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The Accuracy of Endoscopic Diagnosis of Intestinal Metaplasia Compared to Histopathological Diagnosis

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Abstract

Research Article

Intestinal metaplasia (IM) is a common gastric lesion that is considered premalignant. Our study aims to determine the relationship between normal white light endoscopy and histopathological IM diagnoses. This retrospective study evaluated the endoscopic prevalence and histopathological confirmation rate in 229 suspected IM patients among 3247 patients who underwent elective esophagogastroduodenoscopy between October 2016 and May 2020. All endoscopic processes were performed by the same clinical endoscopist. We analyzed and reviewed demographic data, endoscopic findings, and endoscopic biopsy pathology results of all patients obtained from medical records. The endoscopic prevalence of IM was 7.02. IM diagnosis was pathologically confirmed in 92.1% of the patients who were diagnosed with endoscopy. IM was more common in male patients (57.2%) than in female patients. Of the IM patients, 59% were aged ≥ 50 years, whereas 5.2% were aged ≥ 20-30 years and 22.7% ≥ 60-70 years. The incidence of Helicobacter pylori (H.pylori) was 40.2%. The endoscopic diagnosis of gastric intestinal metaplasia, which is a precancerous lesion, was in great agreement with histopathological diagnosis. However, the prevalence of endoscopic IM diagnosis was below that of histopathological diagnosis. IM diagnosis can be made more accurately by diligent and detailed endoscopic examination, particularly in older male patients.

INTRODUCTION

Gastric cancer is still the second most common cause of cancer death globally, despite the gradually reduced incidence in several developed countries[1]. The development of gastric cancer is through a multi-stage pathway that starts with the chronic inflammation of the gastric mucosa caused by *H. pylori*, multifocal atrophic gastritis, IM, dysplasia, and finally, invasive gastric adenocarcinoma[2,3]. The prognosis of gastric cancer varies depending on its stage. The 5-year survival rate for advanced gastric cancer is less than 20%, while this rate is over 90-95% for early-stage gastric cancer [4]. The risk of developing gastric cancer is closely associated with premalignant lesions, such as IM and AG[5]. Therefore, the early detection of these precancerous lesions plays a very important role in the prevention of gastric cancer development. Among many risk factors, H.pylori infection is considered to be the most important risk factor in the development of IM due to facilitating IM morphogenesis [6,7].

Gastric IM is defined as the replacement of the foveolar, surface, and glandular epithelium of the gastric mucosa with an intestine-like epithelium, which includes goblet cells, Paneth cells, and absorptive cells [8]. There are many studies reporting that AG and IM are the major precursor lesions for gastric cancer [6,7,9]. The prevalence of AG and IM varies from country to country but is relatively higher in countries with a high prevalence of H. pylori infections and gastric cancer [10].

Numerous studies support that endoscopic follow-up in patients with intestinal metaplasia and the early diagnosis of gastric cancer significantly reduce mortality[11]. Despite being very practical, the endoscopic diagnosis of IM presents various difficulties. The chromoendoscopy and narrow-band imaging (NBI) modalities have a higher diagnostic yield compared the conventional white-light endoscopy (WLE), but are still inferior to histological diagnosis[12]. Therefore, it is very important to understand the relationship between the endoscopic and histological IM findings. However, there are only a few studies concerning this subject[13]. This study aims to determine the endoscopic prevalence of IM, a premalignant gastric lesion, and the diagnostic compatibility of endoscopic and histopathological diagnosis.

