

# Tumor zonality on preoperative MRI is an independent predictor for positive surgical margin after Retzius-sparing robot-assisted radical prostatectomy



MP19

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## Background & Objectives

To investigate the influence of tumor zonality on positive surgical margin (PSM) after Retzius-sparing robot-assisted radical prostatectomy (RS-RARP).

## Methods

Consecutive 203 patients with prostate cancer (PCa) who underwent RS-RARP in our center were divided into three cohorts according to the tumor zonal origin described on preoperative magnetic resonance imaging (MRI). Clinical and pathological characteristics outcomes were compared between the groups. Relationship of various tumor clinicopathological parameters to PSM after RS-RARP were evaluated.

## Results

The rates of PSM in men with transition zone and mixed tumors were significantly higher than those with peripheral zone tumors ( $p = 0.001$ ). 42.0% and 40.9% of the positive margins in patients with transition zone and mixed cancers were located at the anterior part of the gland, respectively. On multivariate analysis, transition zone tumor was significantly associated with higher PSM rates after RS-RARP ( $p = 0.007$ ). Sub-analysis revealed that transition tumor in patients with high-risk cases had a higher risk of PSM after RS-RARP ( $p = 0.003$ ).

## Table 1

Table 1. Comparison of clinical and pathological specimen features.

	Peripheral zone	Mixed origin	Transitional zone	p value
Number of subjects	113	29	61	
Age (years), (median, IQR)	69(64,74)	72(66,77)	69(66,74)	0.298 <sup>a</sup>
BMI (kg/m <sup>2</sup> ), (median, IQR)	23.84(21.97,25.80)	25.39(22.96,27.06)	23.50(22.21,26.23)	0.251 <sup>a</sup>
PSA (ng/dl), (median, IQR)	9.12(6.69,12.90)	14.32(9.30,26.96)	12.35(6.79,21.79)	0.006 <sup>a</sup>
Tumor volume (ml), (median, IQR)	0.69(0.20,1.79)	1.97(0.62,5.41)	1.58(0.69,3.85)	<0.001 <sup>a</sup>
Prostate volume (ml), (median, IQR)	32.03(24.34,41.50)	31.36(24.59,39.48)	34.53(22.86,44.84)	0.698 <sup>a</sup>
Tumor volume/prostate volume (%), (median, IQR)	2.32(0.70,6.08)	7.48(2.20,13.91)	4.35(2.01,13.37)	<0.001 <sup>a</sup>
Biopsy Gleason score, n (%)				0.222 <sup>b</sup>
3+3-6	34(30.1)	6(20.7)	15(24.6)	
3+4-7	27(23.9)	2(6.9)	12(19.7)	
4+3-7	22(19.5)	12(41.4)	16(26.2)	
4+4-8/3+5-8	26(23.0)	9(31.0)	17(27.9)	
9-10	4(3.5)	0(0)	1(1.6)	
Number of positive cores, (median, IQR)	3(2,4)	6(4,9)	3(2,5)	<0.001 <sup>a</sup>
Maximum tumor per core (%), (median, IQR)	70(30,90)	80(40,90)	60(40,80)	0.667 <sup>a</sup>
Biopsy perineural invasion, n (%)	7(6.7)	23(79.3)	27(44.3)	0.001 <sup>b</sup>
Biopsy tumor laterality, n (%)				<0.001 <sup>b</sup>
Unilateral	70(61.9)	6(20.7)	28(45.9)	
Bilateral	43(38.1)	23(79.3)	33(54.1)	
Clinical stage, n (%)				0.004 <sup>b</sup>
T2a-b	75(66.4)	10(34.5)	28(45.9)	
T2c	26(23.0)	14(48.3)	28(45.9)	
T3a	12(10.6)	5(17.2)	5(8.2)	
Risk group, n (%)				0.361 <sup>b</sup>
Low	12(10.6)	2(6.9)	6(9.8)	
Intermediate	43(38.1)	7(24.1)	16(26.2)	
High	58(51.3)	20(69.0)	39(63.9)	
PSM, n (%)	22(19.5)	13(44.8)	26(42.6)	0.001 <sup>b</sup>

## Table 2

Table 2. Comparison of locations of positive surgical margin.

