

Supplementary

Table S1 Demographic and clinical characteristics of T1N0M0 RC patients before and after PSM

Variables	Before PSM						After PSM					
	Total (n=11,003)	No RT (n=10,969)	Preoperative RT (n=34)	Statistic	P	SMD	Total (n=68)	No RT (n=34)	Preoperative RT (n=34)	Statistic	P	SMD
Age (years)				$\chi^2=3.422$	0.064					$\chi^2=0.000$	>0.99	
<65	6,564 (59.66)	6,549 (59.70)	15 (44.12)			-0.314	30 (44.12)	15 (44.12)	15 (44.12)			0.000
≥65	4,439 (40.34)	4,420 (40.30)	19 (55.88)			0.314	38 (55.88)	19 (55.88)	19 (55.88)			0.000
Sex				$\chi^2=0.157$	0.692					$\chi^2=0.000$	>0.99	
Female	4,902 (44.55)	4,888 (44.56)	14 (41.18)			-0.069	28 (41.18)	14 (41.18)	14 (41.18)			0.000
Male	6,101 (55.45)	6,081 (55.44)	20 (58.82)			0.069	40 (58.82)	20 (58.82)	20 (58.82)			0.000
Year of diagnose				$\chi^2=18.492$	<0.001*					$\chi^2=0.000$	>0.99	
2004–2012	3,633 (33.02)	3,610 (32.91)	23 (67.65)			0.743	46 (67.65)	23 (67.65)	23 (67.65)			0.000
2013–2021	7,370 (66.98)	7,359 (67.09)	11 (32.35)			-0.743	22 (32.35)	11 (32.35)	11 (32.35)			0.000
Surgery				$\chi^2=28.579$	<0.001*					$\chi^2=0.000$	>0.99	
Local excision	6,829 (62.06)	6,823 (62.20)	6 (17.65)			-1.169	12 (17.65)	6 (17.65)	6 (17.65)			0.000
Radical resection	4,174 (37.94)	4,146 (37.80)	28 (82.35)			1.169	56 (82.35)	28 (82.35)	28 (82.35)			0.000
Tumor size (cm)				$\chi^2=93.497$	<0.001*					-	>0.99	
<1	5,207 (47.32)	5,204 (47.44)	3 (8.82)			-1.362	6 (8.82)	3 (8.82)	3 (8.82)			0.000
≥3	1,404 (12.76)	1,381 (12.59)	23 (67.65)			1.177	46 (67.65)	23 (67.65)	23 (67.65)			0.000
≥1 and <3	4,392 (39.92)	4,384 (39.97)	8 (23.53)			-0.388	16 (23.53)	8 (23.53)	8 (23.53)			0.000
Income				$\chi^2=11.608$	0.003*					$\chi^2=0.000$	>0.99	
<\$70,000	3,314 (30.12)	3,295 (30.04)	19 (55.88)			0.520	38 (55.88)	19 (55.88)	19 (55.88)			0.000
≥\$85,000	4,222 (38.37)	4,216 (38.44)	6 (17.65)			-0.545	12 (17.65)	6 (17.65)	6 (17.65)			0.000
\$70,000–\$84,999	3,467 (31.51)	3,458 (31.53)	9 (26.47)			-0.115	18 (26.47)	9 (26.47)	9 (26.47)			0.000

Data are presented as n (%). χ^2 , Chi-squared test; -, Fisher exact; *, simulated P value. PSM, propensity score matching; RC, rectal cancer; RT, radiotherapy; SMD, standardized mean difference.

