Supplementary Appendix S1

Patient preparation for magnetic resonance imaging (MRI)

Patients underwent rectal cleansing using 10 mL of glycerin enema to avoid possible misinterpretation due to residual stool, and 10 mg of raceanisodamine hydrochloride was intramuscularly injected 20–30 minutes before MRI to reduce intestinal peristalsis or rectal spasm, except in patients who had contraindications, such as intracranial hypertension, serious heart disease, glaucoma, or prostatic hypertrophy. A total of 50 mL of ultrasound gel was inserted into the rectal vault of each patient prior to examination.

MR image acquisition

Oblique axial, sagittal, and coronal non-fat saturated T_2-weighted fast-spin echo images were obtained orthogonal or parallel to the long axis of rectal cancer. Pelvic axial T_1-weighted imaging, T_2-weighted sequence with fat saturation, and diffusion-weighted imaging were also performed to facilitate the detection of lymph nodes. A contrast-enhanced 3D T_1-weighted gradient-echo sequence was acquired following intravenous administration of gadolinium-based contrast medium. Details of the protocols are listed as follow.

Table S1 Protocols for the magnetic resonance imaging sequences

Protocol sequence	TR (ms)	TE (ms)	FOV (mm)	Matrix	Bandwidth (kHz)	NEX	ETL	Slice thickness (mm)	Intersection gap (mm)
Axial T2WI	4,800	115	160	256×320	41	4	21	3	0
Sagittal T2WI	4,800	115	240	256×320	41	4	21	4	0.4
Coronal T2WI	4,800	115	240	256×320	41	4	21	4	0.4
T1WI	560	Min	340	288×224	41	2	4	5	0.5
T2WI/FS	5,700	85	340	288×224	31	2	21	5	0.5
DWI (b=0, 1,000)	2,300	Min	340	128×160	250	2	NA	5	0.5
CE-T1WI	3.4	1.6	300	288×224	125	1	NA	3	0

CE, contrast-enhanced; DWI, diffusion-weighted imaging; ETL, echo train length; FOV, field of view; FS, fat saturation; NA, not available; NEX, number of excitations; TE, echo time; TR, repetition time; T1WI, T_1-weighted imaging; T2WI, T_2-weighted imaging.

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Supplementary Appendix S2

Details of imaging analyses for the primary cohort

Oblique axial T_2-weighted imaging (T2WI) was used as the main sequence for evaluation. When a lymph node (LN) could not be discriminated clearly, other sequences such as sagittal, coronal T2WI, or diffusion-weighted imaging were used for assistance.

Nodal location

Nodal location was classified into the following four subtypes according to the position of nodes and primary rectal cancers: (I) ipsilateral and at tumor height; (II) ipsilateral and outside tumor height; (III) contralateral and at tumor height; and (IV) contralateral and outside tumor height.

Chemical shift effect (CSE)

CSE at the edge of nodes was categorized into the following three subtypes based on the presence and aspect of CSE: (I) regular CSE; CSE at the LN border is complete and smooth; (II) irregular CSE; CSE at the LN border is irregular, incomplete, or interrupted; and (III) absent CSE; CSE at the LN border is absent.

Borders

The borders of nodes were classified as well or poorly defined. Well-defined border indicated that the border of the node was regular and smooth; poorly defined border indicated that the border of the node was indistinct, lobulated, or spiculated (*Figure S1*).

Internal signal (IS) pattern and signal intensity (SI)

The IS was categorized as homogeneous or heterogeneous (*Figure S2*). The SI of nodes was classified as hypointensity, isointensity, or hyperintensity on T2WI compared with that of the nearby rectal wall (*Figure S3*). The signal from the major areas of the node that were heterogeneous was evaluated as the nodal SI.

Long- and short-axis diameters

The long- and short-axis diameters of each LN were measured in millimeters, and the ratio of the short- to long-axis diameter was calculated.

Minimum distance to rectal tumor or rectal wall

If the rectal tumor and the ipsilateral node were at the same height, the minimum distance from the node to the outer border of the tumor was recorded. Otherwise, the minimum distance from the node to the rectal wall was measured and recorded on oblique axial T2WI.

