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THE CLINICAL VALUE OF CHOLANGIOGRAPHY*

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THE x-ray study of the biliary ductal system by the use of contrast media is of the greatest clinical and practical value. It is fast becoming an exact science and is comparable to the gastric series, in that it permits us to view clearly and distinctly the size, the shape, and the contour, of a very important anatomical and functional unit. It will reveal, among other findings, the position, size, and number of calculi; the location, the extent, and perhaps the cause of biliary fistulæ; the patency of the ducts; the extent and location of strictures, and functional changes. The advantages of such a study—which is, admittedly, best suited for obstructive lesions—are obvious. Unfortunately, this diagnostic procedure does not yet enjoy the good reputation and confidence which it deserves. *It is of value in every case operated upon for biliary tract disease.* This is particularly true if it is successfully used during operation to determine the presence of calculi in the common duct (immediate cholangiography). Series of studied cases prove that the number of stones “left behind” will be greatly reduced in number if this procedure is always utilized to the best of its potentialities. There are few occasions when the correct interpretation of x-ray findings can be of more value than

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in biliary tract disease, and this is especially so in diseases of the ductal system. There are no serious complications associated with its use, and minor ones are rarely reported. These consist of pain and slight transient fever, and indicate sudden pancreatic involvement through the duct of the latter structure, probably the result of too hasty injection.

The liver, with its excretory system, is the most important organ in the abdomen. Man can live in good health without a stomach, a spleen, the appendix, any or all of the large bowel, the uterus and ovaries, and other abdominal structures. Indeed, cases have recently been reported in which the entire pancreas and the small bowel have been successfully removed, and in which life was apparently not very abnormal. However, experimental animals cannot survive longer than a period of hours without a liver, and some weeks (maximum of a few months) without a common duct. This is also true in human beings. If this fact is kept in mind it will help us to appreciate the importance of using every available means at our disposal for diagnosing lesions of the biliary ductal system, both before, during, and after, operation.

TECHNIQUE

1. *Delayed cholangiography (postoperative).*
—The technique is simple: *i.e.*, it is not difficult; but it requires the same careful and thoughtful attention to asepsis as does, for example, the pyelogram. The contrast media found most suitable is diodrast 35%, although the 17.5% solution is quite satisfactory in thin patients and has some advantages in that it will not “blot out” a small calculus; diodrast 70% often will and is now difficult to obtain. This material is the least irritating of all such substances and produces a very good shadow. Hippuran does not give—at least for us it did not give—a solid shadow: it was much too faint. Lipiodol is too heavy and thick and should be mixed with olive oil. This produces varying densities and complicates the interpretation of shadows. Diodrast is miscible with the bile so that a thoroughly homogeneous solution is produced in all the ducts, both large and small. The consistency of diodrast is comparable to that of water and it can therefore easily penetrate to the liver periphery, thus showing clearly early states of obstruction as interpreted by the dilated smaller radicals. This is an

important point and cannot be shown with lipiodol which, in addition, may produce a shadow so dense that calculi are obscured. Morphine, gr. 1/6, is sometimes administered 15 to 30 minutes before the first plates are taken, to increase the resistance of the sphincter of Oddi. This increases the chance that the dye will not leave the ducts and enter the duodenum too quickly. It also increases the probability that the medium will visualize the liver radicals more clearly. If the dye leaves the duct too quickly calculi may be missed. It is better to place the patient in the Trendelenburg position while the ducts are being filled. In this way the medium will leave the common duct slowly, by running uphill and overflowing, and under some control. In this respect it must be remembered that non-obstructive pictures do not prove the absence of calculi. Stones may be present in the common duct without obstructing the free flow of dye into the duodenum, as shown by the absence of dye in the duct very shortly after injection. Hence the importance of making serial exposures of the filling and emptying phases.

The ductal system is *filled slowly* through the drainage tube in the common duct, or a drain in the gallbladder, or a small catheter in the cystic duct, as the case may be. The diodrast should be heated to body temperature. Care must be exercised to prevent the entrance of air. Bile is first withdrawn and diodrast is injected in amounts of 3 c.c. (if the duct is not too large), after which each picture is taken. *It is important that serial exposures be made.* If the dye is injected until pain appears, and then the first picture made immediately, and another ten to thirty minutes later, misinterpretations are sure to occur sooner or later. If it has been determined that the duct is enlarged (as demonstrated at operation or shown by the withdrawal of a large amount of bile) 5 to 10 c.c. are injected instead of 3 c.c. This is barbotaged back and forth slowly into the duct and radicals. The slow injection and the taking of serial pictures allows a better chance to see calculi and to study a clear outline of the duct, and to reduce the incidence of artefacts. It also produces much less pain. If the gallbladder has not been removed it is better to turn the patient slightly on the right side so that the bladder shadow will not overlies the duct. The films are developed as they are taken.

The first picture after complete filling is taken approximately 30 seconds after the inhalation of amyl nitrite and the second picture approximately two minutes later: *i.e.*, two and a half minutes after inhalation, and a third ten or fifteen minutes later. For these the patient is flat or in a reverse Trendelenburg position. This permits slow and controlled emptying and is much more likely to reveal pathological changes. Failure to follow this simple routine of studying the exposures made during the filling and emptying phases constitute one of the principal causes of failure of this diagnostic procedure.

