Intestinal Metaplasia of the Stomach
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Abstract

Intestinal metaplasia (IM) of the stomach is associated with a very small increased risk of developing gastric cancer. Endoscopic surveillance has been proposed and advocated for populations at risk. Risk factors for IM include Helicobacter pylori infection, high salt intake, smoking, alcohol consumption, and chronic bile reflux. IM tends to appear initially at the antrum–corpus junction, especially at the gastric angularis. As atrophy and metaplastic changes advance, they extend to the antrum and corpus. Gastric IM is categorized histopathologically into incomplete and complete types. Patients with incomplete IM should undergo endoscopic gastric mapping to define the extent of IM and rule out dysplasia or adenocarcinoma. In this video presentation, endoscopic and pathological findings in gastric IM and gastric mapping techniques has been described. This article is part of an expert video encyclopedia.

Keywords

Endoscopy; Gastric cancer; Gastric mapping; Intestinal metaplasia; Standard endoscopy; Stomach; Video.

Video Related to this Article

Video available to view or download at doi:10.1016/S2212-0971(13)70078-5

Material

• Gastroscopes: Olympus GIF-Q180; Olympus America, Center Valley, PA, USA.

Background and Endoscopic Procedure

Intestinal metaplasia (IM) of the stomach is associated with a very small increased risk of developing gastric cancer. The incidence of gastric cancer is high in Eastern Asia, Eastern Europe, and Andean–Latin America. In the United States, several ethnic populations have a high cancer risk, including African-Americans, Native Americans, and immigrants from high-risk regions. Endoscopic surveillance has been proposed and advocated for populations at risk. The much lower incidence of gastric cancer in the United States and other Western countries does not justify a general surveillance program. There are no widely accepted guidelines on the management of gastric IM. Recently, the European Society of Gastrointestinal Endoscopy and other European academic societies have developed evidence-based guidelines on the management of patients with gastric IM. The recommendations emphasize the increased cancer risk in patients with gastric atrophy and IM and the need for adequate staging in the case of high-grade dysplasia (HGD).

Risk factors for IM include Helicobacter pylori infection, high salt intake, smoking, alcohol consumption, and chronic bile reflux. The development of gastric adenocarcinoma of the intestinal type is thought to progress sequentially through four stages: nonatrophic gastritis, multifocal atrophic gastritis, IM, and dysplasia. Chronic H. pylori infection induces chronic inflammation in the gastric mucosa, which may progress to atrophy and IM; this is a precursor to gastric adenocarcinoma. IM initially appears at the antrum–corpus junction, especially at the gastric angularis. As atrophy and metaplastic changes advance, they tend to extend to the antrum and corpus, and dysplastic foci may eventually appear.

Gastric IM is categorized histopathologically into incomplete and complete types. Incomplete IM resembles colonic epithelium with multiple, irregular mucin droplets of variable size in the cytoplasm and absence of a brush border. Complete IM resembles small intestinal epithelium with eosinophilic enterocytes, a brush border, goblet cells, and variable Paneth cells. Helicobacter pylori colonization can be patchy in complete IM type.

Patients with incomplete IM should undergo endoscopic gastric mapping to define the extent of IM and to rule out dysplasia or adenocarcinoma. Gastric mapping involves biopsies of the six zones of the stomach (antrum greater curve, antrum lesser curve, gastric angularis, body greater curve, body lesser curve, and fundus) and any visible lesions. Biopsies from each zone should be collected into a separate specimen bottle.

Complete IM is associated with a lower risk of gastric cancer. Therefore, in the absence of other risk factors for gastric cancer, patients with complete IM do not need long-term endoscopic surveillance.

Elevated serum pepsinogen level has been proposed as a marker of extensive gastric atrophy. Currently, there are no reliable markers of gastric dysplasia or cancer. Patients with HGD or carcinoma in situ confirmed by at least two gastrointestinal pathologists should undergo surgical or endoscopic
resection because of the high probability of coexisting or metachronous invasive carcinoma. IM of the cardia and Barrett’s esophagus differ in their risk for malignant transformation.

