rhagiae and the yellow fever strain *L. icteroides*. Pressure of other work prevented the experiments being conducted further with a view to ascertaining the minimum protective dose of the patient's serum for each strain. Had this been done it is possible that a difference between the three strains of leptospira would have been observed. It is of interest to note that the patient's urine taken on April 26th, when he had apparently recovered, was still harbouring *L. icterohæmorrhagiae*.

During these experiments the rectal temperatures of the guinea-pigs were taken daily. Chart 2 illustrates the temperature of a guinea-pig inoculated with the culture of the human strain, which proved fatal in every case. Chart 3 shows the course of the tempera-

CHART 2.

CHART 3.

Chart 2.—Guinea-pig inoculated with culture of human strain of *L. icterohæmorrhagiae*. A recently isolated rat strain behaved in a similar manner.

Chart 3.—Guinea-pig inoculated with culture of naturally occurring rat strain of *L. icterohæmorrhagiae*. Recovery was due to loss of virulence owing to prolonged maintenance in artificial medium.

ture of a guinea-pig inoculated with the culture of the less virulent rat strain which produced only a febrile reaction from which recovery took place. In the case of the human strain the typical lesions were found in the guinea-pigs after death. There was intense jaundice involving the whole abdominal contents and peritoneum, these being tinged a deep yellow or orange colour. There were extensive hæmorrhagic areas in the lungs and in the tissues about the lower part of the abdominal cavity. Numerous punctiform hæmorrhages occurred in the peritoneum. Leptospiræ, with their characteristic slender spiral bodies and hooked ends, could be demonstrated by dark-ground examination of a saline solution in which the liver or kidneys had been macerated. The organisms were also present in the urine. They were likewise found in Giemsa stain smears of the organs and tissues prepared by Levaditi's silver-nitrate method. The direct examination of the patient's blood failed to reveal leptospiræ. The diagnosis of such a case may be established with the greatest certainty by the intraperitoneal inoculating of two or more guinea-pigs with the blood or urine of the patient.

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THE OPAQUE MEAL:

ITS PRESENT-DAY VALUE IN GASTRIC LESIONS:*

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A CONSIDERABLE advance has been made in recent years in the technique used in the opaque meal examination of the stomach. The examination has attained a remarkable degree of accuracy, but it is difficult for those medical men not working in close touch with the larger hospitals to appreciate the continual advance taking place in this work. A report of the results of the opaque meal examinations carried out at the London Hospital during last year will give a fairly accurate idea of the present-day value of the examination.

Reliable statistics as to the after-results of medical treatment are difficult to obtain. This is especially true of hospital patients, as their habit of roaming makes it impossible to keep in touch with them. It is a different matter, however, if statistics are obtained while the patient is still under hospital observation; consequently it is comparatively easy to gauge accurately the diagnostic value of the opaque meal examination, given some systematic method of ascertaining the operative or post-mortem findings as soon as available, in order to compare them with the radiological findings. In a busy hospital it is practically impossible for the radiologist to be present at all abdominal operations. In fact, except in special cases, it is a waste of time, provided that an accurate description of the pathological conditions found reaches the radiological department.

The diagnostic value of any particular method is very unreliable if it depends upon memory. Mistakes are so easily forgotten, while the number of correct diagnoses has an unwarranted way of increasing—a false idea of accuracy being thereby given. It is seen, therefore, that hard fact must be depended upon if the correct value of any particular method is to be correctly gauged. Owing to the many and various technical methods advocated from time to time by workers in different parts of the world, I have for several years been using a system for estimating the value of each, in order to ascertain whether it was an advance or not on that previously used. A brief description of this system may be of value to others: Card-indexing is used and every item noted during the examination is entered on the patient's card, together with the ultimate diagnosis. A report of the findings is entered up in the ordinary way on the report sheet, which is sent up to the ward. To this report sheet a perforated slip is attached for the operative findings. This is filled in at the operation by the surgeon or his assistant and immediately returned to the department. The operative findings are in this way compared with the radiological findings, these are entered up on the card, and the slips themselves tabulated according to whether the diagnosis has been correct or otherwise, so that one is actually informed, week by week, as to the diagnostic value of the findings. A falling off, without any apparent cause, often indicates that either myself or my assistants require a rest.

Systematic Radioscopic Palpation.

I may mention that the method used entails considerable mental strain on the operator, and that his diagnostic value is lowered if he is below par. This systematic radioscopic palpation, as I term it, has taken me some years to bring to its present state of accuracy. It has stood the test of time better than any other technique that I have used, and has for three years consistently given a high percentage of correct findings. A full description of the method will be found elsewhere,¹ but a brief account of the chief features will not be out of place: A *small quantity* of a special barium cream is administered as the

* Read at the Cong. of Radiology and Physiotherapy, June, 1922.
¹ *Proceedings Roy. Soc. Med.*, 1922.

"meal"; by abdominal palpation this is, so to speak, smeared over the interior of the stomach wall. This "whitewashing" process commences at the cardiac end, and the stomach is systematically examined on the screen inch by inch, the examination terminating at the duodenum. The gastric rugæ are in this way visualised and small ulcer craters can be detected among them, whether on the anterior or posterior surface of the stomach. I have found that ulcers in these positions are frequently missed by most other methods, as the shadow of the stomach, filled with the meal, usually obscures them entirely. Practically any method will show the grosser lesions, such as a bilocular stomach or a new growth invading the organ. The test will always be the detecting of the very small lesions. The duodenal "cap" and the duodenum itself are examined in the same systematic way.

