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Original Article

Pathologic observations of the duodenum in 615 consecutive duodenal specimens: I. benign lesions

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Abstract: The author investigated histopathology of 615 consecutive duodenal specimens in our pathology laboratory. Computer search of the duodenal lesions was performed. Review of histological slides was done, when appropriate. The duodenal specimens were composed of 567 benign lesions and 48 malignant lesions. The 567 benign lesions were composed of chronic non-specific duodenitis in 334 cases (60.0%), duodenal ulcer in 101 cases (17,8%), heterotopic gastric mucosa in 81 cases (14.3%), hyperplastic polyp in 16 cases (2.8%), Brunner's gland hyperplasia in 14 cases (2.5%), Brunner's gland adenoma in 8 cases (1.4%), lymphoid polyp in 5 cases (0.8%), tubular adenoma in 4 cases (0.7%), lymphangioma in 2 cases (0.4%), endocrine nests in 1 case (0.2%), and amyloidosis in 1 case (0.2%). The chronic non-specific duodenitis was characterized by edema and lymphocytic infiltration. The duodenal ulcer was characterized by exudate, necrosis, granulation tissue and regenerative epithelium. The heterotopic gastric mucosa consisted of two types: one was composed of only foveolar epithelium (n=21) and another foveolar epithelium and fundic glands (n=60). Hyperplastic polyp was characterized by proliferation of gastric foveolar-like epithelium. The Brunner's gland hyperplasia was characterized by hyperplastic proliferation of the gland. The Brunner gland adenoma was characterized by neoplastic proliferation of the gland. The lymphoid polyp was characterized by large lymph follicles with large germinal centers. The tubular adenoma was characterized by adenomatous proliferation of intestinal epithelium, similar to colon adenoma. The lymphangioma was characterized by submucosal cavernous proliferation of lymphatics. The endocrine cell nests were characterized by non-neoplasmic proliferation of neuroendocrine cells. The amyloidosis was characterized by deposition of amorphous materials positive with Congo-red stain.

Keywords: Duodenum, benign lesions, pathology, consecutive duodenal specimens

Introduction

Benign lesions of the duodenum include heterotopic pancreas, heterotopic gastric mucosa, duplication, atresia, diverticulum, Celiac disease, tropical sprue, Whipples disease, amyloidosis, parasite infestation, duodenal ulcer, duodenitis, AIDS-related inflammatory disease, fungal infection, cytomegalovirus infection, radiation duodenitis, Brunner's glands hyperplasia, Brunner's glands adenoma, adenoma, hamartomatous polyp, endometriosis, inflammatory fibroid polyp, lipoma, hemangioma, lymphangioma, telangiectasia, neurofibroma, ganglioneurofibroma, and congenital fibromatosis [1]. In the present study, 567 benign duodenal lesions were described.

Materials and methods

The author reviewed the computed results of pathologic reports of 615 consecutive duodenal specimens in the last 10 years of our pathology laboratory. Review of the histological slides was done when appropriate. The duodenal specimens were composed of 567 benign lesions and 48 malignant lesions. Computer search of clinical records were also reviewed. The patients ranged from 25 years to 95 years with a mean of 53 years. Male to female ratio was 321:294. In appropriate cases, an immunohistochemical analysis had been performed with the use of Dako Envision method (Dako), as previously described [2-6].

Results

The duodenal specimens were composed of 567 benign lesions and 48 malignant lesions. In this report, the benign duodenal lesions were described. The 567 benign lesions were composed of chronic non-specific duodenitis in 334 cases (60.0%), duodenal ulcer in 101 cases (17,8%), heterotopic gastric mucosa in 81

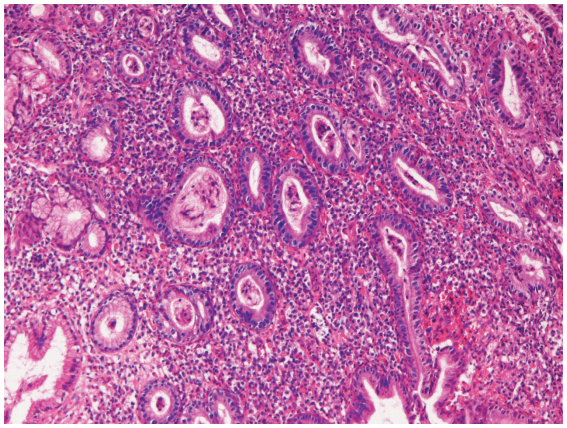

Figure 1. Chronic duodenitis. Much lymphocytes infiltration is seen. HE, x200.

