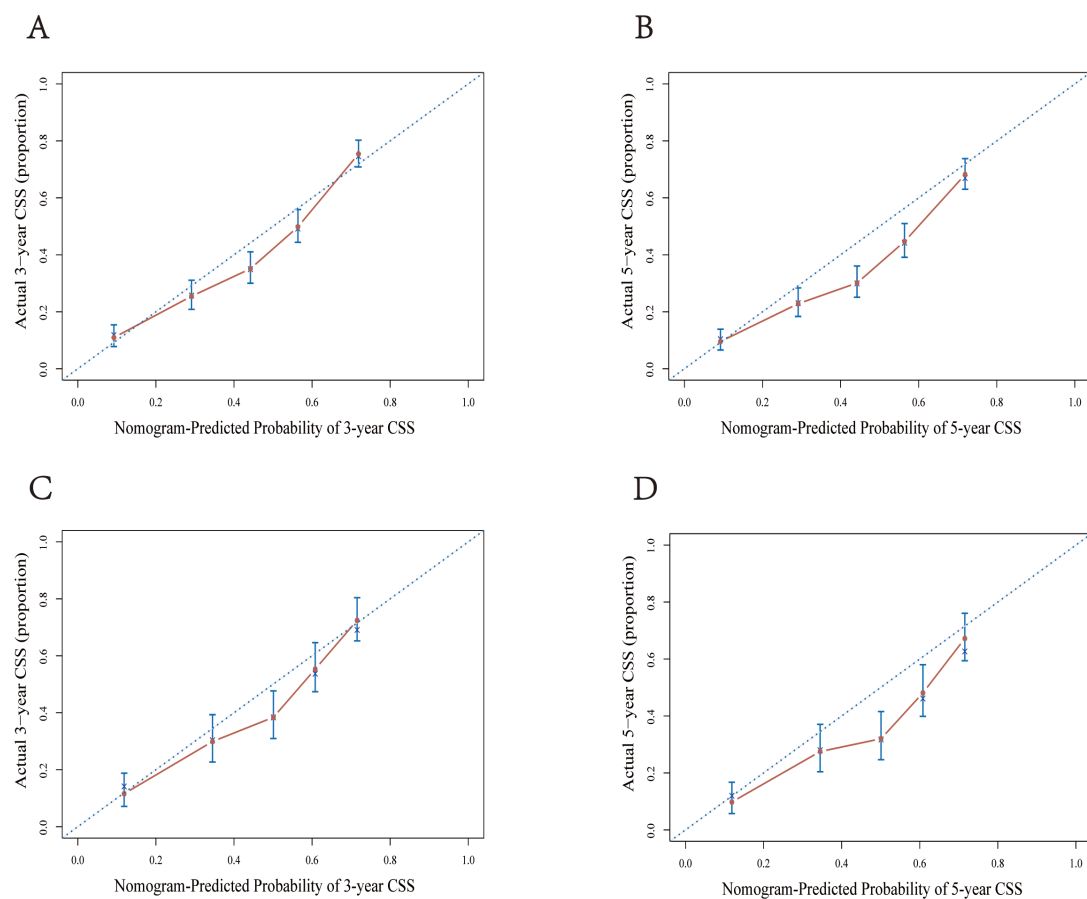
Figure S4. The calibration curves predicting 3- and 5-year cancer-specific survival (CSS) in training group (A, B) and validation group (C, D).

Figure S5. The nomogram and the AJCC stage of the receiver operating characteristic curve analysis in the prediction of CSS at the 3- and 5-year point in the training (A, B), internal validation (C, D) and the decision curve analysis in the prediction of CSS at the 3- and 5-year point in the training (E, F), internal validation (G, H) groups. CSS: Cancer-specific survival; AJCC: American Joint Committee on Cancer.

