The Progress of Diagnosis of the Alimentary Tract Cancer**

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I. Introduction

It is a well-known fact that Japan holds the first place in the world in diagnostic methodology for early gastric cancer lesions. We owe the better part of outstanding diagnostic techniques to Prof. Teiko Tasaka who defined and classified early gastric cancer in 1962 on the basis of his "Nation-wide Statistics on Early Gastric Cancer" involving 385 cases. According to him, early gastric cancer is defined as a carcinoma of the stomach, the invasion of which is limited to the mucosa and submucosa and it is classified into "Type I: protruded type, Type IIa: superficially elevated type, Type IIb: superficially flat type, Type IIc: superficially depressed type and Type III: excavated type." This classification is one of criteria to which a number of clinicians have been and are referring in interpreting gastric findings. This proves to be a very efficient classification since it is based on simple macroscopic observation of the surface of the lesion without regard for histogenetic aspect as to whether the lesion is ulcerative or polypoid.

Between 1962 and 1972, we collected statistics from all over the country on early gastric cancer with collaboration of 91 institutions and presented them to the Gastroenterological Endoscopy, vol. 16. The statistics involved 8,069 early lesions of 7,617 patients. The incidence of early gastric cancer rose year after year, indicating progress in diagnostic techniques. During the nine-year period between 1972 and 1980, we collected 17,212 lesions from 15,933 patients with collaboration of 110 institutions over the nation.

We believe that to have a correct knowledge of the progress in diagnostic techniques for gastro-

intestinal cancer is nothing but to seize Japan's current state of early cancer detection. This paper presents a brief analysis of our statistics.

II. Early gastric cancer

i) Incidence by year

Figure 1 is an arbitrary combination of our two statistics. The incidence of early gastric cancer rose in the course of years since the number of patients was 217 in 1962 increasing to 1,213 in 1971, while it was 1,350 in 1972 increasing to 2,400 in 1980.

Figure 2 relates the size of lesion to the year. The increasing rates of small tumor can be ex-

Fig. 1. Annual number of early gastric cancer (Total number of cases 24,847).

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Fig. 2. The size of early gastric cancer in each year.

Fig. 3. The incidence of each type and histology of early gastric cancer in each age - classified group.

plained by the progress and widespread application of diagnostic endoscopy that permits to detect type IIa, type IIb and type IIc lesions which conventional radiologic procedures alone would have missed.

ii) Type and histology related to patient age

Figure 3 relates the type and histology of lesion to the age of the patient. In this Figure, the "elevated group" denotes types I and IIa lesions, the "intermediate group" type IIa + IIc lesions, the "flat group" type IIb lesions, the "depressed group" types IIc and III lesions and the "miscellaneous group" lesions of other types. With growing age, the rate of "elevated group" and that of "intermediate group" increased; on the contrary, the rate of "depressed group" decreased. This phenomenon suggests a close relationship between age of patient and type of cancer. As patients got older, the rate of papillary adenocarcinoma and that of tubular adenocarcinoma increased. These are called well differentiated adenocarcinoma. This observation was contrasted with the case of so-called undifferentiated adenocarcinoma: the rate of poorly differentiated adenocarcinoma and that of signet-ring cell carcinoma decreased. The development of gastric cancer in terms of histological aspect seems to be related in some way or other to the degree of mucosal atrophy and metaplasia of the organ advancing with the age of the patient.

iii) Multiplicity of early gastric cancer

Figure 4 compares multiplicity of early gastric cancer in each decade and type. The number of lesions per patient showed a tendency for gastric cancer to get slightly more multiple as patients grew older. Aging of gastric mucosa may result in enhancing the activity of carcinogenic factors. The most multiple cancer was type IIb since 325 lesions were detected from 162 patients i.e. one patient had 2.01 lesions, followed by type IIa having 1.17 lesions on the average. The data suggest that once a type IIb or type IIa cancer is detected, one should be reminded of their strong potentiality for multiplicity and should carefully examine the organ for the presence of other lesions.

iv) Histology related to the size and type of early gastric cancer

Fig. 4. Multiplicity of early gastric cancer in each decade and type.

