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—Original Article—

HETEROTOPIC PANCREAS IN SURGICALLY RESECTED STOMACH

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Summary

The heterotopic pancreas collected from the surgically resected stomachs were studied clinico-pathologically. The number of the cases of heterotopic pancreas were 64; 43 in the stomach and 21 in the duodenal bulbus. They were corresponded to 1.2% in the 5446 resected stomachs. The operated cases with this lesion were frequently found in the age of thirty to fifty with male predominance. Thirty eight cases of them were combined with other gastro-duodenal diseases, especially gastric or duodenal ulcers. About 90% of these lesions were found in the pylorus and antrum. They were situated frequently in the greater curvature, posterior and anterior wall, and rarely in the lesser curvature. Their size was ranged about 0.3 to 4.7 cm in diameter, and about 80% of them within 3 cm in diameter. Macroscopically, 49 polypoid, 8 nipple-like, 7 flat and 1 thickening folded lesions were found, respectively. The bridging folds were found in 9 cases, 13.8%. Microscopically, 30, 29 and 6 lesions of type I, II and III types according to Heinrich's classification were found, respectively. The ulcer formation of the mucosal surface of the heterotopic pancreas was found at rate of 10%, and cystic transformation in about 6%.

Key Words: *heterotopic pancreas, aberrant pancreas, accessory pancreas, stomach, duodenum.*

The pancreatic tissue existing in the distant organ or tissue from the pancreas has been called as heterotopic pancreas, aberrant pancreas or accessory pancreas. The heterotopic pancreas is one of the most frequent tumorous lesions in the submucosae of the stomach.

In the present paper, the cases with the heterotopic pancreas in the surgically resected stomach were studied for the clinico-pathologic findings.

Materials and Methods

The surgically resected stomachs were collected from the main hospitals in Mie Prefecture, since 1968 untill 1976. The cases with the heterotopic pancreas were found in 64 (65 lesions), about 1.2% of 5446, of which 43 were in the gastric wall and 21 in the duodenal wall. The cases with the submucosal tumor were 167, 3.0%, and so those with the heterotopic pancreas corresponded to about 38% of them (**Table 1**). The resected stomachs were fixed in 10% formol and observed by the Hematoxylin and Eosin staining method.

Results

1. Combination of the heterotopic pancreas and other gastro-duodenal diseases: The cases with the heterotopic pancreas only were 26 and other 38 cases were resected by the other gastro-duodenal diseases. Although the gastric and duodenal ulcers were about 80% of the complicated lesions, the gastric carcinoma,

polyp, leiomyoma and eosinophilic granuloma were combined not infrequently (**Table 2**).

2. Age and sex distribution: The resected cases were frequently found in the fourth to sixth decades with male predominance, because the majority of the cases with the heterotopic pancreas were resected for the diagnosis of ulcer and carcinoma in these age groups (**Table 3**).

3. Clinical course and symptoms: The symptoms like as epigastralgia, full-filling after dinner, nausea, vomiting, weight loss, etc., continued usually over 3 years in the patients with or without combined diseases. However, the patients without other gastroduodenal diseases showed a tendency to complain the various symptoms for a long periods (**Table 4, 5**).

4. Location: Twenty-one lesions were found in the duodenal bulbus adjacent to the the pylorus ring and 44 in the gastric wall; 12 in the pylorus, 27 in the antrum and 5 in the body. About 90% were found in the pylorus and antrum. They were situated frequently in the greater curvature, anterior and posterior wall, and rarely in the lesser curvature (**Table 6**).

5. Size and number: The size of this lesion was ranged about 0.3 to 4.7 cm in diameter. About 80% of the lesions were within 3 cm in diameter. One case with 2 lesion was found (**Table 7**).

6. Distribution in the gastric wall: Although the heterotopic pancreas was found widely distributed in the gastric wall, about 42% of the lesions were mainly in the submucosae, 25% in the propria muscularis, 18% in the submucosae to propria muscularis, 12% in the subserosae and 13% in the propria muscularis to subserosae. The heterotopic pancreatic tissue in the propria mucosae was

Table 1. Submucosal tumor of the stomach (1968–1976)

Myogenic tumor	65 (38.9%)
Leiomyoma	46
Leiomyosarcoma	16
Leiomyoblastoma	3
Heterotopic pancreas	64 (38.3%)
Stomach	43
Duodenal bulb	21
Eosinophilic granuloma	23 (13.8%)
Lipoma	4 (2.4%)
Carcinoid	4 (2.4%)
Stomach	1
Duodenal bulb	3
Aberrant gastric mucosae	3 (1.8%)
Lymphangioma	2 (1.2%)
Hemangioma	1 (0.6%)
Glomus tumor (duodenum)	1 (0.6%)
Total	167