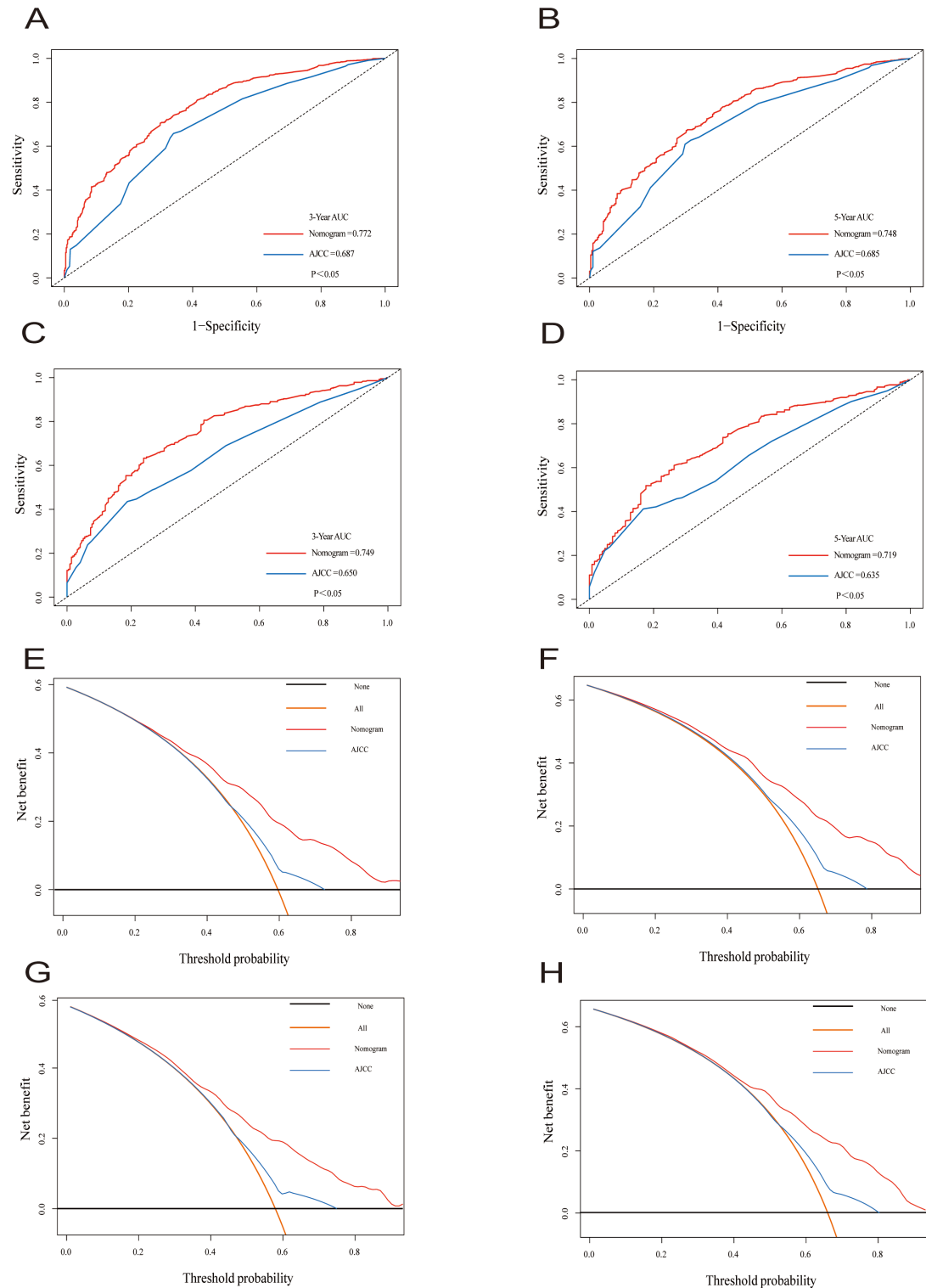**Table S3.** PSM analysis of surgical-based vs radiotherapy-based therapy

