THE SKELETON BARIUM MEAL IN GASTRIC DIAGNOSIS

BY

T. D. OVEREND, B.A., M.R.C.S., L.R.C.P.,
D.M.R.E.CAMB.

RADIOLOGIST TO THE BUCHANAN HOSPITAL, HASTINGS

It has long been customary to commence the radiological examination of the stomach by watching the first mouthful of barium swallowed and looking for a fleck of barium held up in an ulcer niche if this were present. If this first mouthful is spread over the interior of the stomach by palpation a good view of the relief pattern of the mucosa is often obtained. But this procedure has its limitations; the ordinary barium meal is not perfectly adapted for the demonstration of the mucosa, and, in spite of the fact that much work has been done on the subject, it may be said that the study of the alimentary mucous membrane has not yet received the attention it deserves. Some of this neglect is due to the incompleteness of our knowledge of the great variations which may occur in the appearances of the normal relief pattern. Nevertheless, the study of the gastric mucosa is by now a valuable supplement to the usual radiological investigation, and the method of the "thin film," or skeleton meal, reveals details that cannot be otherwise discovered.

The systematic radiological study of the gastric mucosa originated with Forssell, and was extended to the duodenum by Akerlund. The evolution of a technique for clinical use is due to numerous authorities, the chief of whom, in addition to those already mentioned, are Gutzeit, Chaoul, and especially Berg. These workers have greatly enlarged the scope of the gastric examination and have paved the way to a genuine comprehension of the conditions underlying the appearances seen.

TECHNIQUE

The procedure for the demonstration of the gastric relief pattern varies slightly with different authors. The essential preliminary is the preparation of a solution adapted for adhering to the mucosa. Berg uses a solution of 250 to 300 parts of barium sulphate to about 400 of water; Chaoul uses about the same proportions with the addition of small amounts of tragacanth, spirit, and amyl acetate. A useful solution is the following: 10 ounces of barium sulphate, 50 grains of tragacanth powder, made up to 20 ounces with chloroform water. The patient is first examined in the supine position with a slight tilt to the left, a sip of the barium is swallowed, and the cardia screened. By palpation and changes of posture the barium is spread over the mucosa and the patient examined in the prone position with graduated compression. Further sips are given until the mucosa is perfectly covered with the preparation. It is unwise to allow the procedure to become stereotyped; each case has its peculiarities which should be studied individually. The principal sites of ulcer should be screened at every possible angle and examined at different stages of filling. Films are taken when necessary; they may be taken from below or from above the couch. Graduated compression is required to get good relief patterns. The patient is then examined standing, and if the investigation seems complete the stomach is filled with barium and examined in the usual manner. Difficulties can arise if there is excessive fluid or mucus in the stomach, as this can prevent the close adherence of the barium to the mucosa; this can sometimes be dealt with by injecting 1/100 grain of atropine an hour before the examination.

NORMAL APPEARANCES

The normal appearances, as noted above, are subject to great variations, and different patterns appear at different times in the same stomach; this is due to the fact that the pattern depends largely on the state of contraction of the muscularis mucosae. A constant feature is the presence of four well-marked longitudinal ridges, visible on oblique illumination, running down the lesser curvature; these enclose the stomach path of Aschoff, which is the chief ulcer-bearing area. Towards the greater curvature the longitudinal folds become more and more tortuous, and transverse folds appear. A serration on the greater curvature in the completely filled stomach has long been noted; it was considered by some authorities to be a sign of chronic gastritis. It is probably due to the formation of strong transverse ridges in the mucosa caused by local contraction of the muscularis mucosae, these ridges acting as slings to support the heavy part of the filled stomach. Under normal conditions the relief pattern is delicate and easy to deform or obliterate by palpation; pathological changes cause it to stiffen; it then becomes permanent and cannot be altered by pressure. Slow alterations in the pattern can sometimes be observed, and the part played by the muscularis mucosae in evacuating the stomach forms the subject of an interesting paper by Sick. Fig. 1a shows a fairly normal relief pattern in the standing position.

CHRONIC GASTRITIS

In hypertrophic gastritis the folds of the relief pattern are thickened and stiff; in atrophic gastritis they are very delicate and may be partly absent. Difficulties arise from the fact that hypertonic stomachs have strongly marked folds resembling those of hypertrophic gastritis, while atonic and dilated stomachs show delicate folds like those of atrophic gastritis. Great irregularity and stiffness of the folds favours the diagnosis of gastritis, and a still more trustworthy sign is the presence in the relief pattern of rounded or oval translucent islands due to patches of atrophy. Much of the work on gastritis has been done by Gutzeit, using gastroscopic control. It should be mentioned that the distension of the stomach by gas in gastroscopy has a tendency to obliterate the ridges which form the relief pattern.

