
Diagnostic imaging of pancreatic NETs: “take home message”

• To date the predominants imaging modalities for pancreatic endocrine tumors are CE spiral CT, EUS and SRS (Octreoscan). They provide the most cost-effective and accurate means for detecting/diagnosing and staging most cases of pancreatic NETs.

• In case of a suspected pancreatic lesion CE MDR-CT remains the first staging method of choice. It has replaced DSA and has achieved similar or only slightly lower accuracy than EUS in detecting pancreatic tumors.

• EUS had the highest accuracy in assessing tumor size and lymph node involvement and remains the first choice in diagnosis of small tumors.
Diagnostic imaging of pancreatic NETs: “take home message” 2

- EUS is highly accurate in the localization of pancreatic NETs and is cost effective when used early in the preoperative localization strategy. EUS decreases the need for additional invasive tests and avoid unnecessary morbidity and resource consumption.

- The choice of staging modalities clearly varies among different centers depending on the availability of the high-end imaging modalities and the local expertise.

- Cyto- or Histological confirmation is warranted only when the results can alter patient management or prior to palliative CR-Therapies in pts not eligible for surgery or in DD of pancreatic masses.
ENDOSCOPY AND EUS FOR THE DIAGNOSTIC MANAGEMENT OF GI WALL NETs (so-called CARCINOIDS)

• Accurate diagnosis, localization and pre-operative staging are MANDATORY in order to offer the patient the best treatment (the best cost-benefit ratio in the single case)
Allow us to detect and diagnose, by means of targeted endoscopic biopsies, neuro-endocrine neoplasias localized in the mucosa and submucosa of all the GI sites that an endoscope can reach.
We can see up to.............

- gastroscopy

*Carcinoids*

**Gastrinomas**

Somatostatinomas

Insulinomas

Vipomas, GRFomas, Glucagonomas, PPomas, Non functioning Tumors
We can see up to 

- colonscopy 

**Carcinoids**

**Somatostatinomas**

**Enteroglucagonomas**
We can see up to ..........

- enteroscopy
"PUSH-TYPE" ENTEROSCOPY

INTRA-OPERATIVE OR LAPAROSCOPICALLY-ASSISTED ENTEROSCOPY
Mouth to Cecum (or...to anum)

Teeth

Epiglottis

Multiple telangiectasia on a gastric fold

Small Intestine

Ileocecal valve

Wall of right colon
1. Recorded images: impossible to wash the field, come back on a doubtful point, change vision angle etc.

2. Movements sometimes too fast: you can miss also big lesions

3. No operative capabilities both diagnostic and therapeutic

4. Contraindicated in case of stenosis
VIDEO CAPSULE: LIMITs

Unsuitable in case of stenoses, extensive adhesions, history of small bowel resection

or, as in the case of carcinoid tumors with retracted mesentery, should be sed with caution or preceded by the “patency capsule”

(an ingestible and dissolvable, a disintegration time-controlled capsule with an external scanner)
Today the double-balloon enteroscopy and more recently the single balloon, allow us, with time-consuming and invasive examinations, mostly with double approach (oral and anal), to endoscopically visualize, biopsy and, in selected cases, to treat lesions all over the small intestine.
DOUBLE-BALLOON ENTEROSCOPY

Courtesy of Prof. H. Yamamoto
DOUBLE-BALLOON ENTEROSCOPY

Courtesy of Prof. H. Yamamoto
Neuroendocrine tumors of the small bowel appear as subepithelial lesions, mostly yellowish, that can be ulcerated when they exceed 2 cm.
ENTEROSCOPY (wireless and balloon endoscopy)

Preliminary studies seem to demonstrate some potential in detection and diagnosis of small bowel carcinoids.

2 papers compared video capsule endoscopy vs CT/enteroclysis:

1. One fails to demonstrate better results with video capsule.


2. Video capsule detected 9 small bowel NETs that were not visualized after CT and enteroclysis.

ENTEROSCOPY (wireless and balloon endoscopy)

Preliminary studies seem to demonstrate some potential in detection and diagnosis of small bowel carcinoids.

1. Double or single balloon enteroscopy should be useful in detecting and biopsy tiny NEts of the small intestine, more frequently in the ileum

2. but so far only few literature data *

*Yamaguchi Tet al. Multiple carcinoid tumors of the ileum preoperatively diagnosed by enteroscopy with the double-balloon technique. Gastrointest Endosc. 2005;62(2):315


Hystological confirmation of a diagnosis suspected with a video capsule and/or curative endoscopic resection when facing small superficial lesions, limited to mucosa and submucosa, as in other GI sites

• Can visualize the layers of the GI wall (5-9), allowing to identify also tiny lesion (2-3 mm) and to accurately stage the depth of wall invasion and/or the locoregional nodal involvement.
WHAT YOU CAN ASK TO THE ENDOSCOPIST?

- To identify/detect the lesion (DIAGNOSIS AND LOCALIZATION)
- To stage the lesion (prognostic evaluation) (STAGING)
- To treat the lesion (THERAPY)
EUS IN THE ASSESSMENT OF GI TRACT NETs

- Locoregional staging of lesions localized in the wall of the esophagus, stomach, duodenum and colon-rectum, already identified and diagnosed by means of endoscopic biopsies

- Localization of submucosal lesions endoscopically invisible (i.e. duodenal gastrinomas), even of 2 mm in diameter
and .... what about the rest of the small bowel?