Characteristics	Unmatched		P value	Matched		P value
	Surgery-based N = 371	Radiotherapy-based N = 1830		Surgery-based N = 371	Radiotherapy-based N = 371	
Age (years)			0.676			0.568
< 65	244 (65.8%)	1097 (60.0%)		244 (65.8%)	255 (68.7%)	
65-75	98 (26.4%)	494 (27.0%)		98 (26.4%)	71 (19.1%)	
76-85	25 (6.7%)	204 (11.1%)		25 (6.7%)	37 (10.0%)	
> 85	4 (1.1%)	35 (1.9%)		4 (1.1%)	8 (2.2%)	
Sex			0.704			0.393
Male	314 (84.6%)	1505 (82.2%)		314 (84.6%)	333 (89.8%)	
Female	57 (15.4%)	325 (17.8%)		57 (15.4%)	38 (10.2%)	
Race			0.731			0.675
White	290 (78.2%)	1369 (74.8%)		290 (78.2%)	285 (76.8%)	
Black	51 (13.7%)	338 (18.5%)		51 (13.7%)	65 (17.5%)	
Others	30 (8.1%)	123 (6.7%)		30 (8.1%)	21 (5.7%)	
Insurance			0.807			0.606
Yes	258 (69.5%)	1244 (67.9%)		258 (69.5%)	255 (72.8%)	
No/Unknown	113 (30.5%)	586 (32.1%)		113 (30.5%)	101 (27.2%)	
Marital status			0.818			0.593
Married	155 (41.8%)	735 (40.2%)		155 (41.8%)	141 (38.1%)	
Others	216 (58.2%)	1095 (59.8%)		216 (58.2%)	230 (61.9%)	
Primary site			0.657			0.843
Pyriform sinus	227 (61.2%)	991 (54.2%)		227 (61.2%)	204 (55.0%)	
Postcricoid region	4 (1.1%)	47 (2.6%)		4 (1.1%)	9 (2.4%)	
Aryepiglottic fold	23 (6.2%)	94 (5.1%)		23 (6.2%)	18 (4.9%)	
Posterior wall	11 (3.0%)	119 (6.5%)		11 (3.0%)	23 (6.2%)	
Overlapping lesion	15 (4.0%)	70 (3.8%)		15 (4.0%)	12 (3.2%)	
NOS	91 (24.5%)	509 (27.8%)		91 (24.5%)	105 (28.3%)	
Pathological grade			0.016			0.682
I-II	168 (45.3%)	815 (44.5%)		168 (45.3%)	150 (40.4%)	
III-IV	170 (45.8%)	598 (32.7%)		170 (45.8%)	178 (48.0%)	
Unknown	33 (8.9%)	417 (22.8%)		33 (8.9%)	43 (11.6%)	
T stage			0.036			0.454
T1	49 (13.2%)	123 (6.7%)		49 (13.2%)	34 (9.2%)	
T2	82 (22.1%)	568 (31.1%)		82 (22.1%)	90 (24.3%)	
T3	65 (17.5%)	505 (27.6%)		65 (17.5%)	69 (18.6%)	
T4a	149 (40.2%)	449 (24.5%)		149 (40.2%)	125 (33.6%)	
T4b	26 (7.0%)	185 (10.1%)		26 (7.0%)	53 (14.3%)	
N stage			0.551			0.274
N0	38 (10.2%)	237 (13.0%)		38 (10.2%)	50 (13.5%)	
N1	73 (19.7%)	486 (26.5%)		73 (19.7%)	92 (24.8%)	

N2	237 (63.9%)	998 (54.5%)		237 (63.9%)	190 (51.2%)	
N3	23 (6.2%)	109 (6.0%)		23 (6.2%)	39 (10.5%)	
AJCC stage			0.067			0.132
III	51 (13.7%)	469 (25.7%)		51 (13.7%)	79 (21.3%)	
IVa	274 (73.9%)	1093 (59.7)		274 (73.9%)	224 (60.4%)	
IVb	46 (12.4%)	268 (14.6%)		46 (12.4%)	68 (18.3%)	

AJCC: American Joint Committee on Cancer; NOS: Not otherwise specified; PSM: Propensity score matching

