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Imaging morfo-funzionale nella stadiazione del Carcinoma Anale

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Introduction

- Anal Cancer is an uncommon malignancy requiring a specialst multidisciplinary team approach for optimum results
- It accounts for only 0.3% of all cancers and 1.5% of all gastrointestinal tract cancers
- Incidence is higher in woman and is increasing

R. Glynne-Jones et al. Anal cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up Annales of oncology 2010
Uronis HE et al. Anal Cancer: an overview. Oncologist 2007

Introduction

- Today, the therapy of anal cancer depends on the tumor stage.
- Staging by TNM classification prior to therapy is, thus, extremely important.

Eng C.. Cancer Invest. 2006;24(5):535–544..
Das P et al. Int J Radiat Oncol Biol Phys. 2007;68(3):794–800.
Huang K et al. World J Gastroenterol. 2007;13(6):895–900.
Svensson C et al. Int J Colorectal Dis. 1992;7(3):122–124.
Schneider IH et al. Int J Colorectal Dis. 1992;7(4):192–196..

Introduction

- Imaging now has recognized impact on patient management and it has a key role in both primary staging and post-tratment follow-up

RADIOLOGIC STAGING

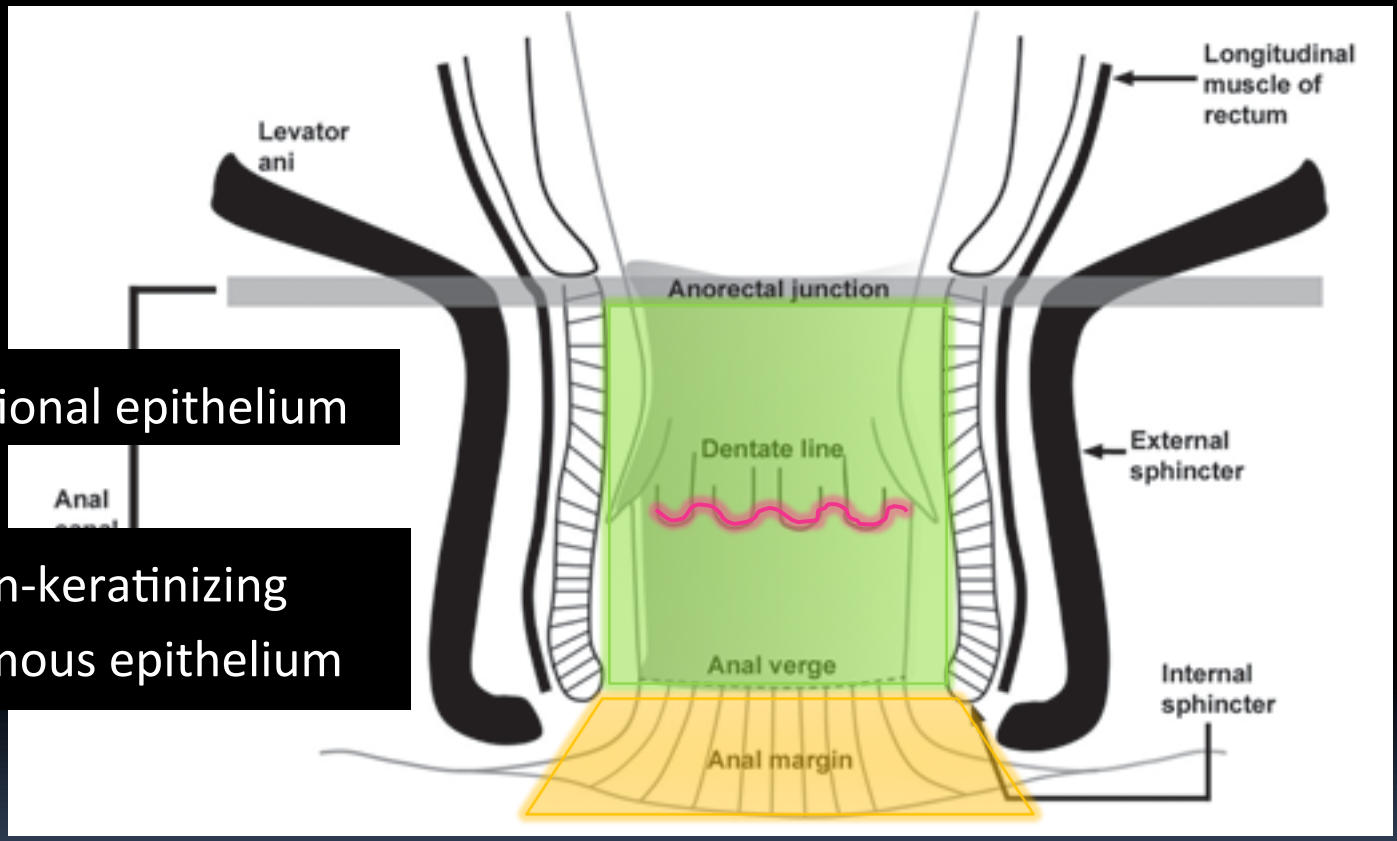
MRI

EUS

FDG PET/CT

Kochhar R. et al. Imaging of anal carcinoma AJR 2012

Anatomy: *Anal Canal vs Anal Margin*



Transitional epithelium

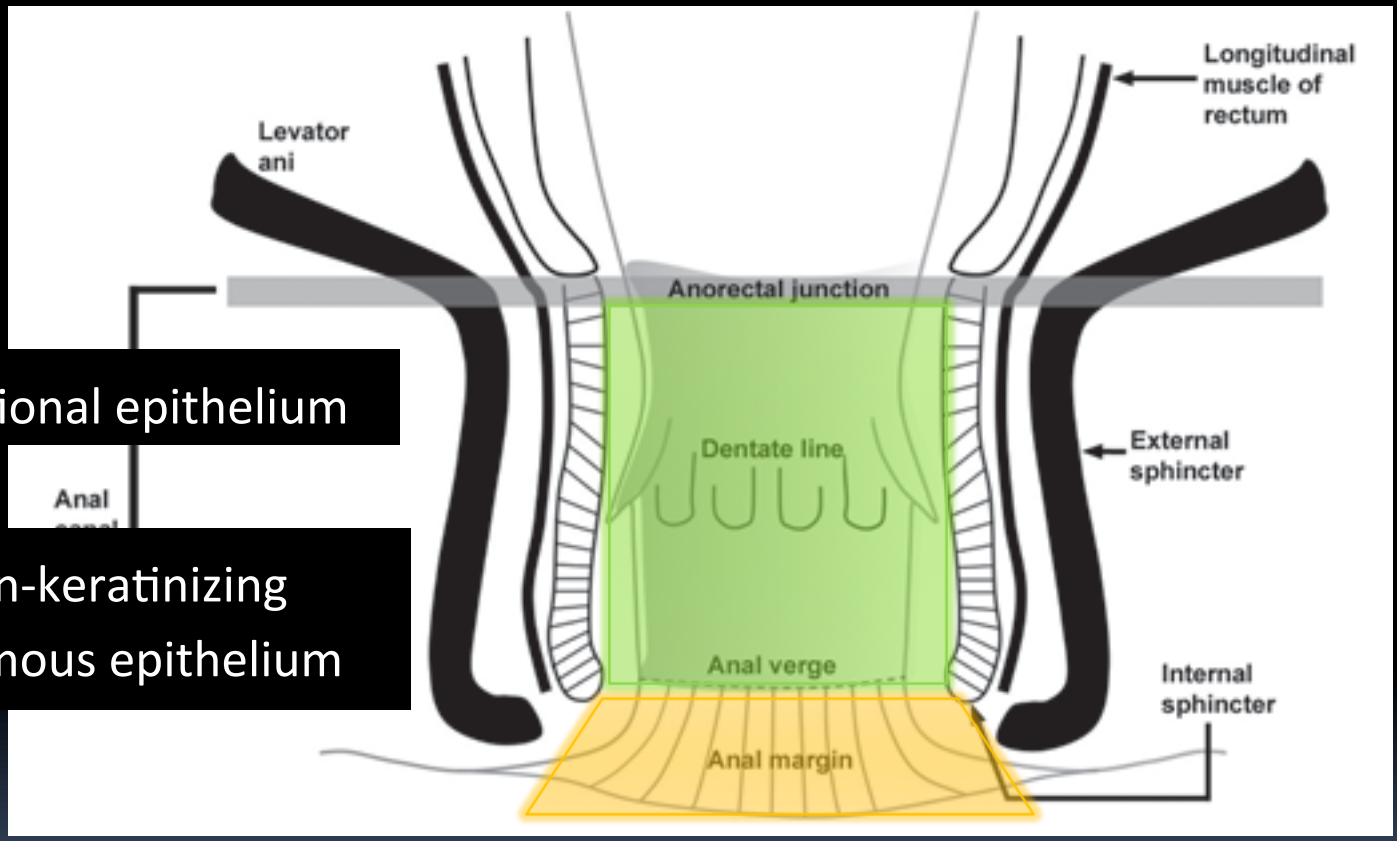
Anal

Non-keratinizing squamous epithelium

ANAL CANAL: extends from the anorectal junction to the anal margin

ANAL MARGIN: pigmented skin immediately surrounding the anal orifice, extending laterally to a radius of ≈ 5 cm

Anatomy: *Anal Canal vs Anal Margin*

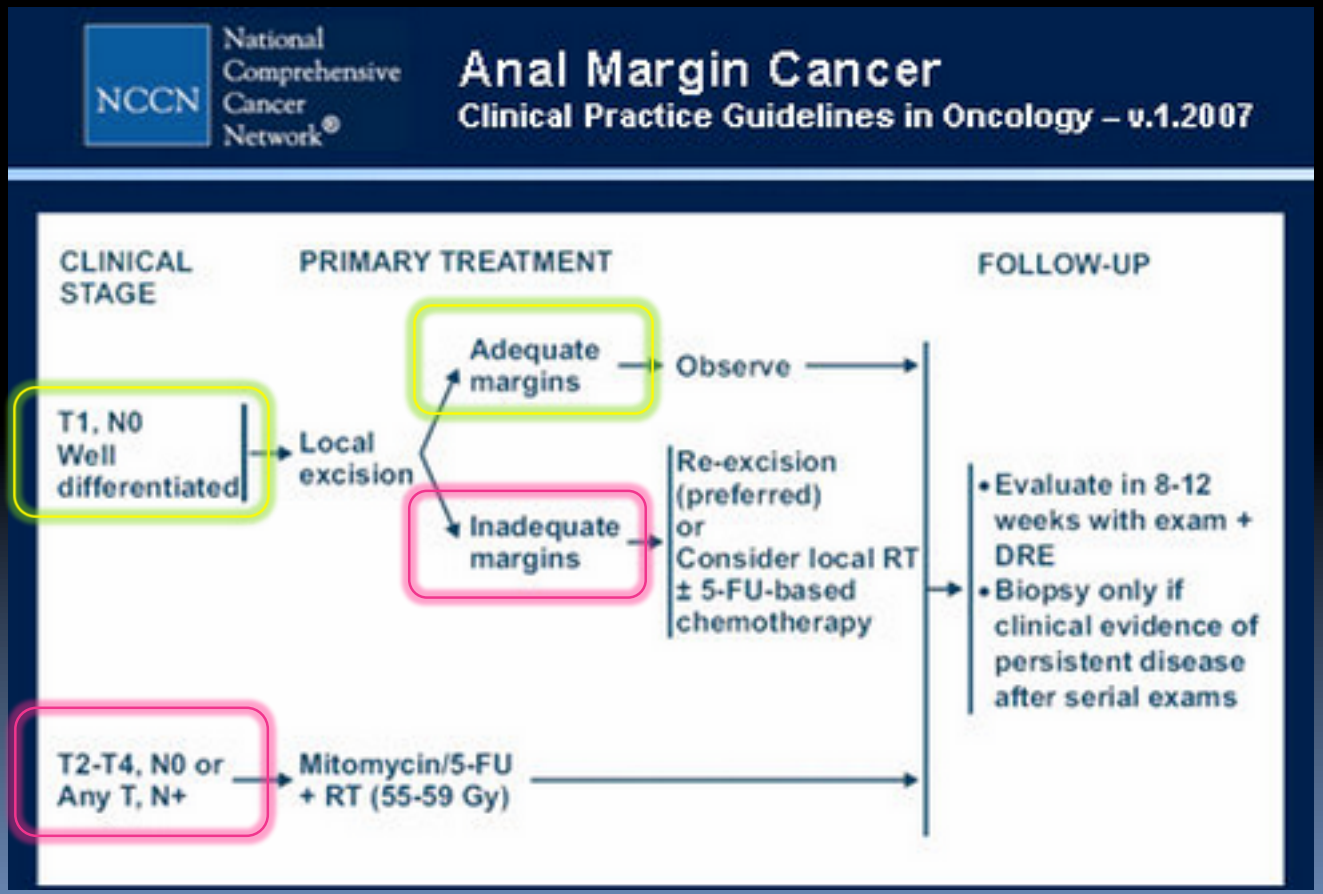


ANAL CANAL TUMORS → are treated with chemoradiotherapy; have a worse prognosis

ANAL MARGIN TUMORS → can be treated by surgical excision alone

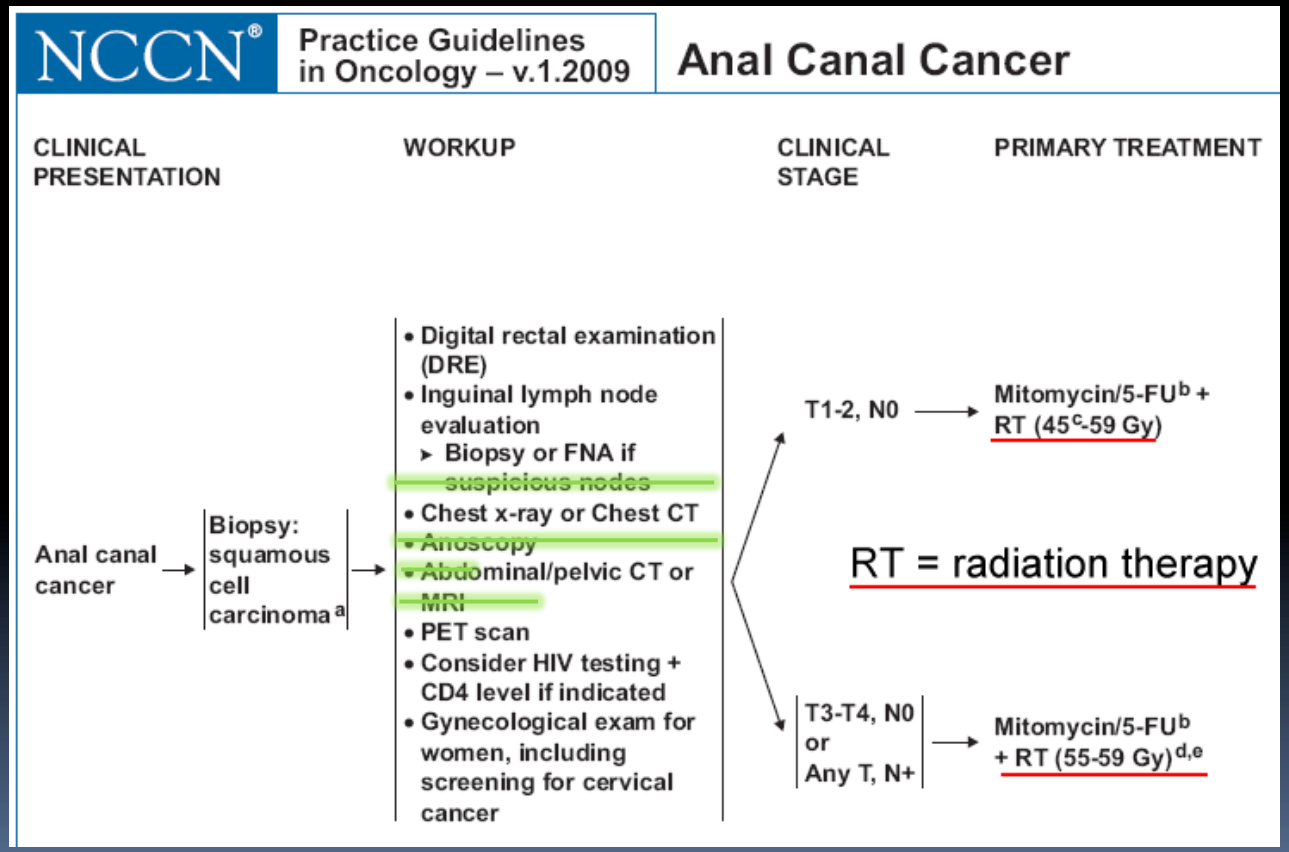
Anal Margin Cancer

- Perianal cancers can be treated like skin cancers
  - Keratinizing
  - Low-grade
  - <2 cm



