

Differential Diagnosis of Gastric Diseases

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Preface

This book is intended to systematically explain our clinical experience with gastric diseases. We have concentrated on how to avoid overlooking changes on the gastric walls and how to improve diagnostic differentiation of these changes on the basis of the findings.

It is difficult to differentiate malignancy from benignancy when the change is a minor or a very small one. Because of this, we have thoroughly classified protruding lesions and excavated lesions for diagnosis. The criterion adopted for classification is the commonly observed unevenness of each gastric area. If the change protrudes higher than normal from the mucous membrane, it is classified as a protruding lesion; and if it is deeper seated, as an excavated lesion. Differentiation follows diagnosis of the presence of disease. The whole process has been described concretely.

There often are small size changes which have not been detected by cautious x-ray examinations and are discovered by endoscopic observations. This book describes the techniques of endoscopic and radiologic examinations and the principles of macroscopic diagnosis based on our experiences.

If the detected change is a protruding lesion, the following findings are necessary for differentiation: 1) size and shape, 2) height, 3) nodular appearance over the protuberant surface, 4) color tone, and 5) morphology of the protuberance. In an excavated lesion: 1) size and shape, 2) depth, 3) nodular appearance at the bottom of the excavation, 4) color tone, 5) border region of the excavation, and 6) nature of the mucous folds.

Repeated examinations are indispensable in order to accurately judge the findings obtained. For this purpose roentgenological examinations and endoscopic observations are both required. In the section on case presentations, interpretation and explanation of the diagnostic processes have been given following the order of the above mentioned checkpoints.

Roentgenology and endoscopy are macroscopic. Thus, they have certain limitations when dealing with minute changes which present few macroscopic findings specific for the disease. Cytology and biopsy are required for definitive diagnosis. The book contains demonstrative descriptions of gastric biopsies under direct vision and discrimination of varied cases, including presentation of cases in which diagnoses are impossible except by gastric biopsies.

January, 1974

Authors

Acknowledgments

Progress in the diagnoses of gastric diseases in the past ten years has been remarkable. X-ray diagnosis in gastroenteropathy has advanced technically through clinical application of the double contrast radiography which was developed by Prof. H. SHIRAKABE. This has been the main reason for success in raising roentgenological diagnosis to the limit of its effectiveness on a macroscopic level. Mechanical improvement of gastroenterological radiography through application of the rotating anode has also been important.

In addition, the remarkable development of endoscopic diagnosis must be mentioned. Such a significant advancement would not have been possible without the often unappreciated continuing efforts of the Olympus Optical Co., Ltd. and the Machida Endoscopic Co., Ltd. At the same time we are extremely grateful to our predecessors, S. TASAKA, D. KONDO and others, for their ceaseless efforts.

Such unprecedented progress attracted international attention to Japan from all of the scholars of the digestive organs. The success of endoscopic diagnosis was especially significant because it appeared simultaneously with the current problem of *Differential Diagnosis of Gastric Diseases*.

Historically, histopathological diagnosis of early gastric cancer must be traced back to MALLORY (1936). Its significance in Japanese medicine lies in the adoption of this technique as a clinical preoperative diagnosis. The "Research Society for Early Gastric Cancer" supervised by Prof. T. MURAKAMI, has published numerous findings in that field and has been playing a dominant role.

It is not rare in Japan that one doctor uses both x-ray and endoscopic diagnoses. It can be positively asserted that, besides being expert in each gastric speciality, mastery of and skill in the use of these two diagnostic techniques together will greatly and immediately enhance diagnostic capabilities. This is because each technique possesses specific characteristics, advantages and disadvantages of its own.

The present book was created in such an atmosphere and is a unified version, with revisions, of two different books published on different dates in Japanese: *Atlas of Gastric Protruded Lesions* (K. KAWAI) and *Atlas of Gastric Excavated Lesions* (H. TANAKA).

