



Figure S1 Observed incidence of CLNM ≥ 5 in different risk group. Observed incidence of CLNM ≥ 5 according to categories of the risk score in the derivation and validation cohorts. CLNM, central lymph node metastasis.

Table S1 Univariable and Multivariable predictors of CLN metastasis in the derivation cohort

Variables	Univariable analysis			Multivariable analysis		
	Negative (n=1,849)	Positive (n=1,693)	P	OR	95% CI	P
Age, years			<0.001			
18–29	155 (8.4)	376 (22.2)		1	Reference	
30–44	689 (37.3)	840 (49.6)		0.657	0.52–0.83	<0.001
45–59	859 (46.5)	425 (25.1)		0.287	0.225–0.367	<0.001
≥60	146 (7.9)	52 (3.1)		0.166	0.111–0.25	<0.001
BMI, kg/m ²			<0.001	1	Reference	
≥18.5	1,776 (96.1)	1,563 (92.3)		1.457	1.036–2.049	0.03
<18.5	73 (3.9)	130 (7.7)		0.912	0.768–1.082	0.29
Sex			<0.001			
Female	1,513 (81.8)	1,201 (70.9)		1	Reference	
Male	336 (18.2)	492 (29.1)		1.608	1.33–1.945	<0.001
Marriage			<0.001			
Unmarried	142 (7.7)	269 (15.9)			Reference	
Married	1,707 (92.3)	1,424 (84.1)				0.92
Hashimoto's disease			0.004			
No	1,201 (65.0)	1,178 (69.6)		1	Reference	
Yes	648 (35.0)	515 (30.4)		0.789	0.67–0.93	0.005
Hypertension			<0.001			
No	1,721 (93.1)	1,622 (95.8)			Reference	
Yes	128 (6.9)	71 (4.2)				0.65
Diabetes			0.98			
No	1,815 (98.2)	1,663 (98.2)				
Yes	34 (1.8)	30 (1.8)				
Smoking			0.004			
No	1,785 (96.5)	1,600 (94.5)			Reference	
Yes	64 (3.5)	93 (5.5)				0.47
Drinking alcohol			0.003			
No	1,815 (98.2)	1,634 (96.5)			Reference	
Yes	34 (1.8)	59 (3.5)				0.07
Location			0.006			
Isthmus	58 (3.1)	85 (5.0)			Reference	
Right	944 (51.1)	904 (53.4)				0.26
Left	847 (45.8)	704 (41.6)				0.06
Border			0.79			
Clear	989 (53.5)	914 (54.0)				
Unclear	860 (46.5)	779 (46.0)				
Calcification			<0.001			
No	871 (47.1)	464 (27.4)		1	Reference	
Yes	978 (52.9)	1,229 (72.6)		1.532	1.305–1.799	<0.001
Aspect ratio			<0.001			
<1	953 (51.5)	1,131 (66.8)			Reference	
>1	885 (47.9)	554 (32.7)				0.43
1	11 (0.6)	8 (0.5)				0.71
TSH level			0.23			
Normal	1,721 (93.1)	1,599 (94.4)				
Low	67 (3.6)	47 (2.8)				
High	61 (3.3)	47 (2.8)				
US CLN abnormalities			<0.001			
No	1,806 (97.7)	1,542 (91.1)		1	Reference	
Yes	43 (2.3)	151 (8.9)		2.234	1.511–3.303	<0.001
US LLN abnormalities			<0.001			
No	1,722 (93.1)	1,309 (77.3)		1	Reference	
Yes	127 (6.9)	384 (22.7)		2.409	1.892–3.066	<0.001
Capsular abnormalities			<0.001			
No	921 (49.8)	593 (35.0)		1	Reference	
Yes	928 (50.2)	1,100 (65.0)		1.33	1.135–1.559	<0.001
Tumor size, mm			<0.001			
0–2	209 (11.3)	50 (3.0)		1	Reference	
>2–5	770 (41.6)	353 (20.9)		1.474	1.037–2.094	0.03
>5–10	601 (32.5)	613 (36.2)		2.572	1.805–3.666	<0.001
>10–20	251 (13.6)	549 (32.4)		4.69	3.22–6.83	<0.001
>20	18 (1.0)	128 (7.6)		12.846	6.886–23.964	<0.001

