

RECTAL CANCER: EXTRAMURAL VASCULAR INVASION(EMVI)

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RECTAL CANCER

- Tumor in the distal 15 cm of the intestinal tract
- Surgical resection with negative margins of at least 1 mm is the only locally curative therapy
- MRI is the most accurate method for local staging of rectal cancer
 - Useful to determine the necessary extent of surgical resection, and whether patients would benefit from neoadjuvant chemoradiation therapy

EXTRAMURAL VASCULAR INVASION (EMVI)

- EMVI is tumor extension into the vasculature beyond the muscularis propria
- It is indicative of locally advanced tumor, which extends deeper into the mesorectum, correlating with **T3 or T4** disease
- Although EMVI is not included in the TNM staging system, the literature suggests that *it is an important independent indicator of poor prognosis* with:
 - Higher incidence of local recurrence
 - Higher incidence of distant metastases
 - Poorer response to neoadjuvant chemoradiation therapy

EXTRAMURAL VASCULAR INVASION (EMVI)

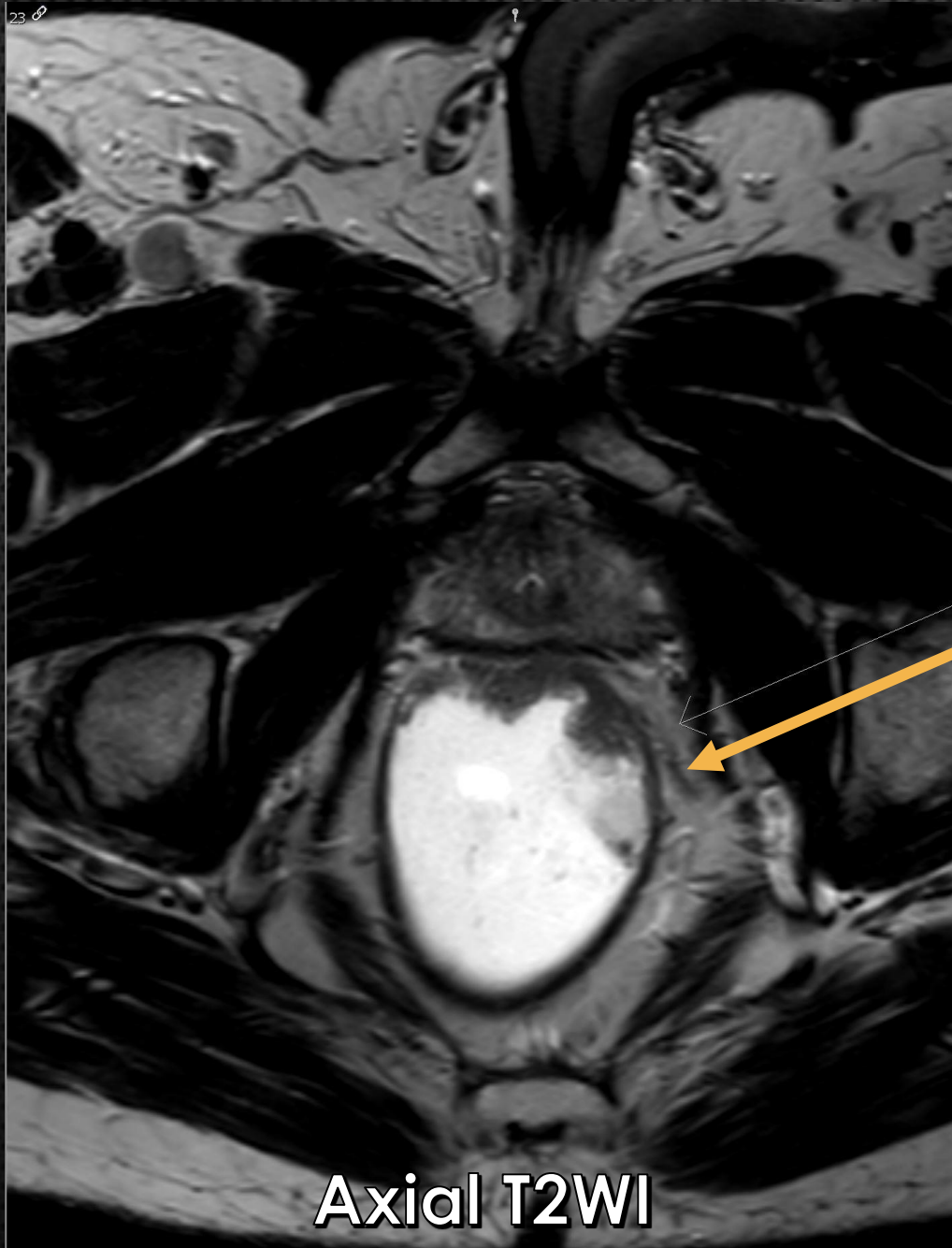
- EMVI has traditionally been detected on histopathology of surgical resections; however, it is thought to have been under-reported in the past
- Compared to histopathologic analysis, MR has high specificity and moderate sensitivity for detection of EMVI
 - MRI EMVI scores of 3 to 4 was 54% sensitive and 96% specific
 - MRI EMVI scores of 2 to 4 was 79% sensitive but only 74% specific