Usually doctors are trained in either roentgenological or endoscopic technique, but both techniques are essential in clinical practice. The authors both mastered endoscopy (flexible gastroscopy, gastroscope examination, and gastrofiberscopy) during their medical training but acquired their knowledge of roentgenology through clinical practice. We hope this volume can help overcome the shortcomings of overspecialization by encouraging the use of each approach where it is most effective.

The authors are still young and feel the need for more experience, but we look forward to hearing both criticisms and advice from others concerned with this field. We hope this book will prove serviceable for the readers' daily diagnoses.

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I. General Section

A. On the concepts of protruding and excavated lesions

What are protruding and excavated lesions?

In this book any lesion differing from the surrounding mucosa is treated either as a protruding type or an excavated type. With the development of radiologic and endoscopic diagnoses, small protrusions and excavations on the gastric mucosa which were not observable before can now be seen, making it more difficult to differentiate between benign and malignant lesions.

Several procedures must be followed to make correct diagnoses. It is necessary to understand the kinds of lesions characterized by a localized protrusion or excavation on the gastric wall. When the objects to be diagnosed are advanced gastric cancers or large, deep peptic ulcers, actual clinical diagnoses are not difficult. However, when gastric lesions are small, benign or malignant, especially early gastric cancers of a superficially elevated or depressed type, the concept of "protruding or excavated gastric lesions" becomes one of great interest.

1. The protruding type of gastric lesion

The term "the protruding type of gastric lesions" has only recently come into use. In 1965 YAMADA and FUKUTOMI first differentiated the protruding type of lesions from gastric polyps and polypous lesions. Polyps have a long history having been described since 1557 (Amatus Lusitanus). MORGAGNI described that in a 50 year old woman in 1769. OTTO described his autopsy findings on a 40 year old man in 1824.

The main reason why we are obliged to call this type of lesion a "protruding type" is that the pathological name "gastric polyp" includes a combined form of different qualities. As pointed out by BOCKUS and HENNING, "a polyp" is named only by the appearance of a tumor, not histopathologically. Among pathologists there is a difference of opinion on epithelial polyps as to whether they are congenital or caused by gastric inflammation. BORRMANN and KONJETZNY discussed the histological findings of gastric polyps. EVANS and MING used different pathological features for the technical term of adenomatous polyp. It must be recognized that the concepts of polyps are widely varied.

Recent improvements in the x-ray equipment, with the rotating anode tubes, allow a new approach for discovering minute features of lesions. The clinical application of gastroc cameras and gastrofiberscopes has enabled us to make rapid advances in the diagnosis of "fine protruding lesions".

If all these lesions are included in the category of "gastric polyps", there is the possibility that "gastric polyps" should also include nonepithelial tumors.

Judging from a pathological standpoint, "a polyp" means "an epithelial protuberance". It is essential for clinicians to consider these lesions protruding from the surrounding mucosa as "protruding lesions of the stomach", to let x-ray and endoscopic examinations go further than mere diagnosis. However, the term "a protruding type of lesion" sounds too vague. It is, of course as has been stated previously, unreasonable to include "a nonepithelial, submucosal tumor" among "gastric polyps".

The final quality diagnosis should not rely only on x-ray or endoscopic diagnosis but on "histopathological diagnosis", including biopsy under direct vision. X-ray and endoscopic examinations to a certain extent make it possible to discern "nonepithelial tumors" (submucosal tumors), benign epithelial tumors (gastric polyps), and malignant epithelial tumors (protruding type of gastric cancers), while we fail to diagnose some cases by other methods. Yet, quite a number of clinicians think it adequate to use the expression "polypoid lesions".

This book will try to give an analytical explanation of the radiologic and endoscopic approach

I. GENERAL SECTION

to these lesions, unifying them as the "protruding type" for a new start in diagnostic standards.

To give a clear definition of a "protruding lesion" we must be certain of the normal mucosa. It has already been histopathologically proven that a healthy membrane can exist, but there can not be such a thing as "a normal membrane". Clinically there is no need for having a rigid definition. Yet ruggedness of the healthy gastric membrane and the comparatively smooth healthy gastric area must be used as standards to diagnose a protuberant lesion. Four pictures taken by double-contrast radiography are shown here.