Table S4. PSM analysis of RT vs RCT

Characteristics	Unmatched			Matched		
	RT N = 267	CRT N = 1563	P value	RT N = 261	CRT N = 261	P value
Age (years)			0.001			0.865
< 65	112 (42.0%)	985 (63.1%)		112 (42.9%)	100 (38.3%)	
65-75	72 (27.0%)	422 (27.0%)		72 (27.6%)	81 (31.0%)	
76-85	61 (22.8%)	143 (9.1%)		61 (23.4%)	68 (26.1%)	
> 85	22 (8.2%)	13 (0.8%)		16 (6.1%)	12 (4.6%)	
Sex			0.476			0.404
Male	209 (78.3%)	1296 (82.9%)		206 (78.9%)	193 (73.9%)	
Female	58 (21.7%)	267 (17.1%)		55 (21.1%)	68 (26.1%)	
Race			0.846			0.173
White	194 (72.7%)	1175 (75.2%)		191 (73.2%)	164 (62.8%)	
Black	57 (21.3%)	281 (18.0%)		56 (21.5%)	69 (26.5%)	
Others	16 (6.0%)	107 (6.8%)		14 (5.3%)	28 (10.7%)	
Insurance			0.563			0.658
Yes	195 (73.1%)	1085 (69.4%)		193 (73.9%)	200 (76.6%)	
No/Unknown	72 (26.9%)	478 (30.6%)		68 (26.1%)	61 (23.4%)	
Marital status			0.802			0.361
Married	114 (42.6%)	697 (44.6%)		105 (40.3%)	122 (46.7%)	
Others	153 (57.3%)	866 (55.4%)		156 (59.7%)	139 (53.3%)	
Primary site			0.876			0.205
Pyriform sinus	155 (58.1%)	836 (53.5%)		151 (57.9%)	142 (54.4%)	
Postcricoid region	10 (3.7%)	37 (2.4%)		10 (3.8%)	2 (0.8%)	
Aryepiglottic fold	14 (5.2%)	80 (5.1%)		14 (5.4%)	22 (8.4%)	
Posterior wall	17 (6.4%)	102 (6.5%)		17 (6.5%)	37 (14.2%)	
Overlapping lesion	9 (3.4%)	61 (3.9%)		9 (3.4%)	15 (5.7%)	
NOS	62 (23.2%)	447 (28.6%)		60 (23.0%)	43 (16.5%)	
Pathological grade			0.558			0.495
I-II	128 (47.9%)	687 (44.0%)		124 (47.5%)	121 (46.4%)	
III-IV	71 (26.6%)	527 (33.7%)		70 (26.8%)	87 (33.3%)	
Unknown	68 (25.5%)	349 (22.3%)		67 (25.7%)	53 (20.3%)	
T stage			0.988			0.474
T1	17 (6.4%)	106 (6.8%)		17 (6.5%)	5 (1.9%)	
T2	77 (28.8%)	491 (31.4%)		75 (28.7%)	68 (26.1%)	
T3	76 (28.5%)	429 (27.4%)		73 (28.0%)	87 (33.3%)	
T4a	71 (26.6%)	378 (24.2%)		70 (26.8%)	70 (26.8%)	
T4b	26 (9.7%)	159 (10.2%)		26 (10.0%)	31 (11.9%)	
N stage			0.291			0.495
N0	45 (16.9%)	192 (12.3%)		43 (16.5%)	63 (24.1%)	
N1	88 (33.0%)	398 (25.5%)		86 (33.0%)	70 (26.8%)	
N2	125 (46.7%)	873 (55.8%)		123 (47.1%)	123 (47.1%)	

N3	9 (3.4%)	100 (6.4%)	9 (3.4%)	5 (2.0%)
AJCC stage			0.514	0.988
III	86 (32.2%)	383 (24.5%)	82 (31.4%)	83 (31.8%)
IVa	150 (56.2%)	943 (60.3%)	148 (56.7%)	146 (55.9%)
IVb	31 (11.6%)	237 (15.2%)	31 (11.9%)	32 (12.3%)

RT: Radiotherapy; CT: Chemoradiotherapy; AJCC: American Joint Committee on Cancer; NOS: Not otherwise specified