MRI DETECTION OF EMVI

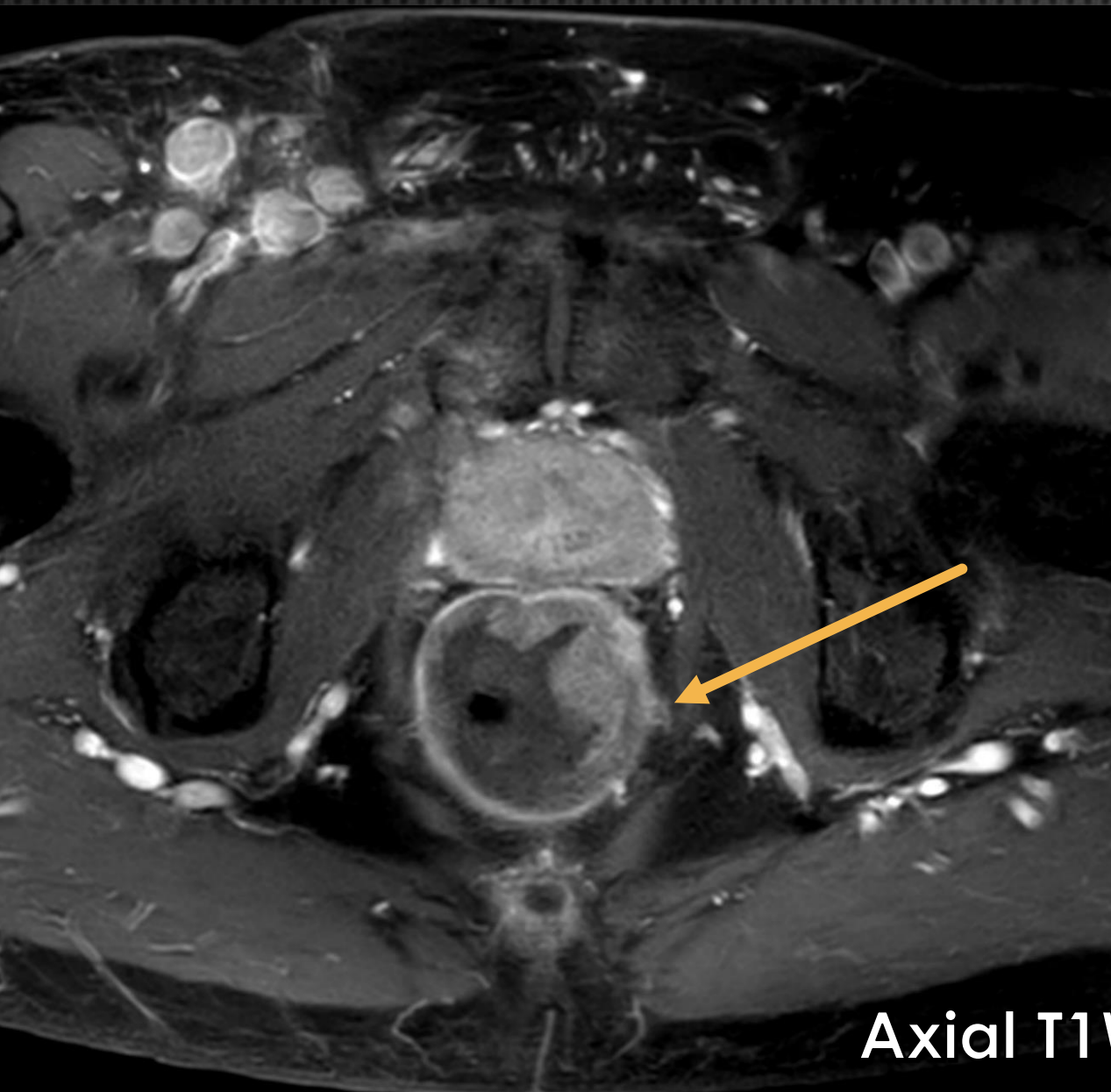
- EMVI is seen on MRI as **tubular or serpiginous perirectal vessels**, which are irregular, expanded, or infiltrated with tumor signal intensity
 - May be directly contiguous or non-contiguous with the primary tumor
- Contrast enhancement increased reader confidence to diagnose EMVI compared to T2-weighted imaging alone
- EMVI correlates with depth of extramural invasion and proximity to mesorectal fascia
- Size of the involved vessels may also correlate with rate of metachronous metastasis and poor response to neoadjuvant chemoradiation therapy