Because of an adequate amount of air and hypotonic gastrography (Fig. 1), a rather uneven and fine granular shadow lying from the central to the angular region could be observed. These granular findings could also be observed on the lower part of the pictures, but the marginal areas were comparatively smooth with no ruggedness. Radiologically, the marginal areas observed from a tangential direction did not show ruggedness. These features could be used to identify those of a normal gastric membrane.

In Figure 2 of the antrum, granules almost identical in size were seen. The marginal areas looked comparatively smooth.



Fig. 1 Double-contrast study (Radiograph taken by the double-contrast method). A fine granular shadow can be observed from the gastric body to the angular region, but this finding may be that of a normal gastric mucosa.



Fig. 2 Double-contrast study of the antrum. A uniform granular pattern is slightly visible.

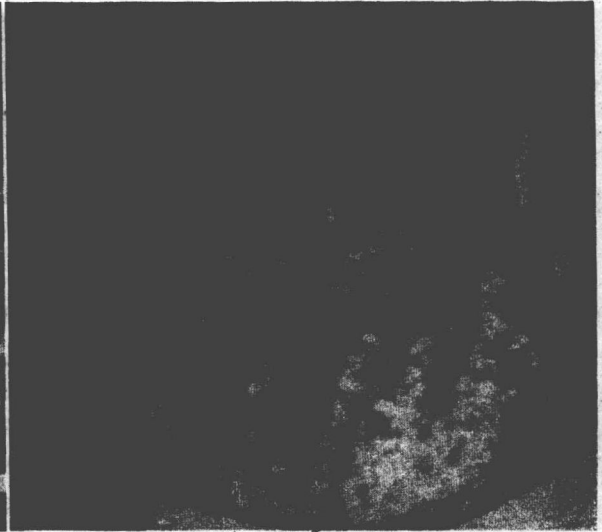


Fig. 3 Double-contrast study of the antrum. The granular change becomes rough and rugged with marked irregularity in the marginal areas.



Fig. 4 Double-contrast study of the antrum. A rough gastric area can be observed, but these granules, generally uniform, may be considered a polypoid lesion.

Figure 3 is a different case showing more remarkable changes. Granules looked irregular and were not of the same size. A small, rough gastric pit was observed, and the marginal areas were more or less rugged.

In Figure 4 with less air, both frontal and marginal areas showed more irregularities.

In the resected stomach several granules were observed in a portion of the antral membrane (Fig. 5a). These findings could be regarded as multiple rough granules or small hemispheric filling defects.

As seen in these pictures (Fig. 5b, c), when a protuberance was discovered in the stomach standing out from the surrounding mucosa, we treated it as a "protruding lesion". Endoscopic examination also showed some scattered, low, reddened, protruding lesions (Fig. 5d). Pathologically