Anal Canal Cancer

- Histologically ACCs can be either keratinising or non keratinising according to their origin below or above the dentate line, although with similar biological behaviour



Glynne-Jones R, Northover JM, Cervantes A (2010) Anal cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann Oncol 21(Suppl5)
Kochhar R, et al (2012) Imaging of anal carcinoma. AJR Am J Roentgenol 199:W335–W344

Staging

Primary tumor (T)

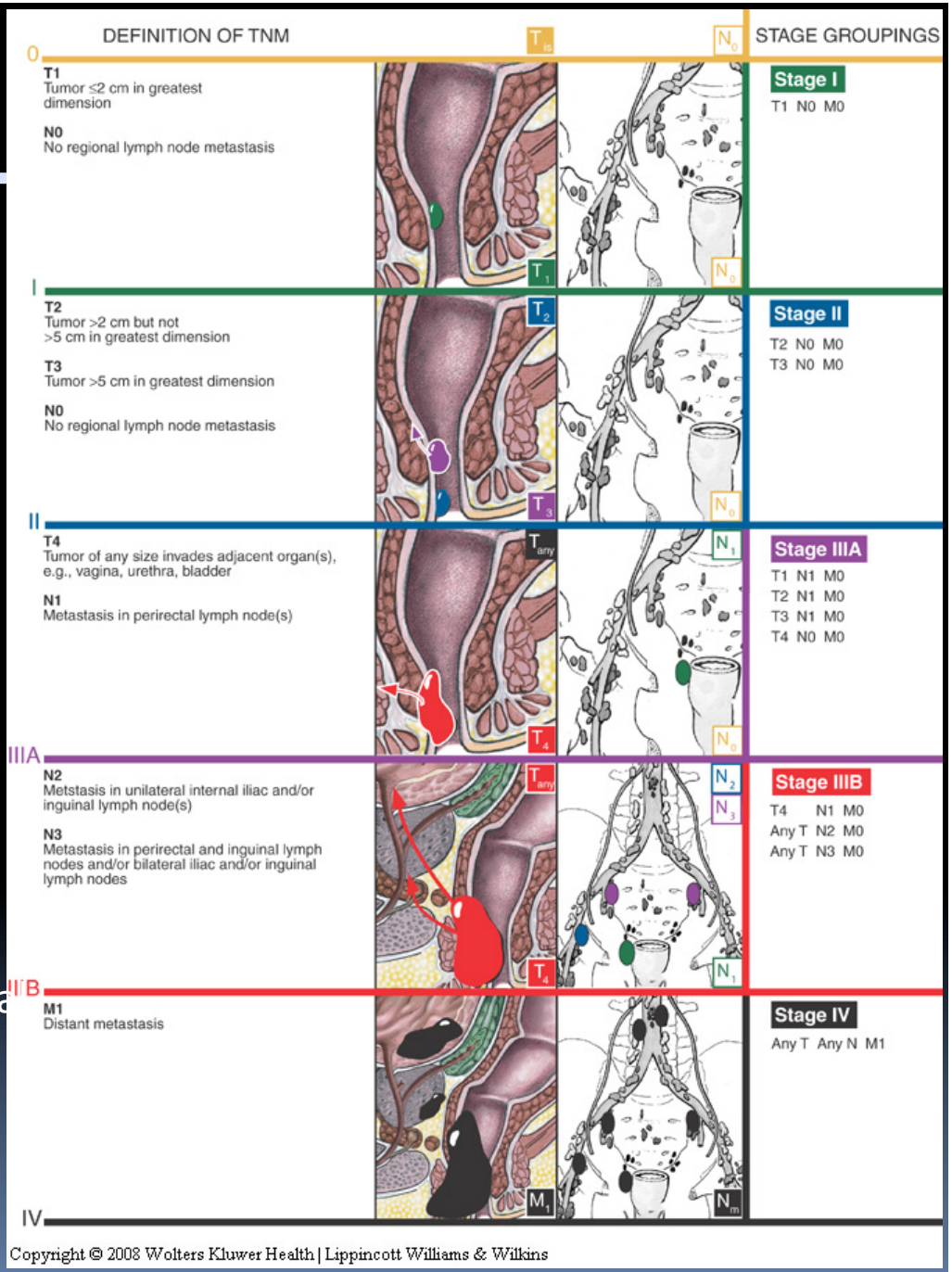
TX Primary tumor cannot be assessed
To No evidence of a primary tumor
Tis Carcinoma in situ
T1 Tumor ≤2 cm in greatest dimension
T2 Tumor >2 cm but <5 cm in greatest dim.
T3 Tumor > 5 cm in greatest dim.
T4 Tumor of any size that
invades adjacent organs

Regional lymph nodes (N)

NX Regional nodes cannot be assessed
No No regional node metastases
N1 Perirectal lymph node(s)
N2 Unilateral internal iliac and/or inguinal ln
N3 Perirectal and inguinal ln and/or in bilatera
internal iliac and/or inguinal

Distant metastasis (M)

MX Distant metastasis cannot be assessed
Mo No distant metastasis
M1 Distant metastasis present

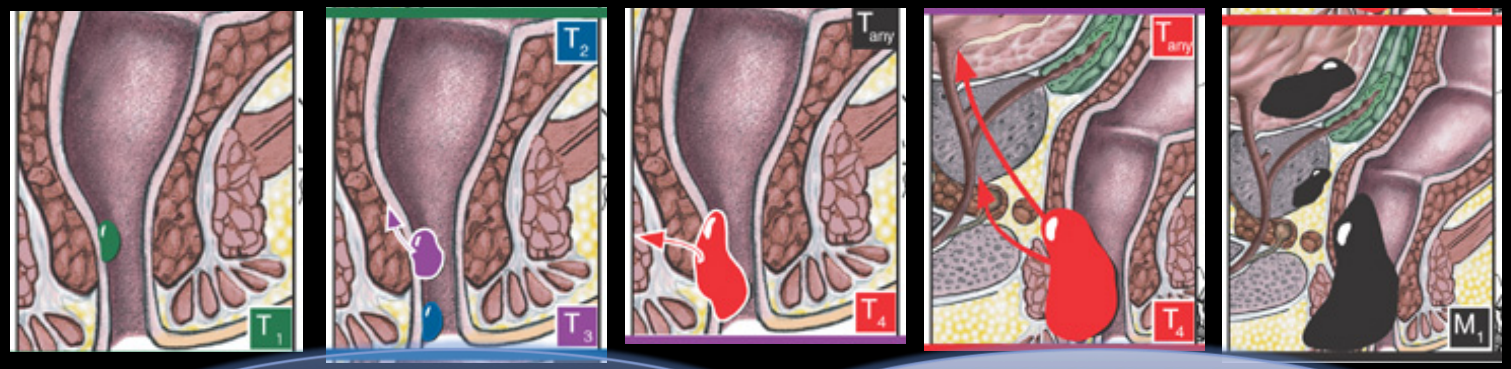


Edge S, et al. AJCC cancer staging manual, 7° ed. 2010

Staging

T-stage

Is defined by Maximum Tumor Diameter and does not take into account sphincter muscle involvement which is an important prognostic factor



