Pathophysiology and endoscopic management of Barrett’s oesophagus

Brad Kendall MBBS, PhD, FRACP

Senior Staff Gastroenterologist, Princess Alexandra Hospital
Senior Lecturer, University of Queensland
Visiting Affiliate, QIMR Berghofer Medical Research Institute
Disclosures

I declare I have no paid or unpaid consultancies, business interests or sources of honoraria payments nor anything else which could potentially be viewed as a conflict of interest.
Barrett’s oesophagus

- Definition
- Epidemiology
- Adenocarcinoma risk
- Endoscopic surveillance
- Endoscopic management of dysplasia and early adenocarcinoma
Barrett’s oesophagus

• Definition

• Epidemiology

• Adenocarcinoma risk

• Endoscopic surveillance

• Endoscopic management of dysplasia and early adenocarcinoma
Definition

• Partial replacement of the normal squamous epithelium in the tubular oesophagus by metaplastic columnar epithelium containing goblet cells (intestinal metaplasia)

Maximal extent of metaplasia: \( M = 8.0 \text{ cm} \)

Circumferential extent of metaplasia: \( C = 3.0 \text{ cm} \)

True position of GOJ: Origin = 0 cm

Whiteman DC and Kendall BJ. MJA 2016; 205:317-324
Definition

• **Partial replacement** of the normal squamous epithelium in the **tubular oesophagus** by metaplastic columnar epithelium containing goblet cells (**intestinal metaplasia**)

Barrett’s oesophagus

- Definition
- Epidemiology
  - Adenocarcinoma risk
  - Endoscopic surveillance
  - Endoscopic management of dysplasia and early adenocarcinoma
Demographic and clinical risk factors

• Age
• Ethnicity
• Sex
• GORD
• Abdominal obesity
• Smoking
• Family history
• NSAIDS
• Helicobacter pylori
Barrett's oesophagus

- Definition
- Epidemiology
- Adenocarcinoma risk
- Endoscopic surveillance
- Endoscopic management of dysplasia and early adenocarcinoma
Males

Females

Thrift, AP and Whiteman DC. Annals of Oncology 2012;23: 3155-62
<table>
<thead>
<tr>
<th>Barrett prevalence (%)</th>
<th>Cancer transition rate per 1000</th>
<th>NNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long</td>
<td>1–2</td>
<td>1.6–3.3</td>
</tr>
<tr>
<td>Short</td>
<td>2–8</td>
<td>0.2–0.7</td>
</tr>
<tr>
<td>Ultra-short</td>
<td>8–18</td>
<td>0.1–0.1</td>
</tr>
</tbody>
</table>

Annual cancer transition rate and number of patients needed to be tested (NNT) to find one cancer applying ranges of population-based Barrett prevalence.
Barrett’s oesophagus

- Definition
- Epidemiology
- Adenocarcinoma risk

- Endoscopic surveillance
- Endoscopic management of dysplasia and early adenocarcinoma
RECOMMENDED ENDOSCOPIC SURVEILLANCE SCHEDULE FOR BARRETT’S OESOPHAGUS

If dysplasia present in any biopsies, then surveillance as per Barrett’s Oesophagus.

If no dysplasia and no IM in biopsies from CLO and maximal length of CLO:
- < 1cm: no follow-up required
- 1-< 3cm: repeat endoscopy in 3-5 yrs and if still no IM, consider discharge
- ≥ 3cm: repeat endoscopy every 2-3 yrs as per protocol for long segment BO NOD

Columnar lined oesophagus (CLO)

Seattle protocol biopsies of CLO

Intestinal metaplasia (IM) present in biopsies from CLO

YES

Barrett’s Oesophagus (BO)

No dysplasia (NOD) on current or previous biopsies

Indefinite for dysplasia (IND) on biopsies

Low grade dysplasia (LGD) on biopsies

High grade dysplasia (HGD) or adenocarcinoma on biopsies

If two consecutive 6 monthly endoscopies show NOD then consider reverting to a less frequent follow-up schedule.

Repeat endoscopy in 6 months
- maximal acid suppression
- Seattle dysplasia biopsy protocol
If repeat endoscopy shows:
- NOD then follow NOD protocol
- IND then repeat in 6 months
- LGD or HGD or adenocarcinoma then follow protocols for these conditions.

Repeat endoscopy every 6 months
- Seattle dysplasia biopsy protocol
or
- Refer to expert centre

Maximal length BO < 3cm
- repeat endoscopy 3-5 yrs
Maximal length BO ≥ 3cm
- repeat endoscopy 2-3 yrs

Refer to centre with integrated expertise in endoscopy, imaging, surgery and histopathology.

Suggested citation:

* Seattle protocol – biopsy of any mucosal irregularity and quadrantic biopsies every 2cm unless known or suspected dysplasia then quadrantic biopsies every 1cm.

* Dysplasia (indefinite, low and high grade) should be confirmed by a second pathologist, ideally an expert gastrointestinal pathologist.