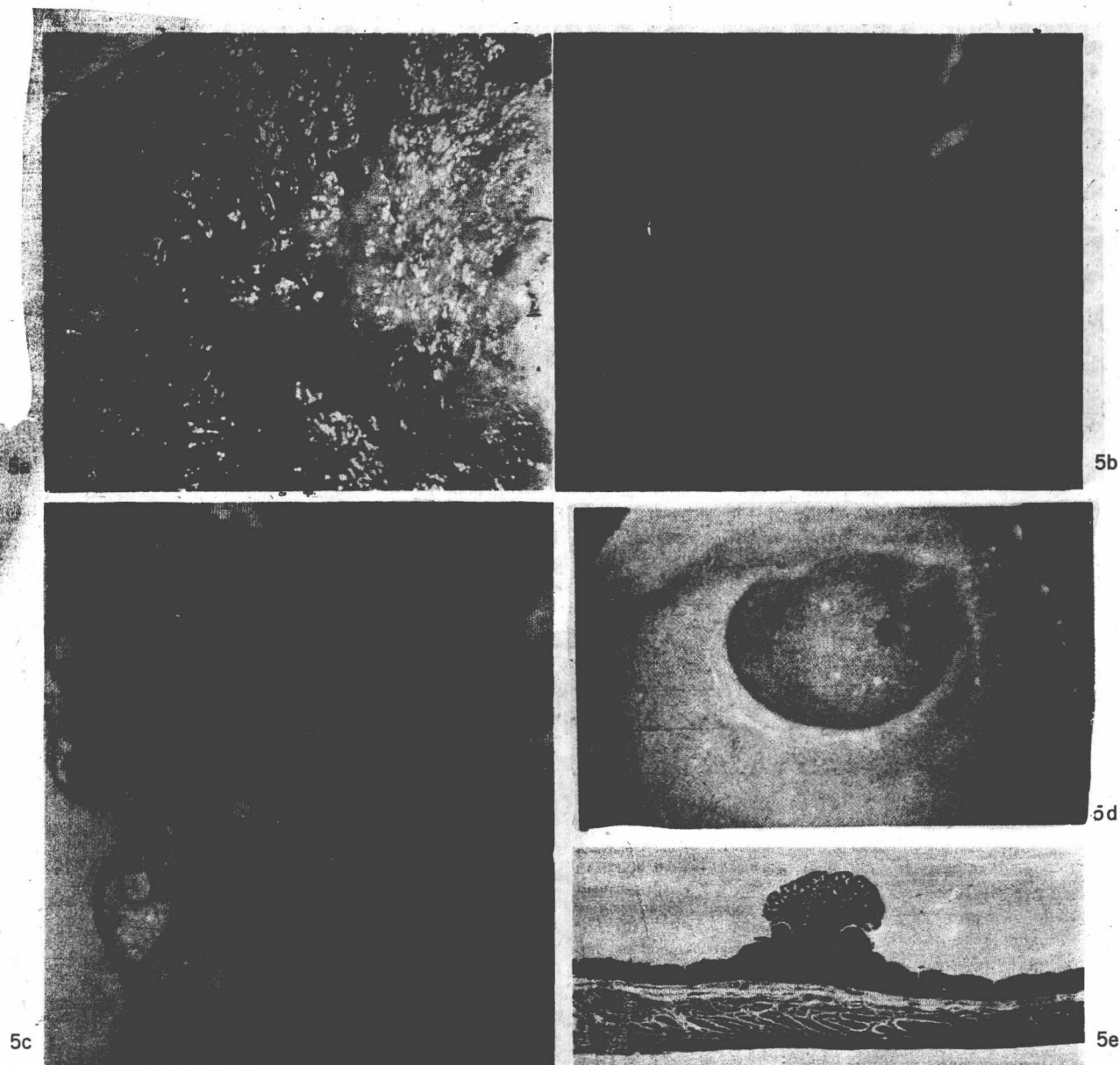


Fig. 5

- a. Resected stomach. Several clear protuberances can be observed in the antral region of the resected stomach.
- b. Double-contrast study in the supine position. At the antrum, multiple rough granules or small hemispherical filling defects are visible.
- c. Double-contrast study. Several filling defects are seen in the antrum appearing almost round in shape, but irregular in size. It is necessary to consider the existence of protruding lesions which have features comparable to rough gastric areas.
- d. Gastrofiberscopic picture.
- e. Histological findings. The relatively smooth gastric mucosa is abruptly elevated with findings of hyperplasia of the gastric epithelium and partial proliferation of the pyloric glands; however, elevation of the mucosal muscle can not be seen.

(Fig. 5e) this was a hyperplastic protuberance, not having developed the characteristics of an adenomatous polyp yet. As expected for such a typical adenomatous polyp, proliferation of the gastric epithelium, fusion and fountain-like proliferation of the mucosal muscle fiber were not seen in the resected stomach.

In Figure 6a, a mucosal protrusion was observed on the anterior wall of the borderline area.

