

## Clinicopathological Study on Gastric Lesions Treated by Strip Biopsy

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**Summary:** Clinicopathological significance of strip biopsy was evaluated in 23 gastric lesions in 22 patients. The 23 lesions consisted of 16 adenomas, 4 adenomas with focal carcinoma, 1 carcinoma, and 2 "no atypical cell". Strip biopsy provided precise information for accurate histological diagnosis and the depth of cancer invasion. Eleven % of lesions diagnosed as Group III by forceps biopsy and 66.7% of Group IV lesions had focal carcinoma in adenoma. Sixteen of 23 lesions were completely resected by strip biopsy. Seven lesions resulted in incomplete resection. One patient of the 7 cases underwent piece-meal resection because the lesion was too large to be resected by single strip biopsy. Four of the 7 lesions received additional endoscopic coagulation by laser or heater probe. All lesions except for 2 lesions which were resected by operation were followed by repeated endoscopy and all remained disappeared. The combination of strip biopsy and coagulation therapy appears to give great benefit in eradicating lesions.

### Introduction

Various endoscopic procedures including laser irradiation, heater probe, snare polypectomy, and strip biopsy have been used for the treatment of gastric cancer and precancerous or border-line lesions at our institute. Strip biopsy was developed by Tada et al<sup>1)</sup> in 1984. Recently, it has been widely accepted as an useful and safe procedure to treat those lesions in Japan. Comparing with coagulation therapy such as laser and heater probe, an advantage of the strip biopsy is that histopathological evaluation is possible on resected specimens. In this study, we evaluated the clinical and pathological significance of the therapy performed over the past 5 years.

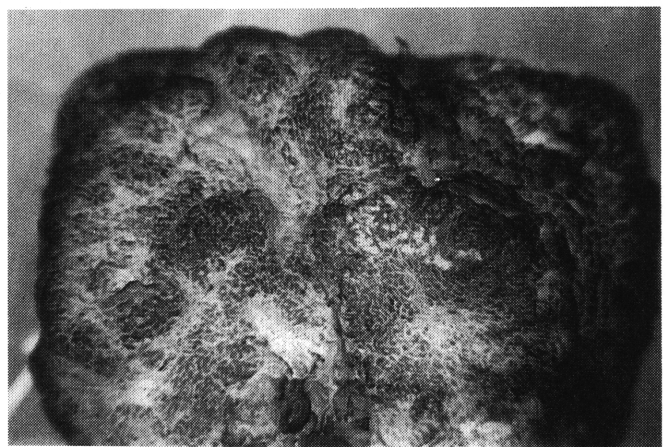
### Patients and Methods

From 1986 to 1991, 24 gastric lesions in 22 patients were treated by strip biopsy (Table 1). The patients consisted of 15 males and 7 females, with a mean age of 64.2 years (range 50 to 83). As for gross appearance of the lesions, 23 of 24 lesions were a superficially elevated type and one was a superficially depressed. Strip biopsy was done ac-

ording to the method of Tada et al<sup>1)</sup>. Endoscopy used was OLYMPUS GIF-2T or 2T-20 with 2 working channels. Several ml of physiological saline was injected into the submucosal layer of the gastric wall with a needle through the endoscopic channels to make a protrusion. Then, the protruded mucosa was resected by means of snare polypectomy. In some cases, the margin of the resected area was coagulated by laser irradiation or heater probe.

The resected lesions were flattened on a plate, measured, and fixed in 10% formaldehyde. After fixation, the surface of specimens was stained with Meyer's hematoxylin and observed with stereoscopy to assess a fine mucosal pattern and how completely lesions were resected (resectability (Fig. 1)). Then, they were sliced in 2 mm thick, embedded in paraffin blocks, sectioned, and stained with hematoxylin and eosin (HE). Pathological findings and resectability were assessed histologically. The latter was determined by presence (as; complete) or absence (as; incomplete) of normal mucosa between a lesion and the edge of a specimen.

The histological grading in stomach biopsy was in accordance with the criteria of the General Rules for the Gastric Cancer Study in Surgery and Pathology of Japanese Society for Gastric Cancer.<sup>2)</sup>



