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Photographic Features of Benign and Malignant Ulcers

N. V. Carandang, M.D.; B. M. Schuman, M.D., and R. J. Priest, M.D.*

One hundred and twenty-nine cases of benign gastric ulcer and 17 cases of malignant gastric ulcer studied by intragastric photography are reviewed. The benign ulcer, characterized by symmetrical contour and smooth base, was diagnosed correctly on the initial photographic study in 97.7% of cases. Malignant ulcers were diagnosed correctly in 59% of cases on the first study. The importance of color photography to complement roentgenographic evaluation of gastric ulceration is emphasized.

According to Boormann's classification of gastric cancers, 30% are of the ulcerating type.¹ Patients with this kind of cancer may have a clinical course similar to that of a patient with benign ulcer.², ³ A reasonable certainty of benignity may spare the patient the morbidity and risk of gastric resection, while a strong suspicion of malignancy will avoid the unnecessary delay of prolonged and futile medical management. Despite the many advances in differential diagnosis techniques, the distinctions are not always made until the post-operative histologic examination. Tetracycline staining or P³² labeling of gastric cancer cells have not proven as dependable as the initial investigations indicated. Exfoliative gastric cytology requires considerable time and expertise to achieve reasonable accuracy, and is not widely used.⁴ Roentgenographic examination of the stomach, therefore, is still the mainstay in the differential diagnosis of gastric ulcer. When the radiologist finds he is unable to determine the probable nature of the ulcer because of conflicting criteria, fiberoptic gastroscopy may supplement his diagnostic data. Intragastric photography provides additional study of the ulcer's characteristics. To determine what photographic features are helpful in separating benign from malignant ulcerations, we have undertaken this review of our cases of gastric ulcers that have been photographed.

Case Material and Instrumentation:

From a total of 1,047 gastrocamera examinations, we reviewed 146 patients with the gastrocamera diagnosis of ulcerative lesions of the stomach during the period of March, 1966, through December, 1968. All procedures were performed by the staff of the Division of Gastroenterology. Included in our review were cases of benign gastric ulcer, malignant gastric ulcer and questionable ulcerating carcinoma. Cases of polypoid or infiltrative type of carcinoma were excluded.

All the selected patients had had previous x-ray evaluation. An ulcer was considered benign if there was disappearance of the crater by x-ray study or appearance of scar formation by repeat intragastric photography. Precise histologic diagnosis was obtained in those patients who underwent
operation. The Olympus gastrocamera, model GT-V and the fiberoptic gastroscope incorporating the intragastric camera, model GTFA, were used. A few of the cases of gastric ulcers as well as the technique of gastrocamera photography have been previously reported by us.\(^5\)

Results:

Of the 146 patients with an ulcerative lesion of the stomach, 53% were male and 47% female. The ages ranged from 20 to 89 years with 90% 40 years of age or over. (Table I)

Three to five progress x-ray examinations were done on each of 116 patients. Eighty-eight percent of these had three upper gastrointestinal series during the course of their illness. The interval between the first and the last x-ray ranged from four weeks to two years, but 96% of them were done within the first four months. Progress gastrocamera examination was done for 27 patients. Forty-one patients underwent surgery.

On the basis of progress upper gastrointestinal x-ray, gastrocamera examination, operative finding and clinical follow-up, 129 patients (88%) were found to have benign ulcers and 17 patients (12%) malignant ulcers. The initial x-ray and gastrocamera diagnosis of these 129 patients with benign ulcers was correct in 97.7% and incorrect in 2.3% as compared to 72% correct, 8% incorrect and 20% uncertain by the initial radiologic diagnoses. (Table III)

Table IV shows the initial diagnoses of the 17 patients with proven malignant ulcers. Three were diagnosed as carcinoma on the first x-ray study. Benign ulcer was considered in 4, questionable carcinoma in 3, non-specific deformity in 6 and normal stomach in 1. Six of these proven malignant ulcers were considered as benign by gastrocamera; one was thought to be a questionable carcinoma and 10 were diagnosed as carcinoma. The percentage accuracy in the diagnosis of malignant ulcers by initial gastrocamera examination was 59%. In the initial roentgenographic study, 18% were correctly identified as malignant ulcerations.

Analysis of Gastrocamera Photographs:

The film strips of all cases were re-
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TABLE II

INITIAL DIAGNOSES OF BENIGN ULCERS

<table>
<thead>
<tr>
<th>Ulcer</th>
<th>X-ray</th>
<th>Gastrocamera</th>
</tr>
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<tbody>
<tr>
<td>? carcinoma</td>
<td>93</td>
<td>123</td>
</tr>
<tr>
<td>Carcinoma</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>Deformity</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Normal</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>0</td>
</tr>
</tbody>
</table>

Certain characteristics were found to be essential for the diagnosis of benign gastric ulcer. Mucosal folds, if present, must radiate to the edge of the lesion without interruption. Benign ulcers are usually circular and symmetrical with a white or grayish-yellow exudate over the base, which is usually smooth and flat or slightly concave. The edge is sharp and slopes down gradually to the ulcer base. The surrounding mucosa is generally clean and smooth but may be edematous and hyperemic.