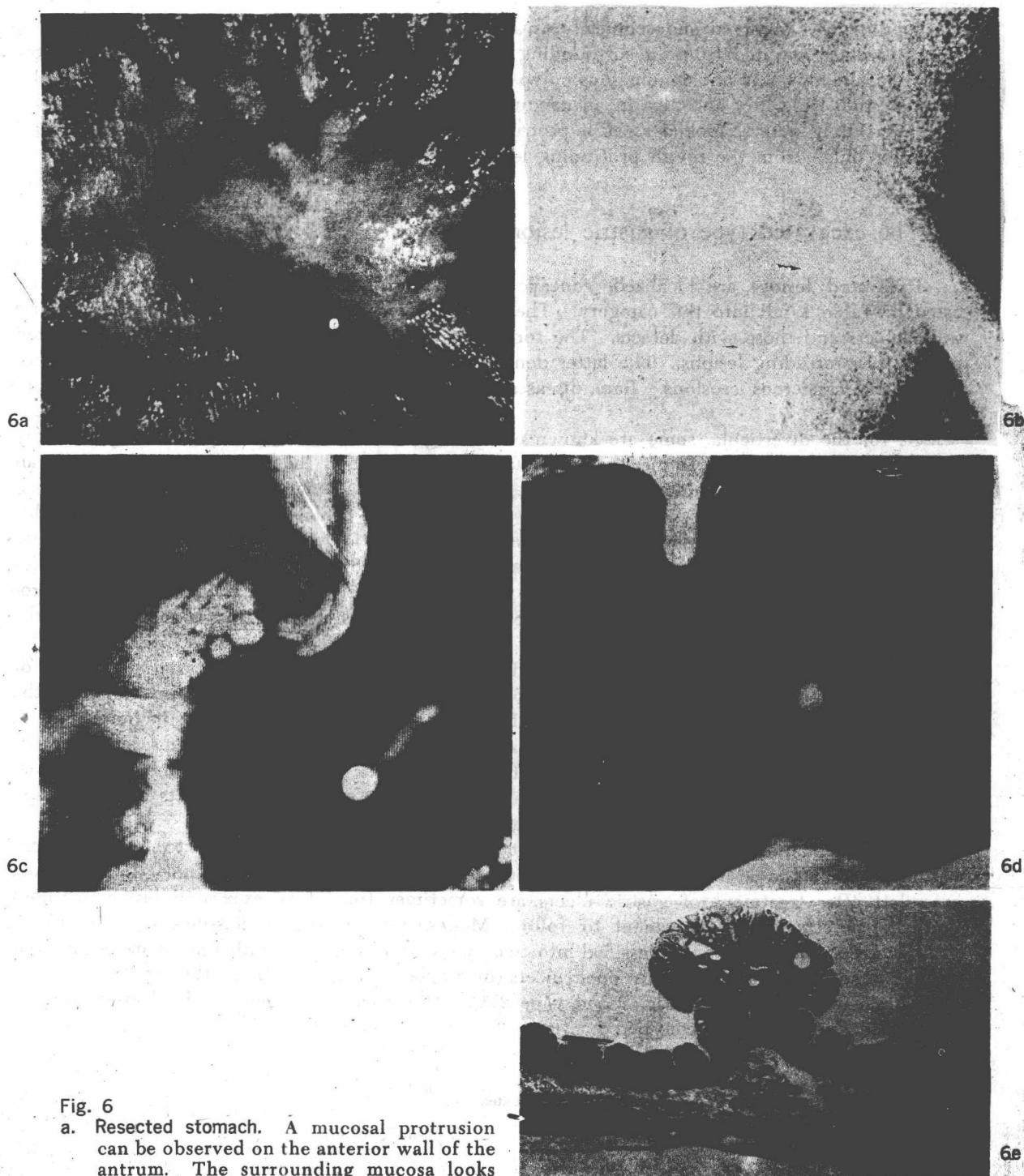


Fig. 6

- a. Resected stomach. A mucosal protrusion can be observed on the anterior wall of the antrum. The surrounding mucosa looks relatively smooth.
- b. Endoscopic picture. A hemispherical protrusion sharply elevated from the surrounding mucosa can be observed on the anterior wall of the angular region fairly close to the antrum. The protrusion is accompanied by redness and light reflection which are considered to be findings of benign gastric polyps.
- c. Double-contrast study. In the antrum, a small peanut-sized filling defect is seen in a thin barium layer.
- d. Proper compression study. The round filling defect continues to the shadow of the mucosal folds running from the gastric body. Marginal irregularities or unevenness are not seen in this radiograph.
- e. Cut surface of the specimen of Fig. 6a. Protrusion of the gastric epithelium is higher than the neighboring gastric mucosa and the elevation of the mucosal muscle is marked.

This finding was observed endoscopically as a reddened, low protrusion (Fig. 6b). This portion was apparently elevated from the surrounding mucosa, protruding into the stomach cavity. Histopathologically this was an adenomatous polyp with a short stem. Seen radiologically in a double-contrast study (Fig. 6c) and also in an adequate compression study (Fig. 6d), the lesion, shown here as a filling defect, looked as if it protruded from the surrounding mucosa. The size did not differ much from the rough protruding lesion mentioned in Figure 3.

2. The excavated type of gastric lesion

Excavated lesions are localized, concave lesions, depressed in the gastric mucosa. Those listed in Table 1 fall into this category. They are classified into two types, those with no gastric wall defects and those with defects. The former include diverticula and the relatively excavated portion of protruding lesions. The latter denote scars with no epithelial defects, peptic erosions, ulcers, and cancerous erosions. Rare diseases such as tuberculosis and syphilis are included in this category.

