Barrett's esophagus

Basics

Barrett’s esophagus results from reflux (gastroesophageal reflux disease; GERD). Barrett’s esophagus is an abnormal, premalignant tissue within the inner layer of the esophagus (i.e. the mucosa). Barrett’s esophagus affects 20% to 30% of individuals with symptoms of gastroesophageal reflux disease (GERD) including heartburn, acid regurgitation, coughing, wheezing and asthma. Barrett’s esophagus equally affects males and females with a maximal frequency at 40-50 years of age. Via a sequence involving low- and high- grade dysplasia Barrett’s esophagus may progress to esophageal cancer: 0.5% annual risk. Thus the risk of Barrett’s esophagus to progress to cancer compares to the risk of a colonic polyp to progress to colon cancer. The cancer risk for low- and high- grade dysplasia increases 10 and 50 fold, respectively, when compared to the cancer risk of Barrett’s esophagus without dysplasia. The development of cancer arising from Barrett’s esophagus without dysplasia takes 5 to 10 years. Barrett’s esophagus is named after the late Norman Barrett (1903-1979), who was born in Australia and worked as a thoracic surgeon in London. In 1957 he described the condition, which later was named Barrett’s esophagus.

Causes

Reflux causes the development of Barrett’s esophagus. Due to the reflux induced inflammation genetic changes (mutations) drive the replacement of the normal mucosa by Barrett’s mucosa. The mutations affect genes for cell growth (p16, p53) and differentiation (Cdx2). Both acid and non-acid reflux contribute to the development of Barrett’s esophagus. When compared to acid reflux, bile reflux seems to be more essential for the development of Barrett’s esophagus.

Reflux inflames the esophagus and drives the genetic changes for the development of Barrett’s esophagus.
**Symptoms**

In 20% to 30% of the cases Barrett’s esophagus associates with reflux symptoms: heartburn, acid regurgitation, coughing, nausea, vomiting, and asthma. However, 10% to 15% of persons without reflux symptoms harbor Barrett’s esophagus (asymptomatic Barrett’s esophagus). In these cases reflux damages the nerves, reflux is not perceived, and as a consequence masks Barrett’s esophagus. Most importantly, 75% of all diagnosed reflux cancers (adenocarcinomas) develop without a prior history of reflux symptoms. In these cases the cancer usually presents at an advanced stage and is diagnosed due to swallowing difficulties. Consequence: reduced life expectancy, impaired life quality (invasive chemotherapy, large surgery; pain and weight loss).

**Diagnosis & tests**

The diagnosis of Barrett’s esophagus is established by gastroscopy and histopathology. Normally a white mucosa lines the inner layer of the esophagus. The presence of tongues, segments and islands of salmon red areas within the inner layer of the esophagus is suspicious for Barrett’s esophagus. During the gastroscopy biopsies are obtained from these areas and examined under the microscope. The presence of goblet cells within salmon red areas (columnar mucosa) defines Barrett’s esophagus without dysplasia. Barrett’s esophagus resembles the mucosa of the duodenum and the large bowel. Therefore the condition is also termed intestinal metaplasia (i.e. looks like intestinal). The probability of Barrett’s esophagus increases with the length of endoscopically visible abnormal salmon red areas. Barrett’s esophagus is found in 10%-15% of cases with a normal endoscopy, in 20%-30% of the cases with abnormal areas ranging from 0.5 cm to 5.0 cm.

*Endoscopy (A) and microscopy (B) of Barrett’s esophagus. A: Endoscopy reveals segments endoscopically visible abnormal salmon red areas (white arrow) within the innermost layer of the esophagus (the mucosa). B: biopsies obtained from these areas reveal Barrett’s mucosa with goblet cells (yellow arrow).*
New test for Barrett’s esophagus (cytosponge)

Prof Rebecca Fitzgerald and her team (London, UK) developed a new test for the diagnosis of Barrett’s esophagus. The patient swallows a special string mounted sponge (cytosponge). After having reached the stomach the sponge is pulled back through the esophagus. During the course through the esophagus the sponge collects cells from the esophagus. After the removal the sponge material is examined for the presence of cells suspicious for Barrett’s esophagus. A positive test is followed by gastroscopy for further evaluation. The test seems suitable for screening and early assessment of Barrett’s esophagus. Thus the cytosponge may become a promising tool for cancer prevention.