Table S2 Demographic and clinical characteristics of T2N0M0 RC patients before and after PSM

Variables	Before PSM						After PSM					
	Total (n=5,603)	No RT (n=5,531)	Preoperative RT (n=72)	Statistic	P	SMD	Total (n=144)	No RT (n=72)	Preoperative RT (n=72)	Statistic	P	SMD
Age (years)				$\chi^2=3.190$	0.074					$\chi^2=0.000$	>0.99	
<65	2,288 (40.84)	2,266 (40.97)	22 (30.56)			-0.226	44 (30.56)	22 (30.56)	22 (30.56)			0.000
≥65	3,315 (59.16)	3,265 (59.03)	50 (69.44)			0.226	100 (69.44)	50 (69.44)	50 (69.44)			0.000
Sex				$\chi^2=2.339$	0.126					$\chi^2=0.000$	>0.99	
Female	2,443 (43.6)	2,418 (43.72)	25 (34.72)			-0.189	50 (34.72)	25 (34.72)	25 (34.72)			0.000
Male	3,160 (56.4)	3,113 (56.28)	47 (65.28)			0.189	94 (65.28)	47 (65.28)	47 (65.28)			0.000
Year of diagnose				$\chi^2=2.737$	0.098					$\chi^2=0.000$	>0.99	
2004–2012	3,039 (54.24)	2,993 (54.11)	46 (63.89)			0.204	92 (63.89)	46 (63.89)	46 (63.89)			0.000
2013–2021	2,564 (45.76)	2,538 (45.89)	26 (36.11)			-0.204	52 (36.11)	26 (36.11)	26 (36.11)			0.000
Race				$\chi^2=0.728$	0.867					$\chi^2=0.000$	>0.99	
American Indian/Alaska Native	38 (0.68)	38 (0.69)	0 (0.00)			-0.084						
Asian or Pacific Islander	475 (8.48)	468 (8.46)	7 (9.72)			0.043	14 (9.72)	7 (9.72)	7 (9.72)			0.000
Black	416 (7.42)	410 (7.41)	6 (8.33)			0.033	12 (8.33)	6 (8.33)	6 (8.33)			0.000
White	4,674 (83.42)	4,615 (83.44)	59 (81.94)			-0.039	118 (81.94)	59 (81.94)	59 (81.94)			0.000
Surgery				$\chi^2=0.002$	0.968					$\chi^2=0.000$	>0.99	
Local excision	769 (13.72)	759 (13.72)	10 (13.89)			0.005	20 (13.89)	10 (13.89)	10 (13.89)			0.000
Radical resection	4,834 (86.28)	4,772 (86.28)	62 (86.11)			-0.005	124 (86.11)	62 (86.11)	62 (86.11)			0.000
Tumor size (cm)				$\chi^2=0.548$	0.760					-	>0.99	
<1	219 (3.91)	215 (3.89)	4 (5.56)			0.073	8 (5.56)	4 (5.56)	4 (5.56)			0.000
≥3	3,120 (55.68)	3,080 (55.69)	40 (55.56)			-0.003	80 (55.56)	40 (55.56)	40 (55.56)			0.000
≥1 and <3	2,264 (40.41)	2,236 (40.43)	28 (38.89)			-0.032	56 (38.89)	28 (38.89)	28 (38.89)			0.000

Table S2 (continued)

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Variables	Before PSM						After PSM					
	Total (n=5,603)	No RT (n=5,531)	Preoperative RT (n=72)	Statistic	P	SMD	Total (n=144)	No RT (n=72)	Preoperative RT (n=72)	Statistic	P	SMD
Income				$\chi^2=2.269$	0.322					$\chi^2=0.000$	>0.99	
<\$70,000	1,861 (33.21)	1,835 (33.18)	26 (36.11)			0.061	52 (36.11)	26 (36.11)	26 (36.11)			0.000
≥\$85,000	1,801 (32.14)	1,774 (32.07)	27 (37.50)			0.112	54 (37.5)	27 (37.50)	27 (37.50)			0.000
\$70,000–\$84,999	1,941 (34.64)	1,922 (34.75)	19 (26.39)			-0.190	38 (26.39)	19 (26.39)	19 (26.39)			0.000

Data are presented as n (%). χ^2 , Chi-squared test; –, Fisher exact. PSM, propensity score matching; RC, rectal cancer; RT, radiotherapy; SMD, standardized mean difference.

