Supplementary

Table S1 Characteristics of RP population

Parameters	Stratification	Total	No GG upgrading (n=220)	GG upgrading (n=141)
BCR-free time (months)	–	36.37 (17.40, 59.17)	42.75 (26.33, 63.63)	21.03 (8.30, 46.43)
Age (years)	–	68.00 (64.00, 72.00)	68.00 (64.00, 72.00)	68.00 (66.00, 73.00)
BMI (kg/m^2)	–	24.16 (22.21, 26.03)	24.19 (22.22, 26.04)	24.09 (22.20, 26.01)
tPSA (ng/mL)	<10.00	25.20 (12.11, 60.80)	57 (25.91)	7 (4.96)
	≥10.00		163 (74.09)	134 (95.04)
fPSA (ng/mL)	≤2.10	2.10 (1.10, 5.61)	79 (35.91)	49 (34.75)
	>2.10		72 (32.73)	55 (39.01)
AAPR	≤0.54	0.54 (0.46, 0.64)	111 (50.45)	69 (48.94)
	>0.54		108 (49.09)	71 (50.35)
LDH (U/L)	≤165.20	165.20 (146.45, 189.90)	110 (50.00)	70 (49.65)
	>165.20		109 (49.55)	70 (49.65)
SII	≤379.50	379.50 (277.83, 481.33)	132 (60.00)	49 (34.75)
	>379.50		88 (40.00)	92 (65.25)
NLR	≤2.13	2.13 (1.73, 2.65)	140 (63.64)	41 (29.08)
	>2.13		80 (36.36)	100 (70.92)
Biopsy GG	1	–	22 (10.00)	38 (26.95)
	2		40 (18.18)	30 (21.28)
	3		63 (28.64)	29 (20.57)
	4		38 (17.27)	44 (31.21)
	5		57 (25.91)	0
The GG of RP	1	–	31 (14.09)	0
	2		62 (28.18)	19 (13.48)
	3		39 (17.73)	20 (14.18)
	4		46 (20.91)	29 (20.57)
	5	–	42 (19.09)	73 (51.77)
Clinical stage	cT1 + cT2	–	144 (65.45)	94 (66.67)
	cT3 + cT4		76 (34.55)	47 (33.33)
Preoperative neoadjuvant therapy	No	–	196 (89.09)	121 (85.82)
	Yes		24 (10.91)	20 (14.18)
Number of positive cores	≤3	–	47 (21.36)	51 (36.17)
	>3		141 (64.09)	73 (51.77)
The percentage of positive cores	≤25.00%	–	43 (19.55)	44 (31.21)
	>25.00%		140 (63.64)	78 (55.32)
Biopsy pathological features	Without adverse pathologic features	–	175 (79.55)	122 (86.52)
	With invasive cribriform pattern		1 (0.45)	0
	With neuroendocrine differentiation		1 (0.45)	1 (0.71)
	With intraductal carcinoma		1 (0.45)	1 (0.71)
	With PNI		33 (15.00)	10 (7.09)
	With LVI		8 (3.64)	6 (4.26)
	With PNI and LVI		1 (0.45)	1 (0.71)

Data are presented as median (IQR) or n (%). Preoperative neoadjuvant therapy: LHRH agonists including Goserelin or leuprorelin. RP, radical prostatectomy; GG, Gleason grade group; BCR, biochemical recurrence; BMI, body mass index; tPSA, total prostate-specific antigen; fPSA, free prostate-specific antigen; AAPR, albumin-to-alkaline phosphatase ratio; LDH, lactate dehydrogenase; SII, systemic immune-inflammation index; NLR, neutrophil-lymphocyte ratio; PNI, Perineural invasion; LVI, lymph vascular invasion; IQR, interquartile range; LHRH, luteinizing hormone-releasing hormone.

Table S2 Comparison of GG between radical prostatectomy and prostate biopsy

Biopsy GG	The GG of RP					Total
	1	2	3	4	5	
1	22 (36.67)	19 (31.67)	7 (11.67)	8 (13.33)	4 (6.67)	60 (16.62)
2	7 (10.00)	33 (47.14)	13 (18.57)	8 (11.43)	9 (12.86)	70 (19.39)
3	2 (2.17)	28 (30.43)	33 (35.87)	13 (14.13)	16 (17.39)	92 (25.48)
4	0 (0.00)	1 (1.22)	6 (7.32)	31 (37.80)	44 (53.66)	82 (22.71)
5	0 (0.00)	0 (0.00)	0 (0.00)	15 (26.32)	42 (73.68)	57 (15.79)
Total	31 (8.59)	81 (22.44)	59 (16.34)	75 (20.78)	115 (31.86)	361 (100.00)

Data are presented as n (%). RP, radical prostatectomy; GG, Gleason grade group.

Table S3 Univariate and multivariate analysis of predictors associated with BCR after RP in overall cohort.

