

Table S1 Multiparametric MRI acquisition parameters

Parameters	Fat suppression	Plane	Repetition time (ms)	Echo time (ms)	Slice thickness (mm)	Slice gap (mm)	Number of excitations	FOV (cm)	Matrix size	Sequence
T2WI	Yes	Coronal	1300	81.2	4	0.5	4	20	288×192	FRFSE
T1WI	No	Axial	540	10.6	4	0.5	2	20	288×224	FSE-XL
T2WI	Yes	Axial	3000	86.9	4	0.5	2	20	320×224	FRFSE
DWI	Yes	Axial	6550	85	4	0.5	8	20	128×128	SE-EPI
CE T1WI	Yes	Axial	5.5	1.6	4	-2	1	25	256×192	FSPGR

T2WI, T2-weighted imaging; T1WI, T1-weighted imaging; DWI, diffusion-weighted imaging; CE, Contrast-enhanced; FOV, field of view; FRFSE, fast recovery fast spin echo; FSE, fast spin echo; SS-EPI, single-shot echo-planar imaging; FSPGR, fast spoiled gradient echo.

Table S2 Comparison of diagnostic performance of various models in training and validation cohorts

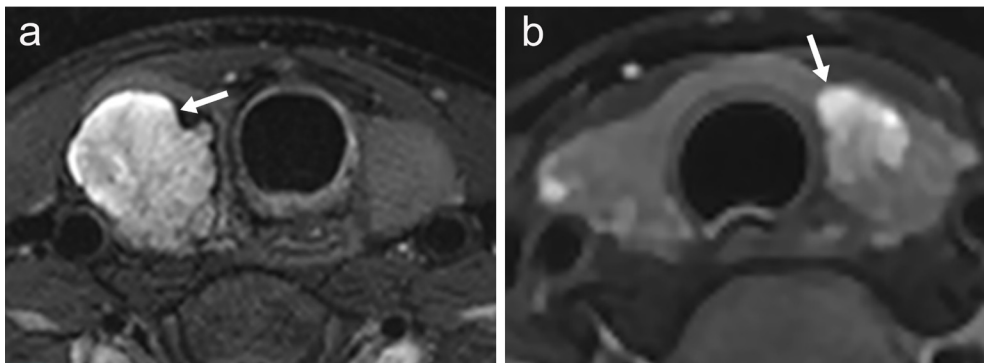
Models	Cohort	AUC	Sensitivity (%)	Specificity (%)	Accuracy (%)	PPV (%)	NPV (%)	UFNA rate	Missed cancer rate
Restricted diffusion (A)	Training	0.837	80.3	87.0	84.3	80.3	87.0	19.7 (13/66)	13.0 (13/100)
	Validation	0.816	69.6	92.5	84.1	84.2	84.1	25.0 (6/24)	12.8 (5/39)
Reversed halo sign in delay phase (B)	Training	0.864	78.8	94.0	87.9	89.7	87.0	10.3 (6/58)	13.0 (14/108)
	Validation	0.810	78.3	85.0	82.6	75.0	87.2	15.8 (3/19)	15.9 (7/44)
Combined model 1 (A and B)	Training	0.823	66.7	98.0	85.5	95.7	81.7	4.3 (2/46)	18.3 (22/120)
	Validation	0.770	56.5	97.5	82.5	92.9	79.6	7.1 (1/14)	20.4 (10/49)
Combined model 2 (A or B)	Training	0.877	92.4	83.0	86.7	78.2	94.3	21.8 (17/78)	5.7 (5/88)
	Validation	0.857	91.3	80.0	84.1	72.4	94.1	27.6 (8/29)	5.9 (2/34)
ACR TI-RADS Category 4	Training	NA	NA	NA	NA	NA	NA	64.6 (62/96)	45.7 (32/70)
	Validation	NA	NA	NA	NA	NA	NA	62.5 (25/40)	34.8 (8/23)

Numbers in parentheses indicate the number of lesions. AUC, area under the curve; PPV, positive predictive value; NPV, negative predictive value; UFNA, unnecessary fine needle aspiration; NA, not applicable.