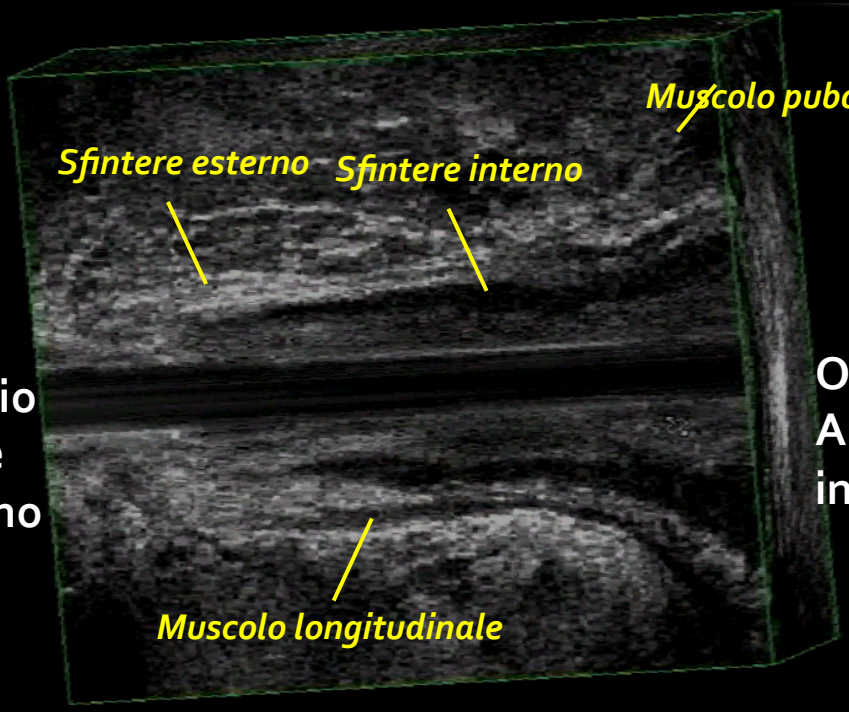
EUS

MRI

TX Primary tumor cannot be assessed
To No evidence of a primary tumor
Tis Carcinoma in situ
T1 Tumor ≤ 2 cm in greatest dimension
T2 Tumor > 2 cm but ≤ 5 cm in greatest dimension
T3 Tumor > 5 cm in greatest dimension
T4 Tumor of any size that invades adjacent organs

Staging

T-stage



Orifizio Anale esterno

Orifizio Anale interno

Relatively cheap

Safe

Has shown to be superior to MRI in the detection of small superficial tumors of the anal canal

EUS

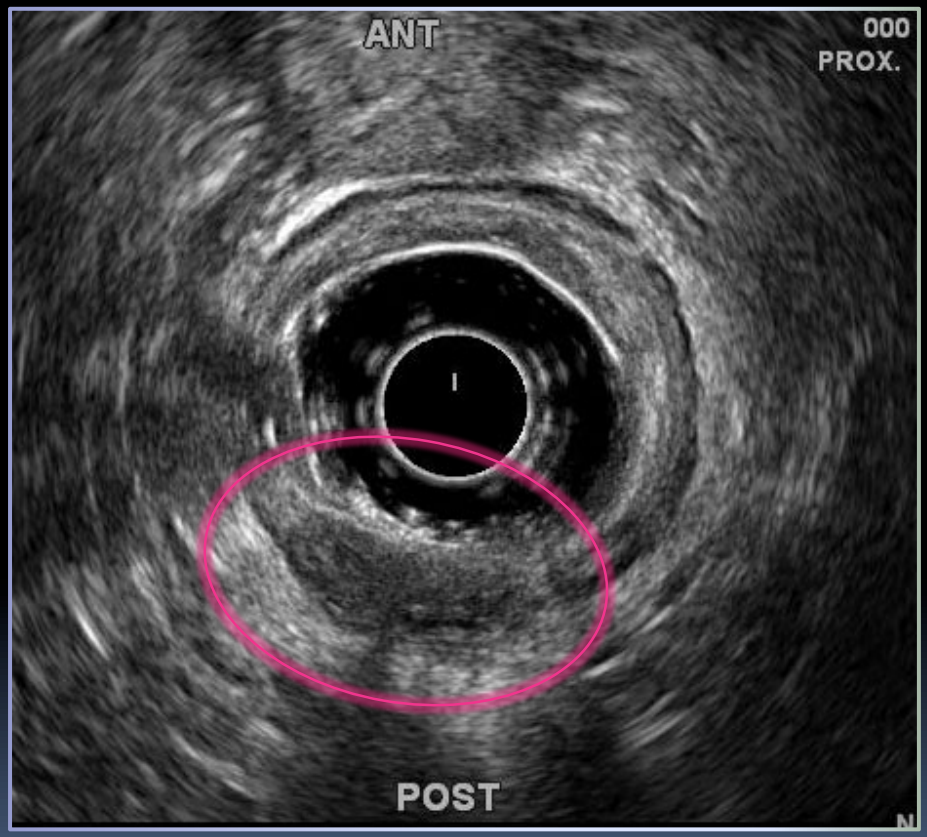
Limited FOV

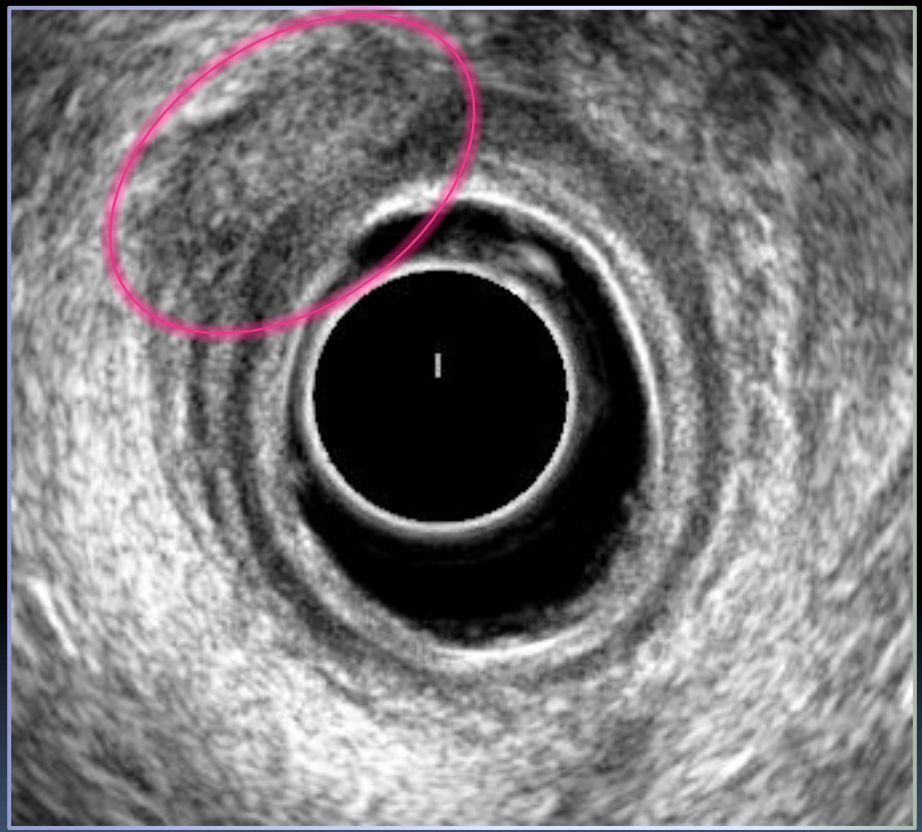
Distant mesorectal nodes, inguinal and iliac nodes

