neurologist there is room for some differentiation. "In the future, as has always been the case in the past, some neurologists will be particularly interested in those aspects of neurology which are relatively remote from psychiatry. Others will find their chief interest in those neurological disorders in which the psychiatric aspect is prominent. These latter should be in a position to pursue their interests unfettered, for they have a most valuable contribution to make to the study of neurology as a whole, and, especially at a time when psychiatry is turning more and more to physical methods of treatment, they have similarly a valuable contribution to make to the study of psychiatry." The Committee also saw the need for the general physician, who combines an interest and training in neurology with his general medicine. The growing relationship between neurology and general medicine might well now be more widely recognized in the training of the neurologist, as it has been in the arrangement recently entered into between the Maida Vale Hospital and the London Hospital for two alternating senior registrarships tenable at both.

I have been speaking of definitions: let me end with a parable. The Pigeon in *Alice in Wonderland* insisted that Alice must be a serpent because she ate eggs. "Little girls," said Alice, 'eat eggs quite as much as serpents do, you know.' 'I don't believe it,' said the Pigeon, 'but if they do, they're a kind of serpent, that's all I can say.'"

The logic of the Pigeon sometimes finds expression to-day. Many kinds of doctors rightly see patients with nervous disorders, but the future of neurology in this country still depends upon its ability to attract, train, and provide satisfying work for neurologists of equal calibre to those to whom we owe the achievements of this branch of medicine and science in the past.

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THE CHOLECYSTOGRAM AND THE CLINICIAN*

BY

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The first step to any form of treatment, whether medical or surgical, is to make an accurate diagnosis. The selection of patients for operation is made on clinical grounds and on the results of appropriate technical investigations. The usual investigation to clarify a diagnosis of disorder of the biliary tract is cholecystography. Great reliance has been placed on this type of investigation despite the fact that it gives a positive diagnosis in less than half the cases of suspected disorder of the biliary tract submitted to it. In an analysis of four separate series of 100 consecutive cholecystographic examinations from three hospitals and my own personal series, the numbers of cases in which no abnormality was reported were 56, 55, 66, and 66. This seemed to be a high incidence, particularly as all the patients had definite symptoms of a disorder of the biliary tract which in many cases was severe. The problem that arises is, What is the diagnosis of these patients, and how may the diagnosis be made?

The "classical cholecystogram" will demonstrate the presence or absence of a gall-bladder shadow, it may demonstrate the presence of gall-stones, it may demonstrate morphological abnormalities of the gall-bladder, it may show a subnormal power of concentration, it will demonstrate whether the gall-bladder contracts or not after a fatty meal. It will not give exact information on the evacuation of the gall-bladder, nor will it in any way give information concerning the various motor dysfunctions of the biliary tract. There are also morphological abnormalities which are not demonstrated by the classical method.

Serial Cholecystography

Experience with the technique of per-operative manometry and radiology (Mallet-Guy and Rose, 1956) over the past three years has demonstrated quite decisively the incidence and importance of disturbances of the motor function of the biliary tract—biliary dyskinesia. A dyskinesia was demonstrated in no fewer than 126 cases out of the first 200 consecutive cases investigated and treated during that time. In 38 of these 126 cases there was a dyskinesia in the absence of any morphological abnormality. This experience indicated the necessity for a more accurate pre-operative method of diagnosing dyskinesia. It was thought that cholecystography should be able to provide the answer to this problem. It was also obvious that cholecystography in its usual form did not supply the answer.

Boyden (1926), in his original work, studied the motor function of the gall-bladder by means of a series of cholecystographic pictures, from which he calculated the volume of the gall-bladder and drew a graph of its evacuation. Clinical radiologists abbreviated this method, and the present technique of cholecystography is to take control pictures before the ingestion of an opaque medium, 14 hours after it, and further radiographs at a variable time after a fatty meal. In some departments this refinement is omitted. This abbreviation destroyed in great part the value of

*Read to the Sections of Radiology and Surgery at the Annual Meeting of the British Medical Association, Newcastle upon Tyne, 1957.

Boyden's work to the clinician. In 1949 Siffert revived the method and simplified the computation of the volume of the gall-bladder. In succeeding years Busson (1951), Robert, Bugiel, and Olivier (1952), and above all Guy Albot *et al.* (1952, 1954), further elaborated the method but simplified the computation of the gall-bladder volume so that to-day serial cholecystography will give an exact diagnosis of

biliary-tract dysfunction provided there is a gall-bladder shadow.

