MRI in Rectal Cancer

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Outlines

- Introduction
- MRI in pre-operative staging
- MRI after neoadjuvant treatment
- Case example
- Conclusions

Introduction

Introduction: why MRI?

- The two major advancements in the treatment of rectal cancer are **total mesorectal excision (TME)**, and neoadjuvant chemoradiation.
- The decision whether rectal cancer patient is a candidate for TME only or neoadjuvant therapy followed by TME, is made on the findings of MRI.
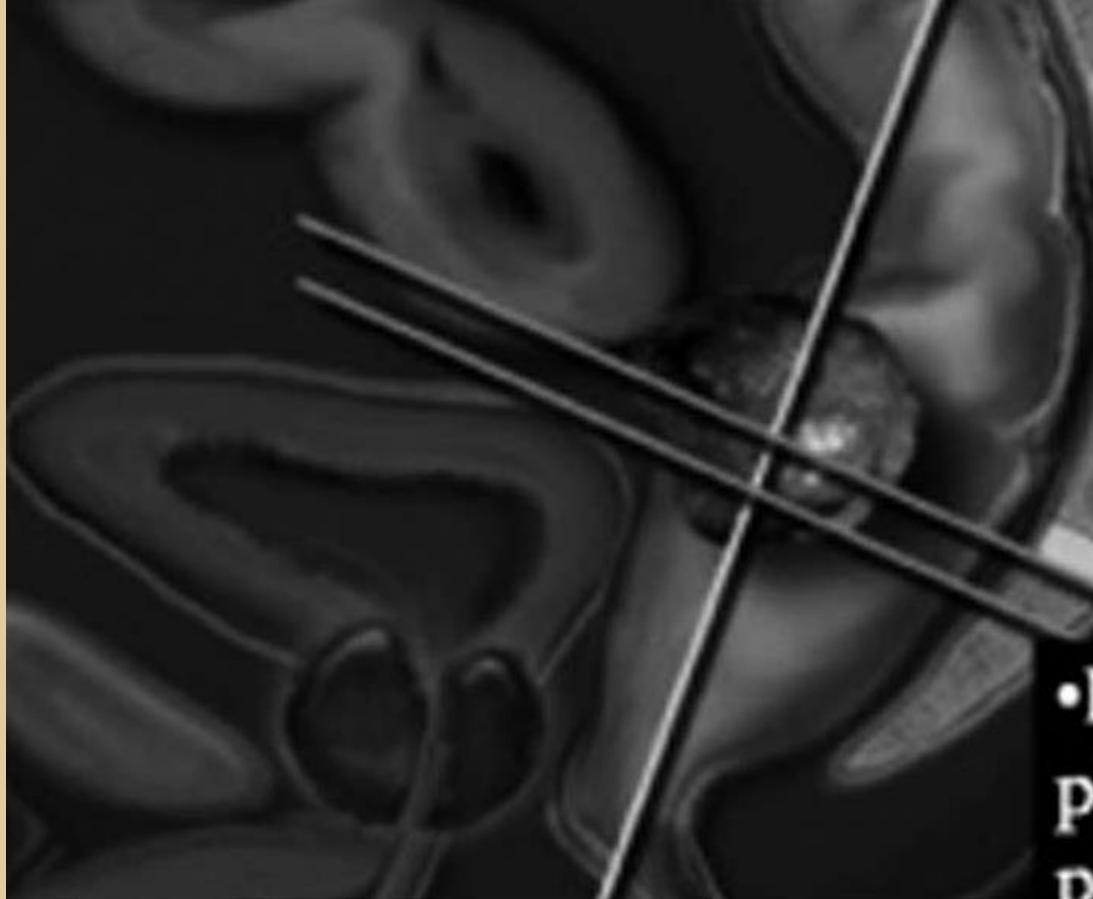- MRI is the most accurate tool for the local staging of rectal cancer.
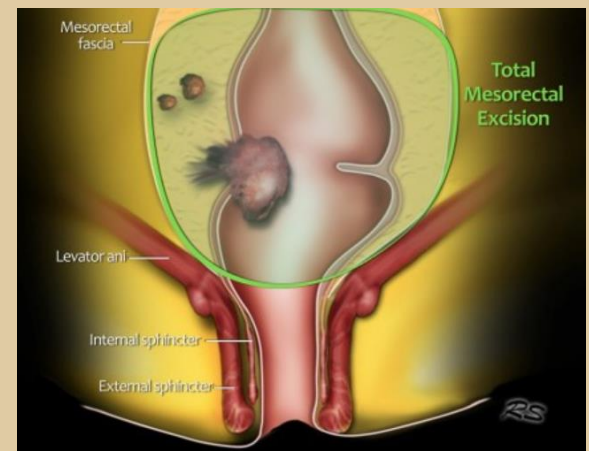
Introduction: why MRI?