Predictors	Univariate analysis		Multiple analysis	
	OR (95% CI)	P	OR (95% CI)	P
Age (years)	1.019 (0.978, 1.061)	0.38	–	–
BMI (kg/m^2)	1.002 (0.918, 1.093)	0.97	–	–
tPSA (ng/mL)	0.918 (0.566, 1.488)	0.73	–	–
fPSA (ng/mL)	0.974 (0.923, 1.028)	0.35	–	–
AAPR	0.752 (0.188, 3.006)	0.69	–	–
LDH (U/L)	1.000 (0.977, 1.002)	0.82	–	–
SII	0.954 (0.589, 1.544)	0.85	–	–
NLR	1.055 (0.635, 1.704)	0.83	–	–
biopsy GG ≥3	1.199 (0.715, 2.009)	0.49	–	–
Clinical stage (cT3 + cT4)	1.628 (1.005, 2.636)	0.048	0.996 (0.996, 2.612)	0.052
Preoperative neoadjuvant therapy	0.449 (0.163, 1.234)	0.12	–	–
Number of positive cores >3	1.131 (0.625, 2.048)	0.68	–	–
The percentage of positive cores >25%	1.407 (0.724, 2.733)	0.31	–	–
Adverse pathologic features	1.428 (0.803, 2.540)	0.23	–	–
GG upgraded	1.916 (1.183, 3.103)	0.008	1.903 (1.175, 3.082)	0.009

Preoperative neoadjuvant therapy: LHRH agonists including Goserelin or leuprorelin. RP, radical prostatectomy; BCR, biochemical recurrence; GG, Gleason grade group; BMI, body mass index; tPSA, total prostate-specific antigen; fPSA, free prostate-specific antigen; AAPR, albumin-to-alkaline phosphatase ratio; LDH, lactate dehydrogenase; SII, systemic immune-inflammation index; NLR, neutrophil-lymphocyte ratio; OR, odds ratio; CI, confidence interval; LHRH, luteinizing hormone-releasing hormone.

Table S4 Univariate and multivariate analysis of predictors associated with BCR after RP in biopsy GG ≤2 cohort

Predictors	Univariate analysis		Multiple analysis	
	OR (95% CI)	P	OR (95% CI)	P
Age (years)	1.012 (0.927, 1.105)	0.79	–	–
BMI (kg/m^2)	0.958 (0.833, 1.102)	0.55	–	–
tPSA (ng/mL)	2.382 (0.987, 5.751)	0.053	–	–
fPSA (ng/mL)	1.770 (0.614, 5.102)	0.29	–	–
AAPR	0.904 (0.384, 2.131)	0.82	–	–
LDH (U/L)	0.655 (0.271, 1.583)	0.35	–	–
SII	1.613 (0.685, 3.799)	0.27	–	–
NLR	2.216 (0.918, 5.351)	0.077	–	–
Clinical stage (cT3 + cT4)	2.368 (0.917, 6.117)	0.075	–	–
Preoperative neoadjuvant therapy	0.585 (0.078, 4.365)	0.60	–	–
Number of positive cores >3	1.084 (0.392, 2.996)	0.88	–	–
The percentage of positive cores >25%	1.245 (0.442, 3.504)	0.68	–	–
Adverse Pathologic Features	2.006 (0.465, 8.649)	0.35	–	–
GG upgraded	2.430 (1.005, 5.876)	0.049	2.430 (1.005, 5.876)	0.049

Preoperative neoadjuvant therapy: LHRH agonists including Goserelin or leuprorelin. RP, radical prostatectomy; BCR, biochemical recurrence; GG, Gleason grade group; BMI, body mass index; tPSA, total prostate-specific antigen; fPSA, free prostate-specific antigen; AAPR, albumin-to-alkaline phosphatase ratio; LDH, lactate dehydrogenase; SII, systemic immune-inflammation index; NLR, neutrophil-lymphocyte ratio; OR, odds ratio; CI, confidence interval; LHRH, luteinizing hormone-releasing hormone.

Table S5 Characteristics of AS cases switched to RP

Parameter	Case 1	Case 2	Case 3
Follow-up time (months)	58.00	38.17	107.00
AS switched to RP of time (months)	24.30	20.33	71.20
BCR-free time (months)	Non-recurrence	16.47	13.50
Age (years)	64	76	73
BMI (kg/m^2)	21.22	26.37	20.45
Biopsy GG	1	1	1
Clinical stage	cT1b	cT1c	cT1c
Number of positive cores	5	3	2
The GG of RP	1	2	4
Pathological staging	pT2	pT3a	pT3b
tPSA (ng/mL)	4.99	9.07	9.93
AAPR	0.48	0.74	0.42
LDH (U/L)	154.9	165.2	130.4
SII	481.61	337.03	4,962.46
NLR	2.47	1.50	17.66

AS, active surveilling; RP, radical prostatectomy; BCR, biochemical recurrence; BMI, body mass index; tPSA, total prostate-specific antigen; AAPR, albumin-to-alkaline phosphatase ratio; LDH, lactate dehydrogenase; SII, systemic immune-inflammation index; NLR, neutrophil-lymphocyte ratio; GG, Gleason grade group.