Table S3 Demographic and clinical characteristics of RC patients undergoing local excision before and after PSM

Variables	Before PSM						After PSM					
	Total (n=7,598)	No RT (n=7,582)	Preoperative RT (n=16)	Statistic	P	SMD	Total (n=32)	No RT (n=16)	Preoperative RT (n=16)	Statistic	P	SMD
Age (years)				$\chi^2=7.584$	0.006*					–	>0.99	
<65	4,471 (58.84)	4,467 (58.92)	4 (25.00)			–0.783	8 (25.00)	4 (25.00)	4 (25.00)			0.000
≥65	3,127 (41.16)	3,115 (41.08)	12 (75.00)			0.783	24 (75.00)	12 (75.00)	12 (75.00)			0.000
Sex				$\chi^2=0.028$	0.867					–	>0.99	
Female	3,483 (45.84)	3,476 (45.85)	7 (43.75)			–0.042	14 (43.75)	7 (43.75)	7 (43.75)			0.000
Male	4,115 (54.16)	4,106 (54.15)	9 (56.25)			0.042	18 (56.25)	9 (56.25)	9 (56.25)			0.000
Year of diagnose				$\chi^2=3.148$	0.076					–	>0.99	
2004–2012	2,064 (27.17)	2,056 (27.12)	8 (50.00)			0.458	16 (50.00)	8 (50.00)	8 (50.00)			0.000
2013–2021	5,534 (72.83)	5,526 (72.88)	8 (50.00)			–0.458	16 (50.00)	8 (50.00)	8 (50.00)			0.000
Race				–	0.139					–	>0.99	
American Indian/Alaska Native	82 (1.08)	82 (1.08)	0 (0.00)			–0.105						
Asian or Pacific Islander	994 (13.08)	994 (13.11)	0 (0.00)			–0.389						
Black	1,114 (14.66)	1,109 (14.63)	5 (31.25)			0.359	10 (31.25)	5 (31.25)	5 (31.25)			0.000
White	5,408 (71.18)	5,397 (71.18)	11 (68.75)			–0.052	22 (68.75)	11 (68.75)	11 (68.75)			0.000
T stage				$\chi^2=42.759$	<0.001*					–	>0.99	
T1	6,829 (89.88)	6,823 (89.99)	6 (37.50)			–1.084	12 (37.50)	6 (37.50)	6 (37.50)			0.000
T2	769 (10.12)	759 (10.01)	10 (62.50)			1.084	20 (62.50)	10 (62.50)	10 (62.50)			0.000
Tumor size (cm)				$\chi^2=78.629$	<0.001*					–	>0.99	
<1	4,195 (55.21)	4,195 (55.33)	0 (0.00)			–1.114						
≥3	865 (11.38)	852 (11.24)	13 (81.25)			1.794	26 (81.25)	13 (81.25)	13 (81.25)			0.000
≥1 and <3	2,538 (33.4)	2,535 (33.43)	3 (18.75)			–0.376	6 (18.75)	3 (18.75)	3 (18.75)			0.000

Table S3 (continued)

Table S3 (continued)

Variables	Before PSM						After PSM					
	Total (n=7,598)	No RT (n=7,582)	Preoperative RT (n=16)	Statistic	P	SMD	Total (n=32)	No RT (n=16)	Preoperative RT (n=16)	Statistic	P	SMD
Income				$\chi^2=8.794$	0.012*					-	>0.99	
<\$70,000	2,215 (29.15)	2,205 (29.08)	10 (62.50)			0.690	20 (62.50)	10 (62.50)	10 (62.50)			0.000
≥\$85,000	2,987 (39.31)	2,983 (39.34)	4 (25.00)			-0.331	8 (25.00)	4 (25.00)	4 (25.00)			0.000
\$70,000–\$84,999	2,396 (31.53)	2,394 (31.57)	2 (12.50)			-0.577	4 (12.50)	2 (12.50)	2 (12.50)			0.000

Data are presented as n (%). χ^2 , Chi-squared test; -, Fisher exact; *, simulated P value. PSM, propensity score matching; RC, rectal cancer; RT, radiotherapy; SMD, standardized mean difference; T, tumor.