**Fig. 1.** The stereoscopic view of a specimen resected by strip biopsy (Meyer's hematoxylin).

**Table 1.** Details of Patients with Gastric Lesions Treated by Strip Biopsy

Case No.	Age	Sex	Location	Size (mm)	Endoscopic diagnosis	Histology of biopsy	Histology of strip biopsy	Resectability	Additional treatment	Outcome
1.	64	M	low. body	9	adenoma	Group III	adenoma, mod.	complete	(-)	disappear
2.	64	M	mid. body	12	adenoma	Group III / IV	ca. in adenoma	incomplete	laser	disappear
3.	50	M	antrum	7	adenoma	Group III	adenoma, mod.	complete	(-)	disappear
4.	54	M	antrum	5	adenoma	Group III	adenoma, mil.	complete	(-)	disappear
5.	77	M	antrum	5	EC ( II a)	Group III / IV	adenoma, mod.	complete	(-)	disappear
6.	62	M	antrum	8	adenoma	Group III	adenoma, sev.	complete	(-)	disappear
7.	66	F	antrum	5	adenoma	Group III	adenoma, mod.	complete	(-)	disappear
8.	63	M	antrum	9	adenoma	Group III	adenoma, mod.	incomplete	(-)	disappear
9.	66	M	antrum	35	EC ( II a)	Group III	ca. in adenoma	incomplete	operation	
10.	51	M	angulus	10	adenoma	Group III	adenoma, sev.	complete	(-)	disappear
11.	64	F	antrum	6	adenoma	Group III	adenoma, mild	complete	(-)	disappear
12.	59	F	low. body	6	EC ( II c)	Group V	carcinoma	incomplete	operation	
13.	65	M	mid. body	7	adenoma	Group III	no adenoma			
14.	56	M	antrum	4	adenoma	Group III	adenoma, mil.	complete	(-)	disappear
15.	63	M	antrum	4	SMT?	Group II	scar	complete	(-)	disappear
16.	59	M	angulus	8	adenoma	Group III	adenoma, mod.	complete	heat probe	disappear
17.	66	M	mid. body	8	adenoma	Group III	adenoma, mod.	incomplete	heat probe	disappear
18.	74	F	antrum	8	EC ( II a)	Group IV	ca. in adenoma	complete	heat probe	disappear
19.	50	M	antrum	12	adenoma	Group III	adenoma, sev.	incomplete	heat probe	disappear
20.	83	M	upp. body	10	adenoma	Group III	adenoma, mod.	complete	(-)	disappear
21.	66	F	angulus	13	adenoma	Group III	ca. in adenoma	complete	heat probe	disappear
22.	77	M	mid. body	9	adenoma	Group III	adenoma, sev.	complete	heat probe	disappear
23.	71	F	antrum	8	adenoma	Group III	adenoma, mod.	complete	(-)	disappear
24.	70	F	antrum	20	adenoma	Group III				

## Result

### 1) Endoscopic findings and diagnosis before strip biopsy

Endoscopically, 22 of 24 lesions showed slightly elevated plaque-like appearance with a fine granular surface and pale color. Exceptionally, the lesion of Case 9 showed an irregular coarse granular or micronodular appearance with reddish color in part. Case 12 presented a small area of reddened depressed mucosa. Case 21 showed an elevated lesion with reddish color and central depression.

Endoscopic biopsies revealed Group II in one lesion, Group III in 18, Group IV in 3, and Group V in one. Together with the endoscopic finding and results of biopsies, the diagnosis before strip biopsy was adenoma in 19 lesions, early carcinoma in 4 (3 type IIa lesions and one type IIc lesion), and submucosal tumor in one (Table 1).

In one case (Case 24), strip biopsy was not accomplished because she had complained abdominal pain during the therapy. Other patients underwent the resection successfully without serious complications. Finally, 23 of 24 lesions were involved in this study.

### 2) Location, gross appearance, and size of lesions.

Thirteen lesions were located in the antrum, 3 in the angulus, 7 in the body, and none in the fornix (Table 2). Most lesions were situated in the lower half of the stomach. The gross appearance of resected lesions was the superficially elevated type in 22 lesions and the superficially

**Table 2.** Location of Lesions Treated by Strip Biopsy

	Antrum	Angulus	Body			Fornix
			lower	middle	upper	
anterior wall	4	0	0	1	0	0
lesser curvature	2	2	1	2	0	0
posterior wall	4	1	1	1	1	0
greater curvature	3	0	0	0	0	0

depressed type in one. Seventeen lesions were smaller than 10 mm in size, 5 were between 10 and 20 mm, and only one was larger than 21 mm.

Focal carcinoma in adenoma or carcinoma was found in 2 of 16 lesions (12.5%) smaller than 10 mm, 2 of 5 lesions (40.0%) between 10 and 20 mm, and 1 of 1 lesion (100.0%) larger than 21 mm (Table 3).

**Table 3.** Gross Appearance of Lesions

Gross appearance	<10 mm	10-20 mm	21 mm <
superficially elevated	16 (1)*	5 (2)*	1 (1)*
flat	0	0	0
superficially depressed	1 (1)*	0	0

(\*)\*: No. of cases with carcinoma in adenoma

(\*\*)\*\*: No. of cases with carcinoma

3) Histopathological findings

Twenty-one of 23 lesions histologically consisted of 16 adenomas (Fig. 2), 4 adenomas with focal carcinoma, and one adenocarcinoma. Adenoma was divided into 3 groups based on histological grading of atypism. Of 16 adenomas, there were 3 adenomas with mild atypia, 10 with moderate atypia, and 3 with severe atypia. Case 12 had poorly differentiated adenocarcinoma., while carcinomas in adenoma were well differentiated type. Two lesions in cases 13 and 15 contained no atypical cell even in serial sections (Table 1).

