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STAGING OF DIGESTIVE TUMORS BY ENDOSCOPIC ULTRASOUND (EUS)

Image: Members of the SIED endoscopic sonography committee.

Endoscopic ultrasound (EUS) is a high-resolution diagnostic tool that integrates endoscopy and ultrasound for locoregional (T and N) staging of gastrointestinal tumors. It is more sensitive than cross-sectional imaging methods in determining depth of invasion and lymph node involvement; however, its usefulness decreases for distant metastases, which reinforces its complementary use with CT and other techniques (1).

MAIN INDICATIONS FOR EUS IN DIGESTIVE CANCERS

EUS is indicated for preoperative staging of esophageal, gastric, pancreatic, and rectal tumors when locoregional information may modify the therapeutic approach (e.g., endoscopic resection vs. surgery vs. neoadjuvant therapy). Its greatest impact is in potentially curable cancers and early stages (2).

EUS IN GASTRIC CANCER

In gastric cancer staging, EUS shows greater sensitivity and accuracy in detecting peri-tumoral wall and lymph node invasion than CT alone, especially in T1–T2 and N0–N1, which can change preoperative therapeutic decisions (3).

EUS continues to be central to locoregional staging of gastric cancer to distinguish mucosal/submucosal (T1) invasion from muscular or deeper invasion and to evaluate suspicious lymph nodes before deciding on endoscopic or surgical therapies(4).

A recent meta-analysis showed that EUS has greater sensitivity for T and N, while CT maintains greater specificity, confirming that both techniques are complementary and not mutually exclusive in the preoperative approach (3).

EUS is the most accurate technique for local (T) staging of gastric cancer, especially in early tumors where layer differentiation defines the possibility of endoscopic treatment. Computed tomography (CT), on the other hand, is superior for regional and distant staging, including advanced lymph node involvement and metastasis (4).

EUS IN ESOPHAGEAL CANCER

EUS shows good accuracy in estimating T and N in esophageal cancer and, when combined with FNA/FNB, can increase the diagnostic accuracy of lymph node involvement (5).

Endoscopic ultrasound (EUS) remains the gold standard for locoregional (T and N) staging of esophageal cancer, allowing for detailed assessment of tumor depth and periesophageal lymph nodes. However, CT and PET-CT are essential for systemic staging and the detection of distant metastases, key elements for selecting patients who are candidates for surgery or multimodal treatment. The accuracy of EUS decreases in stenosing tumors and in restaging after neoadjuvant therapy; therefore, its use should be integrated within a multimodal approach. It should be noted that EUS is generally performed when other techniques indicate that the tumor is operable, since in inoperable tumors it would be an additional examination that increases costs and is not necessary (6).

RECTAL CANCER

High-resolution pelvic MRI is the technique of choice for staging locally advanced rectal cancer, as it allows for accurate assessment of the mesorectal fascia, the circumferential resection margin (CRM), and extramural extension, which are determinants for the indication of neoadjuvant therapy. However, in early tumors, MRI may underestimate tumor depth, a scenario in which endoscopic ultrasound (EUS/ERUS) plays a complementary role by offering better discrimination of the wall layers to differentiate T1 vs T2, directly influencing the selection of local resection versus radical surgery (7).

CANCER OF THE DUODENUM AND PERIAMPULLARY REGION

In duodenal and periampullary tumors, CT and MRI are essential for assessing regional and metastatic extent, while EUS plays a key role in local staging by defining the depth of invasion and its relationship to adjacent pancreaticobiliary structures. Recent studies show that combining cross-sectional imaging and EUS improves diagnostic accuracy, especially in early lesions and in differentiating between duodenal, ampullary, and pancreatic tumors, directly influencing the decision between endoscopic and surgical management (8).

STAGING OF PANCREATIC TUMORS BY ENDOSCOPIC ULTRASOUND (EUS)

Endoscopic ultrasound (EUS) is a fundamental tool in the management of pancreatic cancer due to its high resolution for locoregional tumor evaluation. Its main value in staging lies in the precise characterization of the primary tumor, the assessment of vascular and lymph node invasion, and the obtaining of histological confirmation through biopsy, complementing computed tomography and magnetic resonance imaging in the multimodal approach to the patient. It is always important to understand that in the staging of pancreatic tumors, all imaging techniques, including EUS, are useful and therefore each should ideally be performed so that, by combining the results, we can make the best decision (9).

EVALUATION OF THE PRIMARY TUMOR (T)

Ultrasound ultrasound (USU) is the most sensitive method for detecting and measuring small pancreatic tumors (<2 cm), allowing for precise definition of local extent, involvement of adjacent structures, and relationship to the duodenum and retroperitoneum. This capability makes it especially useful in tumors not clearly defined on initial CT scans or in early stages (10).