Appendix 1 MRI parameter definition and diagram

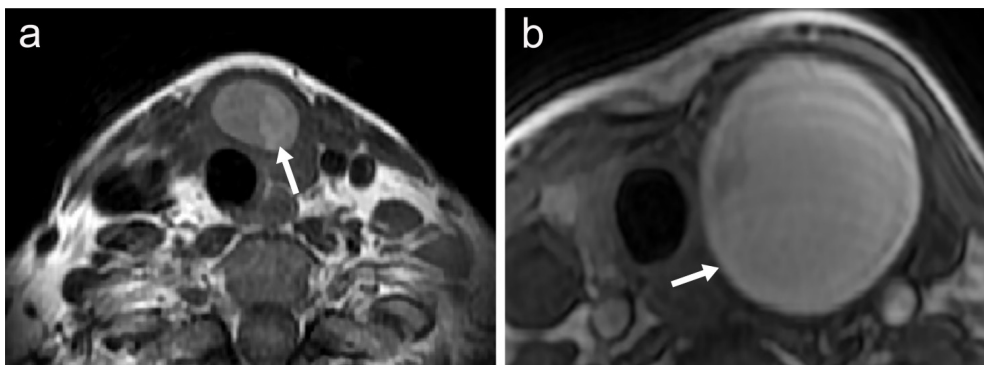
1. Hyperintense on T2WI

Definition: Areas within the lesion on T2-weighted imaging (T2WI) that exhibit signals similar to cerebrospinal fluid (CSF) (indicated by white arrows in the figure below). Cases 1 (a) and 2 (b) presented with T2-weighted imaging (T2WI).



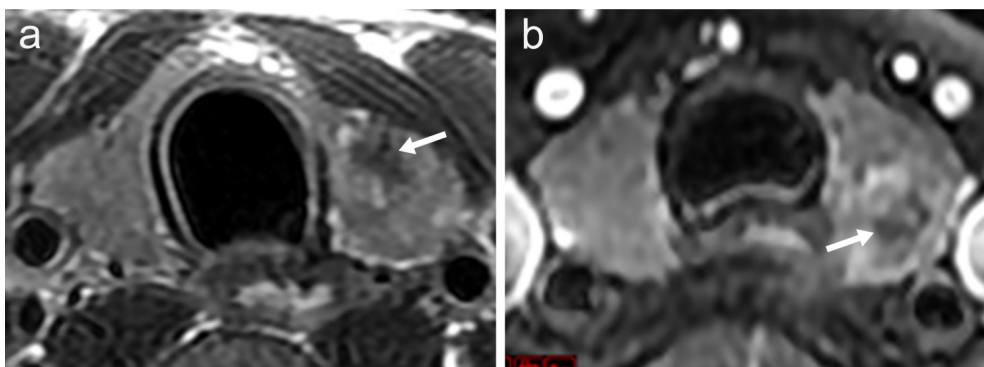
2. Hyperintense on T1WI

Definition: Localized or diffuse high signal intensity within the lesion on T1-weighted imaging (T1WI), as indicated by the white arrows in the figure below. Cases 1 (a) and 2 (b) presented with T1-weighted imaging (T1WI).