Korbsch relies on indirect signs in the diagnosis of gastritis, as increased tone and peristalsis, serration of the greater curvature, local tenderness, etc. Although the diagnosis of gastritis by the skeleton meal is by no means easy or free from the possibility of error, there is little doubt that when its normal appearances are better known it will be found more reliable than any method depending on indirect signs. All the signs enumerated by Korbsch can be found in conditions other than gastritis, and the serration of the greater curvature is found in stomachs that are innocent of any pathological change. Fig. 1b shows gastritis in a case of cholecystitis.

The gastritic changes concurrent with gastric ulcer and carcinoma are of great interest, and it has even been suggested that their study may enable us to foretell the later onset of ulcer and carcinoma. This, perhaps, is unduly optimistic, at any rate as far as carcinoma is concerned, but the study of the relief pattern may shed some light on the factors at work. Another interesting field of study is provided by the cases of gastritis following gastro-jejunostomy.

PEPTIC ULCER

In the skeleton meal, as in the full meal, the direct evidence is given by the actual niche. There are both advantages and disadvantages in the former procedure; it is sometimes difficult to fill the niche when the main cavity of the stomach is empty. On the other hand, in ulcer of the cardia, and in ulcer of the corpus away from the sky-line of the lesser curvature, as well as in pyloric and pre-pyloric ulcer, the filling and visualization of the niche is often very much easier in the skeleton meal. The conditions of the mucosa around the ulcer can also be studied. Barclay has emphasized the fact that the apparent size of an ulcer depends on the heaping up of the mucosa around it; so the decrease in size of a niche under treatment can be misleading. The presence of radial striae in the mucosa converging on the site of an ulcer is another valuable sign. Duodenal ulcer can often be diagnosed by the skeleton meal, but the best method is that described by Akerlund, Attinger, and Berg. This is, to fill the duodenal cap completely by pressure on the stomach and on the descending duodenum. The cap is then examined at all possible angles for contour deformities, and then completely emptied by compression or manipulation and examined again for any residue in a niche. The skeleton meal is especially well adapted for the diagnosis of jejunal and gastro-jejunal ulcer, and also for the differentiation between ulcer and diverticulum. Fig. 2a shows a small ulcer niche on the lesser curvature,

with interruption of the mucous folds from infiltration; Fig. 2b shows a small diverticulum of the lesser curvature with normal folds running into it.

CARCINOMA

The patient with carcinoma of the stomach too often has a well-marked filling defect by the time he comes for investigation. In such a case the examination of the completely filled stomach often gives an easy diagnosis. The skeleton meal here finds its application in determining to what extent the growth has penetrated into the stomach walls beyond the actual filling defect, and it may give valuable information as to the mechanical, as apart from the metastatic, possibilities of resection. It is also of value in the diagnosis between chronic callous ulcer and the malignant ulcer; according to Haudek and Barclay the mucous membrane is abruptly cut off in carcinoma, while in simple ulcer it has an infolded appearance. It is probable that a break in the relief pattern

caused by a growth could be recognized long before the formation of a filling defect. Striation of the mucous folds "against the grain" is considered by Berg to be an early sign of carcinoma; I have seen it in the neighbourhood of an early growth.

Fig. 3a shows the relief pattern in a case in which the growth had penetrated far beyond the filling defect; the

extension in the gastric wall is seen high in the cardia, while the filling defect is low in the body. Fig. 3b shows the pattern in a case that had a large filling defect in the corpus; the mucous folds of the upper third of the stomach are seen to be free from invasion; partial gastrectomy was successfully performed.

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THE SHAPE OF THE PELVIC BRIM AS THE DETERMINING FACTOR IN CHILDBIRTH*

BY

KATHLEEN VAUGHAN, M.B.LOND.

LATE SUPERINTENDENT, DIAMOND JUBILEE ZENANA HOSPITAL,
SRINAGAR.

Those who practise midwifery in the East, whether in India or in China, are soon aware of the fact that under certain conditions of life childbirth is easy and safe, while the opposite conditions render it difficult and dangerous for both mother and child. The field worker, the woman who lives out of doors tending the cattle, planting out crops often knee-deep in cold water in the rice-fields, rowing the heavy boats used for transporting grain, the tent dwellers—such as the women of the nomadic tribes on the North-West Frontier of India—all these have

* A paper read in the Section of Obstetrics at the Annual Meeting of the British Medical Association, Eastbourne, 1931.