The operator needs to have good eyesight, strong wrists and forearms. Full concentration is required of him if small lesions are not to be missed. In fact, it would be a good plan if the operator could be locked up while examining the patient, so that he might remain undisturbed by telephones, visitors, and other distractions. The method should not be confused with ordinary abdominal palpation or "belly-prodding." The diagnostic value of radiograms in this examination has always been unreliable, except, of course, for the grosser lesions. Consequently, I have been forced to discard them, unless they are needed as a record of some unusual condition, or for the purpose of demonstrating the lesion to the surgeon. In many a case where a small lesion has been detected by radiosopic palpation, it has been practically impossible to obtain a radiogram, owing to its position. In cases like these the condition would certainly have been missed if one had relied on the radiogram for the diagnosis.

I maintain that any pathological condition that can be demonstrated on a radiogram can be visualised by this method of palpation, but that an ulcer visualised on the screen cannot always be demonstrated on a radiogram. It will be seen, therefore, that one depends on *direct* evidence of the lesion—in other words, unless *actually visualised* on the screen, a positive diagnosis is not made; consequently the clinical history of the patient matters little. In fact, one has seen cases where the clinical history has been most misleading. All the symptoms may point to a duodenal ulcer, yet the lesion found may be not of the duodenum, but of the cardiac end of the stomach. Only a few weeks ago, a patient who gave a most typical history of duodenal ulcer was found radiologically and at operation to have an inoperable carcinoma of the body of the stomach.

Another point may be mentioned—there is a tendency to place too much reliance on the rate of emptying of the stomach. This has been proved to be dependent on so many outside factors—apprehension, fear, hunger, &c.—that it becomes of itself quite unreliable. In a perfectly normal stomach it was found to be possible to get a difference of four hours in the emptying rate by dieting alone.

Statistical Consideration of Findings.

In considering the figures of the last year, it must be remembered that only those cases are included in which the radiological findings were confirmed or otherwise by operation. A number of carcinomata were considered inoperable by the surgeon and sent home. These have not been included, although it would have been quite justifiable to include them under the head of correct diagnoses. Another point: It is not easy to arrange all the year round for every case to be examined by a radiologist proficient in the art of palpation. Illness, holidays, and changes in staff render this difficult. Apparatus, also, is not always working at concert pitch towards the end of a heavy day. As many as 15 gastric cases have had to be examined in one afternoon.

Let us review the figures for 1921 in detail at the London Hospital. The total number of gastric cases examined was 639. Of these 247 were operated on. A correct diagnosis was made radiologically in 231

patients. The reliability of a negative report from the radiological department may be indicated by the fact that of this total in 88 no ulcer was found at the examination or at operation, while on the other side of the account, 5 ulcers were missed, 4 of which were high up at the cardiac end of the stomach and 1 a small healed ulcer; 32 duodenal ulcers were detected and 7 missed, one of these being a very fat patient. In three cases the radiological findings were in favour of a gastric ulcer, but not found by the surgeon.

One case of interest requires special mention, and it is difficult to decide whether it should be placed on the credit or debit side of the account. The radiological findings were a bilocular stomach, caused by a chronic penetrating ulcer on the lesser curve. What was taken to be the crater of the ulcer could be seen as a fleck lying close to the lesser curve in the region of the constriction—this area of the stomach being fixed to the pancreas. The operative findings were as follows: A chronic pancreatitis with adhesions to the stomach, causing it to be bilocular. A calculus the size of a pea was found embedded in the pancreas. This was opaque to the rays and had been mistaken for the ulcer crater.

The results tabulated for the year 1921 are as follows:—Total cases examined, 639: Operative findings in 247; correct radiological findings in 231 (111 gastric, 32 duodenal, 88 negative diagnoses); incorrect diagnoses in 15.

The incorrect diagnoses were as follows: 4 ulcers high up on the lesser curve missed; 3 suspected ulcers not found at operation; 7 duodenal ulcers not detected (one fat patient); and 1 small healed gastric ulcer missed. I consider the last in the list might be excluded, as scars in the gastric mucous membrane are hardly likely to be detected. No carcinomata of the stomach were missed.

This gives us 14 incorrect against 231 correct diagnoses and two unplaced. The radiological diagnosis was therefore correct in about 94 per cent. of cases. I personally consider that the time is approaching when it will be possible to detect all gastric lesions radiologically. I do not say that the exact nature of the lesion will be diagnosed, but the presence of an organic lesion will be revealed.

THE ACUTE ANTRUM.

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TWENTY-FIVE years ago saw the first appreciation of the importance of the appendix. Now everyone recognises the signs and symptoms associated with the "acute" and "chronic" appendix. The conditions are always in the mind of the surgeon called in to an abdominal case. The appendix always gets its fair share of attention—perhaps too much at times. A similar appreciation of the importance of the antrum and other nasal sinuses is slowly growing to-day. The toxæmia and chronic ill-health produced by a chronic empyema of the maxillary antrum has been pointed out for many years by various writers of text-books on rhinology, but even now it is not sufficiently recognised by the majority of medical men. Acute and subacute sinusitis is even less familiar. Hence the frequency of chronic nasal sinus disease. This unfamiliarity is partly accounted for by the inconspicuous signs which may be present in sinusitis. In fact local signs may be entirely absent, and only by a process of exclusion may one light on a focus of disease in the antrum. The possibility of the condition is not borne in mind and so the diagnosis is missed.

The following series of five cases occurred in the practice of one general practitioner between February and May, 1922. The fact that five cases turned up in three months shows that sinus diseases may be pretty common. Five appendix cases in three months would be a fair incidence. I believe that sinus cases frequently go unrecognised, to the patient's detriment.