2. *Immediate cholangiography.*—Although we have not had the good results reported by others in the use of immediate cholangiography, it is undoubtedly the theoretical method of choice, and has many advantages, not the least of which is that calculi remaining in the duct may be discovered *during the first operation* and thus a second operation, which always carries a much higher mortality, may be prevented. Immediate cholangiography seems to have a special application in those patients who require surgery following cholecystectomy, *i.e.*, those who are undergoing secondary operations. The ductal exploration in such patients may be very unsatisfactory, and because symptoms can be as severe without ductal calculi and without jaundice as with them, the surgeon, no matter how experienced, can never be sure about the presence or absence of remaining stones unless cholangiography is performed at the time of operation or later. This difficulty is, however, largely overcome by the use of routine cystic duct drainage at the first operation, followed by x-ray studies before the patient leaves the hospital. In this way it can be determined, in every patient, whether or not calculi remain in the ductal system. Inasmuch as we have not yet found a consistently satisfactory technique for this procedure, it is not discussed.

SUMMARY

The clinical value of cholangiography (or choledochography) is briefly discussed and a plea is made for a more widespread use of this useful diagnostic aid.

ADDENDUM

Since this paper was submitted for publication, several factors have arisen which should be reported. These are briefly:

1. The claims made for the value of x-ray studies of the common duct following gall-bladder drainage in acute cholecystitis, and in routine drainage of the cystic duct following cholecystectomy, have stood the tests of clinical experience and have been well proved.

2. Morphine, by its action on the sphincteric apparatus, sometimes interferes with the interpretation of the pictures, in so far as the ampullary region is concerned, and it is now thought best to withhold any of the drugs which increase the resistance of the sphincter until several exposures have been made, and if necessary it can then be administered.

3. Great improvement in the technique of immediate cholangiography is necessary before such pictures can be relied upon. The success of this procedure depends on several factors, namely; the amperage of the portable unit, the presence or absence of a Bucky diaphragm, and the co-operation of the patient, which in turn, depends upon the type of anæsthetic used. Until these variable factors can be controlled and made constant, interpretation of pictures made in the x-ray room after operation will be more reliable than those made upon the operating table, although the latter will always have more potential value. Therefore every effort must be made to produce, in the operating room, pictures of equal clarity to those made under ideal conditions.

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RÉSUMÉ

L'importance du foie doit nous inciter à prendre toutes les mesures diagnostiques pour mettre en évidence les lésions des canaux biliaires avant, pendant et après l'opération.

La technique de la cholangiographie tardive ou post-opératoire est décrite. Le diodrast est injecté dans le tube de drainage et des radios sériées sont prises. La cholangiographie immédiate ou faite au cours de l'opération, sera décidée dans les cas où le chirurgien voudra s'assurer de la présence de calculs additionnels ou de calculs simplement difficiles à mettre en évidence.

JEAN SAUCIER

Members are reminded that the regular Annual Meeting of the Canadian Medical Association will be held in Toronto, at the Royal York Hotel, the week of May 22 to 26. Make your reservations early. It will be a good meeting.

PSYCHOSIS IN HYPOPARATHYROIDISM

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TRANSIENT parathyroid insufficiency is a relatively common phenomenon, and occasionally may be accompanied by certain cerebral and psychic symptoms of brief duration. Hypoparathyroidism of long-standing, however, with tetany, epileptiform convulsions of central origin and psychotic changes is much more rare. Greene and Swanson¹ in a recent review of the subject found four cases reported in the literature since 1922. They added five more of their own and suggested that the condition is probably more common than is generally appreciated.

The case which follows is remarkable in several respects; the length of time after thyroidectomy before the symptoms appeared, the persistent character of the disturbance, the general mental and physical deterioration of the patient, who presented the dull and apathetic spectacle of a severe epileptic subject, the complete clearing of the disturbance during pregnancy, and the prompt and dramatic response to treatment. In the first two particulars the case differs from those reported by Greene and Swanson.

CASE REPORT

G.R., a white married woman, 29 years of age, was admitted to hospital April 25, 1943, complaining of convulsive seizures. She had undergone a thyroidectomy in 1930, and four years later at the age of twenty she began to have convulsive seizures. These were inadequately controlled by various agents and gradually increased in number and severity. In a letter from the attending physician it was stated that in 1941, during the patient's first and only pregnancy, the seizures disappeared and the patient's general condition notably improved. She gave birth to a healthy full-term baby on July 13, 1941. In April, 1942, the seizures returned and at the time of this hospital admission were occurring four or five times a day. They were associated with involuntary micturition and bowel evacuations.

The patient was of average physique. The outstanding finding was the dull and apathetic appearance. The speech was sluggish, with almost an impediment at times. There was marked loss of hair, which was scanty and of poor texture. Vision was impaired by bilateral cataracts. The physical findings were otherwise not remarkable. There was a universal hypæsthesia including the cornea. The reflexes were extremely sluggish. Trousseau's sign was positive, Chvostek's sign was elicited, but was inconstant. At times there would be episodes of distinct carpopedal spasm.

The blood Wassermann test was negative. The first serum calcium was 8.3 mgm. per 100 c.c., but later estimations showed varying lower values. Roentgenograms of the skull were normal. The basal metabolic rate was -27.