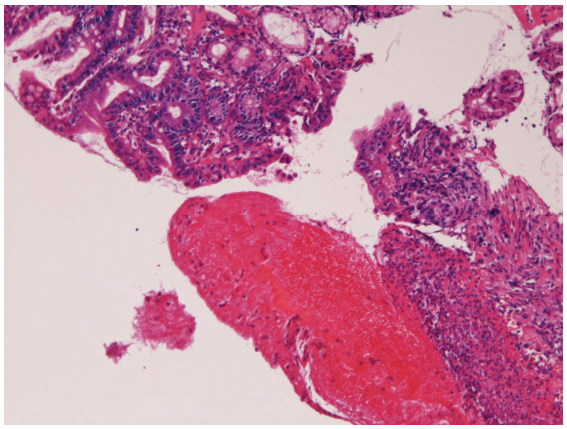

Figure 2. Duodenal ulcer. Necrosis, exudates, infiltration of neutrophils and lymphocytes are recognized. HE, x200.

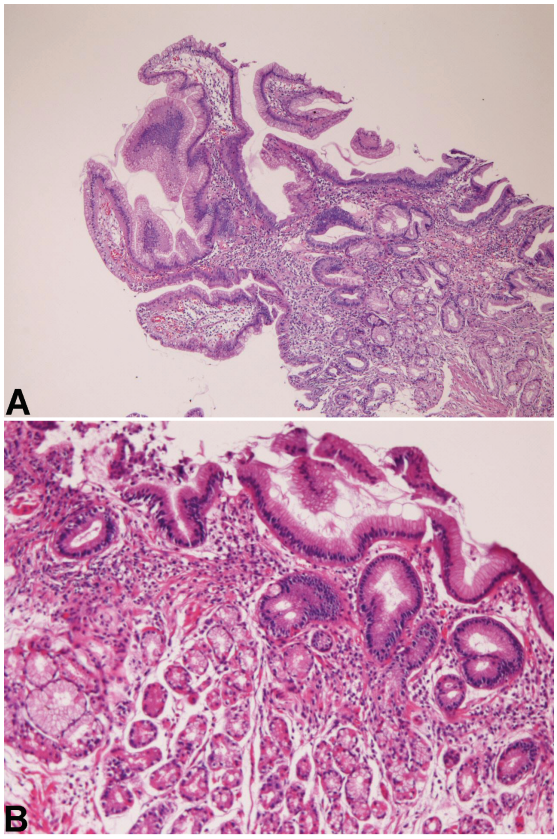

Figure 3. Heterotopic gastric mucosa of the duodenum. A: Gastric foveolar epithelium is recognized. HE, x100. B: Gastric fuveolar epithelium and fundic glands are seen. HE, x200.

cases (14.3%), hyperplastic polyp in 16 cases (2.8%), Brunner's gland hyperplasia in 14 cases (2.5%), Brunner's gland adenoma in 8 cases (1.4%), lymphoid polyp in 5 cases (0.8%), tubular adenoma in 4 cases (0.7%), lymphagioma in 2 cases (0.4%), endocrine cell micronests in 1 case (0.2%), and amyloidosis in 1 case (0.2%).

The chronic non-specific duodenitis (n=334) was characterized by edema and lymphocytic infiltration (**Figure 1**). This condition was very frequently recognized. Almost all duodenal specimens showed more or less lymphocytic infiltration.

The duodenal ulcer (n=101) was characterized by exudate, necrosis, granulation tissue and regenerative epithelium (**Figure 2**). The regenerative epithelium infrequently mimicked adenocarcinoma. No evidence for viral or fungal infection was noted in the present series. The location was fist portion in 87 cases, and second portion in 14 cases. Perforation of the ulcer was recognized in two cases, which needed emergency operations.