- It reveals good anatomical images important for evaluation, particularly MRF, levator ani muscle, and anal sphincters

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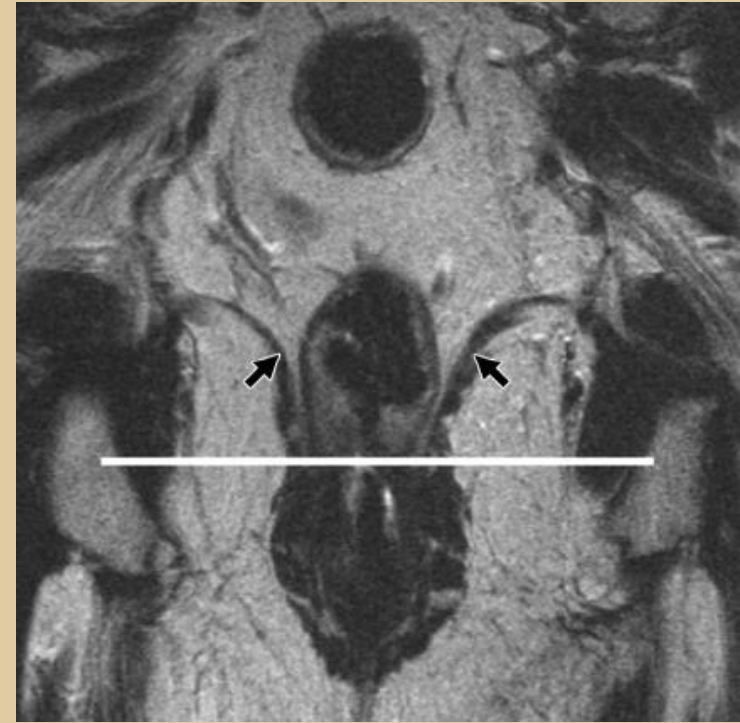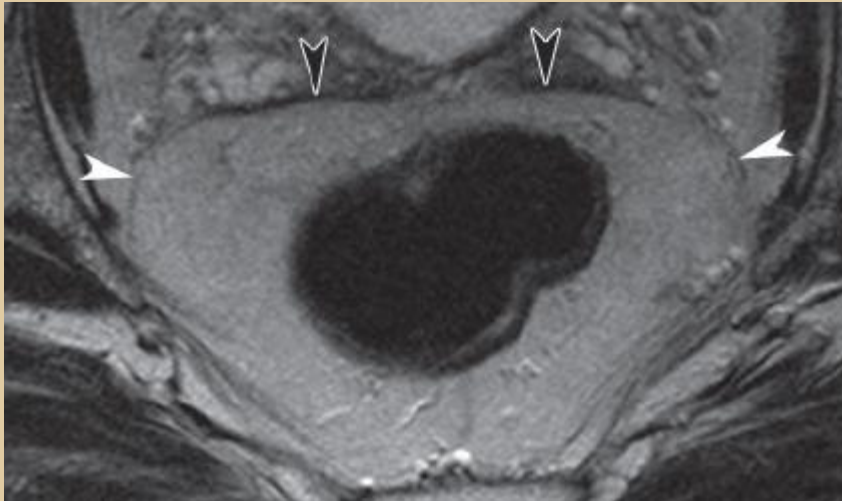
MRI: key sequences are high resolution T2 FSE, axial, sag, coronal

MRI in pre-operative staging

MRI in pre-operative staging

Table 1 Metanalysis of magnetic resonance imaging staging of rectal cancer-Al-Sukhni et al[27]

	Sensitivity% (95%CI)	Specificity% (95%CI)	DOR (95%CI)
T stage	87 (81-92)	75 (68-80)	20.4 (11-37)
N stage	77 (69-84)	71 (59-81)	8.3 (4.6-14.7)
CRM	77 (57-90)	94 (88-97)	56.1 (15-205)

DOR: Diagnostic odds ratio; CI: Confidence interval; CRM: Circumferential resection margin.