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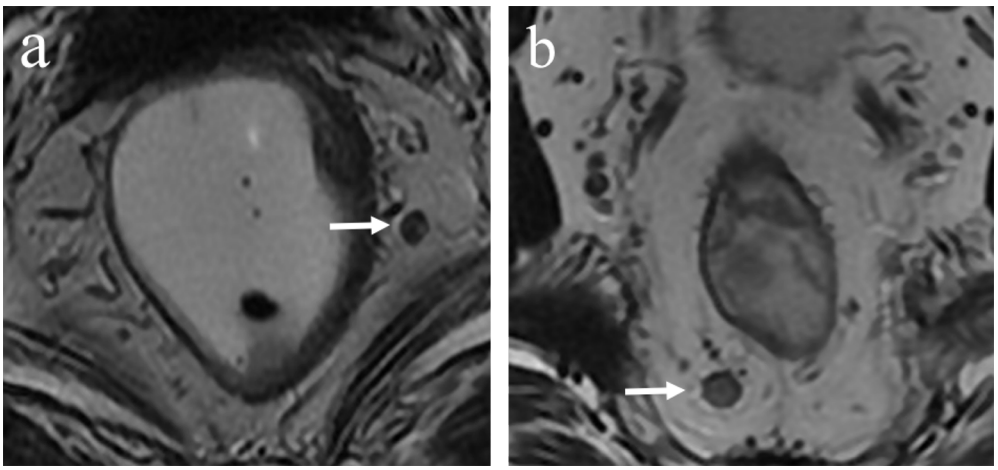

Figure S1 Borders of nodes on T_2-weighted images (white arrows). (A) Well-defined border; (B) poorly defined border.

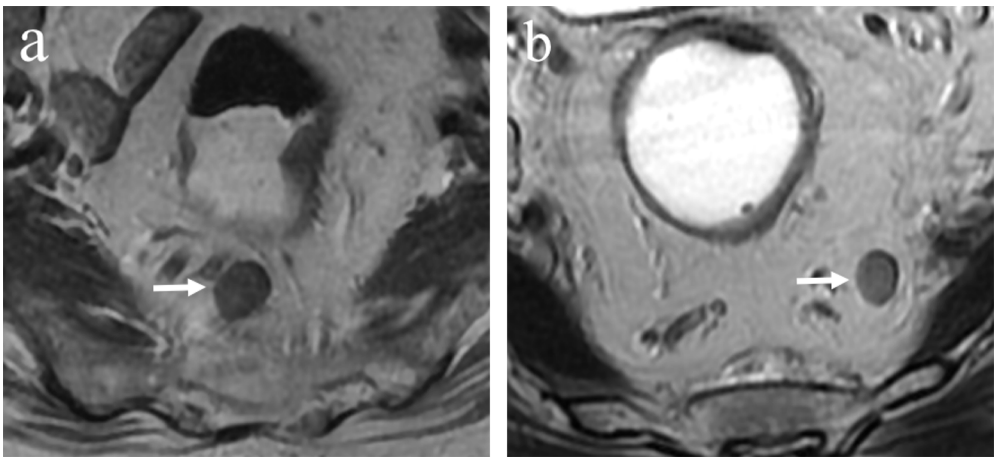

Figure S2 Internal signal (IS) pattern of nodes on T_2-weighted images (white arrows). (A) Signal from the major areas of the node is heterogeneous; (B) signal from the major areas of the node is homogeneous.

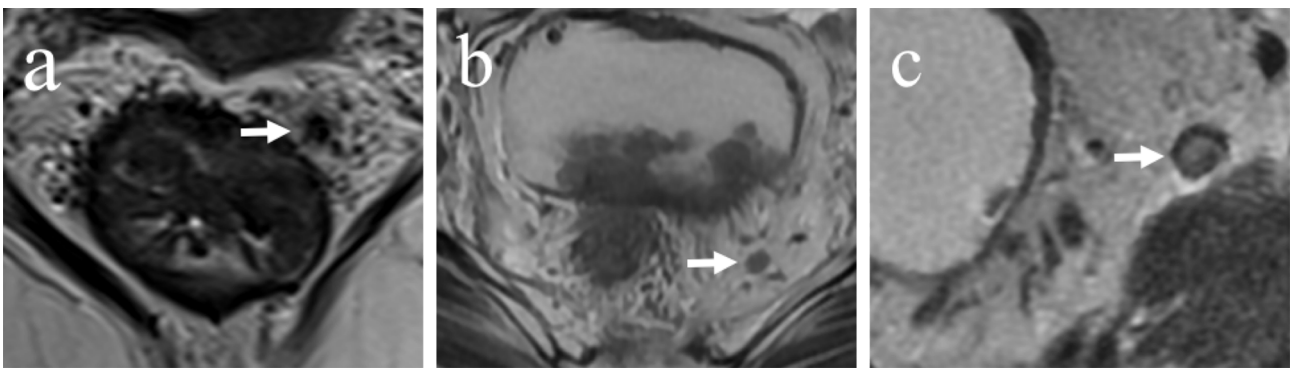

Figure S3 Three subtypes of signal intensity on T_2-weighted images (white arrows). (A) Hypointensity; (B) isointensity; (C) hyperintensity.

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