This graphic is licensed under the Creative Commons Attribution-ShareAlike 3.0 Australia license.
RECOMMENDED ENDOSCOPIC SURVEILLANCE SCHEDULE FOR BARRETT’S OESOPHAGUS

YES
Barrett’s Oesophagus (BO)

Columnar lined oesophagus (CLO)

Seattle protocol biopsies of CLO*

Intestinal metaplasia (IM) present in biopsies from CLO

NO

If dysplasia present in any biopsies, then surveillance as per Barrett’s Oesophagus.

If no dysplasia and no IM in biopsies from CLO and maximal length of CLO:
- < 1cm: no follow-up required
- 1-< 3cm: repeat endoscopy in 3-5 yrs and if still no IM, consider discharge
- ≥ 3cm: repeat endoscopy every 2-3 yrs as per protocol for long segment BO NOD

No dysplasia (NOD) on current or previous biopsies

Maximal length BO < 3cm
- repeat endoscopy 3-5 yrs

Maximal length BO ≥ 3cm
- repeat endoscopy 2-3 yrs

Indefinite for dysplasia (IND) on biopsies

Repeat endoscopy in 6 months
- maximal acid suppression
- Seattle dysplasia biopsy protocol

If repeat endoscopy shows:
- NOD then follow NOD protocol
- IND then repeat in 6 months
- LGD or HGD or adenocarcinoma then follow protocols for these conditions.

Low grade dysplasia (LGD)** on biopsies

Repeat endoscopy every 6 months
- Seattle dysplasia biopsy protocol or
- Refer to expert centre

If two consecutive 6 monthly endoscopies show NOD then consider reverting to a less frequent follow-up schedule.

High grade dysplasia (HGD)** or adenocarcinoma on biopsies

Refer to centre with integrated expertise in endoscopy, imaging, surgery and histopathology.

Suggested citation:

* Seattle protocol = biopsy of any mucosal irregularity and quadrant biopsies every 2cm unless known or suspected dysplasia then quadrant biopsies every 1cm.

** Dysplasia (indefinite, low and high grade) should be confirmed by a second pathologist, ideally an expert gastrointestinal pathologist.

This graphic is licensed under the Creative Commons Attribution-ShareAlike 3.0 Australia license.
RECOMMENDED ENDOSCOPIC SURVEILLANCE SCHEDULE FOR BARRETTE'S OESOPHAGUS

Columnar lined oesophagus (CLO)

Seattle protocol biopsies of CLO*

Intestinal metaplasia (IM) present in biopsies from CLO

YES
Barrett's Oesophagus (BO)

No dysplasia (NOD) on current or previous biopsies

Maximal length BO < 3cm
• repeat endoscopy 3-5 yrs
Maximal length BO ≥ 3cm
• repeat endoscopy 2-3 yrs

Indefinite for dysplasia** (IND) on biopsies

Repeat endoscopy in 6 months
• maximal acid suppression
• Seattle dysplasia biopsy protocol
If repeat endoscopy shows:
• NOD then follow NOD protocol
• IND then repeat in 6 months
• LGD or HGD or adenocarcinoma then follow protocols for these conditions.

Low grade dysplasia** (LGD) on biopsies

Repeat endoscopy every 6 months
• Seattle dysplasia biopsy protocol
or
Refer to expert centre
If two consecutive 6 monthly endoscopies show NOD then consider reverting to a less frequent follow-up schedule.

High grade dysplasia** (HGD) or adenocarcinoma on biopsies

Refer to centre with integrated expertise in endoscopy, imaging, surgery and histopathology.


* Seattle protocol – biopsy of any mucosal irregularity and quadrantic biopsies every 2cm unless known or suspected dysplasia then quadrantic biopsies every 1cm.
* Dysplasia (indefinite, low and high grade) should be confirmed by a second pathologist, ideally an expert gastrointestinal pathologist.

If dysplasia present in any biopsies, then surveillance as per Barrett's Oesophagus.
If no dysplasia and no IM in biopsies from CLO and maximal length of CLO:
• < 1cm: no follow-up required
• 1-< 3cm: repeat endoscopy in 3-5 yrs and if still no IM, consider discharge
• ≥ 3cm: repeat endoscopy every 2-3 yrs as per protocol for long segment BO NOD.
Barrett’s oesophagus

- Definition
- Epidemiology
- Adenocarcinoma risk
- Endoscopic surveillance
- Endoscopic management of dysplasia and early adenocarcinoma
Endoscopic management

• Tissue resection
  • Endoscopic mucosal resection (EMR)
  • Endoscopic submucosal dissection (ESD)

• Tissue ablation
  • Radiofrequency ablation (RFA)
  • Argon plasma coagulation (APC)
  • Photodynamic therapy (PDT)
  • Cryoablation
• Born Adelaide, South Australia 1903

• Emigrated to UK 1913

• Educated at Eton and Trinity College, Cambridge and graduated from St. Thomas’ Hospital in 1928.

• Surgeon St. Thomas’ and Brompton Hospitals, President of Thoracic Surgeons of Great Britain and Ireland 1962 and editor of Thorax 1946-1971.

• **Barrett NR. Chronic peptic ulcer of the oesophagus and oesophagitis. Br J Surg 1950; 38: 175-182**