ASSESSMENT OF VASCULAR INVASION AND RESECTABILITY

Ultrasound ultrasound (EUS) allows for a detailed assessment of the tumor's relationship to the portal vein, the superior mesenteric vein, and, to a lesser extent, arterial structures. Although contrast-enhanced computed tomography remains the gold standard for defining surgical resectability, EUS provides key complementary information in borderline cases, especially for confirming venous invasion and guiding neoadjuvant treatment decisions. Biliary-pancreatic EUS is routinely performed in many endoscopy groups as part of staging because it helps classify tumors as operable, borderline, and inoperable (11).

LYMPH NODE STAGING (N)

EUS allows for the identification of suspicious regional lymph nodes using morphological criteria and, uniquely, guided biopsy for histological confirmation. Although the accuracy in differentiating reactive from metastatic nodes by imaging alone is limited, the possibility of direct sampling significantly improves the accuracy of nodal staging compared to other modalities (12).

LIMITATIONS IN THE DETECTION OF METASTASIS (M)

Ultrasound has a limited role in detecting distant metastases, particularly deep pulmonary and hepatic metastases, and therefore does not replace computed tomography or PET-CT in systemic staging. Its usefulness in this context is restricted to detecting small hepatic metastases accessible from the stomach or duodenum when other imaging modalities are indeterminate (13).

COMPLEMENTARITY WITH OTHER MODALITIES

EUS should be interpreted in conjunction with CT/MRI/PET-CT in digestive tumors:

- CT: better for distant metastases.
- MRI: useful in rectal cancer and hepatobiliary tumors.
- PET-CT: evaluates metabolic activity and can detect hidden metastases.

Integrating these techniques improves overall staging and avoids underestimating or overestimating disease.

Clinical guidelines recommend multimodal diagnostics for tumor staging (14).

EUS-FNA/FNB FOR TISSUE AND N CONFIRMATION

The addition of EUS-guided puncture (FNA or FNB) in suspicious lymph nodes improves the accuracy of N staging and allows obtaining tissue for histological diagnosis, which may change the therapeutic strategy (15).

INTRINSIC LIMITATIONS OF EUS

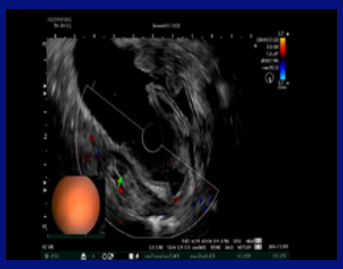
Although useful for locoregional tumor detection, the accuracy of EUS depends on technical and operator factors, and can be reduced by tumor stenosis or post-neoadjuvant therapy, where fibrosis can mimic real invasion. In addition, some anatomical areas may be difficult to access (16).

CONCLUSIONS FOR CLINICAL PRACTICE

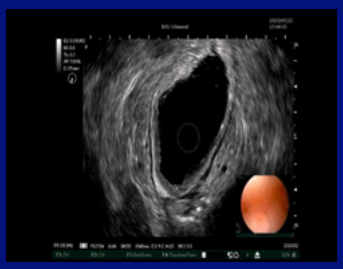
- EUS is especially useful for loco-regional T and N staging of gastrointestinal tumors when the therapeutic decision depends on accurately knowing the invasion of layers and lymph nodes.
- It is recommended for integrated use with CT/MRI/PET-CT for a complete view of the M stage and distant extension, avoiding isolated decisions based on a single technique.
- Guided puncture increases diagnostic certainty in suspicious nodes (involves FNA/FNB).

IMAGES OF INTEREST

PREPYLORIC LESION

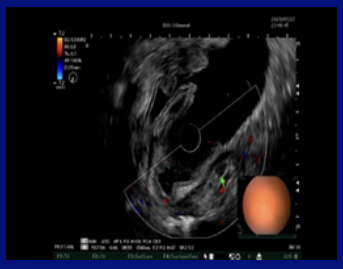


LESION THAT COMPROMISES THE SUBMUCOSA AND REACHES THE MUSCULAR LAYER BUT DOES NOT INVADE IT



SAME AS THE PREVIOUS ONE

THERE IS NO COMPROMISE OF THE MUSCULARIS PROPRIA



TUMOR-LIKE LYMPHADENOPATHY ASSOCIATED WITH THIS NEOPLASM.

THIS LESION WOULD NOT BE SUITABLE FOR AN ESD RESECTION, BUT IT WOULD BE SUITABLE FOR AN EFTR, WHICH IS A FULL-THICKNESS RESECTION.

LITERATURE

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VIDEOS OF THE MONTH

ELUXEO 8000 SYSTEM

EUS EN CA DE ESOFAGO
https://qrfy.io/p/f5xFTzLPav

TUMOR INOPERABLE DE PANCREAS
https://qrfy.io/p/Zng08-dcTR

NET RECTAL - EUS Y RESECCION
https://qrfy.io/p/_fMrOosEJa

MASA OPERABLE DE CANCER DE PANCREAS
https://qrfy.io/p/fNLGXCt4ZB

NEXT EDITION

STUDY OF PANCREATIC PSEUDOCYSTS BY EUS AND DRAINAGE TIPS
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