Pre-operative staging MRI: Mnemonic: DISTANCE

- **DIS:** Distance from the inferior part of the tumor to the transitional skin
- **T:** T staging
- **A:** Anal complex for low lying tumor with specific classification
- **N:** N staging
- **C:** CRM
- **E:** Extramural vascular invasion

Nougaret, Radiology 2013

DISTANCE: DIS = distance

- Low: ≤ 5 cm from anal verge
- Mid: >5-10 cm from anal verge
- High: >10-15 cm from anal verge

High
10.1-15 cm

Mid
5.1-10 cm
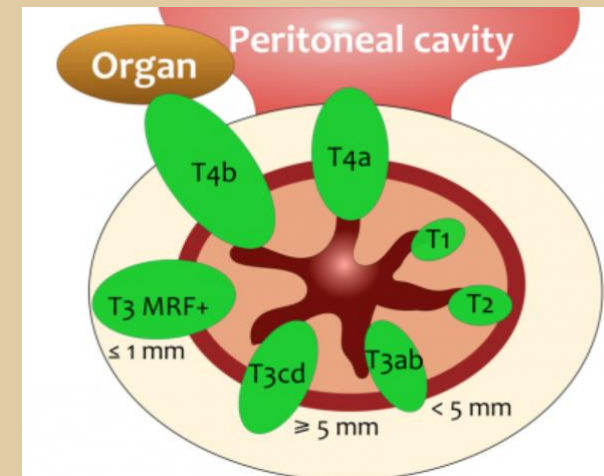
Low
0-5 cm

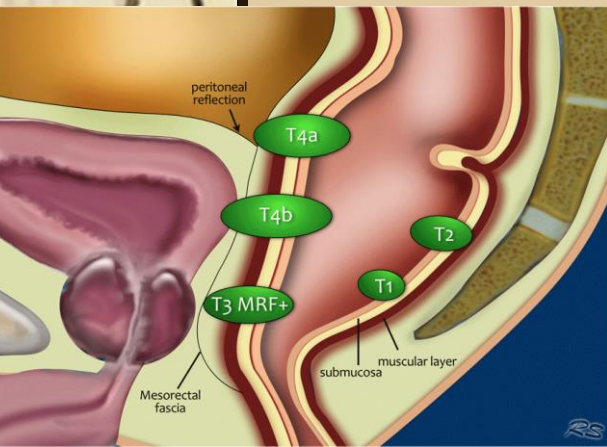Hovart et al, RG 2019

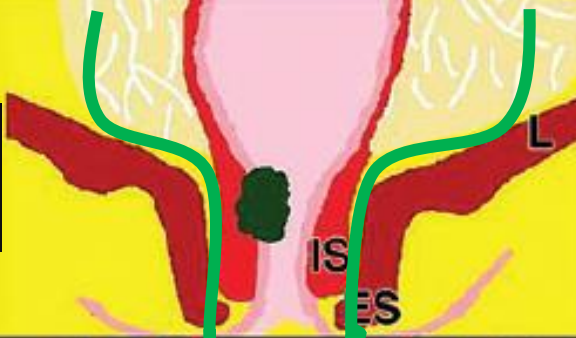10-15 cm
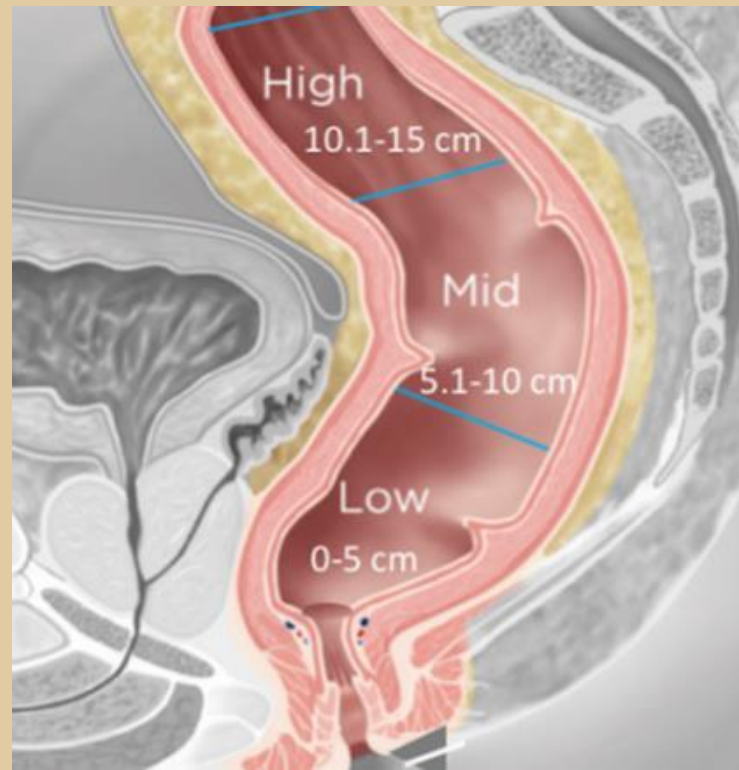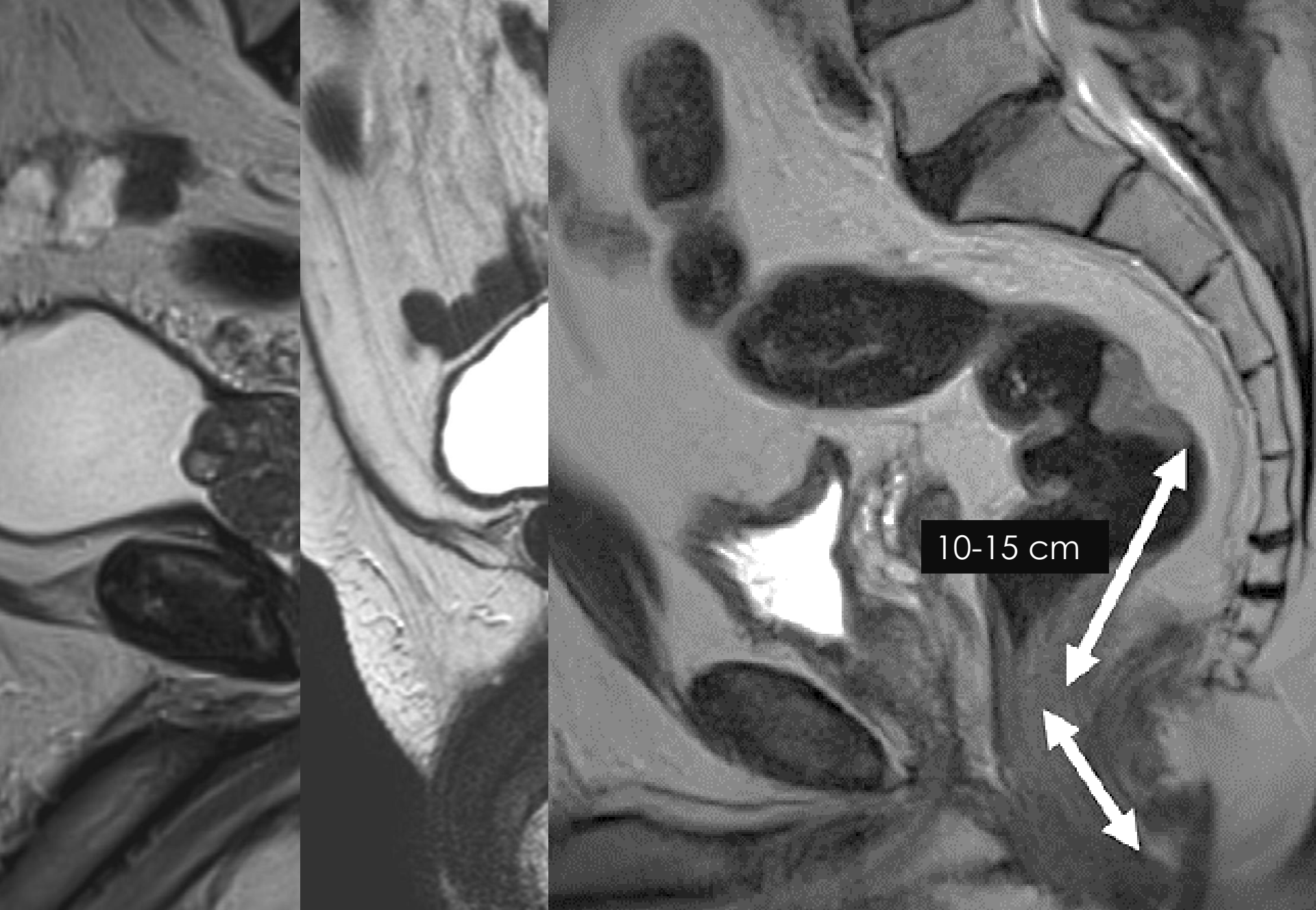
DISTANCE: T = T staging