The hererotopic gastric mucosa (n=81) was located in the first portion in 42 cases, second portion in 32 cases, and third portion in 7 cases. Endoscopically, it was recognized as slight elevated or discolored lesion. Heterotopic gastric mucosa consisted of the following two types: one was composed of only foveolar epithelium (n=21) (**Figure 3A**) and another foveolar epithelium and fundic glands (n=60) (**Figure 3B**). The foveolar epithelium occasionally

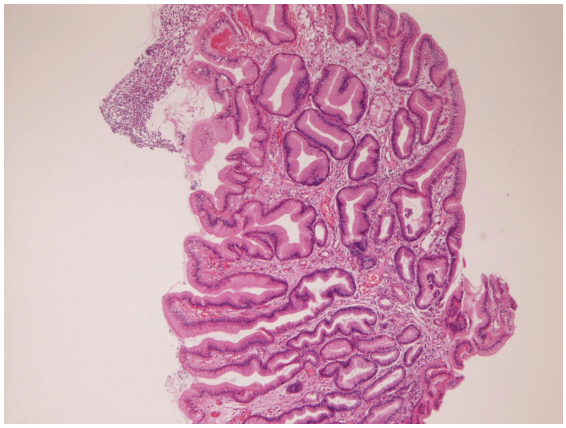

Figure 4. Hyperplastic polyp of the duodenum. Hyperplasia of gastric foveolar-like cells is recognized. HE, x100.

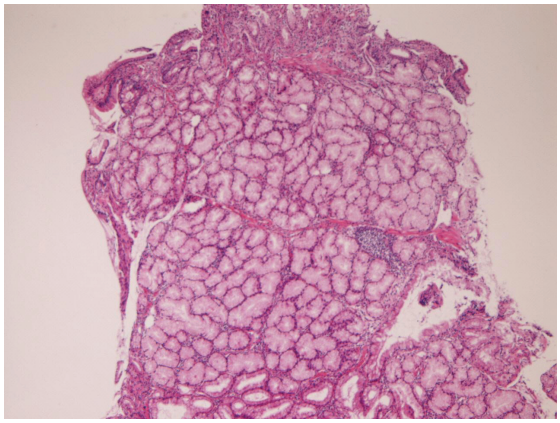

Figure 5. Brunner's gland adenoma. Neoplastic Brunner's gland is noted. No atypia is seen. HE, x100

showed hyperplastic changes (**Figure 3A**).

The hyperplastic polyp (n=16) was located in the first portion in 9 cases, in the second portion in 5 cases and in the third portion in 2 cases. Endoscopically, it was detected as duodenal polyp. Histologically, it was composed of hyperplastic columnar epithelium with mucins, and resembled to hyperplastic polyp of the stomach (**Figure 4**).

The Brunner's gland hyperplasia (n=14) was located in the first portion in 9 cases and the second portion in 5 cases. Endoscopically, it was recognized as an elevated or polyp lesion. It was histologically characterized by hyperplastic proliferation of the gland. However, in biopsy specimens, differentiation from Brunner's gland adenoma was occasionally difficult.

The Brunner gland adenoma (n=8) was situated in the first portion in 3 cases and the second portion in 5 cases. Endoscopically, it was recognized as a polypoid elevation or polyp lesion. It was histologically characterized by neoplastic proliferation of the gland (**Figure 5**).

The lymphoid polyp (n=5) was present in the first portion in 2, second portion in 2, and third portion in 1 cases. Endoscopically, it was recognized as a polyp. It was histologically characterized by a large lymph follicle with a large germinal center (**Figure 6**). The histology and imunohistochemical study demonstrated that it was different from follicular lymphoma and other

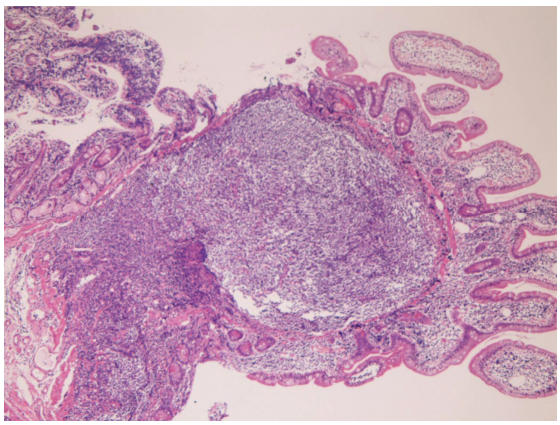

Figure 6. Lymphoid polyp of the duodenum. Hyperplastic lymph follicle is recognized. HE, x40

types of lymphoma.

The tubular adenoma (n=4) was located in the first portion in 1 case, second portion in 2 cases, and third portion in 1 case. Endoscopically, it was recognized as flat or elevated lesions. It was histologically characterized by adenomatous proliferation of intestinal epithelium (**Figure 7**), similar to colon adenoma. Immunohistochemically, the tubular adenoma was negative for p53 protein, and Ki-67 labeling was low (mean Ki-67 labeling = 8%).