Table 2. Heterotopic pancreas and complications

Heterotopic pancreas tissue only	26
Stomach	23
Duodenal bulb	3
Heterotopic pancreas and other gastro-duodenal diseases	38
H.P.+gastric ulcer	19
+duodenal ulcer	5
+gastric and duodenal ulcer	2
+advanced gastric carcinoma	5
+early gastric carcinoma	2
+gastric carcinoma and gastric ulcer	1
+gastric carcinoma and polyp	1
+gastric and duodenal ulcer and eosinophilic granuloma	1
+gastric and duodenal ulcer and leiomyoma	1
+gastric polyp	1
Total	64

Table 3. Age and sex distribution of the heterotopic pancreas

Age / Sex	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70–79	Total
Male	0	0	6	9	15	13	6	1	50
Female	1	0	2	5	0	4	2	0	14
Total	1	0	8	14	15	17	8	1	64

found in 10 cases, about 15.4%. The lesions in the submucosae to propria muscularis showed usually protruded polypoid appearance and those in the propria muscularis to subserosae flat or thickening of the wall (**Table 8, 9**).

7. Gross appearance: Forty-nine sessile polypoid lesions, 8 convexed tumorous lesions with nipple-like appearance, 7 flat-elevated lesions and 1 lesion with thickening fold were found, respectively. The mucosal surface of the protruded lesions showed usually mild unevenness. The opening spots of the pancreatic ducts were found in the 16 lesions, 24.6%, and the bridging folds in 9, 13.8% (**Table 10, Photo. 1, 2**).

8. Microscopic appearance: The histologic classification of the heterotopic pancreas was performed according to the Heinrich's description[11]; I type consists of normal pancreatic tissue, II of pancreatic tissue without islet and III of pancreatic duct only. In the present report, the Heinrich's II type was divided into two subtypes like as acinus-predominant and duct-predominant ones (**Photo. 3–6**). The lesions showing Heinrich's type II were most frequent. In the lesiosn showing Heinrich's type II, especially, duct-predominant type and III, various rates of pyloric and Brunner's glands proliferation

Table 4. Symptoms in the cases with the heterotopic pancreas

Symptoms	Heterotopic pancreas tissue only	Heterotopic pancreas tissue and other gastroduodenal diseases	Total
Epigastralgia	17	23	40
Full-filling after dinner	11	11	22
Nausea vomiting	8	7	15
Anorexia	4	11	15
Fatigue	6	6	12
Weight loss	7	6	13
Epigastric discomfort	4	5	9
Cardialgia	2	6	8
Anemia	3	2	5
Hematemesis tarry stool	1	3	4
Lumber pain	1	1	2
Constipation	1	0	1
No symptom	0	3	3
Total	26	38	64

Table 5. Duration of symptoms in the cases with the heterotopic pancreas

Duration (month)	Heterotopic pancreas tissue only	Heterotopic pancreas tissue and other gastroduodenal diseases	Total
0– 3	5	11	16
3– 6	2	1	3
6– 9	1	2	3
9–12	3	1	4
12–18	1	1	2
18–24	1	3	4
24–36	1	2	3
36–	12	12	24
Unknown	0	5	5
Total	26	38	64

Table 6. Location of the heterotopic pancreas

	Duodenal bulb	Pyrolus	Antrum	Corpus	Fundus	Cardia	Total
Lesser curvature	3	0	2	1	0	0	6
Anterior wall	5	5	8		0	0	18
Posterior wall	4	2	11	3	0	0	20
Greater curvature	9	5	6	1	0	0	21
Total	21	12	27	5	0	0	56

Table 7. Size of the heterotopic pancreas

Size	Number	Per-cent
0–0.9 cm	7	10.8
1.0–1.9	35	53.8
2.0–2.9	17	26.1
3.0–3.9	5	7.7
4.0–4.9	1	1.5
Total	65	100

associated. The ulcer formation of the surface of the heterotopic pancreas was found at rate of 10%, and the inflammatory cell infiltration like as lymphocytes, neutrophils, etc. and fibrosis were associated in the majority of the lesions. The secondary cystic transformation in the duct-predominant type was found in 4

Table 8. Location in the gastric wall and histological type

Location \ Heinrich's type	I	II acinus predominant	II duct predominant	III	Total
m	0	0	0	0	0
m+sm	2	0	0	0	0
m+sm+pm	2	1	3	0	6
m+sm+pm+ss	0	0	0	0	0
sm	0	4	5	2	11
sm+pm	4	4	8	4	20
sm+pm+ss	5	0	0	0	5
pm	0	0	0	0	0
pm+ss	0	0	0	0	0
ss	0	0	0	0	0
Total	13	9	16	6	44

m: propria mucosae, sm: submucosae, pm: propria muscularis, ss: subserosae.