Certain features were noted to be diagnostic of ulcerating carcinoma: 1) The crater is asymmetrical, part of the edge often blending into the gastric wall. 2) The crater is usually filled with nodular tissue giving the base the appearance of a rough surface. 3) The surrounding mucosa is frequently irregular or lobulated. 4) Almost at a right angle to the periphery of the ulcer is the elevated, knobby edge, which in profile descends abruptly like a cliff.

The errors of photographic analysis are primarily due to technical factors, such as failure to photograph the ulcer at a short enough distance to study its features in detail, and failure to get

<table>
<thead>
<tr>
<th>X-ray</th>
<th>Gastrocamera</th>
</tr>
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<tbody>
<tr>
<td>Correct</td>
<td>72%</td>
</tr>
<tr>
<td>Incorrect</td>
<td>8%</td>
</tr>
<tr>
<td>Uncertain</td>
<td>20%</td>
</tr>
</tbody>
</table>
multiple views of the ulcer from different angles. Case I is an example of such an error since the ulcer area itself was never photographed, but only the surrounding mucosa. Case II demonstrates the error in diagnosis that will also occur in benign cases which are studied late in their course when changes of chronic inflammation are established. Errors may occur, also, in cancer cases which are examined at an early stage when the ulcer is superficial and the neoplastic changes are minimal, as illustrated in Case III.

These cases are presented to emphasize the point that in a few instances, the final arbiter in diagnosis must be the pathologist. In two of these cases, with the specimen in his hand for inspection, the surgeon’s interpretation was incorrect. Obviously, a confident early diagnosis of these kinds of cases will be impossible by any non-biopsy technique.

Case Reports:

Case I

M.C., a 58-year-old janitor was admitted on Aug. 24, 1967, for mid abdominal pain, anorexia, nausea and a 40-pound weight loss over the previous year. Physical examination showed two abdominal scars. His hemoglobin was 11.5 gms. Gastric analysis showed a total of 5.64 mEq HCl/hour after histalog stimulation. The upper gastrointestinal series revealed a small hiatal hernia and a persistent collection of barium interpreted as a large ulcer on the lesser curvature, close to the cardia. A polypoid lesion without definite ulceration was seen at gastroscopy and confirmed by gastrocamera photographs. A pre-operative diagnosis of cancer was made. Esophagogastrectomy and pyloroplasty were performed. The gross diagnosis at the operating table was carcinoma of the stomach, but the histologic study proved the lesion to be a benign gastric ulcer.

Case II

I.W., a 77-year-old housewife was admitted for the second time on December 20, 1966, because of severe epigastric pain and weight loss. She had been followed in the outpatient department for these complaints since February, 1966, and was first admitted in October for treatment of an antral ulcer. She went home in two weeks after adequate healing had been demonstrated by progress x-ray examination. Two months later she returned with recurrent pain and a 12-pound weight loss. On admission in December she was weak and depressed. Her abdomen was generally tender, particularly over the epigastric area. The liver edge was palpable on inspiration. The hemoglobin was 10 gms, but dropped to 8.6 gms in two weeks. Gastric analysis showed 1.46 mEq HCl/hour after histalog stimulation. A per-
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Consistent benign antral ulcer was diagnosed by x-ray study. A benign ulcer at the greater curvature of the antrum was demonstrated by gastrocamera examination. Because of the persistent pain and the progressive anemia, an operation was performed and revealed widespread intraabdominal carcinoma from an ulcerating lesion in the lesser curvature of the stomach.

Case III

B.M., a 77-year-old widow, was admitted on August 16, 1966, for the sixth time because of two days of hematemesis and melena. For the last 10 years, she had been treated with salicylates and cortico-steroids for rheumatoid arthritis. Previous admissions were primarily for treatment of joint pain and on one occasion for control of severe antral pain. A prepyloric ulcer was identified in 1962 and responded to medical therapy. Gastric analysis showed 8.10 mEq HCl/hour after histalog stimulation. However, in 1963, pyloroplasty and vagotomy were required for recurrence of the ulcer. The patient did well until May, 1966, when she developed severe epigastric pain. Upper gastrointestinal series and gastrocamera examination revealed a large benign ulcer in the antrum. Follow-up gastrocamera study after two weeks of therapy showed more than 50% healing. Treatment was then continued on an outpatient basis. Three months later, she was readmitted because of upper gastrointestinal bleeding and a Billroth II gastrectomy was done. The operative diagnosis was benign gastric ulcer, but pathologic study demonstrated carcinoma in the ulcer margin.