MRI SCORING OF EMVI

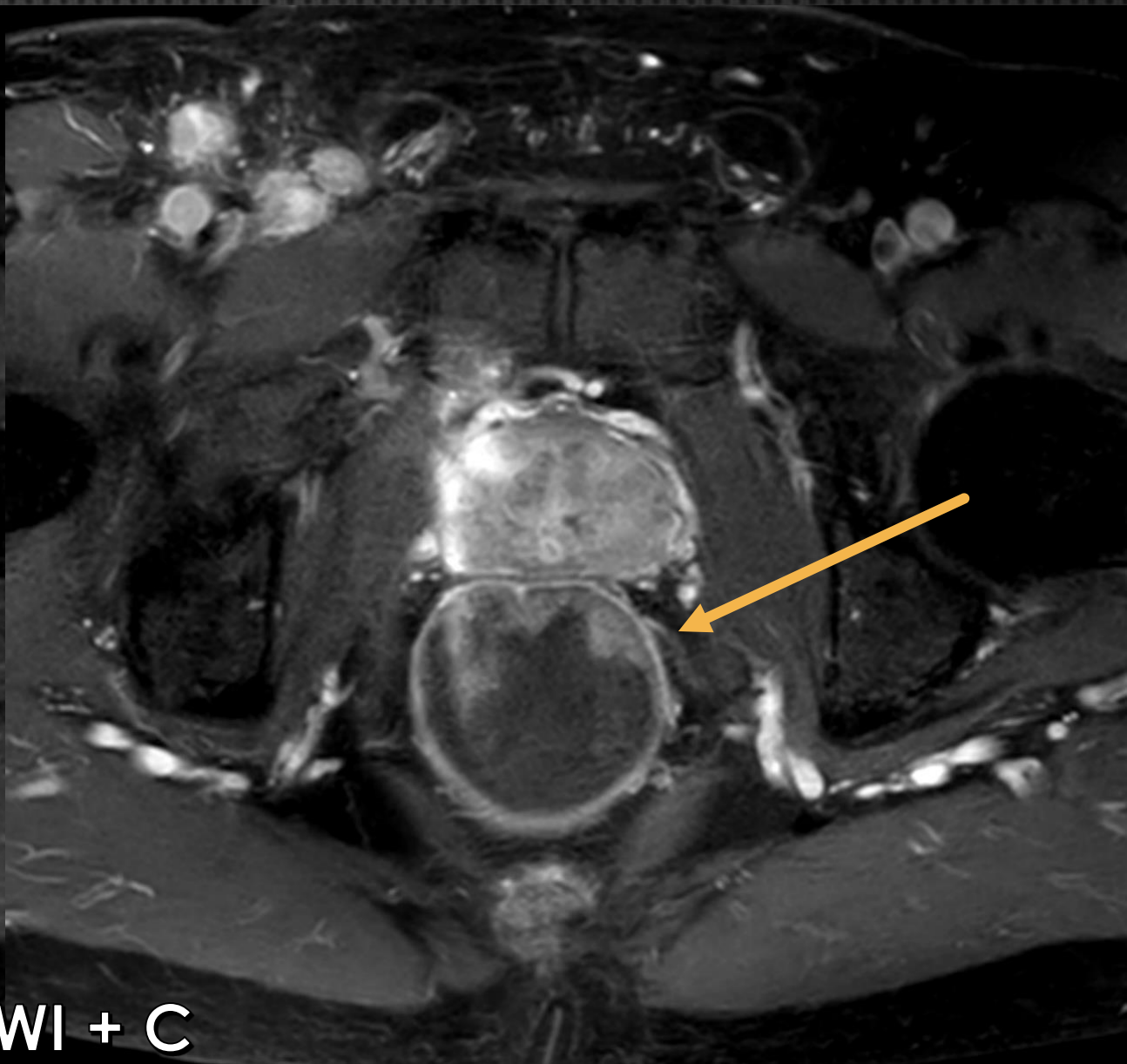
MRI EMVI score	Predicted EMVI Status	Imaging Features
0	Definitely not present	No nodularity or vessels adjacent to areas of tumor penetration
1	Probably not present	Minimal extramural stranding / nodular extension, but not in vicinity of any vascular structures
2	Equivocal	Stranding in vicinity of extramural vessels, which are normal size, and no definite tumor signal seen within.
3	Probably present	Intermediate signal intensity within vessels, although only slightly expanded
4	Definitely present	Obvious irregular vessel contour or nodular expansion of vessel by definite tumor signal



