What is Barrett’s esophagus?

Barrett’s esophagus is a disorder of the esophagus (swallowing tube) in which the normal inner lining of the esophagus changes to resemble the lining of the stomach and the intestine (specialized intestinal metaplasia). This change is in response to chronic irritation from the reflux of gastric and small-bowel contents into the esophagus.

What are the symptoms of Barrett’s esophagus?

Barrett’s esophagus may not cause any symptoms. But most patients diagnosed with Barrett’s esophagus have a history of long-standing gastroesophageal reflux disease (GERD). Typical symptoms of GERD include:

- **Heartburn** – a burning sensation in the chest
- **Regurgitation** – sensation of food or gastric acid backing up into the esophagus or throat
- **Dysphagia** – difficulty swallowing
  (Note: This symptom requires immediate attention.)

Who is at risk for developing Barrett’s esophagus?

Several conditions and factors are associated with an increased risk for developing Barrett’s esophagus.

- **Heartburn or GERD** – It’s estimated that 10% -15% of patients experiencing GERD symptoms two to three times per week have coexistent Barrett’s esophagus on endoscopy.
- **Obesity** – Obese patients, especially those with a body mass index (BMI) over 30, are 2.5 times more likely to develop Barrett’s compared to normal-weight patients.
- **Gender** – Men are four times more likely to develop Barrett’s esophagus than women.
- **Ethnicity** – Population-based studies in the United States indicate that the incidence of Barrett’s esophagus is up to fourfold higher in Caucasian patients compared to African American or Hispanic patients.
- **Increasing age** – Starting at age 40, there appears to be a small but incremental increase in the risk of developing Barrett’s esophagus. Most patients with a new diagnosis are between the age of 50 and 60 years.
- **Family history** – Some studies have shown that up to 7% of patients with Barrett’s esophagus may have a similarly affected first-or second-degree relative. The exact risk for family members of patients with Barrett’s esophagus is still being defined.

What is the role of a hiatal hernia in Barrett’s esophagus?

Nearly all patients with Barrett’s esophagus have a hiatal hernia. A hiatal hernia predisposes a person to GERD due to the migration of part of the stomach through the diaphragmatic opening (hiatus) into
the chest cavity, resulting in a loss of the “anti-reflux valve.” A large hiatal hernia may warrant surgical repair before embarking on treatment for Barrett’s esophagus.

What are the complications of Barrett’s esophagus?

Barrett’s esophagus is a premalignant condition and can lead to development of esophagus cancer, known as adenocarcinoma. Fortunately, the majority of patients with Barrett’s esophagus will not develop cancer and the rate of developing cancer is only about 0.5% each year.

Cancer in Barrett’s esophagus generally develops in a stepwise fashion, starting with low-grade dysplasia and progressing to high-grade dysplasia and finally to cancer. With endoscopic surveillance of Barrett’s, it’s usually possible to detect the transformation toward cancer before cancer develops.

How is Barrett’s esophagus diagnosed?

Barrett’s esophagus can be easily diagnosed by routine upper endoscopy and confirmed on biopsies. But more challenging is the detection of precancerous and cancerous change in Barrett’s esophagus. Dysplasia and cancer may develop as “islands in a sea” of Barrett’s esophagus.

Advanced Imaging Technology

At California Pacific Medical Center’s Interventional Endoscopy Services (IES), we use advanced imaging technology to detect dysplasia and cancerous changes at the very earliest stage when treatment is most effective.

Optical “Zoom” and high-resolution endoscopy

Specialized endoscopes equipped with microchips that generate high-resolution images with optical magnification greatly enhance the tissue architecture and vascular pattern. This technology, in conjunction with other advanced imaging techniques such as narrow-band imaging (NBI) that use selective reflective property of light, greatly enhance the detection of dysplasia and cancerous changes in Barrett’s mucosa. This technology is available in only a few centers in the world.

Endoscopic Ultrasound (EUS)

A miniaturized high-frequency ultrasound transducer probe enables the endoscopist to “see” into the wall of the esophagus. The probe uses sound waves to determine the depth of invasion of a precancerous or cancerous lesion with great accuracy. This information is critical in planning the most appropriate treatment.

What are the treatment options for Barrett’s esophagus?

At IES we use a multidisciplinary approach to Barrett’s esophagus. Patients will be counseled about treatment for GERD. If a large hiatal hernia is present, we may recommend surgical repair.

Patients with dysplasia will be counseled about treatment options, including surveillance (watchful-waiting strategy). Most patients are interested in therapies to treat the dysplasia and remove Barrett’s esophagus. These will be discussed, and the risks and benefits will be detailed. We will tailor a treatment strategy specific for each patient. Treatment options include:

Endoscopic Mucosectomy (EMR) or Mucosectomy

This procedure involves the removal or “stripping off” of abnormal tissue, using minimally invasive microsurgical techniques through the endoscope. The resected tissue is examined by the pathologist to ensure proper diagnosis and removal. Normal squamous tissue grows in place of the resected tissue.

Physicians at IES have been performing this procedure for many years with excellent results.

Radiofrequency Ablation (RFA)

Dysplastic cells in the esophagus can be treated with bursts of thermal energy to “burn” the abnormal lining. This is an outpatient procedure and the patient can expect to return to normal activities the next day. Some patients may experience chest discomfort for up to a week after treatment. In multicenter studies, RFA has been shown to completely eliminate dysplastic tissue in 80% to 90% of the patients.

Cryotherapy

Similar to RFA, cryotherapy destroys abnormal cells by thermal extremes. Liquid carbon dioxide or nitrogen is delivered through the endoscope to “freeze” the abnormal lining. The treated tissue sloughs off and is replaced by normal esophageal tissue.