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MATERIALS and METHODS

Ethical approval

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Alt başlık

There were a total of 3247 patients that presented to the gastroenterology outpatient clinic between October 2016 and May 2020 with various symptoms for which endoscopy was indicated, who gave written consent and underwent elective endoscopy. This retrospective study includes 229 of these 3247 patients that were endoscopically diagnosed with IM and underwent biopsy. Endoscopic findings of whitish swollen plaque-like lesions, mottled patchy erythema, and homogeneous nodular discolorations were evaluated to indicate intestinal metaplasia[13]. Demographic data and endoscopic and pathological findings of these patients were recorded. Patients that underwent biopsy for diagnoses other than the endoscopic definition of IM specified above (e.g. erosive/nonerosive gastritis, nodular gastritis, gastric ulcer, gastric cancer, polypoid lesions, gastric polyp) and were subsequently diagnosed with IM, gastric surgery patients, and patients with incomplete data were excluded from the study. Upper endoscopy was performed by the same experienced endoscopist in all patients after at least 8 hours of fasting and full sedation using a Fujinon endoscope. At least 3 biopsy samples were obtained from the gastric lesions that conformed with the endoscopic description mentioned above and fixed in 10% formalin. After routine examination procedures, the sections from the prepared paraffin blocks were stained with HE and evaluated for Hp (Giemsa staining), neutrophil infiltration, IM, atrophy, dysplasia, and other lesions. IM was histopathologically defined as the replacement of the glandular epithelium with an epithelium containing goblet cells. The biopsy samples of these patients were stained with PAS-Alcian Blue (pH 2.5) and High Iron Diamine-Alcian Blue (pH 2.5) combination stains: PAS to demonstrate neutral mucins, Alcian Blue for sialomucins, and High Iron Diamine for sulfomucins. IM was graded according to the following criteria. Mild (+) IM: < 1/3 of the surface area is involved; Moderate (++) IM: between 1/3 and 2/3 of the surface area is involved; Severe (+++) IM: > 2/3 of the surface area is involved[14]. The endoscopic prevalence of IM and its correlation with gender, age, and metaplasia severity were evaluated. The distribution of IM was evaluated according to age groups (<50 years vs ≥ 50 years; ≥20-30 years, ≥30-40 years, ≥40-50 years, ≥50-60 years, ≥60-70 years, and ≥ 70 years). The incidence of H. pylori was investigated. Hospital data usage permission was obtained for this study.

Statistical analysis

Data were analyzed using SPSS software version 21.0. The significance of the difference between the two groups was investigated using Pearson's chi-square test or Fisher's exact test for categorical variables and Student's t-test for continuous variables. A p-value < 0.05 was considered statistically significant.

RESULTS

The endoscopic prevalence of IM was 7.02. IM diagnosis was histopathologically confirmed in 211 (92.1%) of the 229 patients endoscopically diagnosed with IM. In the remaining 18 (7.9%) patients, endoscopic IM diagnosis was not confirmed histopathologically. The mean age of the patients included in the study was 53.79 ± 14.93 years (min-max 22-89). Of the patients who were diagnosed with IM, 98 (42.8%) were female and 131 (57.2%) were male; 94 (41%) were aged < 50 years and 135 (59%) were aged ≥ 50 years. The lowest number of IM cases was in the 20-30 age group with 12 patients (5.2%), and the highest in the 60-70 age group with 52 (22.7%). 92 patients (40.2%) tested positive for H. pylori. Patients' demographic data and endoscopic and histopathological IM findings are presented in Table 1 and the distribution of these findings according to age groups is presented in Table 2. The histopathological severity was +/3 in 56 patients (26.5%), ++/3 in 100 (47.4%), and +++/3 in 55 (26.1%). 155 (73.5%) of the patients that were endoscopically diagnosed with IM had moderate or severe histologic IM. Histopathological severity is presented in Figures 1a-c and endoscopic IM images are presented in Figures 2a-b.

DISCUSSION

Determining the prevalence of gastric IM in the general population is rather difficult due to the asymptomatic nature of the lesion. Histological examination is the gold standard for the diagnosis of AG and IM and is more sensitive and specific compared to endoscopic histologic assessment is dint among evaluators[15]

Table 1. Demographic, endoscopic, and histopathological IM data of the patients

Variables	
Age, year, mean±SD (min-max)	53.79±14.93 (22-89)
Female, n (%)	98 (% 42.8)
Male, n (%)	131 (% 57.2)
H.pylori positviti, n (%)	92 (%40.2)
Number of endoscopic IM, n (%) Number of histologic IM, n (%)	229 211 (%92.1)
Degree of histological activity +/3, n (%) ++/3, n (%) +++/3, n (%)	 56 (% 26.5) 100 (% 47.4) 55 (%26.1)