Stenotic tumors assessment

Technique

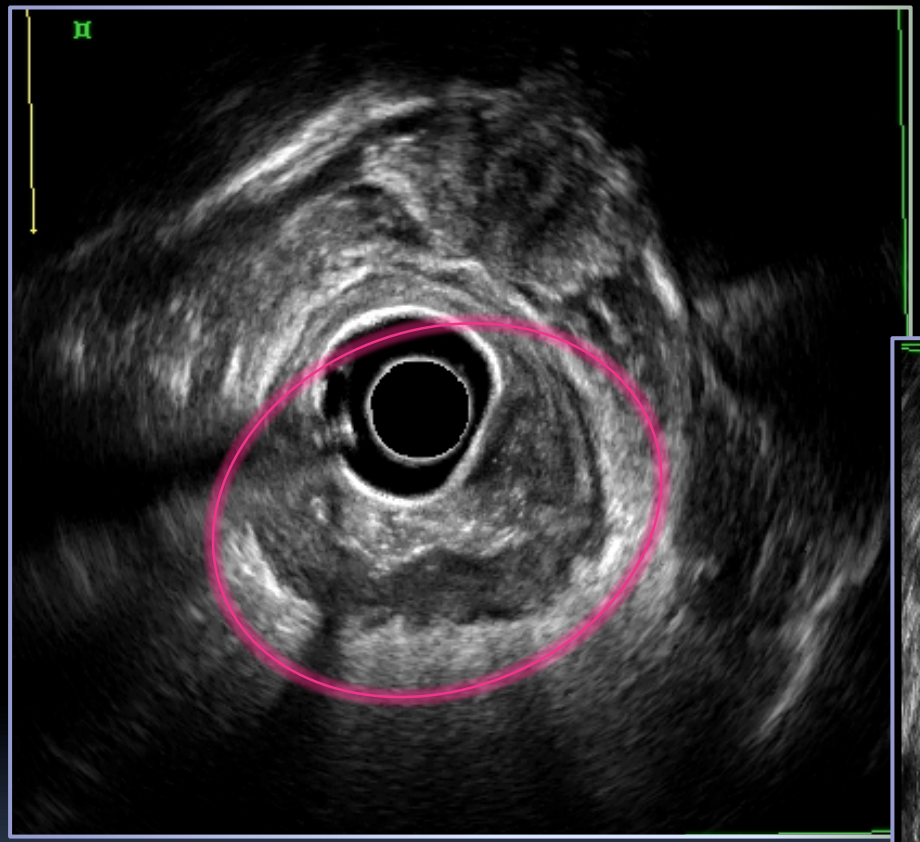
T-stage

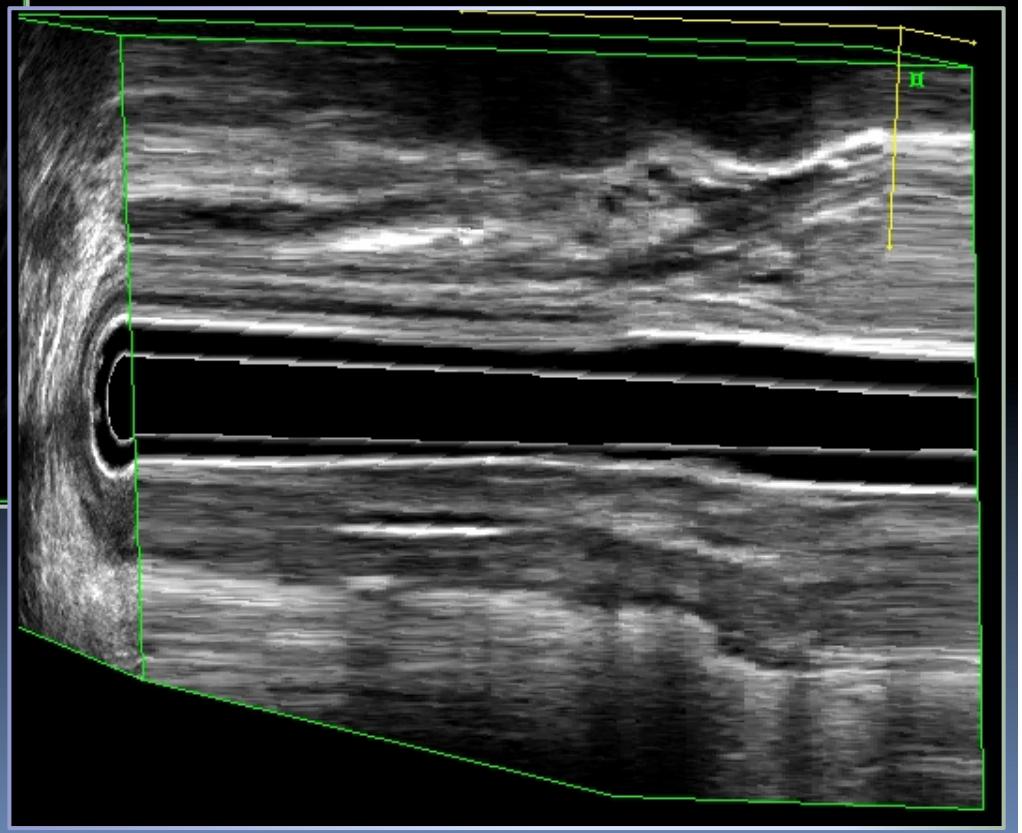




Technique

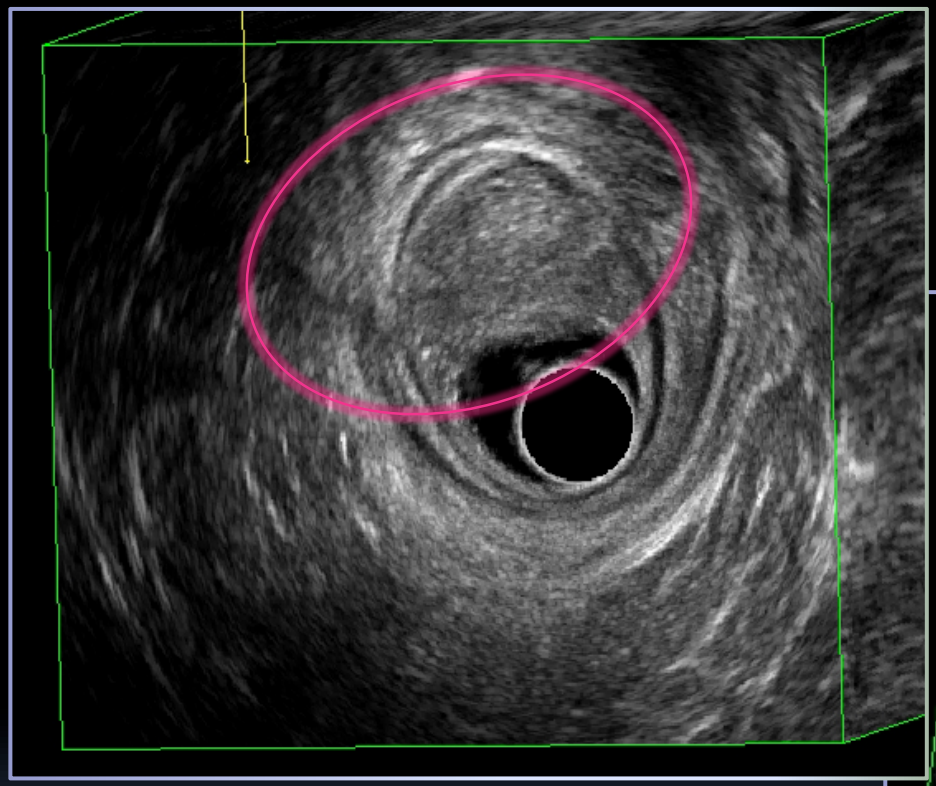
T-stage

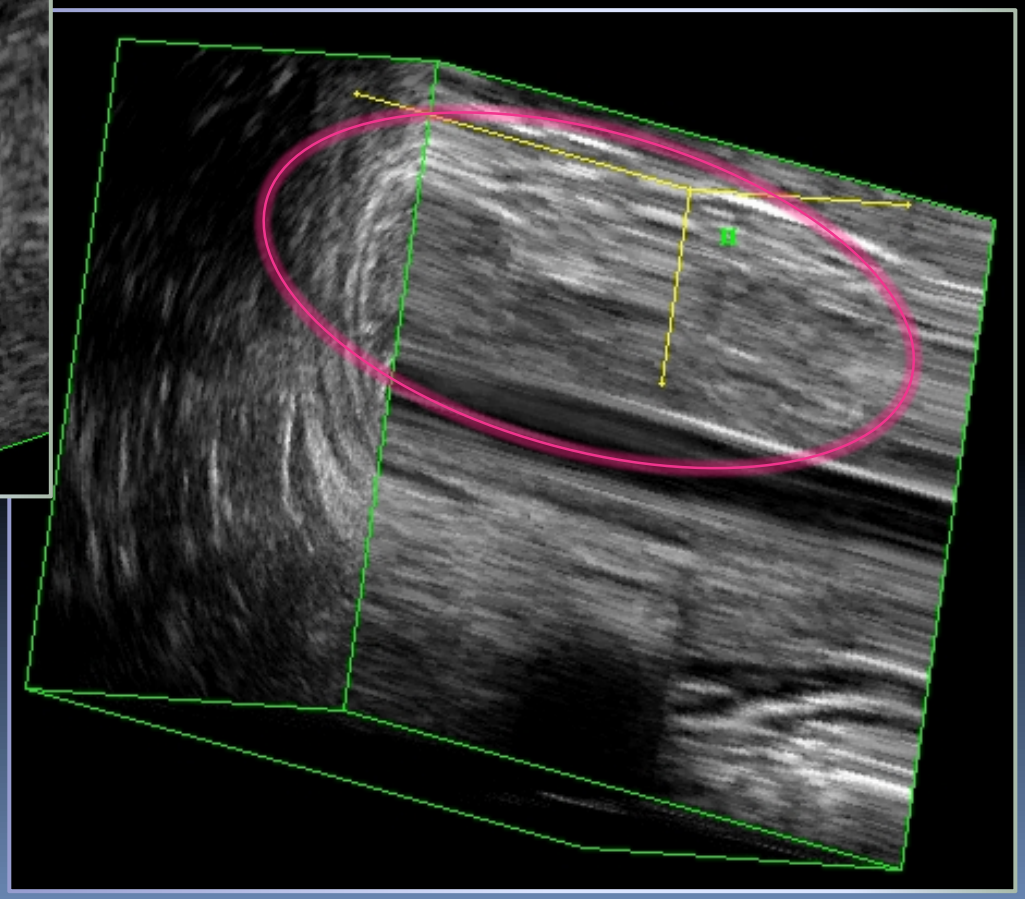




Technique

T-stage

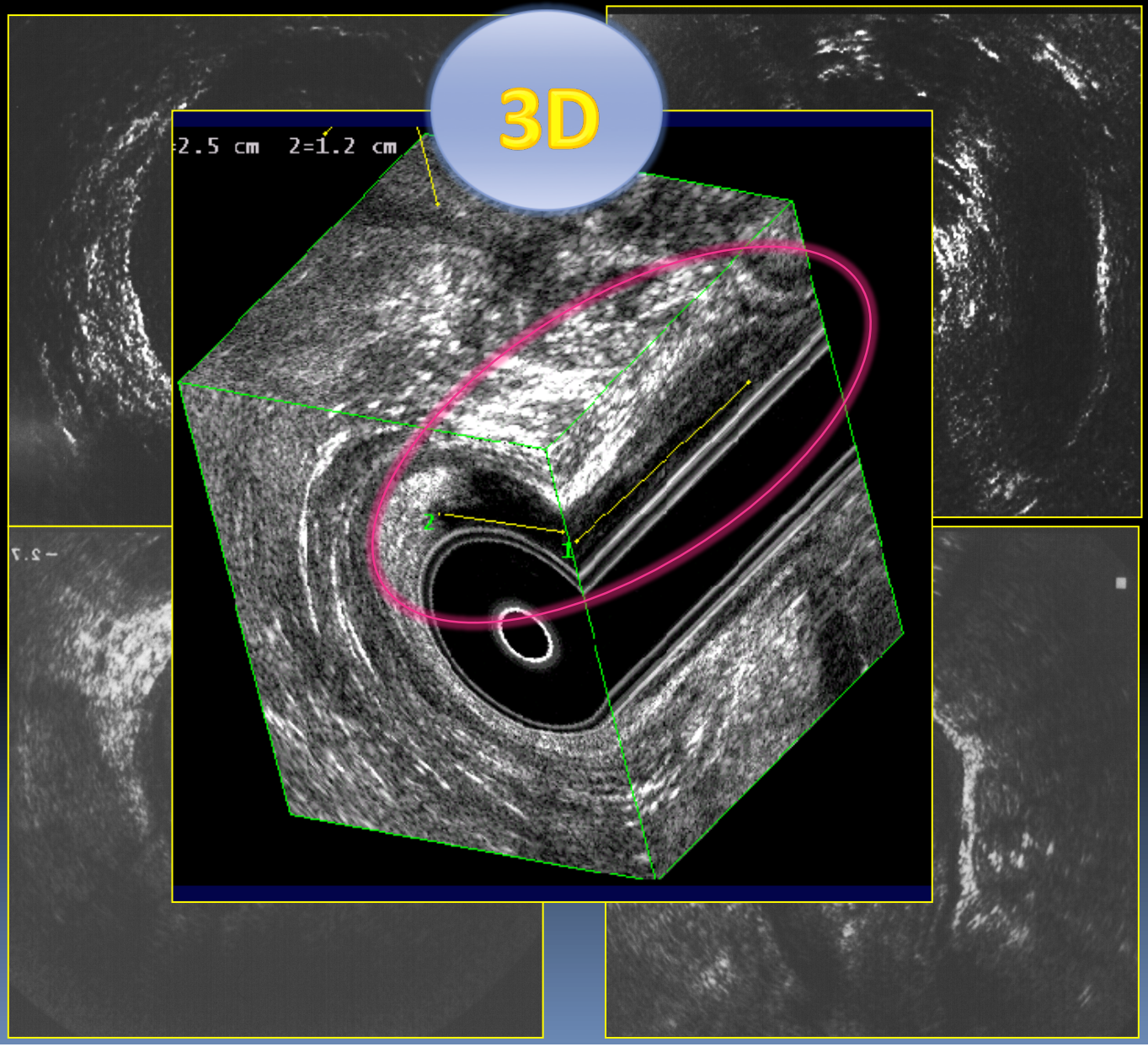




3D

Technique

T-stage



Staging

T-stage

Patients with bulky tumours, and those whose tumours have a long craniocaudal extent, benefit from primary staging with MR as anal endosonography is not feasible.

High-resolution multiplanar information about primary tumor:

- Location
- Size
- Circumferential
- Cranio-caudal extent

Involvement of adjacent structures

Expensive

Time-consuming

Contra-indications

S.C. Roach et al. Clinical Radiology (2005) 60, 1111–1119

Technique

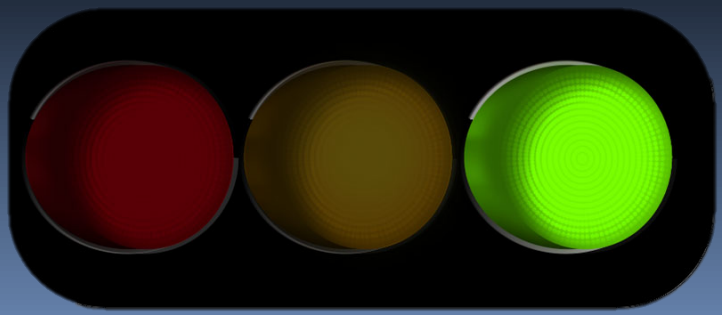
T-stage

MRI

External phased-array coils on high-magnetic-field scanners is the imaging modality of choice to investigate the anal region

No special patient preparation is needed.