From K. Yasuda. Endoscopy 2004
and .... what about the rest of the small bowel?

From: K. Yasuda. Endoscopy 2004
Today is also possible, with the new balloon endoscopes, to evaluate and stage, by means of miniprobes, NETs of the small bowel, so far beyond the grasp of EUS.

EUS IN THE ASSESSMENT OF GI TRACT NETs

- Hypo-echoic, round or oval, well demarcated lesions, mainly in the 2nd and 3rd wall layer, sometimes with transmural invasion of the GI wall
EUS IN THE ASSESSMENT OF GI TRACT NETs

- Preoperative EUS is mandatory for evaluating tumor size and depth of invasion; these features are considered to be important metastatic risk factors and the main determinants of appropriate therapy (endoscopic excision, local excision or radical resection)
1. To assess complete endoscopic resection
2. To follow-up patients
WHAT YOU CAN ASK TO THE ENDOSCOPIST?

- To identify/detect the lesion
  (DIAGNOSIS AND LOCALIZATION)

- To stage the lesion
  (prognostic evaluation)
  (STAGING)

- To treat the lesion
  (THERAPY)
DIAGNOSTIC ENDOSCOPY

GEP NEUROENDOCRINE TUMORS: THE ROLE OF ENDOSCOPIC TECHNIQUES

THERAPEUTIC ENDOSCOPY
**GI TRACT NETs (carcinoids): ROLE OF ENDOSCOPIC TECHNIQUES**

**ENDO THERAPY = CURATIVE THERAPY**

Mucosal and/or submucosal Tumors

- **< 1 cm**
  - Esophagus
  - Stomach
  - Duodenum
  - Colon

- **< 1.5 cm**
  - Rectum

Without NODAL involvement
GEP NETs: ROLE OF ENDOSCOPIC TECHNIQUES

DIAGNOSTIC EUS

THERAPEUTIC EUS
High-frequency probe EUS-assisted endoscopic mucosal resection: A therapeutic strategy for submucosal tumors of the GI tract

(Waxman I et al. Gastrointest Endosc 2002)

“Carcinoid of the GI tract can be managed safely, quickly, and easily with HFPE-assisted EMR”.
“Use of EUS-guided Injection in endoscopic resection of solid submucosal tumors”

Sun S et al. Endoscopy 2002

16 lesions; 9 in the muscolaris propria: no perforations; two bleedings endoscopically treated
### Is Endoscopic Resection Sufficient?

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<tr>
<th>Type</th>
<th>ACAG</th>
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| **Tipo I** | **ACAG**                                         | *ENDOSCOPIC RESECTION: max 5 tumors, < 10 mm*  
* > 5 tumors, < 10 mm: ANTRECTOMY*  
* Diameter > 10 mm: antrectomy + surgical resection of the larger tumors*  
* Serosal or extra-gastric involvement: total gastrectomy and lymphadenectomy* |
| Tipo II  | MEN I                                            | *ENDOSCOPIC RESECTION: TUMORS < 10 mm*  
* SURGICAL RESECTION: TUMORS > 10 mm* |
| Tipo III | Sporadic                                         | *ENDOSCOPIC RESECTION IS NEVER ADEQUATE*                                                     |

*Study Group for Endocrine Abdominal Tumors Eur J Surg 1995; 161: 375*
Endoscopic removal of duodenal carcinoids smaller than 1 cm that are located outside the periampullary region, with no EUS signs of invasion of the muscularis propria, is safe, patient-friendly, adequate and effective treatment.

*Endoscopy 2004; 36: 651-5*

EUS-assisted EMR of larger lesions has been reported

*Pungpapong S et al. GIE 2006;63:703*
IS ENDOSCOPIC RESECTION SUFFICIENT?

- 99 pts with duodenal carcinoids < 10 mm: no one developed metastases.

- Duodenal gastrinomas: 77%: < 1 cm in diameter
  Nodal mts: 47%,
  Hepatic mts: 5%

Arch Pathol Lab Med 1990; 114: 700-4

Best Practice & Research Clinical Gastroenterology 2005; 19:675–697
Rectal carcinoid tumors that satisfy the following three conditions are indicated for local resection, including endoscopic polypectomy: a maximum diameter of 10 mm, no invasion of the muscularis propria, and no depression or ulceration in the lesion.

Endoscopy and EUS in GEP tumors

Diagnosis

LOC/STAGING

DIAGNOSI TISSUTALE (BIOPSY/EUS-FNA)

TERAPIA

EMR/HF-MPs

EUS-FNI

ID-HIFU
“The future treatment of patients with NE tumors will be tumor-biology based and biotherapies will be tumor-targeted. With the advent of the new analogs and drugs every patients will get a “tailor-made” therapy.”

adapted from: Oberg K. The Oncologist 1998;3:339

Requirements for a correct therapeutic approach:

- correct diagnosis and staging
- comprehension of the biological behaviour of the tumor
- multidisciplinary management
ASSESSMENT AND MANAGEMENT OF PATIENTS WITH SUSPECTED GEP NETs:

The ideal team (The dream team)

Expert Pathologist

EUS/endoscopy Expert

Expert Radiologist

Pathologist

EUS/Endoscopy Expert

Radionuclear imaging Expert

Dedicated surgeon

Expert Clinician