SD; standart deviation, n;number, IM; İntestinal metaplazi, H.pylori; Helicobacter pylori

Table 2. Distribution of IM according to age groups

Age groups	
< 50, n (%) ≥50, n (%)	94 (% 41) 135 (% 59)
≥20-30, n (%) ≥30-40, n (%) ≥40-50, n (%) ≥50-60, n (%) ≥60-70, n (%) ≥70, n (%)	12 (% 5.2) 31 (%13.5) 51 (%22.3) 46 (%20.1) 52 (%22.7) 37 (%16.2)

n; number

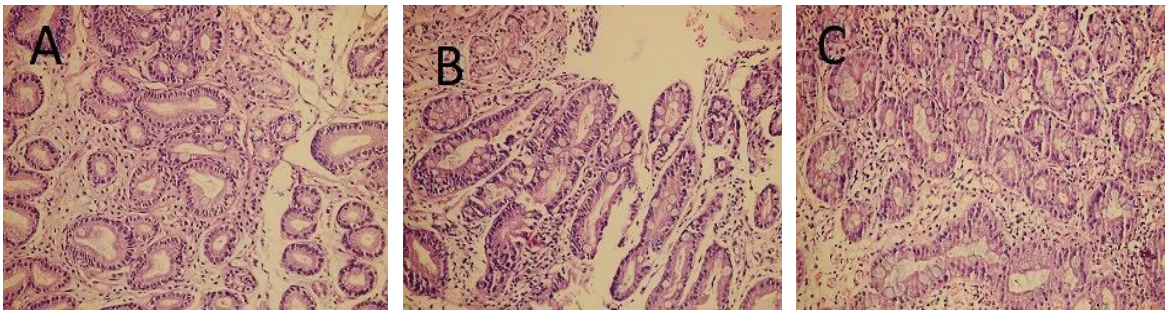

Figure 1. Histopathological intestinal metaplasia severity according to the Sydney System, A: There is intestinal metaplasia with broad stoplasma goblet cell-like structure, +/3 mild, B: There is an intestinal metaplasia that is stained open in a medium-density cell that fills some gland lumens, with a broad stoplasma goblet cell-like structure, ++/3 moderate, C: Severe atrophic gastritis and intestinal metaplasia with broad stoplasma goblet cell-like structure in which the gland epithelium is intensely stained, +++/3 severe.

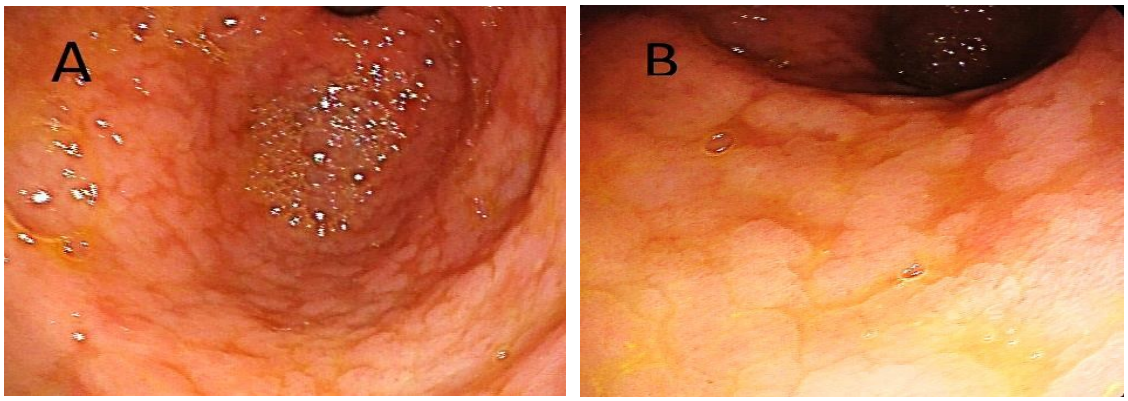

Figure 2. Endoscopic images of intestinal metaplasia, A: Patchy erythematous lesions and mucosal irregularity, B: Whitish swollen plaque-like lesions.