Treatment of Barrett’s esophagus

The treatment of Barrett’s esophagus with and without dysplasia consists of radiofrequency ablation. Radiofrequency ablation is an effective tool for durable elimination of Barrett’s esophagus (92% after 5 years). Endoscopically visible nodules and polyps are removed by endoscopic mucosal resection prior to radiofrequency ablation. Radiofrequency ablation is recommended for Barrett’s esophagus with dysplasia and early cancer. Radiofrequency is also recommended for treatment of Barrett’s esophagus without dysplasia for persons with the following risk profile:
- Long-standing reflux (>10 years)
- Family history positive for cancer
- Hiatal hernia larger than 2-3 cm
- Salmon red areas (columnar lined esophagus) > 2 cm
- Absence of contraindications (pregnancy, heart lung disease, blood clotting disorder)

Radiofrequency ablation of Barrett’s esophagus is the same as the removal of a polyp in the colon.

After radiofrequency ablation patients are put on a continuous high dose regimen with proton pump inhibitor (PPI; i.e. 2 x 40 mg per day p.o.). The PPI administration favors the development of normal tissue in 70% and 90% of the cases after one and up to three treatment sessions, respectively. The requirement of subsequent ablations is related to the length of the Barrett’s mucosa.

Radiofrequency ablation eliminates Barrett’s esophagus, but not the cause: reflux. Therefore we recommend anti reflux surgery (magnetic ring, fundoplication) after successful radiofrequency ablation of Barrett’s esophagus. We currently examine the effect of combined fundoplication and radiofrequency ablation (all in one).
Radiofrequency ablation (HALO 360) for circumferential ablation of Barrett’s esophagus. The treatment balloon releases the radio frequency energy for the ablation of the Barrett’s mucosa. After the treatment normal tissue develops.

Complication of Barrett’s esophagus

Esophageal cancer (adenocarcinoma) is the major complication of Barrett’s esophagus. Via a sequence involving low- and high-grade dysplasia Barrett’s esophagus may progress towards cancer. Those with Barrett’s esophagus without dysplasia have an 0.5% annual risk for cancer development. One out of 10 individuals with Barrett’s esophagus develops cancer in 20 years. Therefore the cancer risk of Barrett’s esophagus without dysplasia equals the risk of a colonic polyp to progress to colonic cancer. The cancer risk increases 10 and 50 fold in the presence of low- and high-grade dysplasia. Esophageal cancer is a life threatening disease and significantly impairs the life quality (chemotherapy, big operation with removal of the esophagus). Depending on the tumor stage the 5 years survival of esophageal adenocarcinoma ranges from 20% to 90%.

Prevention

Barrett’s esophagus cannot be prevented. The progression of Barrett’s esophagus to cancer can be prevented by radiofrequency ablation. Therefore we recommend screening gastroscopy for Barrett’s esophagus at the age of 40 for males and females. In the presence of Barrett’s esophagus we recommend radiofrequency ablation for the elimination of the cancer risk.
Endoscopy and histopathology of Barrett’s esophagus. The yellow arrow marks the tip of the biopsy forceps. The microscopic examination reveals tissue containing goblet cells (white arrow). This is Barrett’s esophagus.

Self test

There exists no self test for Barrett’s esophagus We recommend gastroscopy for the exclusion of Barrett’s esophagus (especially for persons with a positive cancer family history). In the future screening endoscopy will be partly replaced by the cytosponge test.

Expert opinion

Fritz Wrba (Pathologist, Vienna). We diagnose Barrett’s esophagus under the microscope. However, we depend on adequate biopsy sampling. If the endoscopist does not know where to sample, we will not have the chance to find Barrett’s esophagus. Barrett’s esophagus harbors an increased cancer risk. Therefore it is essential to find it. We know that Barrett’s always develops at the junction between the normal squamous mucosa and the columnar lined esophagus. This is why we ask the endoscopist to biopsy sample the squamocolumnar junction. Otherwise we can not tell, of Barrett’s exists or not.

Martin Riegler (Surgeon, Vienna). We know that Barrett’s esophagus ad colon polyps share the same cancer risk (0.5% annual risk). Polyps are removed during the colonoscopy. And Barrett’s: we are lucky to have radiofrequency ablation, the HALO procedure. It is safe, endoscopic and durable. This is why we offer radiofrequency ablation. We know that it prevents cancer and saves lives. So why wait. Let us act and eliminate the cancer risk.

Patient forum

Reinhard R. (50 years, Vienna). I have heartburn since 20 years. I underwent annual endoscopies since 1999. At that time I got the diagnosis of having Barrett’s esophagus. Since 7 years I knew to have dysplasia. My physicians suggested to continue follow up. November 2011 I got the diagnosis high grade
dysplasia. I searched the web and found the Reflux Medical Institute. I underwent another endoscopy, early cancer was found. Subsequent endoscopic resection eliminated all the cancer tissue. After that I underwent HALO ablation. In 4 weeks I will go for a follow up endoscopy test. I whished I had the opportunity for earlier removal of my Barrett’s esophagus. This might have prevented my cancer. I recommend that patients with Barrett’s esophagus should ask for active treatment option. Barrett’s can be removed, but only few are aware of that.

**Literature**