Table S4 Demographic and clinical characteristics of RC patients undergoing radical resection before and after PSM

Variables	Before PSM					After PSM						
	Total (n=9,008)	No RT (n=8,918)	Preoperative RT (n=90)	Statistic	P	SMD	Total (n=180)	No RT (n=90)	Preoperative RT (n=90)	Statistic	P	SMD
Age (years)				$\chi^2=5.212$	0.022*					$\chi^2=0.024$	0.877	
<65	4,381 (48.63)	4,348 (48.76)	33 (36.67)			-0.251	67 (37.22)	34 (37.78)	33 (36.67)			-0.023
≥65	4,627 (51.37)	4,570 (51.24)	57 (63.33)			0.251	113 (62.78)	56 (62.22)	57 (63.33)			0.023
Sex				$\chi^2=1.987$	0.159					$\chi^2=0.024$	0.877	
Female	3,862 (42.87)	3,830 (42.95)	32 (35.56)			-0.154	65 (36.11)	33 (36.67)	32 (35.56)			-0.023
Male	5,146 (57.13)	5,088 (57.05)	58 (64.44)			0.154	115 (63.89)	57 (63.33)	58 (64.44)			0.023
Year of diagnose				$\chi^2=10.054$	0.002*					$\chi^2=0.026$	0.873	
2004–2012	4,608 (51.15)	4,547 (50.99)	61 (67.78)			0.359	123 (68.33)	62 (68.89)	61 (67.78)			-0.024
2013–2021	4,400 (48.85)	4,371 (49.01)	29 (32.22)			-0.359	57 (31.67)	28 (31.11)	29 (32.22)			0.024
Race				$\chi^2=0.930$	0.818					$\chi^2=0.000$	>0.99	
American Indian/ Alaska Native	55 (0.61)	55 (0.62)	0 (0.00)			-0.079						
Asian or Pacific Islander	790 (8.77)	782 (8.77)	8 (8.89)			0.004	16 (8.89)	8 (8.89)	8 (8.89)			0.000
Black	649 (7.2)	641 (7.19)	8 (8.89)			0.060	16 (8.89)	8 (8.89)	8 (8.89)			0.000
White	7,514 (83.41)	7,440 (83.43)	74 (82.22)			-0.032	148 (82.22)	74 (82.22)	74 (82.22)			0.000
T stage				$\chi^2=8.475$	0.004*					$\chi^2=0.026$	0.871	
T1	4,174 (46.34)	4,146 (46.49)	28 (31.11)			-0.332	55 (30.56)	27 (30.00)	28 (31.11)			0.024
T2	4,834 (53.66)	4,772 (53.51)	62 (68.89)			0.332	125 (69.44)	63 (70.00)	62 (68.89)			-0.024
Tumor size (cm)				$\chi^2=8.927$	0.012*					$\chi^2=0.025$	0.988	
<1	1,231 (13.67)	1,224 (13.73)	7 (7.78)			-0.222	14 (7.78)	7 (7.78)	7 (7.78)			0.000
≥3	3,659 (40.62)	3,609 (40.47)	50 (55.56)			0.304	99 (55.00)	49 (54.44)	50 (55.56)			0.022
≥1 and <3	4,118 (45.71)	4,085 (45.81)	33 (36.67)			-0.190	67 (37.22)	34 (37.78)	33 (36.67)			-0.023

Table S4 (continued)

Table S4 (continued)