T-staging
- T1 and T2: tumors limited to the bowel wall.
- T3: tumors grow through the bowel wall and infiltrate the mesorectal fat.

       T3a: < 1mm EMD (extramural depth)
       T3b: 1-5 mm EMD
       T3c: 5 - 15 mm EMD
       T3d: > 15 mm EMD
- T4: tumors invade adjacent structures

       T4a: invasion peritoneal reflection
       T4b: invasion adjacent organs

STAGE 1

Intersphincteric APR

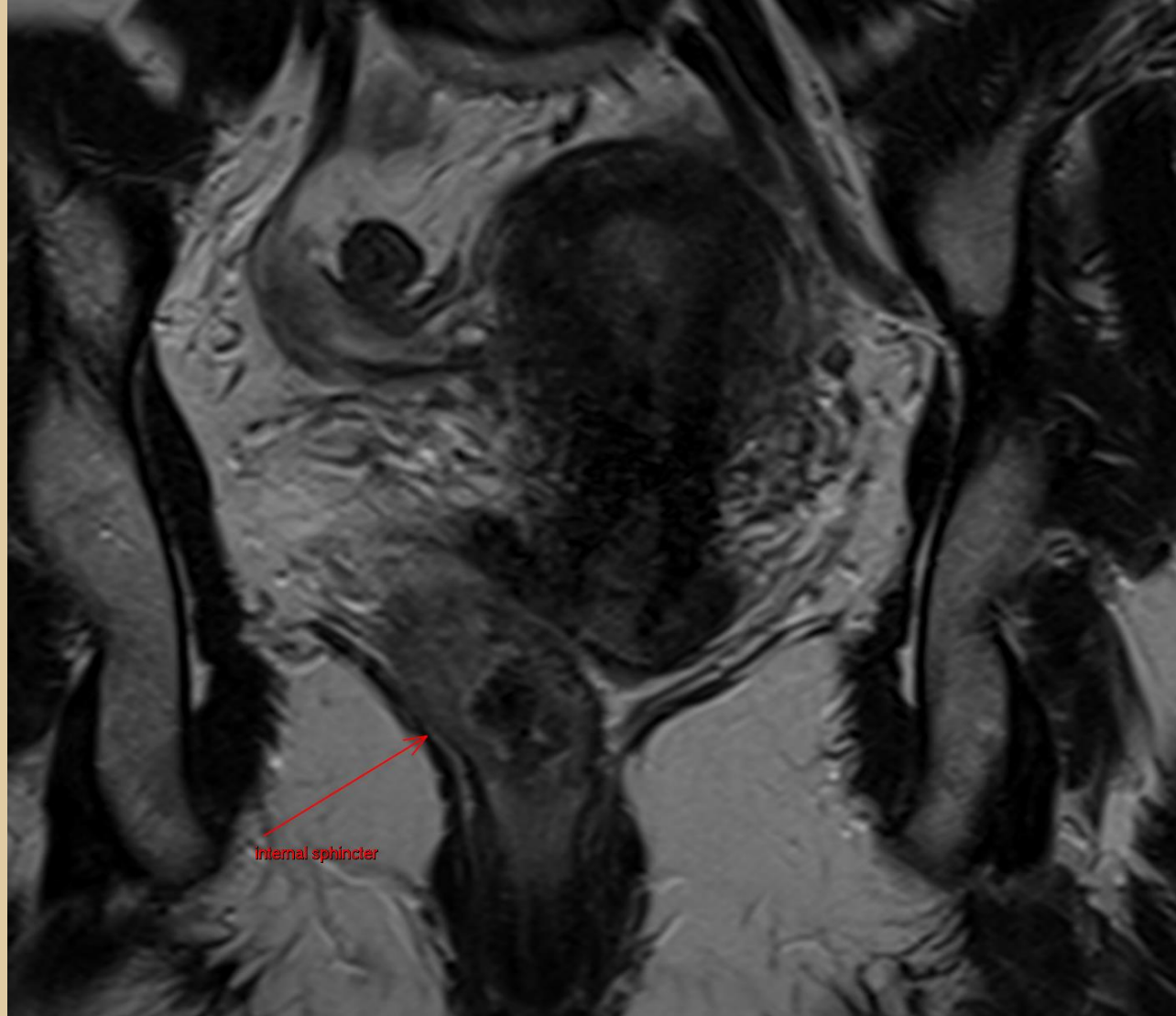Extralevator APR

into intersphincteric plane

STAGE 3

Extralevator APR

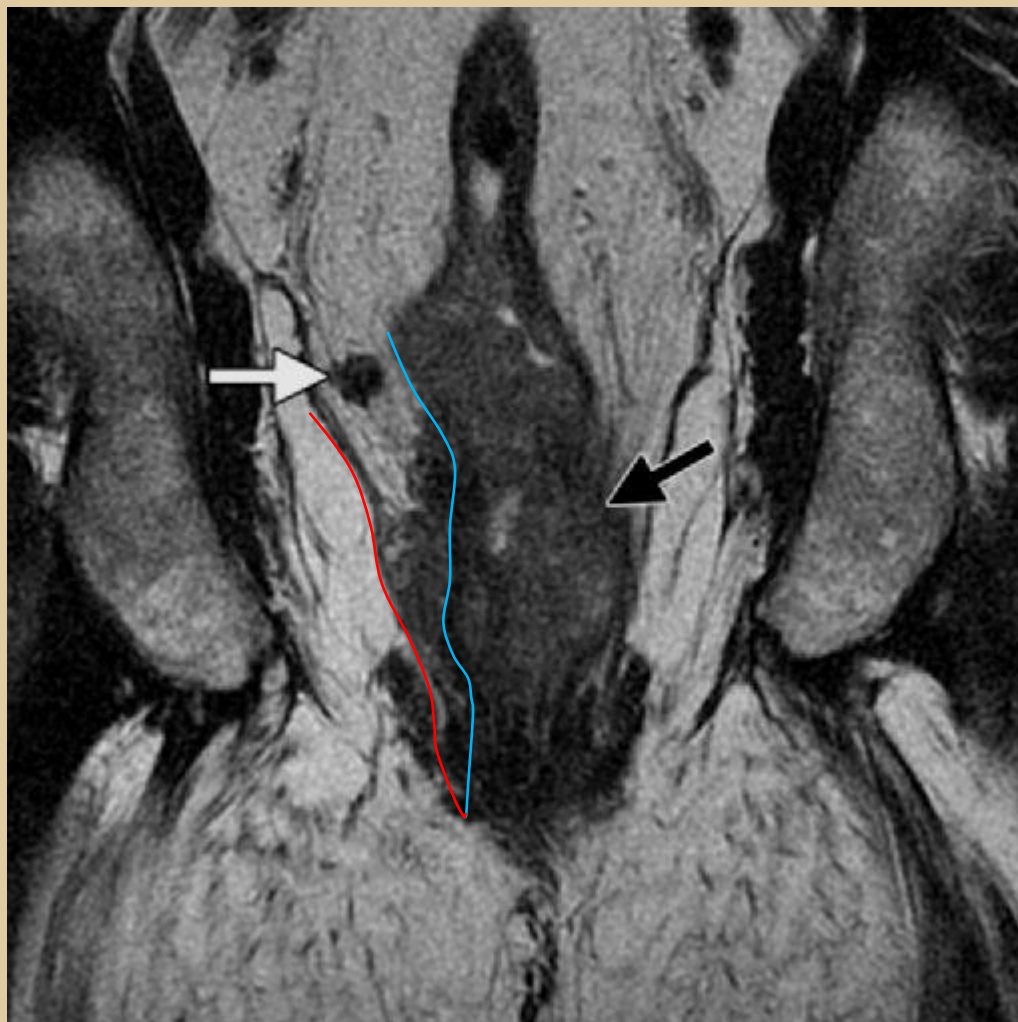lies within 1mm of levator muscle

STAGE 4

Ishioanal APR

rnal within ators with or without invading adjacent organs

IS
ES
L

DISTANCE: A = Anal complex for low lying tumor with specific classification

Nougaret, Radiology 2013

Internal sphincter

- **CA lower rectum with invasion of internal anal sphincter, stage 2**
- **Sx: extralevator APR and TME**

- **CA lower rectum with invasion of right intersphincteric plane, stage 3**
- **Sx: Extralevator APR**

DISTANCE: N = Nodal staging

N-staging
- N0: no suspicious nodes
- N1: 1-3 suspicious nodes
- N2: ⩾ 4 suspicious nodes

N-stage - suspicious nodes			
Malignant characteristics	Indistinct	Heterogeneous	Round
Short axis	- < 5mm : needs 3 malignant characteristics - 5 -9mm : needs 2 malignant characteristic - > 9mm : always suspicious		
cN-stage	- N0 : *no suspicious* lymph nodes - N1 : 1-3 *suspicious* lymph nodes - N2 : ≥ 4 *suspicious* lymph nodes		

DISTANCE: C = CRM

- MRF + : tumor within 1mm of MRF
- MRF threatened: tumor within 1-2 mm of MRF
- MRF - : no tumor within 2 mm of MRF
- This applies to main tumor, LN, and EMV