The lymphangioma (n=2) was present in the second portion in all the two cases. Endoscopically, it was recognized as polyp or submucosal

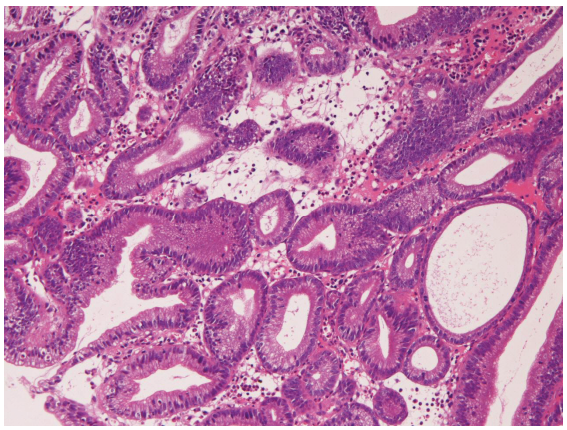

Figure 7. Tubular adenoma of the duodenum. Adenomatous proliferation of intestinal epithelium is recognized. The appearances are similar to colonic adenoma. HE, x200.

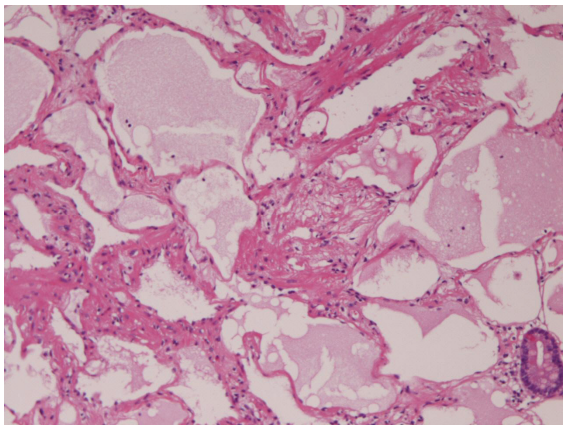

Figure 8. Lymphagioma of the duodenum. Neoplastifc proliferation of lymphatics is recognized. HE, x100.

tumor. Pathologically, it was characterized by submucosal cavernous proliferation of lymphatics free of red blood cells (**Figure 8**). No atypia was recognized.

The endocrine cell micronests (n=1) was located in the second portion. Endoscopically, it was recognized as a flat discolored lesion. It was pathologically characterized by non-neoplasmic proliferation of neuroendocrine cells positive for synaptophysin, neuro- specific enolase, and CD56.

In amyloidosis (n=1), biopsy was taken from the bulb. Endoscopically, it was recognized as a polyp. Pathologically, it was characterized by deposition of amorphous materials (**Figure 9A**) positive with Congo-red stain (**Figure 9B**). Later the patient (76-year-old man) was found to have multiple myeloma.

Discussion

In the present series, chronic non-specific duodenitis was the most common benign condition. Almost all patients in the present study showed more or less lymphocytic infiltration of the duodenal mucosa, similar to the stomach. The lymphocytes may play an important role of local immunity.

The duodenal ulcer was the second common benign condition next to duodenitis. It was a simple ulcer. However, penetration and perforation may occur, causing serious problems, as seen in the present study. Pathologically, the