Briefly, the method used is to take both antero-posterior and lateral radiographs 14 hours after the ingestion of a single dose of iopanoic acid ("telepaque") and then every 10 minutes after a fatty meal for 80 minutes (Rose, unpublished). From these radiographs the volume of the gall-bladder is computed and two curves are drawn: the curve of the volumes, and the curve of the angle or erection of the gall-bladder (see Figs. 2-5). This is the angle between the long axis of the gall-bladder and that of the spinal column in the lateral view. This angle is important, as any in-

crease of the angle has the effect of reducing the apparent length of the gall-bladder shadow in the antero-posterior view and so must be taken into account when calculating the volume. Normally it is between 5 and 15 degrees, and it depends on two factors: (1) the tone and force of contraction of the gall-bladder, and (2) the resistance to its evacuation.

After the ingestion of a fatty meal the gall-bladder shadow normally becomes smaller and in the antero-posterior view moves proximally and rotates externally (Fig. 1). In the lateral view the shadow appears to rotate so that the long axis becomes more vertical and the angle of erection increases from 5 to 15 degrees. The normal volume of the gall-bladder is between 25 and 30 ml., and in normal circumstances decreases by 70% in the first 30 minutes after the fatty meal.

In abnormal states the gall-bladder may evacuate

insufficiently (hypokinesia) or it may evacuate excessively (hyperkinesia). The gall-bladder tone, as indicated by the angle of erection, may be less than normal (hypotonic) or greater than normal (hypertonic). In conditions of obstruction to evacuation the curve of the angle of erection contrasts strongly with that of evacuation (Fig. 2). The evacuation is insufficient while the angle of erection increases. If, however, the angle of erection is initially low and fails to increase during the test, then the gall-bladder is atonic (Fig. 3). The gall-bladder may evacuate excessively and yet have a small angle of erection which does not increase during the test. This occurs when the sphincters are particularly atonic and the normal stimulus to evacuate, which is hormonal, produces an excessive response.

Personal Series

Between October, 1954, and December, 1956, 200 cases of disorder of the biliary tract were admitted to the clinic for investigation and treatment, but it was not until Case 63 that serial cholecystography was used as a means of selection of cases for operation. Of the other 137 patients, 40 had a normal "classical" cholecystogram, but serial cholecystography showed a dyskinesia which was subsequently proved at operation in each case. The most common finding was a vesicular stasis—that is, a gall-bladder which evacuates insufficiently. There were 34 of these cases.

The gall-bladder may fail to empty normally because of atony of its muscle; there were 20 such cases, 7 of which were also associated with a morphological abnormality. Case 96 is an example.

Case 96.—A woman aged 41 had a history of painful dyspepsia for nine years with invalidism. She had been investigated and treated five times, with negative "classical" cholecystograms, two laparotomies, appendicectomy, and division of adhesions. Serial cholecystography in 1955 showed a gall-bladder of normal size which evacuated moderately insufficiently. The angle of erection was disregarded on account of probable adhesions (Fig. 3). Cholecystographic diagnosis: vesicular stasis probably due to biliary hypotonia. At operation on October 26, 1955, the intravesicular pressure stabilized at 11 cm. of water. Cholecysto-cholangiography showed a distended gall-bladder. Operative diagnosis: biliary hypotonia. Operation: right

FIG. 1.—Superimposed tracings from a normal serial cholecystogram showing the alteration in the size and position of the gall-bladder shadow, in the two views.

crease of the angle has the effect of reducing the apparent length of the gall-bladder shadow in the antero-posterior view and so must be taken into account when calculating the volume. Normally it is between 5 and 15 degrees, and it depends on two factors: (1) the tone and force of contraction of the gall-bladder, and (2) the resistance to its evacuation.

FIG. 2.—Case 221. Serial cholecystogram in a case of obstruction of the cystic duct due to an infundibulo-colic kink.

FIG. 3.—Case 96. Serial cholecystogram in a case of vesicular hypokinesia with hypotonia.

FIG. 4.—Case 180. Serial cholecystogram in a case of obstruction of the cystic duct due to spasm of the sphincter of Lütken's.

splanchnicectomy. Result: there was a considerable amelioration of symptoms and a replacement of 28 lb. (12.7 kg.) of weight loss with a return to full duties.

Of these 20 cases, 13 were unassociated with any morphological abnormality, and only a right splanchnicectomy was performed. Four cases were associated with gall-stones, and in addition to the right splanchnicectomy three had a cholecystectomy and one had a cholecystolithotomy. Two cases were associated with a chronic cholecystitis and one with a cholesterosis; these cases also had a cholecystectomy and right splanchnicectomy. Of the results, 17 were good and three were unsatisfactory.

The gall-bladder may fail to empty normally because of an obstruction to the neck of the gall-bladder or cystic duct due to spasm of the sphincter of Lütken's or to some organic abnormality. There were 14 such cases, and seven were due to spasm of the sphincter of Lütken's, two of which were associated with a duodenal ulcer. Case 180 is an example.