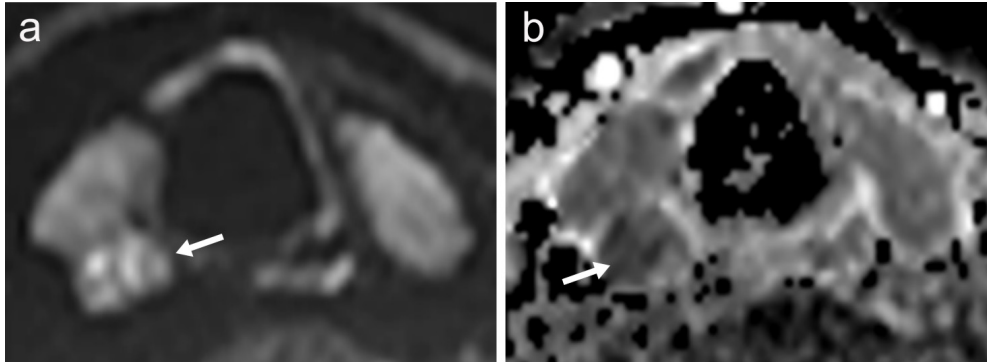
3. Hypointense on T2WI

Definition: Localized or diffuse low signal intensity areas within the lesion on T2-weighted imaging (T2WI), as indicated by the white arrows in the figure below. Cases 1 (a) and 2 (b) presented with T2-weighted imaging (T2WI).



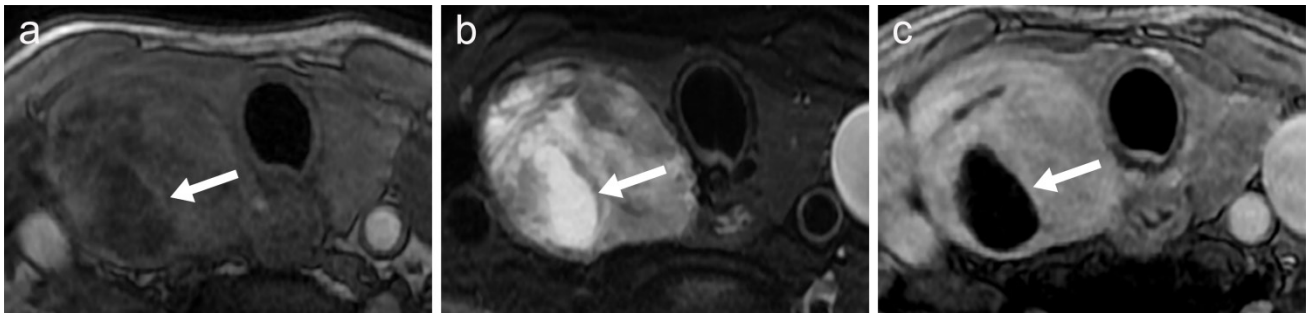
4. Restricted diffusion

Definition: Regions of the lesion exhibiting high signal intensity on diffusion-weighted imaging (DWI) and low signal intensity on the apparent diffusion coefficient (ADC), accompanied by observable enhancement, as denoted by the white arrows in the figure below. DWI (a) and ADC (b).



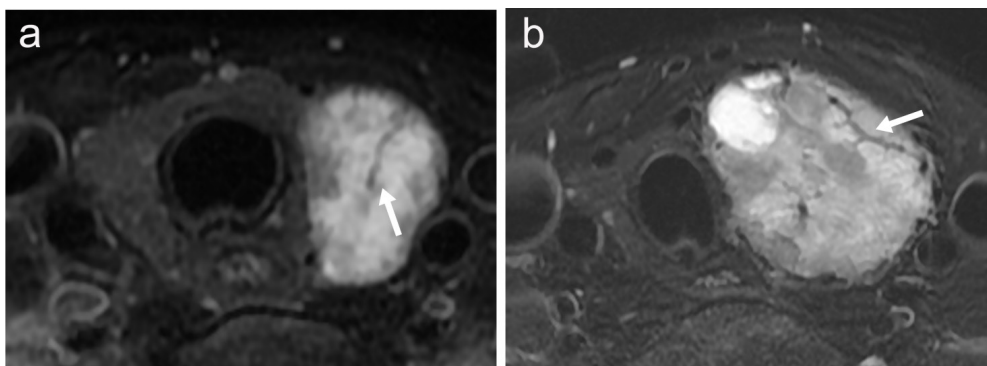
5. Cystic degeneration

Definition: Areas of the lesion exhibiting low signal intensity on T1-weighted imaging (T1WI) and high signal intensity on T2-weighted imaging (T2WI), with no enhancement observed, resembling cerebrospinal fluid (CSF) signals, as indicated by the white arrows in the figure below. T1WI (a), T2WI (b) and the delayed phase of multiphasic contrast-enhanced MRI (c).