As for the diverticula, some are known to be congenital and some, postnatal. They naturally show different forms, the former having a narrow entrance and the latter being formed by an inflammation of the surrounding area or by adhesion. A diverticulum is a deformation or transformation and can hardly be called a gastric lesion; but, for convenience, it is classified in this book as an excavated lesion without any defect of the gastric wall. Both radiographically and endoscopically, it tends to be expressed as an excavation. Shadow flecks are observed radiologically because the contrast meal remains in the excavation between the elevated areas. Macroscopically the lesion is treated as an excavated lesion, and this classification is suggested for the convenience of reaching a diagnosis.

Both radiologic and endoscopic examinations should be based on a qualitative observation of the gastric mucosa, by which we are able to surmise lesions under the mucosa, regarding the activity and elasticity of the gastric wall. It is the authors' impression that diagnoses should begin with observations of defects of the mucosa. There are still many problems left in order to determine accurately the existence of defects of the mucosa. However, present x-ray examinations can reveal minute ruggedness, and with an endoscopic examination, defects of the mucosa can be found from precise observations of the coating of the stomach wall.

A defect of only the epithelium does not mean much, but it is possible to tell by examination whether the lesion on the gastric mucosa is an epithelial defect or not. In this sense, scars left after treatment of gastric ulcers are sometimes treated as excavated lesions without epithelial defects. It is convenient to follow MURAKAMI and KOIDE's classification of scars of gastric ulcers. Ulcer scars are classified into two types: those covered with only a mucosal layer, defined as scars with histologically open ulcers (incomplete scars), and those thickly covered with epithelium (complete scars) (Fig. 7 and page 211). The excavation seen in the healed area of an erosion should also be considered.

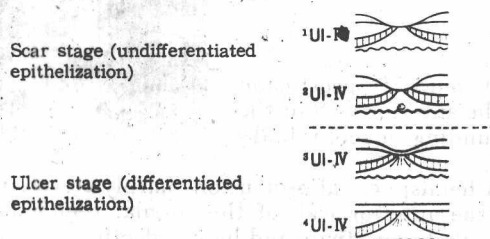


Fig. 7 Ulcer recovery stages (MURAKAMI, KOIDE).