Figure 5 relates histological aspect of early gastric cancer to its type and size. Well differentiated adenocarcinoma, which includes papillary and tubular adenocarcinoma, predominated in the “elevated group”, “intermediate group” and “flat group”. The rate of undifferentiated adenocarcinoma which includes poorly differentiated and signet-ring cell adenocarcinoma was highest in the “depressed group” and lowest in the “elevated group”. As lesions increased their size, the rate of well differentiated adenocarcinoma decreased while that of undifferentiated adenocarcinoma increased. It is clear from these data that well differentiated adenocarcinoma could be detected at the stage where its lesion was still small and that it was difficult to detect undifferentiated adenocarcinoma before its lesion grew to a certain extent. Detection of cancer partly depends on morphology of the lesion: the surface of well differentiated adenocarcinoma is liable to protrude while undifferentiated adenocarcinoma is likely

Fig. 5. The incidence of each histology of early gastric cancer classified by type and size.

to have a depressed surface. That undifferentiated adenocarcinoma grows more rapidly than well differentiated adenocarcinoma should be taken into consideration.

v) Invasion related to the size and type of early gastric cancer

Figure 6 shows the depth of invasion by the size and type of the lesion. The rate of m cancer was as high as 84.5% when the lesion was 5 mm or less in diameter, and the rate lowered in proportion as the lesion got larger, to the extent that sm cancer accounted for 57.3%, overwhelming m cancer when the lesion measured 41 mm or more. In types IIa and IIb, m cancer accounted for 68.0 and 87.3%, respectively, while type IIa + IIc showed an advanced degree of invasion since the rate of sm cancer attained 69.2%.

vi) Lymph node metastasis related to the depth of invasion

Figure 7 shows lymph node metastasis by the size and type of early gastric cancer. In the lesions

Fig. 6. The depth of invasion by the size and type of early gastric cancer.

10 mm or less in diameter, 1.8% involved lymph nodes for m cancer and 11.3% for sm cancer. The percentage rose as the size of lesions increased and in fact, lymph node metastasis occurred in 6.6% for m cancer and 26.6% for sm cancer when lesions grew to as large as 41 mm or more. It is important therefore to detect and treat a cancer in its early stage where the lesion remains of small size. In the case of sm cancer, type IIa + IIc was most liable to metastasize into lymph nodes; the metastatic rate was lowest with type IIb. In the case of m cancer, however, this type IIb was more metastatic than other types. This is probably because the lesion of type IIb cancer was mostly limited to the mucosa despite of its large size. M cancer made a striking contrast with sm cancer in the rate of metastasis of elevated lesions. Lymph node metastasis occurred in only about 3% of elevated lesions as long as they were localized in the mucosa, while the rate drastically increased to 21 to 25% when lesions involved the submucosa. In the case of depressed lesions, the rate of lymph node metastasis was as high as about 5% for m

Fig. 7. The incidence of lymph node metastasis of early gastric cancer classified by size and type.

cancer and about 17% for sm cancer. It seems that depressed lesions in the stage of submucosal invasion did not easily metastasize into lymph nodes.

III. Early esophageal cancer

Early esophageal cancer is defined as esophageal cancer of which invasion was limited to the mucosa and submucosa without lymph node metastasis. That the absence of lymph node metastasis is included in the definition is based upon that the 5 years survival rate of those who have esophageal cancer (without lymph node metastasis) is 67%, while those of the esophageal advanced cancer patient and superficial type of esophageal cancer with lymph node metastasis are 22% and 14%, respectively.

From the relevant articles in the past and the national statistics, we have collected 204 cases about early esophageal cancer. In Japan, the frequency of esophageal cancer is about 10% of

Fig. 8. The number of patients of early esophageal cancer in each location.