Table 9. Location in the duodenal wall and histological type

Location \ Heinrich's type	I	II acinus predominant	II duct predominant	III	Total
m	0	0	0	0	0
m+sm	0	0	0	0	0
m+sm+pm	0	0	0	0	0
m+sm+pm+ss	2	0	0	0	2
sm	0	0	0	0	0
sm+pm	0	2	0	0	0
sm+pm+ss	6	1	1	0	0
pm	0	0	0	0	0
pm+ss	7	1	0	0	8
ss	1	0	0	0	0
Total	16	4	1	0	21

Table 10. Macroscopic appearance and location of the heterotopic pancreas

Macroscopic finding \ Location		Sm	Sm+Pm	Pm	Pm+Ss	Ss	Total
Protruded	sessile	20	9	13	1	6	49
	polypoid nipple-like	5	3				8
Flat		1		3	1	2	7
Thickening-folded		1					1
Total		27	12	16	2	8	65

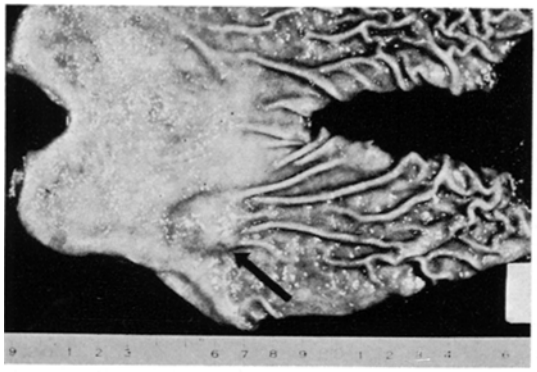

Photo. 1. Sessile polypoid submucosal tumor in the posterior wall of the antrum.

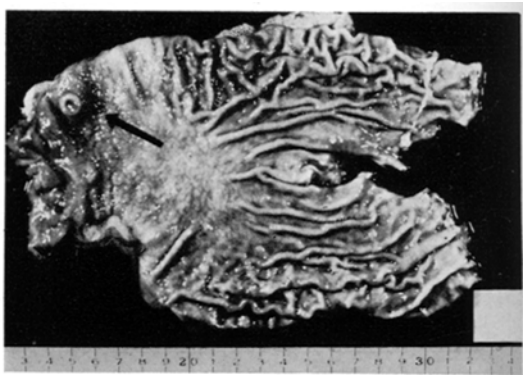

Photo. 2. Nipple-like appearance of the submucosal tumor in the anterior wall of the pylorus.