Lesions with a defect of the mucosa and of the gastric wall are classified according to BORRMANN's classification of gastric cancer (Fig. 8), the early gastric cancer classification (Fig. 9), and MURAKAMI's ulcer classification (Fig. 10). At the annual meeting of the Japan Gastroenterological Endoscopy Society in 1962 and the Japanese Research Society for Gastric Cancer in 1963, this early gastric carcinoma was defined as a carcinoma of the stomach in which invasion

was limited to the mucosa and submucosa.

Excavated lesions are classified roughly into two types, excavations with and without gastric wall defects. The former lesions are further classified into excavations with and without mucosal defects.

A little explanation should be added to MURAKAMI's ulcer depth classification (Fig. 10) and its practical application in actual cases. In U1-II~IV, the depth does not indicate the numerical value of the depth measured from the gastric wall to the bottom of the excavation, but the depth according to the layer construction of the gastric wall affected by the lesion.

To verify the depth of the ulcer, changes of peristalsis caused by scar formation must be taken into consideration along with the actual depth of the ulcer. Concerning the real depth of the ulcer, there are still several points to be clarified. Ascertaining whether the excavation of

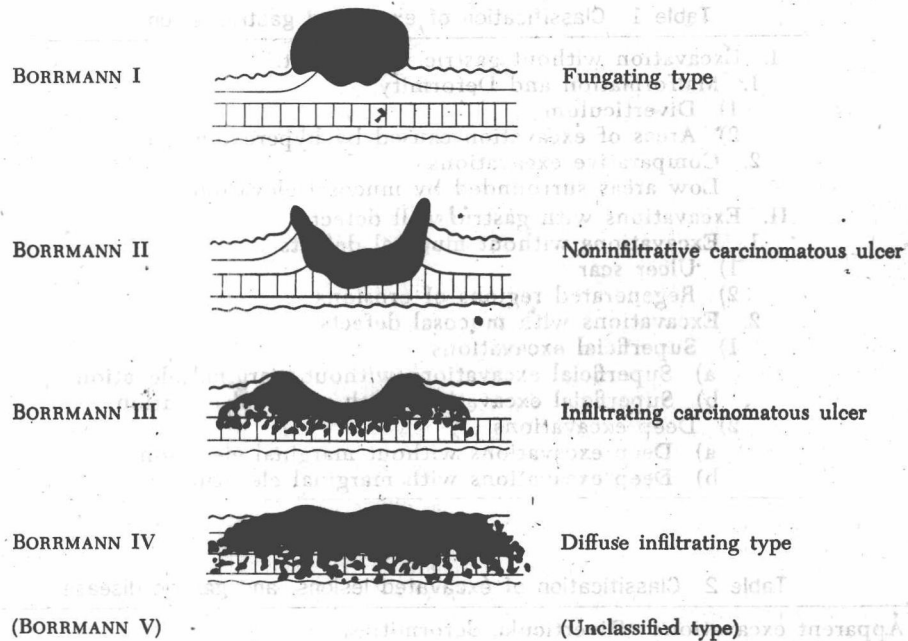


Fig. 8 Type of advanced gastric cancer.