Case 180.—A woman aged 39 had a history of duodenal-ulcer-like dyspepsia with associated biliary symptoms for seven years. Barium-meal examination showed a duodenal ulcer. Serial cholecystography showed a gall-bladder with gross insufficiency of evacuation. There was a steeply rising angle of erection. The antero-posterior view showed a "golf-ball" gall-bladder (Fig. 4). Cholecystographic diagnosis: vesicular stasis from a cystic duct obstruction. At operation on October 1, 1956, an anterior-wall duodenal ulcer was found. The pressure within the gall-bladder was of the obstruction type. Cholecysto-cholangiography showed a small pear-shaped gall-bladder, a normal common duct, but a very long reflux along the duct of Wirsung. After vagotomy and posterior gastro-enterostomy had been performed the intravesicular pressure rose to 15 cm. of water and then stabilized at 12 cm. of water. Operative diagnosis: spasm of sphincters of Lütken's and Oddi and a duodenal ulcer. Operation: vagotomy and posterior gastro-enterostomy. Result: complete cure.

In all these cases a vagotomy was performed and all the results were good.

Seven cases were due to a valve, a fibrosis of the cystic duct, or an infundibulo-colic kink. Case 221 is an example.

Case 221.—A woman aged 30 had a history of painful dyspepsia associated with severe headaches for five years. A serial cholecystogram showed a gall-bladder of normal size which evacuated with moderate-to-gross insufficiency. The angle of erection was of a minus quantity; this minus angle increased considerably during the examination. On the lateral view at 10 to 40 minutes an infundibulo-colic kink was demonstrated (Fig. 2). Cholecystographic diagnosis: vesicular stasis due to cystic duct obstruction. At operation on February 18, 1957, the pressure within the gall-bladder first rose to 20 cm. of water and then stabilized at 12 cm. of water. The cholecysto-cholangiogram showed a marked kink at the infundibulo-colic junction. Operative diagnosis: infundibulo-colic kink; the gall-bladder was on a long mesentery. Operation: cholecystectomy. The pathological specimen confirmed the diagnosis. Result: complete cure.

These seven cases all had a cholecystectomy performed, but three of them, being also associated with a biliary hypotonia, also had a right splanchnicectomy; all seven gave good results.

The opposite condition to a vesicular stasis is a gall-bladder which empties too rapidly—a vesicular hyperkinesia. In this series there were six such cases: one was associated with a duodenal ulcer and

was treated as a duodenal ulcer; one was treated medically; and two had a chronic cholecystitis which resulted in an irritable gall-bladder, and a cholecystectomy was performed. The remaining two had a marked biliary hypotonia, and a right splanchnicectomy was performed. Case 204 is an example.

Case 204.—A woman aged 67 had a history of painful dyspepsia for twelve years. Serial cholecystography showed a gall-bladder of normal size which emptied rapidly with an angle of erection which did not alter during the examination (Fig. 5). Cholecystographic diagnosis: vesicular hyperkinesia with hypotonia. At operation on January 7, 1957, the pressure within the gall-bladder stabilized at 8 cm. of water. The cholecysto-cholangiogram showed a dilated pear-shaped gall-bladder and a tortuous cystic and common duct. Operative diagnosis: biliary hypotonia. Operation: right splanchnicectomy. Result: complete cure.

One of the two cholecystectomy cases was considerably improved and one had a bad result. Of the right splanchnicectomy cases, one was a complete cure and one was considerably improved. The patient with duodenal ulcer was completely cured. The patient on medical treatment was improved but not cured.

Conclusion

It should be noted that not one of these 40 cases would have been either diagnosed correctly or treated successfully without the use of serial cholecystography and peroperative manometry and radiology. Classical cholecystography failed to reveal any abnormality in these cases.

These facts have led me to abandon the classical method of cholecystography in favour of the serial method as a means of selection of cases for operation, when peroperative manometry and radiography will confirm the diagnosis and give the indication for operative treatment. A normal classical cholecystographic report on a patient suffering from symptoms which implicate the biliary tract is incorrect in 95% of cases.

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FIG. 5.—Case 204. Serial cholecystogram in a case of vesicular hyperkinesia with hypotonia.

The Proceedings of the Hastings Conference of the National Society for Clean Air, now available, contain all the papers, lectures, and addresses, together with the discussions, given at the conference, which was held last October. From the viewpoint of fuel policy there is the address by the Minister of Power, Lord MILLS. Two papers discuss the question of air pollution from road vehicles, two more the administrative problems of the Clean Air Act, and others examine the Act from the standpoint of industry and fuel efficiency. There is also a contribution by the Director-General of the Meteorological Office, Sir GRAHAM SUTTON. The Society's president, Dr. R. LESSING, devotes most of his address to a discussion of the means for controlling the primary sources of pollution. There is a short report on the availability of smokeless fuels, and a resolution and statement calling for greater efforts on the part of all concerned to organize the training and certification of boiler operators. The Proceedings are obtainable from the Society, Palace Chambers, Bridge Street, London, S.W.1, price 12s. 6d.