CLN, central lymph node; OR, odds ratio; CI, confidence interval; BMI, body mass index; TSH, thyroid stimulating hormone; US, ultrasound; CLN, central lymph node; LLN, lateral lymph node

Table S2 Univariable and Multivariable predictors of LLN metastasis in the derivation cohort

Variables	Univariable analysis			Multivariable analysis		
	Negative (n=111)	Positive (n=314)	P	OR	95% CI	P
Age, years			0.001			0.44
18–29	16 (14.4)	83 (26.4)				
30–44	44 (39.6)	146 (46.5)				
45–59	41 (36.9)	72 (22.9)				
≥60	10 (9.0)	13 (4.1)				
BMI, kg/m ²			0.15			
≥18.5	105 (94.6)	283 (90.1)				
<18.5	6 (5.4)	31 (9.9)				
Sex			0.12			
Female	85 (76.6)	216 (68.8)				
Male	26 (23.4)	98 (31.2)				
Marriage			0.048			0.80
Unmarried	13 (11.7)	63 (20.1)				
Married	98 (88.3)	251 (79.9)				
Hashimoto's disease			>0.99			
No	69 (62.2)	195 (62.1)				
Yes	42 (37.8)	119 (37.9)				
Hypertension			0.58			
No	105 (94.6)	301 (95.9)				
Yes	6 (5.4)	13 (4.1)				
Diabetes			0.47			
No	110 (99.1)	308 (98.1)				
Yes	1 (0.9)	6 (1.9)				
Smoking			0.47			
No	106 (95.5)	294 (93.6)				
Yes	5 (4.5)	20 (6.4)				
Drinking alcohol			0.79			
No	109 (98.2)	307 (97.8)				
Yes	2 (1.8)	7 (2.2)				
Location			0.33			
No lower pole	73 (65.8)	222 (70.7)				
Lower pole	38 (34.2)	92 (29.3)				
Border			0.34			
Clear	67 (60.4)	174 (55.4)				
Unclear	44 (39.6)	140 (44.6)				
Calcification			0.04			0.65
No	36 (32.4)	71 (22.6)				
Yes	75 (67.6)	243 (77.4)				
Aspect ratio			0.56			
<1	80 (72.1)	239 (76.1)				
>1	30 (27.0)	74 (23.6)				
1	1 (0.9)	1 (0.3)				
TSH level			0.56			
Normal	104 (93.7)	300 (95.5)				
Low	5 (4.5)	8 (2.5)				
High	2 (1.8)	6 (1.9)				
Number of positive CLN			<0.001			
0	59 (53.2)	31 (9.9)		1	Reference	<0.001
1–4	39 (35.1)	143 (45.5)		6.155	3.479–10.892	<0.001
≥5	13 (11.7)	140 (44.6)		17.561	8.509–36.243	
Capsular abnormalities			<0.001			
No	50 (45.0)	66 (21.0)		1	Reference	0.005
Yes	61 (55.0)	248 (79.0)		2.113	1.246–3.584	
Tumor size, mm			0.002			0.94
0–2	4 (3.6)	5 (1.6)				
>2–5	21 (18.9)	23 (7.3)				
>5–10	34 (30.6)	84 (26.8)				
>10–20	39 (35.1)	143 (45.5)				
>20	13 (11.7)	59 (18.8)				

LLN, lateral lymph node; OR, odds ratio; CI, confidence interval; BMI, body mass index; TSH, thyroid stimulating hormone; CLN, central lymph node.