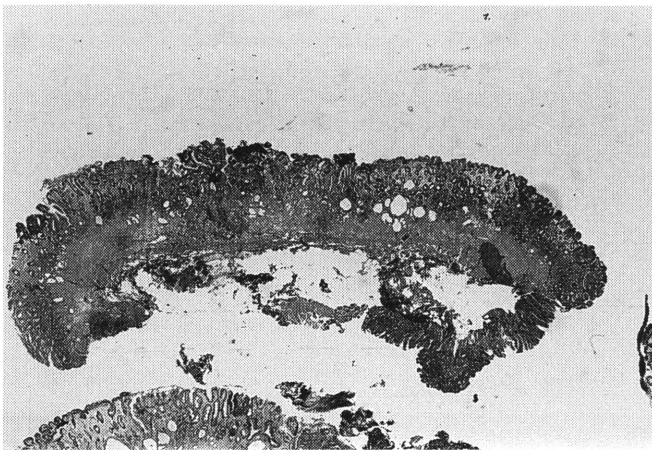


Fig. 2. The cross-sectional view of resected adenoma. The specimen contains mucosa, lamina muscularis mucosa and a superficial part of submucosa.

Comparing histopathological diagnosis of forceps biopsy with that of strip biopsy, one lesion with Group II had “no atypical cell”, and 18 lesions with Group III revealed “no atypical cell” in one lesions, adenoma in 15 lesions (3 adenomas with mild atypia, 9 with moderate atypia, and 3 with severe atypia), and carcinoma in adenoma in 2 lesions. One of 3 lesions with Group IV had adenoma with moderate atypia and 2 had carcinoma in adenoma. One lesion with Group V had poorly differentiated adenocarcinoma (Fig. 3).

Background mucosa of 16 adenomas were also evaluated histologically (Table 4). There was no fundic gland in

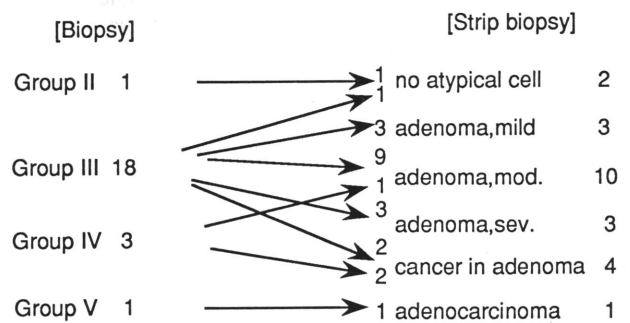


Fig. 3. Relationship of Histological Diagnosis between Conventional and Strip biopsy.

Table 4. Histological Characteristics of Adjacent Mucosa

1) Type of gland	2) Degree of intestinal metaplasia	
fundic gland	0	(-) 0
pyloric gland	14	(+) 8
		(++) 6
fully intestinalized mucosa	2	(+++) 2
total	16	total 16

this series. All specimens included pyloric gland mucosa which were displaced by intestinal metaplasia to various extent. Degree of intestinal metaplasia was classified in 4 grades, none ( - ), mild (+), moderate (++) and severe (+++), according to Nakamura.<sup>3)</sup> There were 8 lesions with (+)-intestinal metaplasia, 6 with (++) and 2 with (+++).

4) Resectability and follow-up study

All resected specimens were histologically confirmed to include the mucosal layer and a superficial part of the submucosal layer of the gastric wall. Sixteen of 23 lesions resulted in complete resection and 7 in incomplete (Table 1). Table 5 shows a detail of the patients resulted in incomplete resection. Location of the lesions varied from the middle body to the antrum. Size of the lesions ranges from 6 to 35 mm. Three of 7 lesions had carcinoma or carcinoma in adenoma. Case 9 with carcinoma in adenoma, measuring 35 mm in size, underwent piece-meal resection because the

Table 5. Cases Resulted in Incomplete Resection (7 out of 23 patients)

Case No.	Location	Size (mm)	Histology	Additional treatment	Outcome
2	anterior middle body	12	carcinoma in adenoma	laser	disappeared
8	posterior antrum	9	adenoma	(-)	disappeared
9*	posterior antrum	35	carcinoma in adenoma	operation	disappeared
12	posterior lower body	6	carcinoma	operation	disappeared
17	lesser cur.** middle body	8	adenoma	heat probe	disappeared
19	greater cur. **antrum	12	adenoma	heat probe	disappeared
22	posterior middle body	9	adenoma	heat probe	disappeared

\*: piece-meal resection, cur\*\*: curvature

lesion was too large to resect by a single strip biopsy. In this case, the purpose of the strip biopsy was not to eradicate the lesion but to make a precise diagnosis on a large specimen. Cases 9 and 12 underwent operation after strip biopsy because carcinoma remained in their stomach. Case 2 received laser irradiation and Cases 17, 19 and 22 underwent coagulation by heater probe to the margin of resected areas. Case 8 did not receive any additional treatment.