Highresolution T2-weighted sequences along three planes, with coronal and axial scans planned slightly oblique, respectively parallel and perpendicular to the long axis of the anal canal.

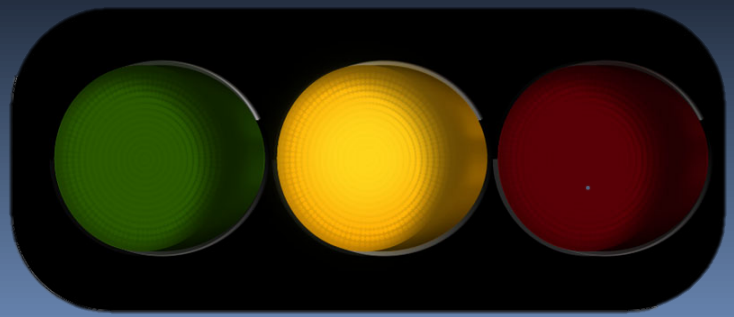


Technique

T-stage

MRI

Do post-contrast MRI acquisitions offer additional information to the high soft tissue contrast intrinsic to T2 weighted imaging ?

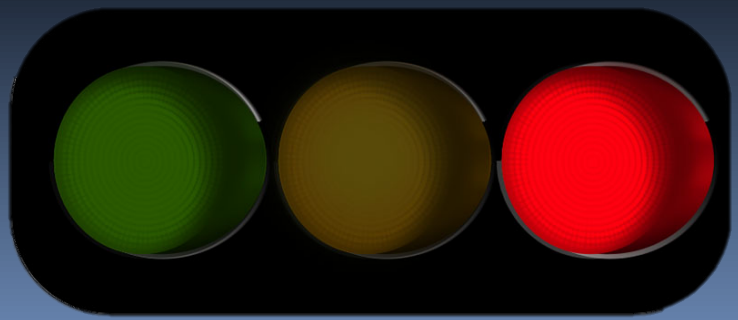


Technique

T-stage

MRI

Short-tau inversion recovery (STIR) sequences are less useful because of limited spatial detail and difficulty to delineate anatomic landmarks



Staging

T-stage

MRI

In 2010 the European Society for Medical Oncology (ESMO) recommended MRI as the primary imaging modality to accurately stage AC, taking into account the maximum tumour diameter, possible invasion of adjacent organs and nodal involvement

EUS

Sensitivity of EUS and MRI for the identification of AC has been reported to approach 90–100 %, with high concordance regarding tumour size, although on a limited number of patients, and more precise results with ultrasound for smaller, superficial tumours

Otto S. D. et al. J Gastrointest Surg (2009) 13:1292–1298
Glynne-Jones R et al. 2010 Ann Oncol 21
Roach SC et al (2005) Magnetic resonance imaging of anal cancer. Clin Radiol 60:1111–1119

Staging

N-stage

- Lymph node status in patients with anal cancer is a significant prognostic factor.
- Increasing tumor size portends a greater propensity for lymph node and distant metastases.
- Lymph node metastases may be present (in 25 % of cases) even with superficial (up to T2) ACs, and are unreliably assessed clinically.

Gastroentérologie Clinique et Biologique (2009) 33, 456—458

Staging

N-stage

- Nodal status is based on distance from the primary site rather than the number of nodes involved
- Nodal involvement of anal canal lesions differs from that of anal margin tumors

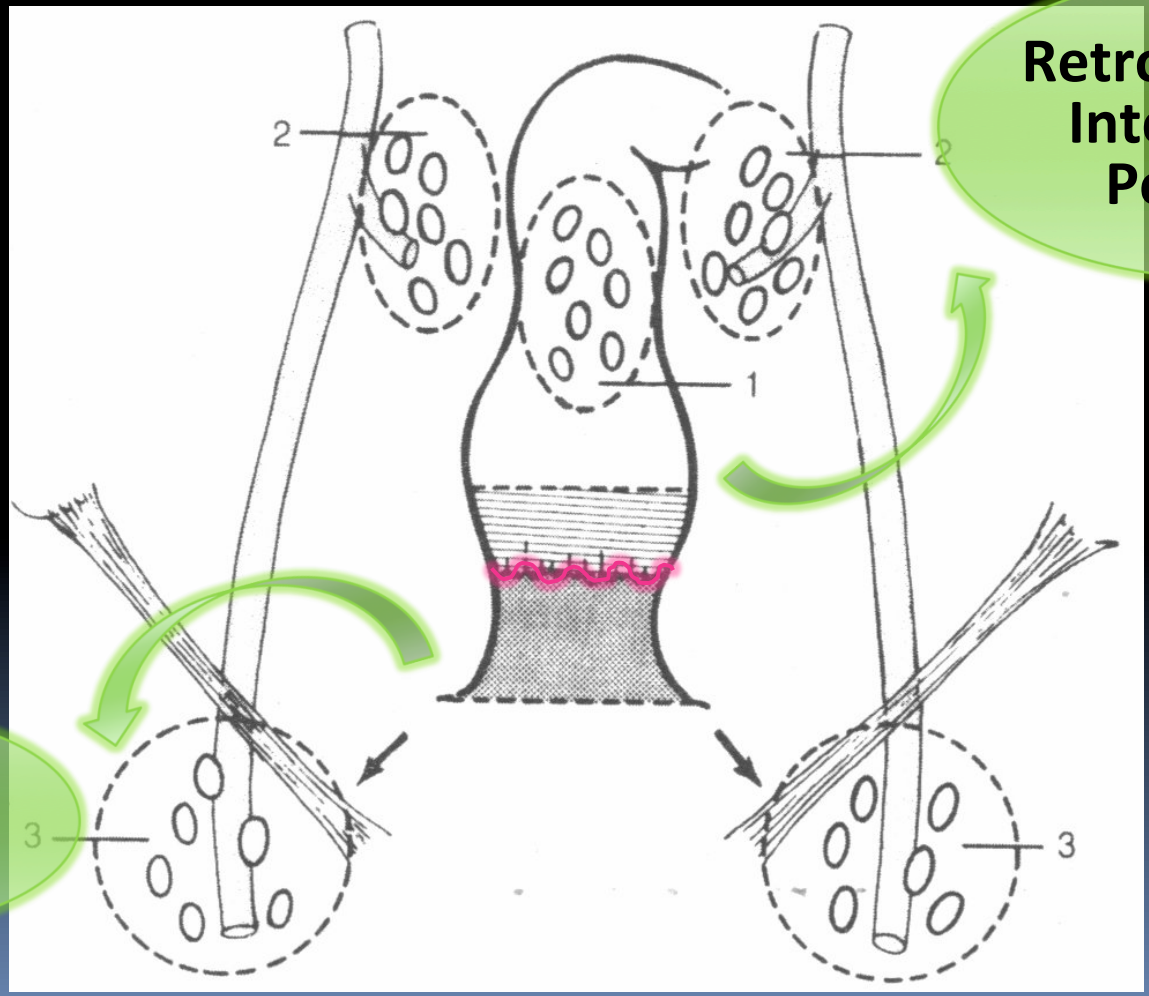
NX Regional nodes cannot be assessed
No No regional node metastases
N1 Metastasis in perirectal lymph node(s)
N2 Metastasis in unilateral internal iliac and/or inguinal lymph nodes
N3 Metastasis in perirectal and inguinal lymph nodes and/or in bilateral internal iliac and/or inguinal lymph nodes

Glynne-Jones R, Northover JM, Cervantes A (2010) Anal cancer: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann Oncol 21(Suppl 5):v87–v92

Staging

N-stage

Nodal drainage depends on which side of the dentate line the anal cancer has its epicenter

