stomach; by a short-circuiting operation combined with destruction of the ulcer when it lies in the duodenum. Balfour's method and Walton's method have proved excellent in the hands of their authors. Other complementary procedures within the abdomen must be observed.

11. Gastrectomy in the treatment of duodenal ulcer is more dangerous than gastro-enterostomy, and does not appear to give any better late results, if indeed its results are so good. It should therefore have no place among surgical methods for the treatment of duodenal ulcer at the present time.

12. The medical treatment of gastric ulcer and of duodenal ulcer is perhaps not so much a medical problem as a problem in social economics. Rest in bed; freedom from anxieties, abstinence from work, complete repose in fact, are essential if treatment is to have the best chance of success. A counsel of almost unattainable perfection!

13. The connexion between gastric cancer and gastric ulcer is so clear³⁰ that gastrectomy alone, wherever it is practicable, should be regarded as the appropriate surgical treatment for chronic incoercible gastric ulcer.

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THE INTERPRETATION OF THE RADIOGRAPHIC APPEARANCES OF GASTRIC ULCER.

BY

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WHEN a radiologist detects a projection on the outline of the opaque food in the stomach he makes a positive diagnosis of an ulcer, and when the apparent pocket is deep he describes it as a "penetrating" ulcer. The question that arises is whether he is or is not justified in making the statement that it is a "penetrating" ulcer. We have all seen "penetrating" ulcers—ulcers that apparently penetrate into the stomach wall, sometimes even showing

hardly penetrated the muscular coat at all, and with no overhanging of the edges. It is difficult to imagine how an ulcer of this type could have given rise to such a definite x-ray picture of a pocket, for in the actual excised specimen there was nothing to suggest the presence of either the niche that held the opaque food in a deep cup or the pocket of air above it. There can be no doubt, therefore, that the conditions seen at x-ray examination must be far different from those that we find either in the excised specimen or even on opening the stomach at the operation when anaesthesia and other abnormal conditions are present.

The only reasonable explanation of such discrepancies is that, in life, the mucous membrane may be heaped up around the ulcer to such an extent that it actually over-

FIG. 1.—Large ulcer on lesser curvature, probably penetrating into the muscular coats. Suggested outline of the base of the mucous membrane indicated by a dotted line.

a small bubble of occluded air above the opaque food in the niche. When such a pocket is fixed on palpation there seems little room to doubt the true nature of the condition. Yet I have seen these radiographic appearances when excision has shown merely a flat ulcer that

FIG. 2.—Small ulcer on the lesser curvature, possibly healing. Suggested outline of the base of the mucous membrane dotted in. Note the half-shadow around the base of the ulcer suggesting the thickening of the mucous membrane. (S.190.24.)

laps the ulcerated surface, and thus forms a surrounding crater. On many occasions, by the aid of radiosopic palpation, I have convinced myself of the presence of quite minute ulcers by reason of the residue left in such pockets when the opaque food has been manipulated up

and down the rugae. The smallest of these ulcers that I have seen after excision was not more than an eighth of an inch in diameter, and did not even penetrate the whole thickness of the mucous membrane. The crater in this specimen was far too shallow to account for the definite

appearance of the crater I have on a number of occasions suggested that the ulcer was healing, and this opinion has been confirmed both clinically and by further x-ray examination.

Radiographically we can diagnose an ulcer, but we cannot

FIG. 3.—Ulcer on the lesser curvature. Suggested outline of the base of the mucous membrane dotted in. Note the half-shadow below the ulcer due to thickening of the mucous membrane. (S.1070.24.)

and quite heavy shadow of the food residue that was constantly retained on palpation. I am quite certain, therefore, that when radiologists detect what we describe as a "penetrating" ulcer they are often picturing a much more extensive pathological condition than actually exists. If I am right in my deduction we may, and actually do, get an appearance of a penetrating ulcer from a mere erosion of the mucous membrane, the heaped-up surrounding mucous membrane being almost entirely responsible for the depth of the crater and for the appearance of "penetration."

If this explanation is correct there is little difficulty in understanding how even apparently large ulcers can disappear in a comparatively short time—a sequence that radiologists frequently have the opportunity of observing. It would be obviously impossible for a real penetrating ulcer of chronic type to heal in so short a space of time as a few weeks, but far from improbable that an erosion should heal in this time. Moreover, the way in which such ulcers close in, radiographically, seems to point to the correctness of this deduction—we do not see the edges healing over the crater and tending to enclose the pocket. As healing takes place the crater becomes shallow and V-shaped, and then flattens out—indicating, to my mind, that as healing progresses the surrounding mucous membrane loses its heaped-up character and the local contour assumes its normal level. On the V-shaped appear-

FIG. 4.—Large ulcer on the lesser curvature. Patient in supine position. The stomach lies over the vertebrae, and there is therefore slight pressure on the region of the ulcer. Note the half-shadow around the ulcer, due to the extensive thickening of the mucous membrane with the distorted rugae radiating towards the ulcer. Suggested outline of the base of the mucous membrane dotted in. (S.309.24.)

as yet be certain whether we are dealing with a perforating ulcer, a penetrating ulcer, or a mere erosion; the apparent depth of the crater probably depends far more on the surrounding thickness and puckering of the mucous membrane than on the extent of the actual damage to the coats of the stomach; the degree of local spasm of the mucous membrane will depend on the irritation from the ulcerated surface. As this ulcerated surface heals and becomes less sensitive, so the local spasm of the musculature in the mucous membrane will subside, with the result that the crater will no longer

be of the nature of a pocket, but a V-shaped niche.

In looking through a number of radiographs of gastric ulcer there is a certain amount of evidence that this hypothesis is correct, as will be seen on reference to the radiographs reproduced.

I suggest, therefore, that the nomenclature used by the radiologist is at fault, and that although what he sees may indicate a deep

FIG. 5.—a and b, Typical x-ray appearances of gastric ulcer on the margin near the lesser curvature. c, Crater of ulcer hidden among the folds of the mucous membrane on the anterior or posterior wall. d, e, and f, Diagrams of pathological specimens of perforating, penetrating, and mucous membrane erosion ulcers. g, Suggested interpretation of the x-ray appearances, the pocket being due to overfolding of the heaped-up mucous membrane. h, Diagram of suggested conditions on healing of ulcer. The mucous membrane loses its heaped-up condition; the ulcer becomes shallow and conical or V-shaped before it disappears.

crater on the outline of the contents of the stomach, yet he is not justified in calling it a "penetrating" ulcer. The radiologist has no means of determining whether this ulcer crater is formed merely by a heaping-up of the mucous membrane, or whether it is in fact due to a "penetration" of the muscular coat or even to an actual perforation into a dense mass of surrounding reaction.