A New look at Barrett’s Esophagus:

Viren Joshi MD, AGAF, FACG
Ochsner Clinic Foundation
Associate Professor University of Queensland School of Medicine
Professor Tulane School of Medicine
Norman Barrett: (1903-1979)

1953, Allison and Johnstone
Risk factors for Adenocarcinoma in Barrett’s:

- Age >45
- Male
- Ethnicity (Caucasian)
- Duration of GERD
- LSBE >8cms
- HGD
- Ulceration and stricture at endoscopy
Barrett's Esophagus Endoscopy:

- Specialized Intestinal Metaplasia in Esophagus (salmon colored)
- Endoscopy Measurements: TGF, Z-line
- Prague Classification (C-value, M-value)
- Most well identified risk factor for adenocarcinoma esophagus
- Surveillance shown not effective in reducing cancer risk for EAC
- Ablation more cost effective than surveillance in reducing EAC relative risk
Risk of Barrett’s Progression to Cancer

- Metaplasia ( < 0.5% patient-year)
- Low Grade Dysplasia (1% patient-year)
- High Grade Dysplasia (10% patient-year)
Metaplasia - Dysplasia - Carcinoma Sequence

- Metaplasia
- Hyperplasia
- Inflammation

Progression Cancer Risk

Abnormal Ploidy
p53, Glut-1
Increasing expression with progression of neoplasia

Selection of metaplastic clones

Reflex

Normal Epithelium

Adenocarcinoma

Low Grade Dysplasia

High Grade Dysplasia
Barrett’s Dysplasia : Detection

- Paradigm shift : Traditional Seattle Protocol
- Biopsies (2 pathologists) or WATS - computerised analysis of brushings
- Electronic Chromoendoscopy (NBI, FICE)
- High Magnification Endoscopy (Confocal, OCT)
Barrett’s Gross and H and E
Barrett’s Epithelium In -Vivo
Dysplasia:
Confocal Endomicroscopy: Dysplasia
Near Infrared light:

VLE Procedure
Volumetric Laser Endomicroscopy
Normal Squamous Epithelium

e
lp
mm
sm
mp
adventitia

1 mm
BARRÉT'S
- LOSS OF LAYERED ARCHITECTURE
- GLANDS OR DUCTS IN MUCOSA
- IRREGULAR CRIBIFORMED GLANDS
- INCREASED SURFACE SCATTERING

NORMAL CARDIA
- PIT & CRYPT ARCHITECTURE
- HIGHLY REFLECTIVE SURFACE
- POOR IMAGE PENETRATION

NORMAL SQUAMOUS
- LAYERED ARCHITECTURE

SCALE BAR = 2MM

Neosquamous epithelium
Narrow Band Imaging (NBI)

- 80 yo female. HGD/IMC no prior treatment.
- Pathology: BE w/ LGD and focal HGD
VLE - Volumetric Laser Endomicroscopy

- Volumetric Laser Endomicroscopy (VLE) is a next-generation technology, based upon Optical Coherence Tomography (OCT)
  - Traditional OCT - Time Domain Interferometry
  - VLE - Fourier Domain Interferometry - 100x faster than Traditional OCT

- Provides high resolution, cross-sectional, real-time imaging of tissue
  - Resolution ~ 7 microns
  - Imaging depth 3mm into tissue

- Proprietary swept-source laser enables dramatically greater resolution and faster acquisition times than OCT
  - Volumetric imaging > 10,000mm³ in less than 90 seconds

- Optical Probe enables volumetric (circumferential + longitudinal) scan over 6cm length
Volumetric Laser Endomicroscopy Guides Both Selection of Ablative Modality and Tissue Sampling During Ongoing Therapy of Barrett's Esophagus
Volumetric Laser Endomicroscopy Improves Detection of Persistent or Recurrent Barrett's Esophagus, Dysplasia and Neoplasia Following Endoscopic Treatment
Absence of Suspicious Findings on Volumetric Laser Endomicroscopy Strongly Predicts Histopathologic Complete Remission of Dysplasia and Intestinal Metaplasia in Patients After Visual Eradication of Barrett's Esophagus
VLE targeted tissue sampling eliminates unnecessary biopsies during planned ablation of Barrett’s Esophagus:
EUS - Gastrointestinal wall layers: Critical to Understand T Staging

Impact on Rectal and Esophageal Cancer Management

T stage Accuracy 70-90%

N stage accuracy Lower (70%-80%)

CT cannot determine wall layers - Compared to CT, EUS has better accuracy for T and N stage
Elimination Of HGD / Early EAC:

- Ablate (Thermal, Non-thermal)
- Resect (EMR, ESD)
- Individualize
- Patient-Physician discussion (management of reflux)
Barrett’s Esophagus and Early Cancer:
Pathology compared to VLE

Typical biopsy size and depth

Blood vessel

Glands
Role of EUS

- Routine staging of patients with nodular BE with EUS or other imaging modalities before EMR has no demonstrated benefit. Given the possibility of over- and understaging, findings of these modalities should not preclude the performance of EMR to stage-early neoplasia (Strong recommendation, moderate level of evidence).

- In patients with known T1b disease, EUS may have a role in assessing and sampling regional lymph nodes, given the increased prevalence of lymph node involvement in these patients compared with less advanced disease (Strong recommendation, moderate level of evidence).
Therapy

Based on endoscopic view of visible Barrett’s

- Nodular

- Non-Nodular Disease
Pathology and Depth of Invasion

• Low grade Dysplasia

• High grade Dysplasia

• Early Esophageal Cancer - T1a

• Early Esophageal Cancer - T1b (Individualize)
Early Cancer (EAC) - Early Adenocarcinoma

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T1 esophageal cancer, request an endoscopic mucosal resection (EMR) for in-depth review
Sub Squamous Intestinal Metaplasia
Conclusion:

- Advanced Imaging Technologies have a role in targeting biopsies during surveillance
- Improve Yield of Dysplasia detection
- Potentially Help in Individualising Therapy -RFA Vs Cryotherapy
- Role of EUS limited in T1 EAC