Enlarged tubular vessel with intermediate tumor signal in the mesorectal fat adjacent to the tumor

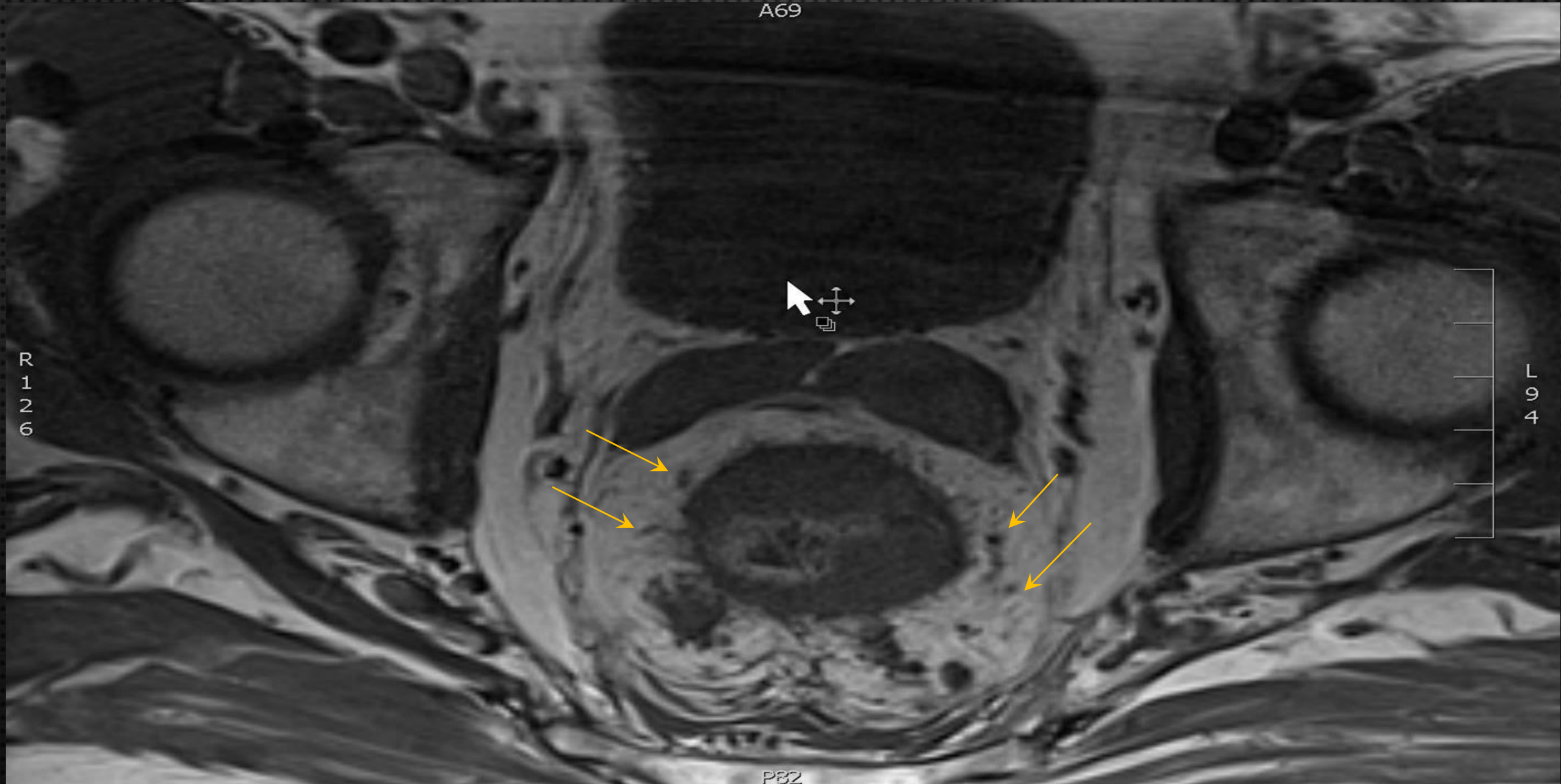


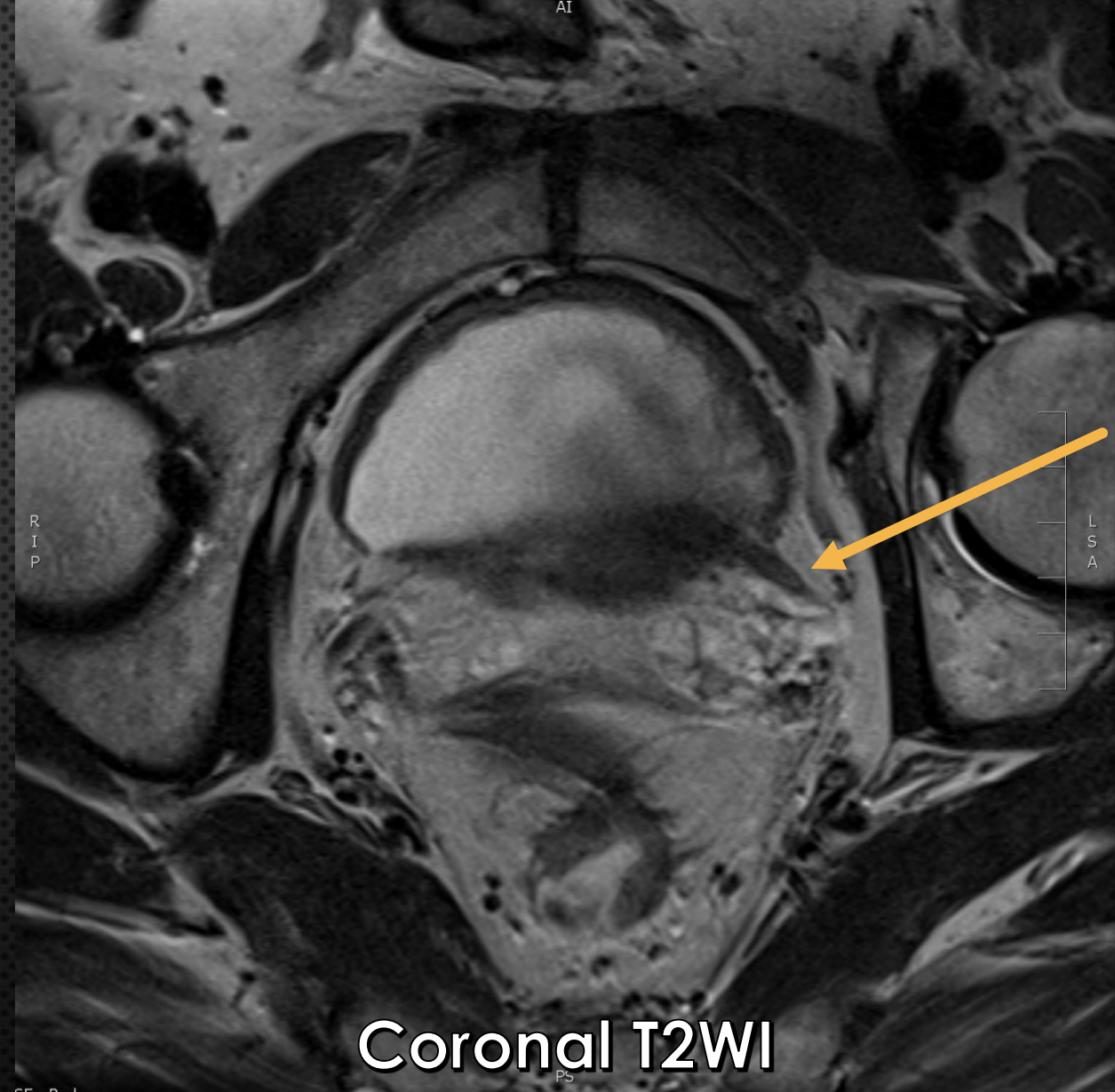
Axial T1WI + C



The same patient with irregular wispy enhancement of the enlarged left meso-rectal veins

T3 with +EMVI





A different patient with enlarged irregular vascular flow voids in the mesorectal fat

TEACHING POINTS

- Although extramural vascular invasion (EMVI) is not included in the TNM staging system of rectal cancer, it is an important finding that should be included in the MR report for initial staging.
- EMVI is a **significant finding** which may help direct neoadjuvant chemoradiation therapy options and surgical planning.
- EMVI is an **independent prognostic indicator** for more precise risk stratification of locally recurrent and metastatic disease.
- **MRI is superior to histopathologic analysis** for detection of EMVI

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