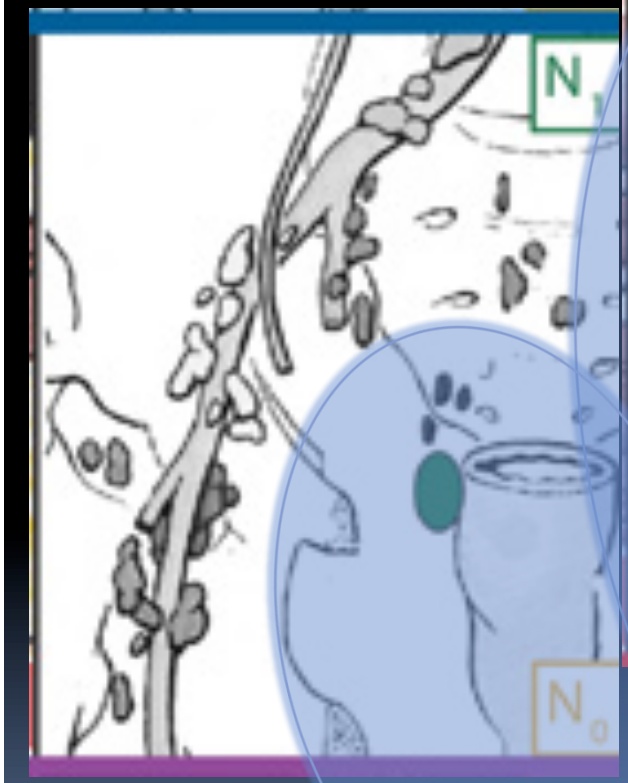


Retroperitoneal
Internal iliac
Perirectal

Inguinal
Femoral

Staging

N-stage



EUS

MRI

PET/CT

Staging

N-stage

PET/CT

- FDG-PET/CT is an imaging modality which greatly affects the management of patients with anal cancer.
- Current treatment guidelines include (FDGPET/CT) as part of the standard pretreatment workup of patients diagnosed with anal cancer.
- FDG-PET/CT can also be used for radiation therapy treatment planning by clearly defining sites of metabolically active tumor.

Gastroentérologie Clinique et Biologique (2009) 33, 456—458

Staging

N-stage

PET/CT

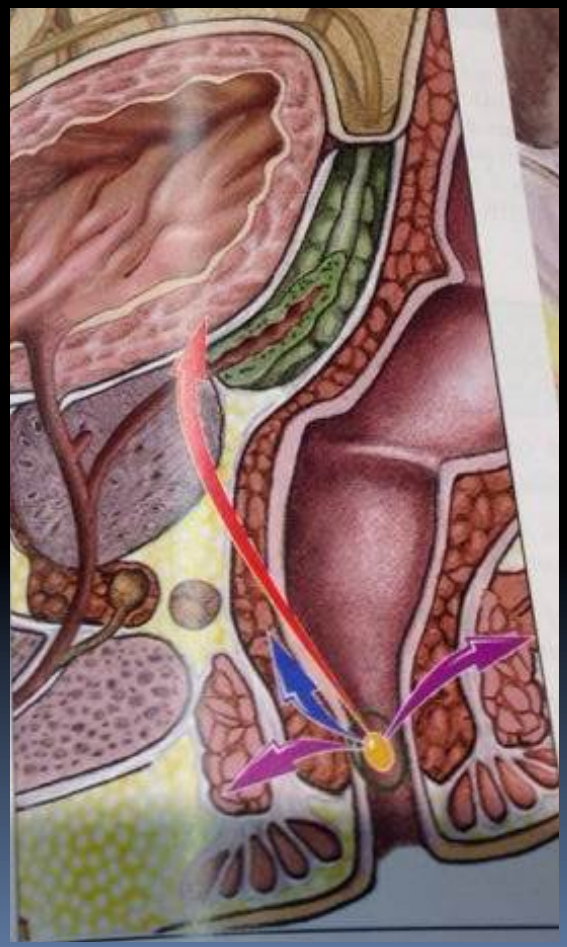
- In immunocompetent patients FDG-PET/CT has high specificity for nodal and visceral dissemination.
- At diagnosis, FDG-PET/CT may alter staging of anal SCAC in 20 % of patients, leading to inclusion of involved pelvic or inguinal lymph nodes in the radiation field

Widder J, Kastenberger R, Fercher E, Schmid R, Langendijk JA, Dobrowsky W, et al. Radiation dose associated with local control in advanced anal cancer: retrospective analysis of 129 patients. Radiother Oncol 2008;87: 367—75.

Staging

M-stage

Patterns of spread for anal cancer
MALE ANUS

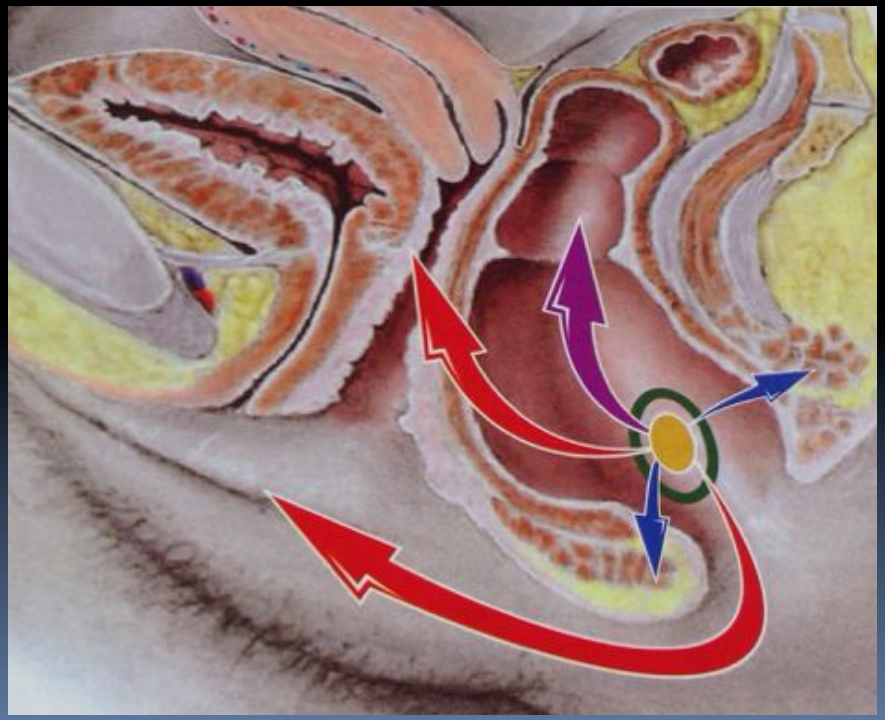


S	Rectum	T3
I	Skin of anus Scrotum	T3 T4
M	Anal canal Pectin of anal canal	T1, T2 T1 T2
L	External anal sphincter Ischial rectal space	T3 T3
A	Scrotum Penis Urethra	T4 T4 T4
P	Sacrum, coccyx	T4, N1

Staging

M-stage

Patterns of spread for anal cancer in FEMALE ANUS



S	**Rectum**	T3
I	Skin of anus	T3
M	Vulva, Labia Majora Labia Majora	T4 T1 T2
L	External anal sphincter Levator ani muscle	T3 T3 T3
A	Vagina Vulva, Labia Majora Urethra Bladder	T4 T4 T4 T4
P	Sacrum, coccyx	T4, N1

Staging

M-stage

- As suggested by ECCO guidelines, search for distant spread is usually performed by means of contrast enhanced body MDCT, with conventional imaging appearances of liver and lung metastases. Dissemination is very uncommon (less than 5 % of patients at initial diagnosis, and is usually encountered in association with post-treatment recurrence)

Conclusions

Method	Diagnosis & Staging Capability	Recommended for use
Primary tumor ± Regional Nodes		
Endoanal US	Very accurate modality for detecting and defining primary lesions	Yes if preoperative chemoradiation is considered
MRI	Useful in defining depth of penetration of the primary lesion	Yes
CT	Most valuable of all modalities for determining extra-anal local invasion and nodal metastases	Yes
PET	Part of the standard pretreatment workup	Yes
Metastases		
Chest film ± CT	Chest film, best for metastasis screening; CT cest ,rules out multiple metastases	Yes
CT abdomen	Most useful study to define para-aortic nodes enlargement or liver metastases	Yes
Liver US	Can differentiate between cystic and solid lesions	Yes