GEP NEN: diagnosis, staging, classification, characterization

MP VULLIERME BEAUJON HOSPITAL



HÔPITAUX

DE PARIS

ASSISTANCE PUBLIQUE



Pancreas NEN

Gastrinoma

Malignancy, Prognosis

Small GUT net

Metastasis

PANCREAS NEN: multiple pattern

mainly typical

correlated with pathological features

- Well differenciated (G1)- poorly differenciated
- Fonctioning non fonctioning

• Benign (G1) – malignant (G2-G3)

MDCT typical pattern

- Enhancement at arterial phase
- No stenosis of MPD







Rodallec, Pancreatology 2005

Hyperenhancing Pitfall



Renal Metastasis



Intrapancreatic spleen



Microkyst = liquid



ADC: high

MRI = T2 hyperintense



Jang, Clin Radiol. 2015

MRI typical pattern







Pancreas-NET DW-MRI: sensitivity

DWI alone 65% With MRI 95%

ADC



Caramella, European Radiology 2010

Multiple typical TNE: MEN 1



- 53 % MEN 1 with pancreatic NET
- 15 30 % Pancreatic NET with MEN
- Malignant : >3 cm (40% metastases)





Ruszniewski, GCB 2003Barbe, dig liv dis 2012

Malignancy

Arterial encasement

Venous mural nodule



Pronostic: vascularisation correlated with MDCT enhancement

MDCT: if weak enhancement

- Poorly differenciated
- liver mets
- High mitotic Index





well differenciatedStrong enhancement





Rodallec, pancreatology 2005

Pancreatic NETmalignancy: size and Ca+

Tumor > 3 cm malignancy PPV 61 %

Adding calcification: PPV 100 %



Falconi gaujoux

Gallotti, AJR 2013

DW-MRI pancreas NET

Related with cellularity: G1-G2-G3

Reverse correlation Ki-67 and ADC (r = -0.70; P < 0.01).

ADC = 1

ADC benign/malignant • benign: 1.48 • Malignant: 1.04 (p < 0.01) Differenciation • Well differenciated: 1.75 ± 0.53 (p < 0.01). • Neuro endocrine carcinoma : 1.00 ± 0.19 Wang J Magn Reson Imaging. 2011

Jang <u>Acta Radiol.</u> 2014



Poorly differentiated malignant non functionning tumor

Low enhancement

Size: > 2 cm

Calcifications

Vascular involvement

- arterial: encasement
- venous: endoluminal nodule



Manfredi, European radiology 2013

Pancreatic typical pattern

Pancreatic NET: staging at diagnosis related with symptoma

	Non metastatic	N+	M+
Non hyper functionning	15 %	22 %	63 %
Insulinoma	94 %	2 %	4 %
Gastrinoma	28 %	50 %	22 %

Insulinoma: highly symptomatic



Gastrinoma: Zollinger-Ellison

localization: > 80% *Stabile square* > 50% duodenum

60% multiple

metastasis at first diagnostic



Horton et al Radiographics 2006

Hyperfunctionning tumors: gastrinoma



Gastrinoma, 60 % multiple







Small Gut Carcinoid

Epidemiology

 \geq 1/3 GUT endocrine tumor = ileum

2/3 metastasis at diagnosis

20 – 30 % multiple

Imaging

Local secretion (serotonine)

- Ganglio-mesenteric complex
- Occlusion
- Ischemia

Primary mass

- Occlusion
- Ischemia
- bleeding

Ganglio-mesenteric complex

Spiculated Masse

- Fibro desmoplastic Stroma
- Local reaction
- Calcifications 50-70%
- Radiated fibrosis with retraction





Bowel loop venous ischemia related with serotonine



Target pattern

Primary: ileocaecal location



Primary

Tumor fibrosis and retraction

- Kinking +++
- Mucosa: ulceration
- Muscularis Hypertrophia



Primary: multiple 20/30%

CT with enteroclysis and water





Primary preoperative staging



Stade 3 MSA artery encasement but first jejunal arteries not encased



Lardière-Deguelte Neuroendocrinology 2016

Small gut carcinoid: surgery

Stade 2 MSA artery branches encasement without encasement of the trunc





Lardière-Deguelte Neuroendocrinology 2016

Oesophageal





Rectal NET, MDCT and MRI



Malignant NET staging at diagnosis

	Non metastatic	N+	M+
Non functionning	15 %	22 %	63 %
insulinoma	94 %	2 %	4 %
gastrinoma	28 %	50 %	22 %

Malignant NET: staging



Madeira, gut 1998

Metastatic node

Similar to other disease:

large, round, heterogeneous, not well delineated

NET, could also be:

- small
- enhancing



Nahon-Uzan, GCB 2005

Scigliano, 2008

Bone metastase MDCT pattern

enhanced MDCT: arterial phase





NET Liver metastases: staging ?

56%

MDCT: mise 50 % of lesion

MR and DW-MR: if surgery

Sensitivity :

- diffusion-weighted MR : 71%
- compared with T2-weighted :
- and gadolinium-enhanced MRI: 48%

DW+ T2WFSE : 78%

DW+ T2WFSE + dynamic Gd-enhanced: 80%

d'Assignies, Radiology2013

Liver Metastases enhancement behavior

Hypervascular arterial phase 60-83 % wash-out on portal venous phase
Micronodular 22 %



Unenhanced

Arterial phase

Portal venous phase

Ronot, European Radiol 2017

Liver metastases: MRI with DW-MRI

T1







Arterial phase

DW MRI Sensitivity 80-91 %

Small liver metastasis, DW-MRI

 \leq 1 cm: sensitivity: 65 %





Liver metastasis: diffusion weighted MRI and hepatobiliary contrast agent

Hepatobiliary contrast agents detection on hepatobiliary phase

Meta-analysis on liver mets

• 39 articles (1989 patients, 3854 liver metastases)

MRI	Sensitivity (%)
diffusion	87.1%
HB phase using Gadoxetic acid	90.6%
both	95.5%



Vilgrain, Europ Radiol 2016

IET

ses

Conclusion

Imaging improved in quality

Protocols dedicated to NET

Dw-MRI and MRI hepatospecific agent are promising for liver

Standard of care : ENETS consensus guideline *Neuroendocrinology 2017*