Discussion:

The high percentage of accuracy of the initial diagnosis of benign gastric ulcers with gastrocamera examination (97.7%) as opposed to that obtained by x-ray study (72%) indicates the value of direct observation and study of color photographs. This difference in accuracy, however, is diminished by the progress x-ray study following therapy. The clinician, however, appreciates knowing that he is not wasting two weeks of hospital time to elucidate the 20% uncertain radiologic diagnoses. The endoscopic demonstration of gastric ulcer in 10 patients with normal x-ray study and persistent symptoms is another important benefit of this complementary study. The low diagnostic accuracy for proven malignant ulcer by initial x-ray and gastrocamera examinations (18% and 59% respectively) shows clearly that the problem of ulcerating carcinoma has not been solved. This finding, however, should discourage neither radiologist nor endoscopist because it applies only to this highly selected group of gastric carcinoma. When all types of gastric cancers are considered, the percentage of accuracy ranges from 70% to 90% for both procedures.6,9

Of the 17 patients with proven malignant ulcers, 10 were operated upon soon after the initial gastrocamera examination. The remaining seven were given a two-week trial of medical therapy. The color photos of the second examination showed four carcinomas, two ulcers unchanged in size, and one ulcer with more than 50% healing. On x-ray, healing was demonstrated in this same patient, and the same two cases showed no change in size of their ulcers, but the remaining four were considered probably malignant. Thus, only one case was ultimately interpreted as benign by both techniques. This patient (Case III) required resection for hemorrhage, following which the pathologist made the correct diagnosis.

We do not claim that gastroscopic photography supplants roentgenographic examination for routine evaluation of gastric ulcer. It is clear that the majority of benign ulcers are definitely diagnosed by x-ray study, so any other diagnostic approach will
Large ulcer on the posterior wall at the base of the angulus with a sharp border and smooth base.

Edematous folds radiate into this deep gastric ulcer.

Punched out ulcer situated close to the cardia. The connecting tube of the gastro-camera lies above the ulcer.

Elliptical ulcer along the lesser curvature of the antrum.

Multiple gastric ulcers, the larger is on the lesser curvature of the antrum and the other at the angulus.

NOTE: Some details of ulcer characteristics are lost because it was not possible to reproduce the photographs in color.
add little information. However, in the relatively small number of cases where the character of the ulcer is in doubt, we urge endoscopic evaluation to determine whether a two-week trial of hospital medical therapy is in order. Should gastroscopic observation indicate malignant change, surgery should be done without further delay. When a trial of medical therapy is indicated, the progress upper GI series is important to evaluate the degree of healing. This x-ray study will provide a definitive answer in most cases, making a second endoscopic study unnecessary.

Thus, we propose that gastroscopy and gastroscopic photography be used in ulcer cases where the initial x-ray study is inconclusive for benignity or suggests malignancy; also, in the small number of cases where progress upper GI series has failed to provide a reasonably certain differentiation.

Summary:

One hundred and twenty-nine cases of benign gastric ulcer and 17 cases of malignant gastric ulcer studied by intragastric photography are reviewed for evaluation of important differential photographic features. Benign ulcers are symmetrical with smooth bases and sloping borders. Malignant ulcers are asymmetrical with irregular bases and perpendicular edges. The indications for fiberoptic gastroscopy and/or intragastric photography in the problem cases of gastric ulcer are emphasized.

TABLE V

INITIAL DIAGNOSTIC ACCURACY FOR MALIGNANT ULCERS

<table>
<thead>
<tr>
<th></th>
<th>X-ray</th>
<th>Gastrocamera</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct</td>
<td>18%</td>
<td>59%</td>
</tr>
<tr>
<td>Incorrect</td>
<td>29%</td>
<td>35%</td>
</tr>
<tr>
<td>Uncertain</td>
<td>53%</td>
<td>6%</td>
</tr>
</tbody>
</table>
Three features of malignancy: irregular border, raised edge and shaggy base.

Satellite nodules surround this ulcerating cancer.

A clean but shaggy base with nodularity of the margin.

NOTE: Some details of ulcer characteristics are lost because it was not possible to reproduce the photographs in color.
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CASE REPORTS

I

Lobulated lesion diagnosed as possible carcinoma. This was a benign gastric ulcer by histologic study.

II

This clean antrum has a small ulcer at the pre-pyloric area considered benign but proven malignant at surgery.

III

These two pictures show the folds radiating to the edges of the ulcer and progress healing of the ulcer on medical treatment. The ulcer proved to be malignant on pathologic examination.

NOTE: Some details of ulcer characteristics are lost because it was not possible to reproduce the photographs in color.
REFERENCES