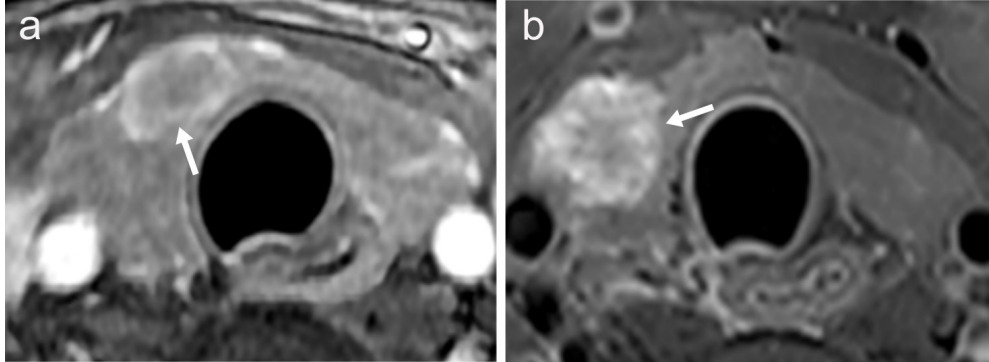
6. Flow-void signal

Definition: Multiple lines with no signal in the lesion on the T2WI image, as indicated by the white arrows in the figure below. Cases 1 (a) and 2 (b) presented with T2-weighted imaging (T2WI).



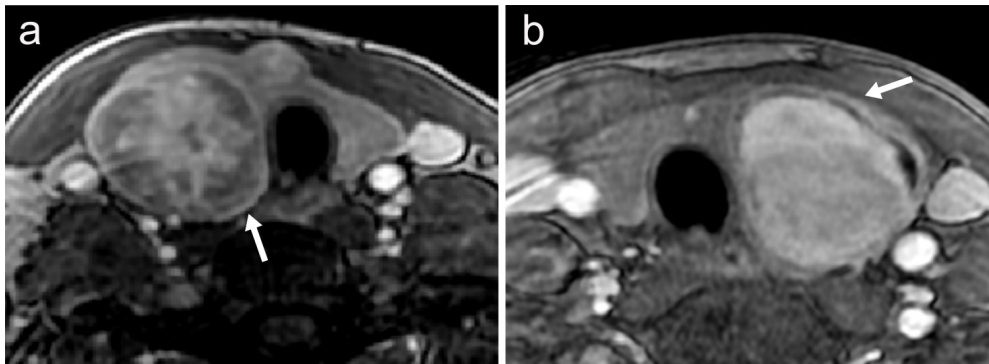
7. Reversed halo sign in the delayed phase

Definition: The enhancement pattern that the enhancement of the peripheral area of the lesion was greater than that of the central area in the delayed phase of multiphase contrast-enhanced MRI, and the demarcation between the area was blurred, as indicated by the white arrows in the figure below. Case 1 (a) and case 2 (b) in the delayed phase of multiphase contrast-enhanced MRI.



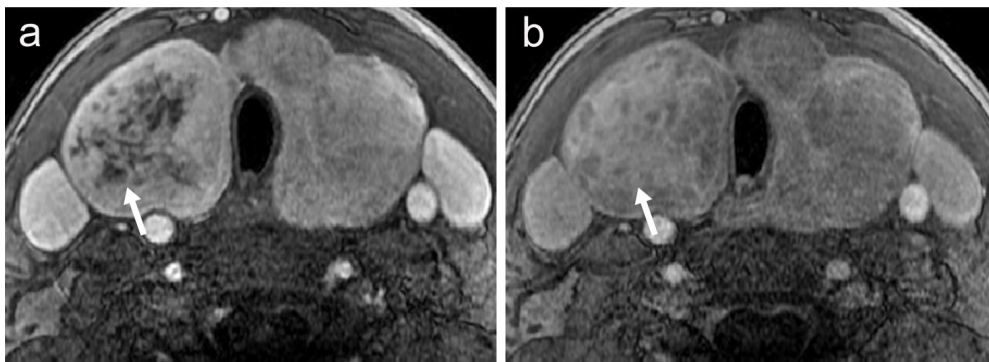
8. Pseudocapsule

Definition: Peritumoral rim that showed enhancement in multiphase contrast-enhanced MRI imaging, as indicated by the white arrows in the figure below. Case 1 (a) and case 2 (b) in the delayed phase of multiphase contrast-enhanced MRI.