	Entire cohort	Peripheral zone	Mixed Origin	Transitional zone	P Value
Apex, n (%)	18/98(18.4)	2/26(7.7)	4/22(18.2)	12/50(24.0)	0.257
Base, n (%)	17/98(17.3)	2/26(7.7)	3/22(13.6)	12/50(24.0)	0.213
Anterior, n (%)	39/98(39.8)	9/26(34.6)	9/22(40.9)	21/50(42.0)	0.817
Posterior, n (%)	24/98(24.5)	13/26(50.0)	6/22(27.3)	5/50(10.0)	0.001

## Table 3

Table 3. Univariable and multivariable analyses of clinical and preoperative pathological factors on positive surgical margin.

	Univariable Analysis			Multivariable Analysis		
	OR	CI 95%	P value	OR	CI 95%	P value
PSA	1.070	1.036-1.104	<0.001	1.043	1.005-1.082	0.026
Tumor volume	1.267	1.123-1.430	<0.001	1.021	0.659-1.581	0.927
Prostate volume	0.970	0.948-0.993	0.010	0.964	0.926-1.004	0.075
Tumor volume/prostate volume	1.102	1.054-1.152	<0.001	1.042	0.896-1.211	0.594
Position of tumor			0.001			0.024
Peripheral zone	1			1		
Mixed origin	3.361	1.412-8.001	0.006	2.074	0.659-6.524	0.212
Transitional zone	3.073	1.543-6.118	0.001	3.692	1.437-9.490	0.007
Biopsy Gleason score			0.077			0.402
3+3-6	1			1		
3+4-7	1.650	0.624-4.366	0.313	0.343	0.075-1.563	0.167
4+3-7	3.536	1.461-8.558	0.005	0.467	0.113-1.929	0.293
4+4-8/3+5-8	2.000	0.810-4.936	0.133	0.191	0.035-1.035	0.055
9-10	3.000	0.442-20.379	0.261	0.190	0.013-2.844	0.229
Number of positive cores	1.280	1.144-1.432	<0.001	0.983	0.794-1.216	0.873
Maximum tumor per core	1.027	1.014-1.040	<0.001	1.034	1.014-1.054	0.001
Biopsy perineural invasion	2.677	1.353-5.297	0.005	1.441	0.555-3.744	0.453
Biopsy bilateral tumor	2.680	1.435-5.005	0.002	1.281	0.461-3.558	0.635
Clinical stage			0.001			0.926
T2a-b	1			1		
T2c	3.266	1.675-6.368	0.001	0.885	0.199-3.943	0.873
T3a	2.864	1.087-7.547	0.033	1.165	0.257-5.287	0.843
Risk group			0.019			0.379
Low	1			1		
Intermediate	2.647	0.551-12.776	0.224	3.801	0.507-28.482	0.194
High	5.425	1.201-24.507	0.028	5.166	0.445-59.898	0.189

## Table 4

Table 4. Sub-analysis of D'Amico risk group and pathological stage for positive surgical margin.

	Peripheral zone	Mixed Origin	Transitional zone	P Value
PSM, n (%)				
Overall	22/113(19.5)	13/29(44.8)	26/61(42.6)	0.001
Low-intermediate risk	9/55(16.4)	2/9(22.2)	6/22(27.3)	0.501
High risk	13/58(22.4)	11/20(55.0)	20/39(51.3)	0.003
pT2	3/53(5.7)	1/6(16.7)	10/40(25.0)	0.022
pT3	19/60(31.7)	12/23(52.2)	16/21(76.2)	0.001