Variables	Before PSM						After PSM					
	Total (n=9,008)	No RT (n=8,918)	Preoperative RT (n=90)	Statistic	P	SMD	Total (n=180)	No RT (n=90)	Preoperative RT (n=90)	Statistic	P	SMD
Income				$\chi^2=1.627$	0.443					$\chi^2=0.000$	>0.99	
<\$70,000	2,960 (32.86)	2,925 (32.80)	35 (38.89)			0.125	70 (38.89)	35 (38.89)	35 (38.89)			0.000
≥\$85,000	3,036 (33.7)	3,007 (33.72)	29 (32.22)			-0.032	58 (32.22)	29 (32.22)	29 (32.22)			0.000
\$70,000–\$84,999	3,012 (33.44)	2,986 (33.48)	26 (28.89)			-0.101	52 (28.89)	26 (28.89)	26 (28.89)			0.000

Data are presented as n (%). χ^2 , Chi-squared test; *, simulated P value. PSM, propensity score matching; RC, rectal cancer; RT, radiotherapy; SMD, standardized mean difference; T, tumor.

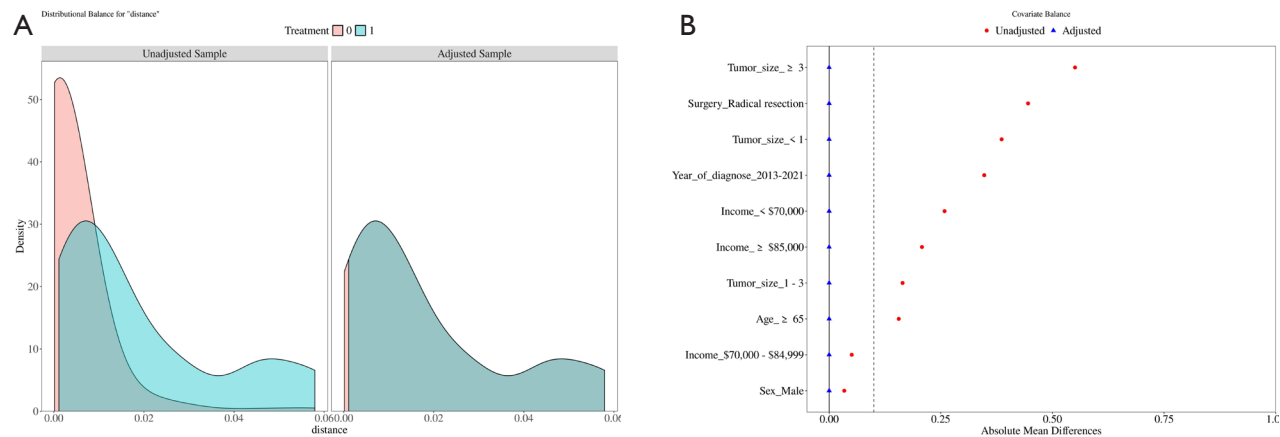


Figure S1 Standardized mean difference analysis (A) and probability density analysis (B) for T1N0M0. (A) Standardized mean difference analysis. 0, no RT; 1, preoperative RT. The curves of the two matched groups exhibit a high degree of overlap within the PS value range, indicating that the baseline characteristics between the groups are well balanced. (B) Probability density analysis. Before adjustment, there were significant differences between the groups. After adjustment, the differences between the groups nearly disappeared. PS, propensity score; RT, radiotherapy.