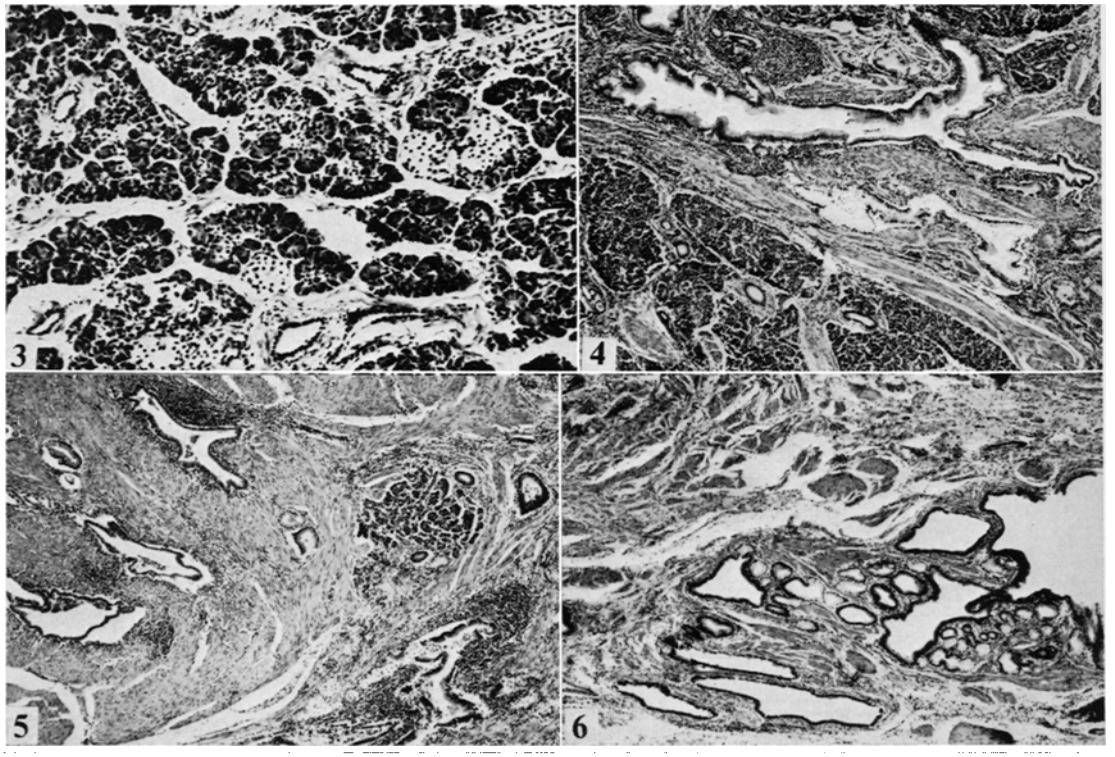

Photo. 3. Heinrich's type I with normal pancreatic tissue. H.E. stain, ×60
Photo. 4. Heinrich's type II without islet. Acinus- predominant type. H.E. stain, ×32
Photo. 5. Heinrich's type without islet. Duct-predominant type. H.E. stain, ×32
Photo. 6. Heinrich's type III consisted of only ducts of the pancreas. H.E. stain, ×60

Table 11. Histological appearance of the heterotopic pancreas

Histological appearance \ Heinrich's type		I (29-lesion)	II acinus predominant (13-lesion)	II duct predominant (17-lesion)	III (6-lesion)	Total 65
Adenomyosis		2	4	15	4	25
Proliferation	no	22	10	2	3	37
of pyloric and	mild	6	0	12	3	21
Brunner's glands	moderate	1	1	3	0	5
	marked	0	0	0	0	0
Fibrosis	no	8	3	0	3	14
	mild	15	4	15	3	37
	moderate	5	1	2	0	8
	marked	0	1	0	0	1
Inflammatory	no	7	3	0	3	13
cell infiltration	mild	17	5	16	3	41
	moderate	3	1	1	0	5
	marked	1	0	0	0	1
Ulcer formation		6	0	0	0	6
Cyst formation		0	0	3	1	4
Calcification		1	0	0	0	1

cases, and the cysts of which wall consisted of fibrous tissue with or without columner epithelium included from serous to bloody fluids. Microscopic calcification in the heterotopic pancreas was found in only one case (**Table 11**).

Discussion

The heterotopic pancreas distributes widely in the stomach, duodenum, jejunum, ileum, Meckel's diverticle, gall bladder, bile tract, spleen, liver, omentum, mesentery, etc. . However, the majority of these lesions locates in the duodenum, stomach and jejunum. For example Peason reported for the incidence as follows, 30% in the duodenum, 25% in the stomach, 15% in the jejunum, 3% in the ileum and 6% in the Meckel's diverticle[9]. The frequency found in the autopsy cases has been reported as about 1 to 2% and that in the resected stomachs about 1% by Kuru[13] and 0.25% by Nagayo[12]. These lesions locate frequently in the antrum near the greater curvature. On the other hand, the incidence of the heterotopic pancreas in the duodenum was reported for the autopsy cases as 15% in the children and 12.5% in the adults by Feldman[5], and the lesions over 80% were found in the second portion, especially, upper region of the papilla of Vater which corresponds to the primordial area of the pancreas.

The majority of the patients with the heterotopic pancreas complained no remarkable symptom and was unexpectedly found by the clinical investigation for the other gastroduodenal diseases and/or in the resected stomachs complicated with other gastroduodenal diseases. The size of the heterotopic pancreas in the children is usually about 1 to 2 mm in diameter and probably develops in parallel with the body growth. Various symptoms may be complained due to the pyloric stenosis, prolapse and ulcer formation associated with the tumor growth[7]. Various inflammatory changes like as inflammatory cell infiltration up to abscess formation and fibrosis probably caused by the retrograde infection from the ducts were found especially around the ducts. Secondary cystic transformation may be caused by the obstruction of the ducts associated with these inflammatory changes[3,12]. Although several cases with

malignant transformation of the heterotopic pancreas have been reported in the literatures[3,6,13], it should be considered that the gastric carcinoma developed and invaded into the heterotopic pancreas in the majority of the cases. For the definition of the secondary malignant transformation of the heterotopic pancreas, it is necessary that the pancreatic tissue remains in a part of the cancerous tissue in the submucosal tumor. Although 8 combined cases with the distant gastric carcinoma were found in the present series, there was no other case that was decided upon to be transformed from the heterotopic pancreas. The gastric and duodenal ulcers were most frequent complications of the heterotopic pancreas in the resected stomachs[12]. Although several cases showed ulceration on the heterotopic pancreas, the majority of the ulcers existed apart from this lesion, and so the majority of these combinations of the ulcer and heterotopic pancreas may be simple complication of the primary peptic ulcer. However, the distant ulcer formation may be rarely associated with the ulcerogenic excretion from the heterotopic pancreas like as Zollinger-Ellison's syndrome.

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