## Figure 1

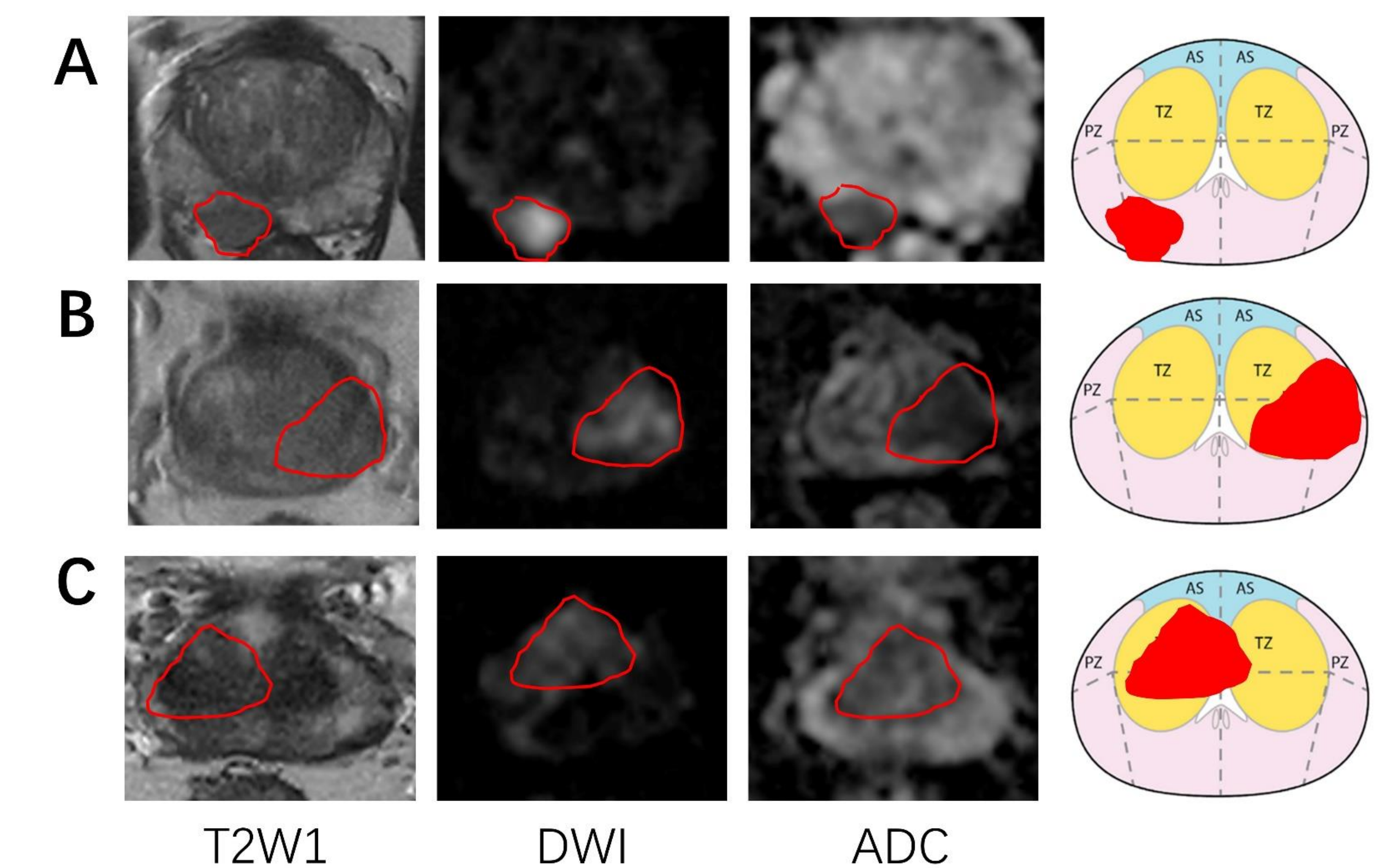


Fig.1 Identification of tumor zonality in preoperative MRI. (A) peripheral zone tumors, (B) mixed origin tumors, and (C) transitional zone tumors.

## Conclusions

Transition zone tumor is an independent risk factor for PSM after RS-RARP. Preoperative identification of transition zone tumor might aid surgical planning with Retzius-sparing technique, especially for patients with high-risk PCa and extraprostatic extension.