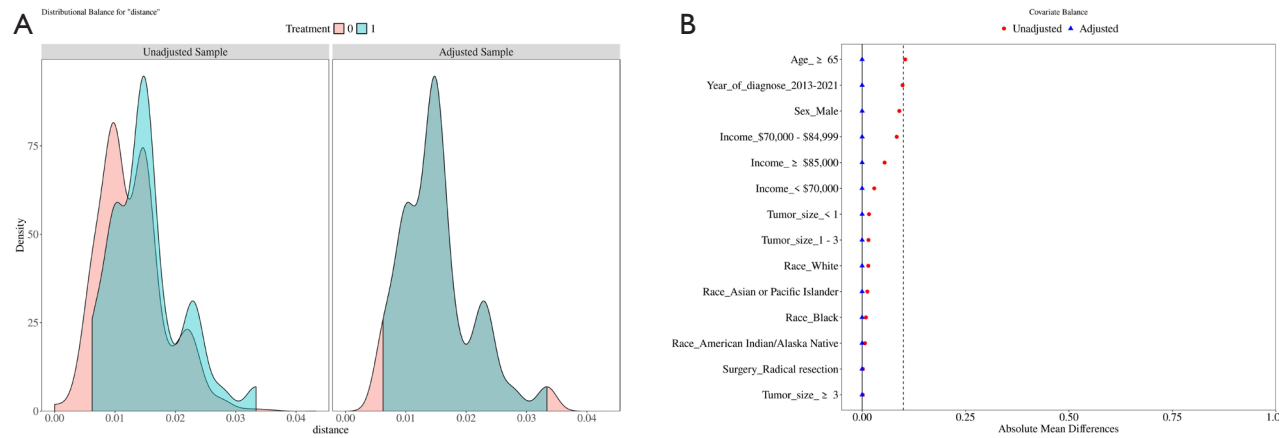


Figure S2 Standardized mean difference analysis (A) and probability density analysis (B) for T2N0M0. (A) Standardized mean difference analysis. 0, no RT; 1, preoperative RT. (B) Probability density analysis. RT, radiotherapy.

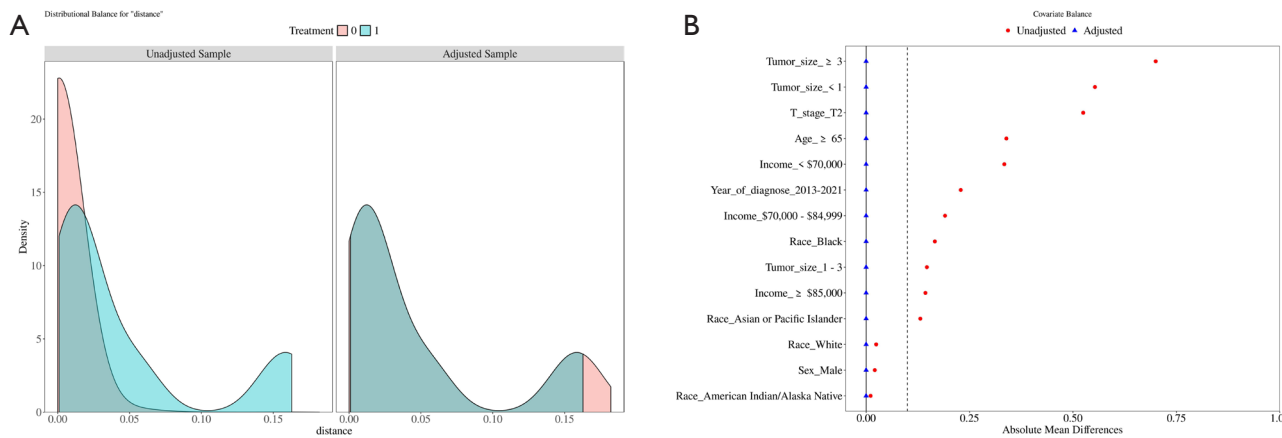


Figure S3 Standardized mean difference analysis (A) and probability density analysis (B) for patients undergoing local excision. (A) Standardized mean difference analysis. 0, no RT; 1, preoperative RT. (B) Probability density analysis. RT, radiotherapy; T, tumor.

