

Pancreatic Neuroendocrine Tumors

Chris Baliski MD, FRCSC, FACS
Kelowna General Hospital
Kelowna, BC

Background

- 1 / 100,000
- Present in 1 – 10% autopsies
- Functional & non-functional (35-50%)*
- APUD system

* Hochwald, Surgical Endocrinology, 2001

- Gastrinoma
- Insulinoma
- Others
 - Glucagonoma
 - VIPoma
- Nonfunctional Pancreatic Islet Cell Tumors

Genetic Syndromes Assoc with PET's:

- MEN-1
- von Hippel-Lindau
 - Nonfunctional tumors
- Neurofibromatosis
 - SSomas
- Tuberous Sclerosis

Zollinger-Ellison Syndrome

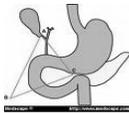
- 1 / million
- 60% malignant
- 75 % sporadic
- 25 % MEN-1
 - benign, multicentric , extrapancreatic , and earlier
 - > 50 % of MEN pancreatic tumors are gastrinomas

ZES

- Hypergastrinemia in the presence of gastric acid hypersecretion
- PUD, diarrhea, GERD
- Ca, PTH, imaging the pituitary and GH,PRL, and ACTH to rule out MEN-1
 - 1/3 of MEN1 may present with ZES

Distribution of lesions:

- Depends on study
 - Select patients in surgical series
 - 40% pancreas and 40% duodenum (NIH unselected)
 - 60% duodenum, 24% pancreas (NIH surgical)



Localization

- Localize primary and rule out metastasis
- Octreotide Scan
 - Primary 58%, Liver 92%
 - Conventional tests + Angio (48% / 83%)
- EUS
 - Most pancreatic lesions
 - > 50% duodenal
- Angiography w secretin + HV sampling

Surgery

- Kocker; inferior border of pancreas
- Palpation (60%)
- IOUS
- Transillumination (15%)
- Duodenotomy (25%)
 - Higher identification – 76 vs 98%
- Remove suspicious LN's



Norton et al., Ann Surg, 2004

Surgery

- Enucleation usually possible for pancreas
- Enucleation in duodenum if < 5mm
- Whipple ?
 - May provide better cure rates (Bartsch et al., 2005)

Natural History ZES

- N=212
- 13 year mean follow-up
- 33% died
 - 50% ZES related
 - None acid related
- Prognostic Factors
 - Pancreas, > 3 cm, ppLN's, liver mets
 - Extent liver mets, Cushing's

Yu et al., JCO, 1999

- 26% developed liver metastasis
- 10 year survival (from ZES)
 - 96% if no liver mets
 - 85% if metachronous mets
 - 26% if synchronous mets

Yu et al., JCO, 1999

Does Surgery Affect Outcome ?

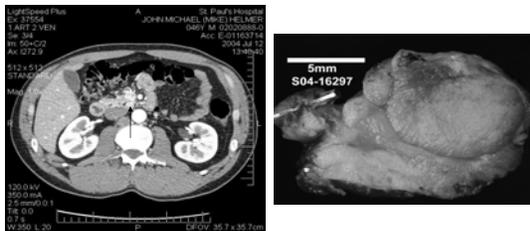
- 94% 10 year survival in surgical patients
- 34% sporadics disease free at 10 years
 - 0% of MEN-1
- Liver mets less common w Surgery
 - 3% vs 23% liver mets
 - 2 deaths in medical group (p= 0.085)

Fraker et al., NEJM 1999
Fraker et al., Ann Surg 1994

ZES in MEN-1

- Controversial
- NIH operate once tumor > 3cm
- Others when biochemical evidence
- Role of parathyroidectomy prior to surgery for ZES
- "Cure" probably < 10%

Insulinomas



Insulinomas

- 90% benign
- 10% malignant / MEN-1
- Whipple's triad
- Extent of imaging variable
 - None (Surgery + IOUS)
 - U/S (Mayo)
 - EUS +/- Ca stim'n with hepatic venous sampling (Thomson)
- 97.2% success at Mayo (Grant, ES)

Nonfunctioning ICT's

- 5th - 6th decade
- 35-50 % of pancreatic islet cell tumors
- - at least as common as insulinomas
- Present with local Sx's
- Tend to be large and often with met Dz
 - similar presentation to adenoCA
 - less often causes back pain
 - Less systemic effects
- Mult lesions (5-25%) at the time of Sx

Islet Cell Carcinomas

- N=163
- No syndrome or serum peptides < 2x normal
- Median 6 cm
- *26% underwent resection of the primary Dz
 - R0 in 32/42
- Median survival 3.2 yrs (43% 5 YS)
 - Localized Dz: 7 yrs
 - Nonresectable primary: 5.2 yrs
 - Nonresectable mets: 2.1 yrs
- May be a role for palliative resection

Evans et al., 2001

Conclusions

- PNET's uncommon
- Surgery may improve outcome in ZES
 - Controversial in MEN-1
- High cure rate in insulinomas
- Nonfunctional tumors increasingly recognized