that of gastric cancer. In the 60s years old group there are as many as 94 cases (46.8%), followed by 50s years old group 28.9%, 70s years old group 15.9%, 40s years old group 5.9%, 30s years old group 2.0% and 80s years old group 0.5%. Comparing with the age distribution of gastric cancer, we found that there is a tendency for esophageal cancer to occur among old people. In Fig. 8, we take a closer look at the distribution of location of early esophageal cancer. The mid-portion of intrathoracic esophagus (Im) occupies 83.2% of all the cases, followed by lower-portion of intrathoracic esophagus (Ei). Mid-portion of esophagus is considered to be the place where early esophageal cancer can be most easily found. In terms of the type, more than half of the cases are superficially depressed type, and half of them are larger than 3.1 cm in size. On the other hand, all of superficially elevated type esophageal cancer are smaller than 3.0 cm in size. In terms of depth, 85.7% of those who have lesion less than 1.0 cm in size are m cancer. All of those having more than 5.1 cm are noted to have sm cancer. 85.7% of those having superficially elevated type and all of those having superficially flat type are m cancer. 60% of those having superficially depressed type are sm cancer. In order to cure esophageal cancer, we regard that it is necessary to detect the esophageal cancer when it stays in superficial state. By using the esophageal endoscopic examination and biopsy of the suspicious lesions, esophageal cancer can be detected in the earlier state.

IV. Early duodenal cancer

In accordance with the definition of early gastric cancer, we collected 22 cases of early duodenal cancer excluding those found in the papilla Vater. The frequency of early duodenal cancer is thought to be about 1/100 of that of gastric cancer. We could not find any article mentioning about the early small intestinal cancer except duodenum. Even for such rare cancer, we found that the cases reported for the last 5 years have increased rapidly. This can be considered as the reflection of the technical advance in the endoscopic examination. Fig. 9 profiles the location where early duodenal cancer were detected. Thirteen out of total 22 cases (59.1%) are located in the bulbous. Twenty out of 22 cases (90.9%), which located in the bulbous, post-bulbar portion and descending loop, were found by the screen examination of duodenum using fiberscope. In terms of the type, 18 out of 22 cases (81.8%) were early cancer type I, and depressed type cancer was as low as 9.1%. The depth-invasion of pedunculated type (Ip) of early I cancer limited to mucosa was 75%, and that of non-pedunculated type (Is) belonging to sm cancer was 70%. Furthermore, 4 out of 5 cases of so-called cancer in adenoma was m cancer. We think that it is necessary to perform polypectomy for the elevated adenomatous lesion in the duodenum as in the colon.

V. Early colon cancer

In recent years, the increase of western type of food taking in Japan has resulted in the increase of colon cancer, especially of the sigmoid colon cancer which is frequent in North America

Fig. 9. The number of patients of early duodenal cancer in each location.

Fig. 10. The number of patients of early colonic cancer in each location.

and Europe. It was predicted that colon cancer will become the top of cancer in Japan by 2000 year instead of gastric cancer. The incidence of colon cancer is about 30% of the gastric cancer, and about 7000 people died of colon cancer in one year. Male/female ratio is 1.8, and the frequency in the 50s years old group is the highest as 27.7%. Considering the peak of frequency of early gastric cancer is observed in the 60s years old group, it is suggested that the colon cancer tends to occur among younger generation. Fig. 10 shows the location of the colon cancer, 66 out of the total 159 cases (41.5%) were rectum, and 61 cases (38.4%) were sigmoid colon. Namely, 79.9% of these cases were in the recto-sigmoid region. It suggested that most of the early colon cancer can be detected by the lower colon-fiberscopy which can be performed easily in the out-patient clinic.

In terms of size, 116 out of 163 lesions (71.1%) are smaller than 2.0 cm in diameter. In terms of the type, 135 out of 163 lesions (82.8%) are type I early cancer. As to depth of invasion, m cancer is noted in 78.8% of type Ip, 41.8% of type Is and 55.0% of type IIa cancer. Namely, polypectomy of colon polyp, as a method for diagnosis, is more significant than the polypectomy in the esophagus and stomach.

VI. Conclusion

The progress and the widespread application of endoscopic diagnosis of cancer in the recent two decades are striking. We have described the current status of early cancer detection in Japan, mainly on the basis of our nationwide statistics. Cancer in the alimentary tract approximately 68,000 deaths per year in Japan. The great difference between this number and the number of cases in our statistics affords evidence of the fact that still a large number patients could not get the benefit of the recent medical achievement. In closing this paper, we would like to point out that diagnostics would make further rapid progress, riding on the wave of technical innovation and that whether or not available techniques are used in the most reasonable and effective manner depends greatly upon clinicians, who acknowledge and take advantage of the studies presented.

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