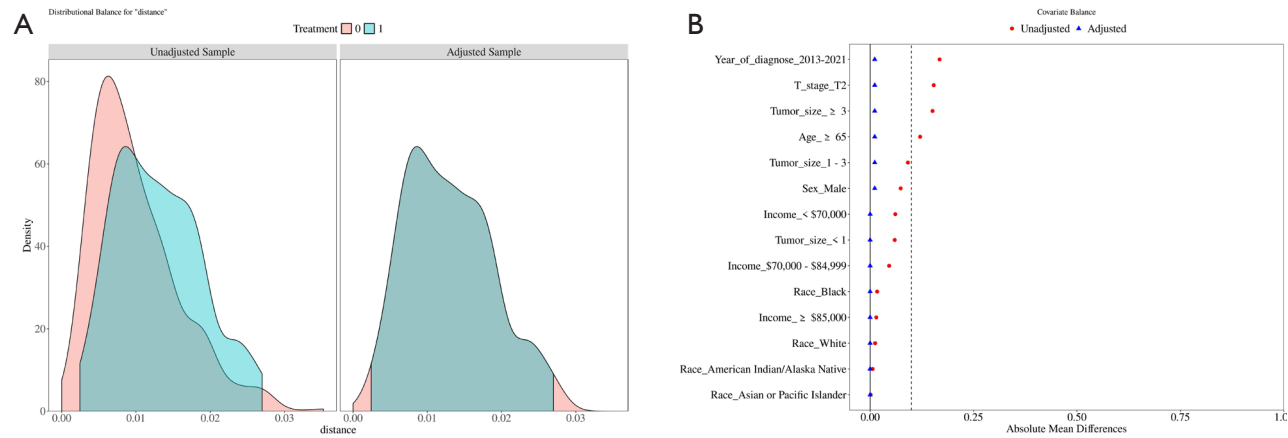


Figure S4 Standardized mean difference analysis (A) and probability density analysis (B) for patients undergoing radical resection. (A) Standardized mean difference analysis. 0, no RT; 1, preoperative RT. (B) Probability density analysis. RT, radiotherapy; T, tumor.

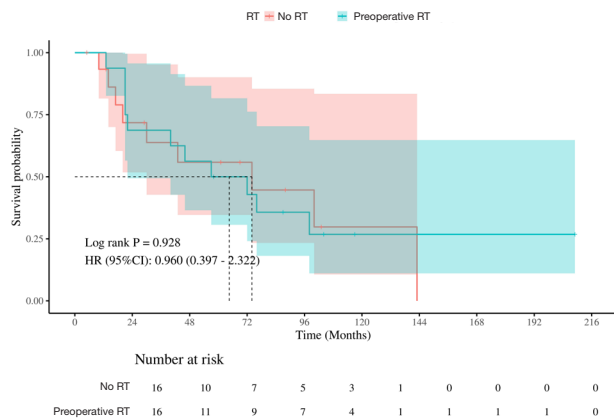


Figure S5 KM analysis of the impact of preoperative RT on OS in patients undergoing local excision after PSM. CI, confidence interval; HR, hazard ratio; KM, Kaplan-Meier; OS, overall survival; PSM, propensity score matching; RC, rectal cancer; RT, radiotherapy.

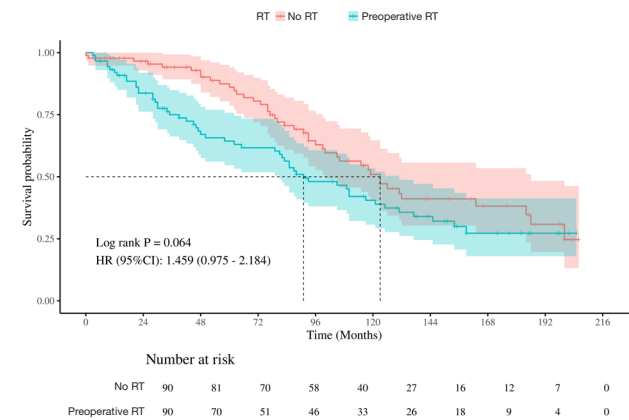


Figure S6 KM analysis of the impact of preoperative RT on OS in patients undergoing radical resection after PSM. CI, confidence interval; HR, hazard ratio; KM, Kaplan-Meier; OS, overall survival; PSM, propensity score matching; RC, rectal cancer; RT, radiotherapy.