Table S6 Univariate and multivariate analysis of predictors associated with GG upgrading after RP in overall cohort

Predictors	Univariate analysis		Multiple analysis	
	OR (95% CI)	P	OR (95% CI)	P
Age (years)	1.039 (1.003, 1.076)	0.03	–	–
BMI (kg/m²)	1.011 (0.936, 1.092)	0.79	–	–
tPSA (ng/mL)	1.920 (1.236, 2.983)	0.004	2.267 (1.267, 4.058)	0.006
fPSA (ng/mL)	1.011 (0.986, 1.036)	0.40	–	–
AAPR	0.862 (0.237, 3.136)	0.82	–	–
LDH (U/L)	0.999 (0.996, 1.002)	0.43	–	–
SII	2.816 (1.815, 4.369)	0.001	1.924 (1.015, 3.648)	0.045
NLR	4.268 (2.706, 6.732)	0.001	3.243 (1.697, 6.198)	<0.001
Biopsy GG ≥3	0.421 (0.271, 0.655)	<0.001	0.351 (0.192, 0.643)	0.001
Clinical stage (cT3 + cT4)	0.947 (0.606, 1.481)	0.81	–	–
Preoperative neoadjuvant therapy	1.350 (0.715, 2.548)	0.36	–	–
Number of positive cores >3	0.477 (0.293, 0.776)	0.003	0.494 (0.272, 0.900)	0.02
The percentage of positive cores >25%	0.544 (0.329, 0.901)	0.018	–	–

Preoperative neoadjuvant therapy: LHRH agonists including Goserelin or leuprorelin. RP, radical prostatectomy; GG, Gleason grade group; BMI, body mass index; tPSA, total prostate-specific antigen; fPSA, free prostate-specific antigen; AAPR, albumin-to-alkaline phosphatase ratio; LDH, lactate dehydrogenase; SII, systemic immune-inflammation index; NLR, neutrophil-lymphocyte ratio; OR, odds ratio; CI, confidence interval; LHRH, luteinizing hormone-releasing hormone.

Table S7 Characteristics of RP population (biopsy GG ≤2 cohort)

Parameter	Stratification	Total	No GG upgrading (n=62)	GG upgrading (n=68)
BCR-free time (months)	–	36.75 (14.97, 59.59)	50.00 (31.88, 66.77)	23.43 (8.23, 45.85)
Age (years)	–	68.00 (65.00, 71.00)	67.00 (64.00, 70.00)	68.00 (66.00, 73.00)
BMI (kg/m²)	–	24.06 (22.31, 26.29)	24.19 (22.34, 25.92)	23.94 (22.31, 26.33)
tPSA (ng/mL)	<10	15.21 (10.17, 33.20)	27 (43.55)	5 (7.35)
	≥10		35 (56.45)	63 (92.65)
fPSA (ng/mL)	≤2.10	1.35 (0.71, 2.41)	30 (48.39)	29 (42.65)
	>2.10		11 (17.74)	17 (25.00)
AAPR	≤0.54	0.54 (0.46, 0.65)	34 (54.84)	31 (45.59)
	>0.54		28 (45.16)	37 (54.41)
LDH (U/L)	≤165.20	163.10 (146.00, 189.83)	34 (54.84)	36 (52.94)
	>165.20		28 (45.16)	32 (47.06)
SII	≤379.50	364.77 (273.16, 434.37)	45 (72.58)	26 (38.24)
	>379.50		17 (27.42)	42 (61.76)
NLR	≤2.13	2.10 (1.72, 2.48)	44 (70.97)	24 (35.29)
	>2.13		18 (29.03)	44 (64.71)
Clinical stage	cT1 + cT2	–	57 (91.94)	50 (73.53)
	cT3 + cT4		5 (8.06)	18 (26.47)
Number of positive cores	≤3	–	22 (35.48)	38 (55.88)
	>3		31 (50.00)	20 (29.41)
The percentage of positive cores	≤25.00%	–	21 (33.87)	35 (51.47)
	>25.00%		32 (51.61)	23 (33.82)
Preoperative neoadjuvant therapy	No	–	57 (91.94)	63 (92.65)
	Yes		5 (8.06)	5 (7.35)

Data are presented as median (IQR) or n (%). Preoperative neoadjuvant therapy: LHRH agonists including Goserelin or leuprorelin. RP, radical prostatectomy; GG, Gleason grade group; BCR, biochemical recurrence; BMI, body mass index; tPSA, total prostate-specific antigen; fPSA, free prostate-specific antigen; AAPR, albumin-to-alkaline phosphatase ratio; LDH, lactate dehydrogenase; SII, systemic immune-inflammation index; NLR, neutrophil-lymphocyte ratio; IQR, interquartile range; LHRH, luteinizing hormone-releasing hormone.