**Key Learning Points/Tips and Tricks**

- IM of the stomach is associated with a very small increased risk of developing gastric cancer.
- Risk factors for IM include:
  - *H. pylori* infection
  - High salt intake
  - Smoking
  - Alcohol consumption
  - Chronic bile reflux
- High-risk populations for gastric cancers include the following:
  - Eastern Asian
  - Eastern European
  - Andean–Latin American
  - In the United States:
    - African-Americans
    - Native Americans
    - Immigrants from high-risk regions
- The development of intestinal type gastric adenocarcinoma is thought to progress sequentially through four stages:
  - Nonatrophic gastritis
  - Multifocal atrophic gastritis
  - IM
  - Dysplasia
- Chronic *H. pylori* infection is considered the primary cause of gastric cancer.
- IM foci develop at the antrum–corpus junction initially and extend to the antrum and corpus.
- Gastric IM is categorized histopathologically into two types:
  - Incomplete IM
    - Resembles colonic epithelium
      - (a) Irregular mucin droplets of variable size in the cytoplasm.
      - (b) Absence of a brush border
    - Recommend endoscopic gastric mapping ± endoscopic surveillance
  - Complete IM
    - Resembles small intestinal epithelium
      - (a) Eosinophilic enterocytes
      - (b) Brush border
      - (c) Goblet cells
      - (d) Variable Paneth cells
    - Endoscopic surveillance is not recommended if other risk factors for gastric cancer are absent.
- There are no widely accepted guidelines on the management of gastric IM.
- Endoscopic surveillance is proposed and advocated for populations at risk:
  - Ethnic background
  - Family history of gastric cancer
  - Histological type and extension of IM
  - Gastric atrophy and IM
- Elevated serum pepsinogen level has been proposed as a marker of extensive gastric atrophy.
- IM of the cardia and Barrett’s esophagus differ in their risk for malignant transformation.

**Scripted Voiceover**

<table>
<thead>
<tr>
<th>Time (min:sec)</th>
<th>Voiceover text</th>
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<tbody>
<tr>
<td>00:00</td>
<td>Intestinal metaplasia (IM) of the stomach is associated with a very small increased risk of developing gastric cancer.</td>
</tr>
<tr>
<td>00:11</td>
<td>Known risk factors for IM include <em>Helicobacter pylori</em> infection, high salt intake, smoking, alcohol consumption, and chronic bile reflux.</td>
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<tr>
<td>00:27</td>
<td>Histopathologically, gastric IM is sub-grouped into incomplete and complete types.</td>
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<tr>
<td>00:36</td>
<td>Incomplete IM resembles colonic epithelium with irregular mucin droplets and the absence of a brush border.</td>
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<tr>
<td>00:49</td>
<td>Complete IM resembles small intestinal epithelium with eosinophilic enterocytes, a brush border, goblet cells, and Paneth cells.</td>
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<tr>
<td>01:04</td>
<td>Patients with incomplete IM should undergo endoscopic gastric mapping to define the extent of IM and to rule out dysplasia or adenocarcinoma.</td>
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<tr>
<td>01:19</td>
<td>Gastric mapping involves biopsies of the six zones of the stomach and any visible lesions.</td>
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<td>01:30</td>
<td>Biopsies from each zone should be collected into a separate specimen bottle.</td>
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<td>01:39</td>
<td>Gastric mapping is also recommended during endoscopic surveillance of gastric IM.</td>
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<td>01:55</td>
<td>The development of gastric adenocarcinoma of the intestinal type is thought to progress sequentially through these four stages.</td>
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<tr>
<td>02:07</td>
<td>IM initially appears at the antrum–corpus junction, especially at the gastric angularis.</td>
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<td>02:19</td>
<td>As atrophy and metaplastic changes advance, they tend to extend to the antrum and the corpus.</td>
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<tr>
<td>02:30</td>
<td>In this patient, the granular appearance of the gastric mucosa is from <em>H. pylori</em> infection and gastric IM.</td>
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<td>02:43</td>
<td>Frequently, the gastric IM is better visualized under digital chromoendoscopy.</td>
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<td>03:08</td>
<td>Antral biopsy in this case confirmed the gastric IM.</td>
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<td>03:28</td>
<td>Gastric IM can appear as a localized papule as in this case, or can be found on random biopsy of the gastric antrum or body.</td>
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<tr>
<td>03:58</td>
<td>In this patient with chronic active gastritis due to <em>H. pylori</em> infection, multiple areas of gastric IM can be observed.</td>
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<tr>
<td>04:23</td>
<td>In addition to digital chromoendoscopy, gastric IM can be further enhanced by mucosal application of contrast agent.</td>
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</table>
In this patient, gastric dysplastic polyps developed in the setting of chronic active gastritis and gastric IM.

Gastric dysplastic chances can be observed in these pathological images.

In patients with gastric IM, endoscopic surveillance is proposed and advocated for at-risk populations including ethnic background, family history of gastric cancer, histologic type and extension of IM, gastric atrophy and IM.

Thank you for your attention.

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**Further Reading**