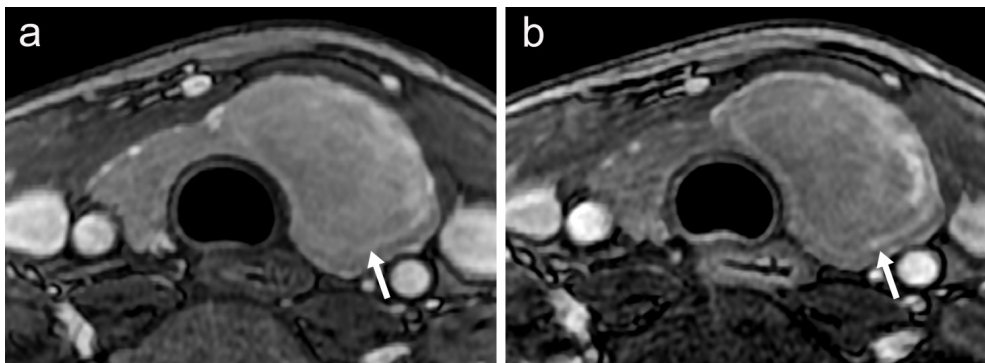
9. Fissure-filling enhancement

Definition: The irregular fissure that did not enhance in the early phase in the internal area of the lesion presented a progressive and filling enhancement pattern in the delayed phase, as indicated by the white arrows in the figure below. The early phase (a) and delayed phase (b) of multiphase contrast-enhanced MRI.



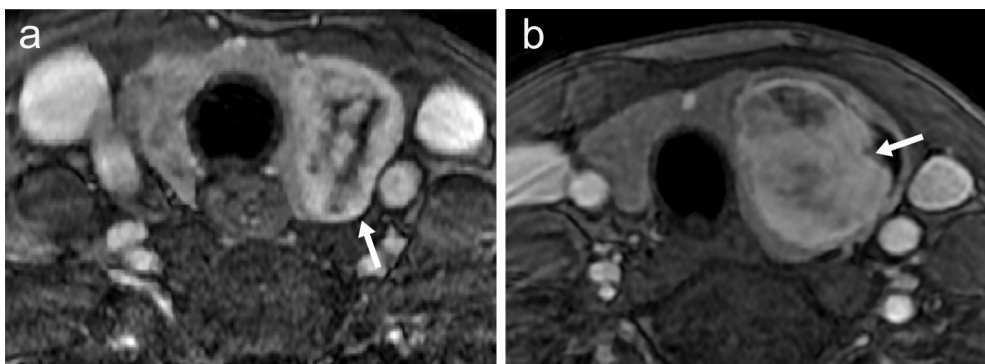
10. Wash-out pattern

Definition: The enhancement of lesion in the early phase of multiphasic contrast-enhanced, and the degree of enhancement in the delayed phase decreased, as indicated by the white arrows in the figure below. The early phase (a) and delayed phase (b) of multiphasic contrast-enhanced MRI.



11. Hyperenhancement in the early phase

Definition: The enhancement degree of lesion similar to that of the common carotid artery in the early phase of multiphasic contrast-enhanced MRI, as indicated by the white arrows in the figure below. Case 1 (a) and case 2 (b) in the early phase of multiphasic contrast-enhanced MRI. MRI, magnetic resonance imaging.



12. Change of lesion size in multiphasic enhancement

Definition: Changes in the size and morphology of lesions in the early phase and delayed phase of multiphasic contrast-enhanced MRI, as indicated by the white arrows in the figure below. The early phase (a) and delayed phase (b) of multiphasic contrast-enhanced MRI. MRI, magnetic resonance imaging.