All cases except for Cases 9 and 12 have received follow-up study with repeated endoscopy andoscopic biopsies at intervals of 6 months. The follow-up period ranged from 0.5 to 5 years with an average of 1.5 years. All lesions remained disappeared in the follow-up study, even in Case 8 who had not received additional treatment.

## Discussion

In recent years in Japan, endoscopic therapy for gastrointestinal tumors has become popular. There are several methods to treat gastric tumors by endoscopy. These are roughly divided into two groups; one is the coagulation method such as laser irradiation, heater probe, microwave, and electrocoagulation by high frequency current, and another is the mucosal resection method including single snare polypectomy, double snare polypectomy, and strip biopsy.

The clinical significance of endoscopic laser therapy has been well established by many authors.<sup>4,5,6,7</sup> The laser provided good results in the treatment of gastric tumors such as adenoma and carcinoma. Indeed, among the various endoscopic procedures, it appeared the most effective therapy for advanced carcinoma, particularly in palliation of cancerous stricture.<sup>5,7</sup> It is also effective in eradication of early carcinoma and adenoma. However, the disadvantage of laser therapy is the lack of total histology of lesions. Especially, this becomes a great problem in treatment of border-line lesions and mucosal resection can solve the problem.

Strip biopsy permits the safe resection of superficial lesions including not only a broad part the submucosal layer but also surrounding normal mucosa. So it provides enough amount of tissue for histological study of lesions. The efficacy of endoscopic forceps biopsy is limited in the diagnosis of border-line lesions and early carcinomas.<sup>8,9,10</sup> Takemoto et al<sup>8</sup>) reported that 70.5% of Group III lesions and 91.7% of Group IV were diagnosed as carcinoma in the specimen obtained by strip biopsy. In our study, 11% of Group III and 66.7% of Group IV lesions were carcinoma. Although our data showed smaller figures, it should be emphasized that a considerable number of border-line lesions contain carcinoma. Therefore, the treatment of choice for border-line lesions is complete resection by strip biopsy.

Strip biopsy also permits the histological study on the

background mucosa of lesions as well as the lesions themselves. In the past, gastric adenoma and its background mucosa were studied on the specimens resected by operation or by endoscopic follow-up study with repeated biopsies.<sup>11</sup> Strip biopsy can provide information about the background mucosa, almost equivalent to operation. In our study, adenoma occurred in the pyloric gland mucosa with intestinal metaplasia or fully intestinalized mucosa. The literature<sup>12,13</sup>) and our experience suggested that gastric adenoma and carcinoma of differentiated type have same background in origin and that adenoma has potential to develop carcinoma. In this respect, gastric adenoma is good indication of strip biopsy.

In the literature,<sup>8</sup>) tissues up to 3 cm in size can be resected by strip biopsy, while the largest size in our study was 2 cm. Evaluating resectability of strip biopsy histologically, 7 of 23 lesions (30%) resulted in incomplete resection. In general, the manipulation of endoscopic mucosal resection is difficult when lesions are located in the posterior wall of the upper and middle gastric body and near the cardiac region. And when lesions are too large, the complete resection is difficult, too. In these cases, coagulation therapy is recommended.

The indication of endoscopic therapy for early gastric cancer should be restricted to lesions confined to the mucosal layer without lymphnode metastasis. Oguro et al<sup>4</sup>) reported that well-differentiated adenocarcinoma of type I, type IIa, and type IIb lesion, or type IIa + IIc lesion of 20 mm and less in size are good candidate for endoscopic therapy. However, accurate diagnosis of the depth of mural invasion is sometimes difficult to make even by using endoscopic ultrasonography. Strip biopsy can provide more accurate information about mural invasion by histological examination of resected specimen. Thus, it has several advantages in treatment of gastric tumors. Recently at our institute, a number of patients undergoing laser therapy has been declining, while strip biopsy has become the procedure of preference. Coagulation therapy, however, is useful when mucosal resection is difficult because of the location and size of lesions. Combination of the both methods gives a superior result in the endoscopic therapy.

## Conclusion

Among several methods of endoscopic therapy, strip biopsy appears to be the most valuable for superficial carcinoma and adenoma, because it permits histological examination of resected specimens and making accurate diagnosis. As adenomas or border-line lesions sometimes have focal carcinoma, it is better to resect them by strip biopsy if possible.

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