Nougaret, Radiology 2013
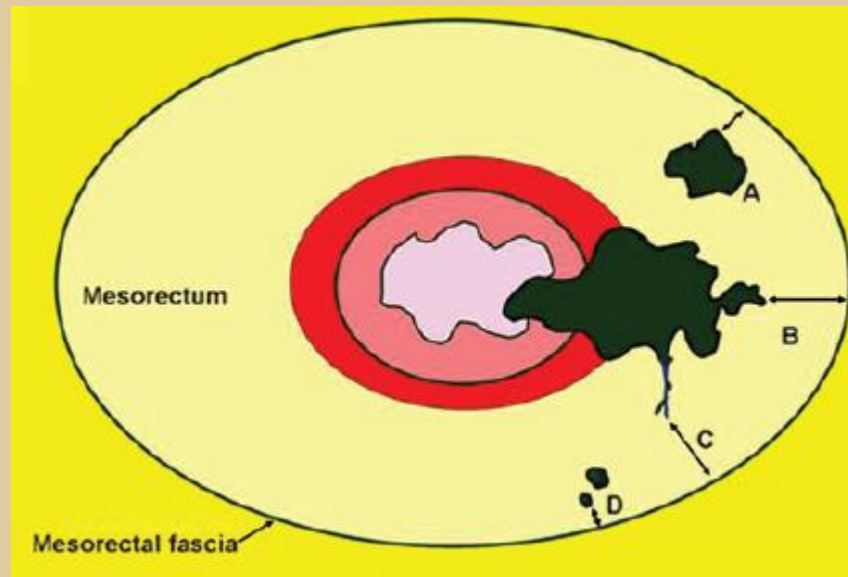
DISTANCE: E= extramural vascular invasion independent prognostic factor
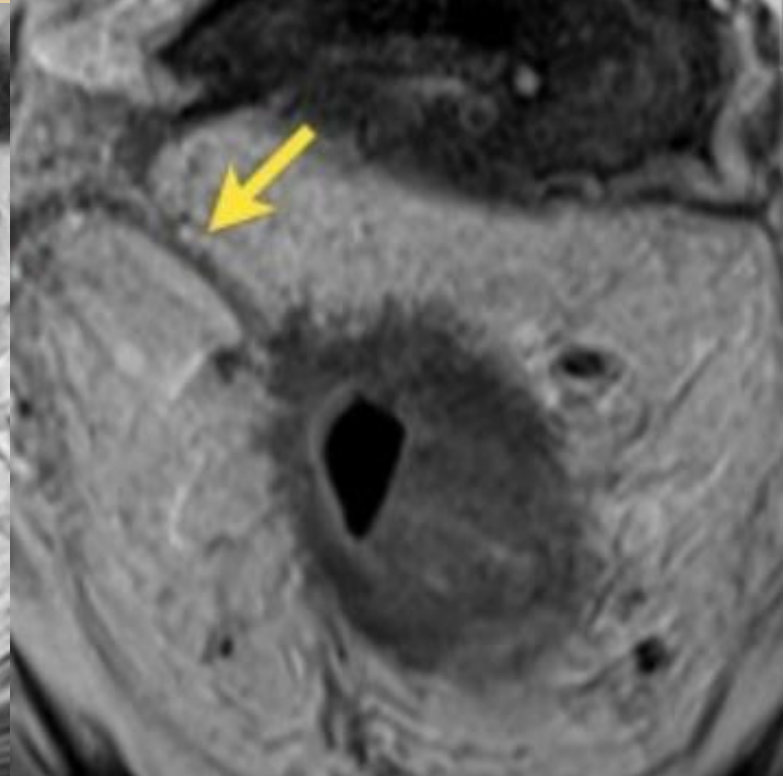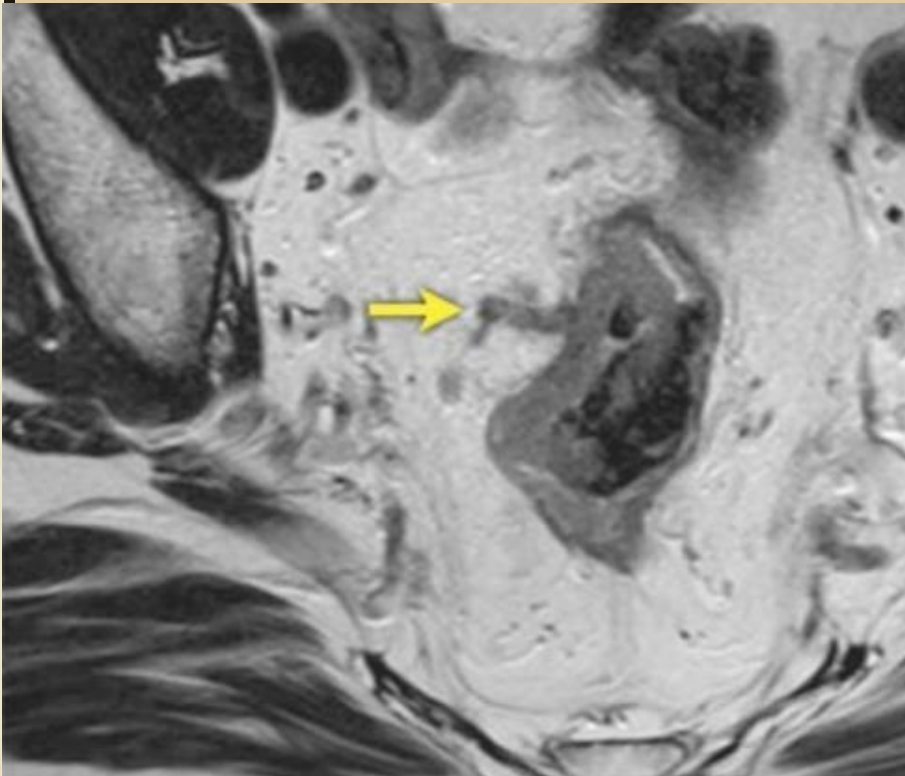
- EMVI is suspected if a vascular structure is expanded, irregular or infiltrated by tumor.
- EMVI is a risk factor for recurrent disease.
- EMVI is associated with T3- and T4 tumors.