Case Studies

Case 1: Intestinal Metaplasia

Case Overview

A 62 year old male presented with complaints of daily heartburn and chest discomfort. These symptoms had been ongoing for seven to eight years, but had worsened over the last few months. He underwent an upper endoscopy and Barrett’s esophagus was diagnosed. A nodular area was noted in the lower esophagus and biopsies of this showed high-grade dysplasia. Biopsies of the areas surrounding the nodule showed intestinal metaplasia. He was subsequently referred to IES for evaluation and treatment.
Case 1, figure 1: Endoscopy showing a nodular area at the lower esophagus (yellow arrow).

Case 1, figure 2: Zoom endoscopy combined with Narrow Band Imaging (NBI) of the nodular area (yellow circle). Note the raised mucosa, aberrant crypts and corkscrew vessels suggestive of dysplasia.

Case 1, figure 3: Catheter bases Endoscopic Ultrasound (EUS) examination of the esophageal wall. All the wall layers are well seen and are normal without any invasive tumors.

Treatment
Endoscopic examination demonstrated a short segment of Barrett’s esophagus with a nodular area at the gastro-esophageal junction. Optical zoom endoscopy was used to accurately define the areas with suspected dysplasia. Endoscopic mucosal resection (EMR) or mucosectomy was performed allowing successful removal of the abnormal appearing mucosa.

Case 1, figure 4: The nodular area has been successfully removed using minimally invasive endoscopic techniques (yellow arrow).

Outcome
The pathology from the EMR specimen confirmed high-grade dysplasia in Barrett’s esophagus. Endoscopy two months later revealed a well-healed scar at the resection site. The patient is doing well without further evidence of dysplasia on surveillance endoscopy.

Case 1, figure 5: Endoscopic examination two months post treatment using Narrow Band Imaging (NBI) showing well-healed scar at the resection site (yellow arrow). No evidence of residual Barrett’s is seen.

Case 2: Barrett’s with low-grade dysplasia
Case Overview
A 59 year old male was diagnosed with Barrett’s esophagus five years ago. On his last surveillance endoscopy, random biopsies of the Barrett’s mucosa showed low-grade dysplasia. The patient was referred to IES for further evaluation and treatment.

Case 2, figure 1: White light endoscopy showing Barrett’s esophagus (yellow arrows). No “nodules” (masses or lesions suspicious for tumor) are seen in the Barrett’s mucosa. Note the interspersed normal squamous lining of the esophagus (blue arrow).

Case 2, figure 2: Enhanced imaging using Narrow Band Imaging (NBI) of the Barrett’s esophagus. No focal abnormal areas were noted. The Barrett’s mucosa (yellow arrows) and the interspersed squamous mucosa (blue arrow) are well seen.

Treatment
Endoscopic examination including optical zoom endoscopy and narrow band imaging (NBI) demonstrated a 5cm segment of Barrett’s esophagus. No nodules or raised lesions were noted in the esophagus. Endoscopic ultrasound (EUS) examination revealed normal wall layers of the esophagus with no evidence of invasive tumor. Treatment of the entire segment of the Barrett’s esophagus with radiofrequency ablation (RFA) was performed.
Case 2, figure 3: Circumferential Radiofrequency Ablation (RFA) of the lower esophagus performed using the Halo 360 device (mucosa appears white after delivery of treatment). Picture is taken using ultraslim endoscope alongside RF ablation catheter.

Outcome
The patient required three sessions of radiofrequency ablation for complete eradication of Barrett’s esophagus, which was replaced with normal squamous tissue. The patient continues to be asymptomatic on anti-acid (PPI) therapy and free of Barrett’s mucosa at follow-up.

Case 2, figure 4: Endoscopic examination two months after treatment completion shows replacement of Barrett’s mucosa with normal squamous tissue throughout the esophagus.

Case 3: Barrett’s with high-grade dysplasia
Case Overview
66 white male was diagnosed with Barrett’s esophagus. Endoscopy and biopsies showed an area of nodular high-grade dysplasia. At IES, he underwent endoscopic mucosal resection (EMR) of the nodular area with success. He is now considered for ablation of residual Barrett’s esophagus.

Case 3, figure 1: Barrett’s mucosa (blue arrows). Please note the location of the prior endoscopic mucosal resection (yellow arrow).

Treatment
Risks and benefits of ablative therapy for the remaining non-dysplastic Barrett’s esophagus were discussed with the patient. He underwent carbon dioxide based cryotherapy for the remaining Barrett’s.

Case 3, figure 2: Application of probe-based spray cryotherapy for ablation of residual Barrett’s mucosa.

Outcome
The patient underwent two sessions of cryotherapy. Complete eradication of the Barrett’s esophagus was noted on follow-up examination. He continues to be in a surveillance program.

Case 3, figure 3: Follow-up examination post therapy. Normal esophageal lining is noted with complete resolution of Barrett’s esophagus.

Patients need a referral from their primary care provider or physician specialist prior to scheduling Barrett’s esophagus evaluation. Medical records, pertinent laboratory reports, and imaging reports should be forwarded to the Paul May and Frank Stein Interventional Endoscopy Center to determine referral indication appropriateness.

For more information
Please contact the Paul May and Frank Stein Interventional Endoscopy Center
Phone: 415-600-1151
Email: ies@sutterhealth.org

Location
2351 Clay St., 6th Floor
San Francisco, California 94115
www.cpmc.org/ies

For Patient Referrals
888-637-2762

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