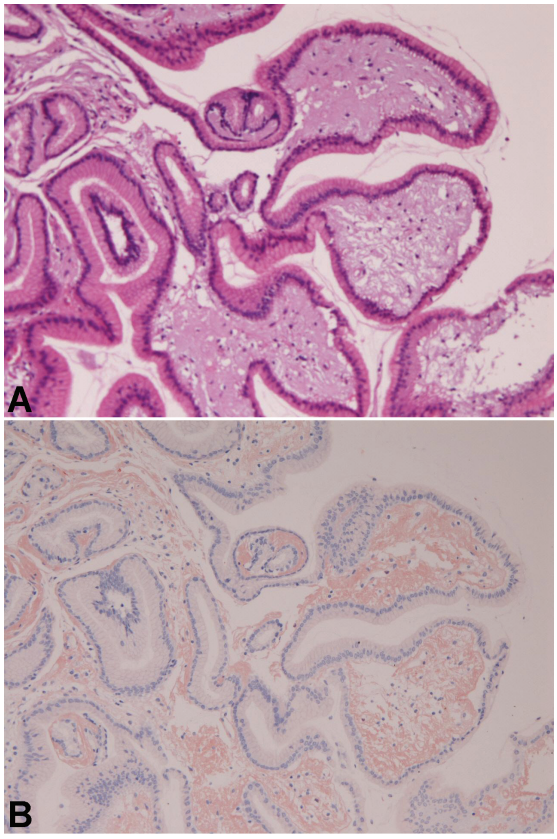

Figure 9. Amyloidosis of the duodenum A: Red amorphous substance is noted in the mucosa. HE, x100 B: The substance is positive with Congo-red stain. Congo-red stain, x100.

ulcer margin regenerative epithelium must be differentiated from adenocarcinoma.

Heterotopic gastric mucosa is well recognized entity, and several case report or small case series have been published [7-10]. However, the frequency and common site have been unclear. In the present series, the frequency was 14.3%. In the present study, it was located in the first portion in 42 cases, second portion in 32 cases, and third portion in 7 cases. Therefore, the common location is the first and second portions of the duondenum. In the present study, heterotpic gastric mucosa consisted of the following two types: one was composed of only foveolar epithelium (n=21) and another foveolar epithelium and fundic glands (n=60). The author speculates that the latter is a congenital maliformation while the former is a congenital or acquired lesion (gastric foveolar metaplasia). Of importance, adenoma and adenocarcinoma very infrequently arise in heterotopic gastric mucosa [11, 12]. The foveolar epithelium occasionally showed hyperplastic changes in the present series.

Hyperplastic polyp was recognized in 2.8% in the present study. Its common locations are the first and second portions of the duodenum. Histologically, it was composed of hyperplastic columnar epithelium with mucins, and resembled to hyperplastic polyp of the stomach. The author speculates that the hyperplastic polyp is in fact hyperplastic changes of ectopic foveolar gastric mucosa. It should be kept in mild that hyperplastic polyp may undergo malignant transformation [13-15].

In the present study, Brunner's gland hyperplasia was seen in 2.5%. Its preferential locations were the first portion and the second portion of the duodenum. In biopsy specimens, differentiation from Brunner's gland adenoma was occasionally difficult. A few case studies of Brunner's gland hyperplasia have been reported [16, 17]. It is important to recognize that carcinoma may arise in Brunner's gland hyperplasia [17].

Brunner gland adenoma was recognized in 1.4% in the present series. The preferential location was the second portion of the duodenum. A few case reports of this neoplasm have been reported [18, 19]. It was noteworthy that carcinoma may arise from Brunner's gland adenoma [19].

The lymphoid polyp was noted in 5 cases in the present study. In the English literature, no reports of lymphoid polyp of the duodenum are present. It has been rarely reported in the rectum [20]. The important point is a differential diagnosis from malignant lymphoma, follicular lymphoma, and lymphomatoid hyperplasia. In the present study, lymphoma was denied from various immunohistochemical stainings. Otherwise, it has little clinical relevance.

In the present study, tubular adenoma of the duodenum was recognized in 4 patients. Endoscopically, it was recognized as flat or elevated lesions. It was histologically characterized by adenomatous proliferation of intestinal epithelium, similar to colon adenoma. Adenoma of the duodenum is extremely rare [22]. In the present study, the neoplasm is not adenocarcinoma in histology as well as immunohistochemistry.

Lymphangioma of the duodenum was recognized in 2 cases in the present series. Lymphangioma of the duodenum is very rare, and a few case reports are present in the English literature [23, 24]. Lymphangioma of the duodenum was characterized by submucosal cavernous proliferation of lymphatics free of red blood cells in the present study. No atypia was recognized. It has no clinical relevance.

Endocrine cell micronests were noted in 1 case. This is a rare condition, frequently associated with duodenal carcinoid tumors [25, 26]. The micronests were pathologically characterized by non-neoplasmic proliferation of neuroendocrine cells positive for synaptophysin, neuron-specific enolase, and CD56. In the present series, no association with carcinoids was noted.

In the present study, amyloidosis was recognized in 1 case. Endoscopically, it was recognized as a polyp. Pathologically, it was characterized by deposition of amorphous materials positive with Congo-red stain. The patient (76-year-old man) was found to have multiple myeloma later, suggesting that systemic amyloidosis may present initially as duodenal polyp.

In summary, the present study reported the histopathology of various benign lesions of the duodenum.

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