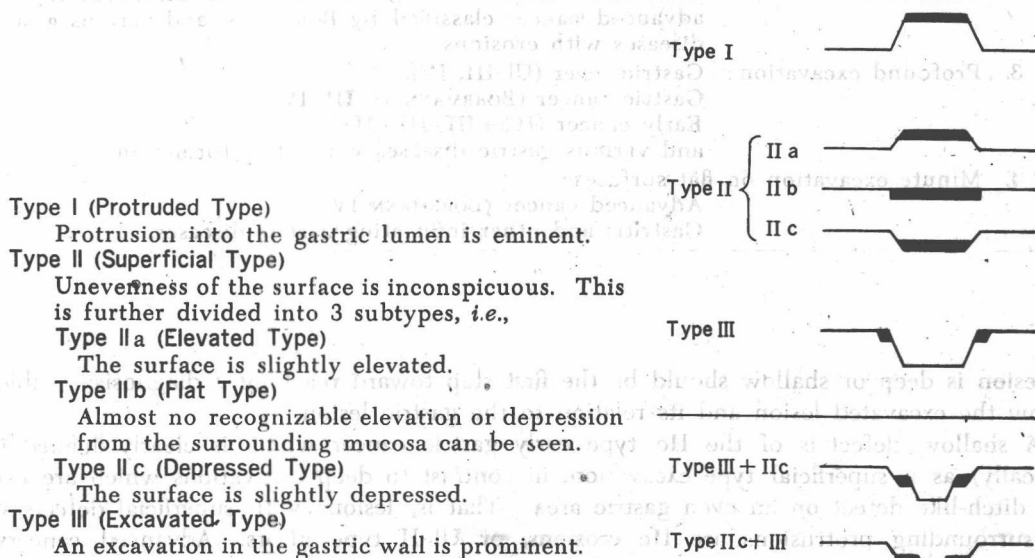


Fig. 9 Macroscopic classification of an early gastric carcinoma.

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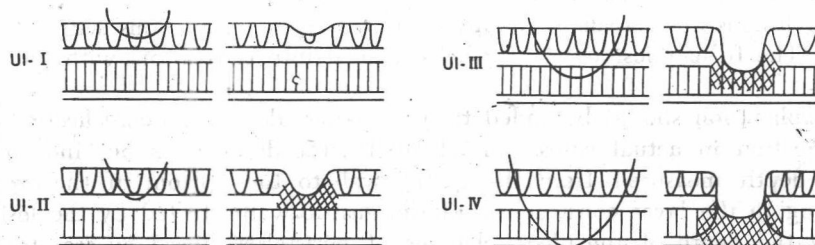


Fig. 10 Ul depth classification (MURAKAMI)

Table 1 Classification of excavated gastric lesion

- I. Excavation without gastric wall defect:
 1. Malformation and Deformity
 - 1) Diverticulum
 - 2) Areas of excavation caused by hyperextension
 2. Comparative excavations
 - Low areas surrounded by mucosal elevations
- II. Excavations with gastric wall defects.
 1. Excavations without mucosal defects
 - 1) Ulcer scar
 - 2) Regenerated regions of erosions
 2. Excavations with mucosal defects
 - 1) Superficial excavations
 - a) Superficial excavations without marginal elevation
 - b) Superficial excavations with marginal elevation
 - 2) Deep excavations
 - a) Deep excavations without marginal elevation
 - b) Deep excavations with marginal elevation

Table 2 Classification of excavated lesions, and gastric disease

1. Apparent excavation: Diverticula, deformities,
(defect of wall (-)) Meandering polypoid lesions.
2. Superficial excavation
Mucosal defect (-): Ulcer scars, regenerated erosions, congenital malformations.
Mucosal defect (+): Early cancer (IIc, IIa+IIc), erosions, gastric ulcers (UI-II~IV),
advanced cancer classified by BORRMANN, and various gastric diseases with erosions.
3. Profound excavation: Gastric ulcer (UI-III, IV),
Gastric cancer (BORRMANN II, III, IV),
Early cancer (IIc+III, III+IIc),
and various gastric diseases with ulcer formation.
4. Minute excavation on flat surfaces:
Advanced cancer (BORRMANN IV)
Gastritis and other infiltrating gastric diseases.

the lesion is deep or shallow should be the first step toward reaching a diagnosis. Table 1 and 2 show the excavated lesion and its relation to the gastric lesion.

A shallow defect is of the IIc type early gastric cancer which is clearly defined (macroscopically) as a superficial type excavation, in contrast to deep excavations which are expressed by a ditch-like defect on an even gastric area. That is, lesions with superficial defects without any surrounding protrusions are IIc erosions, or UI-II type ulcers. Advanced cancers, early cancers, and peptic ulcers can be included under profound excavations. Superficial excavations with protrusions in the surrounding area, type IIa+IIc early cancers, are sometimes included in this classification.