Endoscopically, IM is usually observed as a mucosal nodular pattern that occurs after the development of AG. The endoscopic diagnosis of severe AG and IM cases is not difficult. However, it may be difficult to diagnose mild AG and IM cases[16,17]. Therefore, it is appropriate to perform a biopsy in suspected AG and IM cases.

The prevalence of IM and gastric atrophy varies worldwide depending on H. pylori infections. The prevalence of intestinal metaplasia is high in patients with *H. pylori*-positive gastritis[6,18]. Ozden et al. investigated the prevalence of H. pylori infection in Turkey and found the rate of H. pylori-positivity to be 81% for the general population[19]. In their study, Craanen et al. found Hp positivity in 73% of individuals and determined that Hp positivity was an important factor in IM development[20]. Another study reported the prevalence of H. Pylori to be 38.6% in gastric IM[21]. In our study, we determined the prevalence of H.pylori to be 40.2% (n = 92). This rate is below the general H. pylori prevalence and seems to be compatible with histopathologically diagnosed IM-positive patients. The low Hp positivity can be ascribed to the low prevalence of H. Pylori in gastric IM sites.

Numerous studies have reported that being aged ≥ 50 years is an independent risk factor for IM and that the incidence of IM increases with age[3,22]. One study reported the prevalence of IM to be 10% in individuals aged < 50 years and

32% in individuals aged ≥ 50 and over[20]. In our study, 41% of our patients were aged < 50 years, and 59% were aged ≥ 50 years. The age distribution analysis revealed the lowest number of IM cases to be in the 20-30 age group with 5.2% and the highest in the 60-70 age group with 22.7%. Our results are consistent with those of previous studies.

A study from Japan reported the histological prevalence of IM to be 28.5%[23], whereas a study from Korea indicated the histological prevalence of IM to be 28.6% and 21.2% in the antrum and corpus, respectively[10]. Two Korean multicenter studies from 2006 and 2011 indicated the endoscopic prevalence of IM as 7.1% and 12.5%, respectively, and that these rates were below histological diagnostic rates. Both studies reported a higher IM prevalence in males[24,25]. Depending on the preferred diagnostic methods and countries, the prevalence of IM ranges from 7.1 to 42.5% [26-28]. Although endoscopy is the major diagnostic method for AG and IM, the sensitivity and specificity of endoscopic diagnoses are low with a considerable possibility of interobserver variance. Lim et al. reported the sensitivity and specificity of endoscopy to be low for the diagnosis of IM. Based on histology, the sensitivity and specificity of endoscopy in the diagnosis of IM were determined as 24.0% and 91.9% for the antrum and 24.2% and 88.0% for the corpus[29]. In our study, all endoscopic examinations were performed by a single experienced endoscopist, thus eliminating intra-observer variation, and the prevalence of gastric IM was determined as 7.02%. The prevalence of IM was higher in males than in females. Our data are consistent with the previous studies.

The image quality of conventional endoscopes has significantly improved in recent years and typical endoscopic findings have been interpreted to indicate AG and IM. In the meantime, different endoscopic modalities have been developed, such as magnification chromoendoscopy and narrow-band imaging (NBI), for the endoscopic diagnosis of AG and IM [30-32]. However, the examination of the entire stomach can be difficult and time consuming with NBI or ME. For this reason, a diligent and detailed WLE examination should be performed first.

CONCLUSION

There are few studies on the high agreement between endoscopic and histological metaplasia diagnoses. Our results were consistent with those of the studies reporting a high agreement between the endoscopic and histopathological diagnosis of gastric intestinal metaplasia, a precancerous lesion. However, it should be kept in mind that, despite the high agreement, the diagnostic yield of endoscopy is still below that of histopathology for IM. The diagnostic yield of endoscopy for IM can be improved with an adequate examination duration and performing conventional WLE in patients with highly suspected IM, particularly in male patients aged ≥ 50 years.

Conflict of interest

The authors declare that they have no conflict of interest.

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