waited on the boys at table, and the dates on which the cases fell among the boys are more suggestive of contact infection from one source than of infection from case to case. The last point applies equally well to M.R., and in addition she undoubtedly infected the laundryman. She did not, however, visit the child in the town. The Medical Officer of Health reports that by the time she was admitted into the Isolation Hospital at Hitchin her head was a mass of foul-smelling offensive sores, while Y.S. was comparatively clean. Taking the available evidence as a whole, we think M.R. was the originator and that she infected Y.S., whose skin was already in an unhealthy state. Y.S. took the infection to the town, but, possibly owing to the ministrations of the matron, by the time she reached Hitchin her sores were healing, and the infection was then carried on by M.R.

Steps Taken to Prevent Spread.—These were: (1) Careful and repeated swabbing of all members of the infected house and isolation of immune carriers; (2) isolation of the boys from the infected house; (3) protective injections (2,000 units of anti-diphtheria serum) and re-immunization of the boys and the domestic staff; (4) re-immunization of the rest of the school with 0.3 ml. A.P.T.

Points of Interest

(a) The comparatively small number of cases and carriers in a closed community.—This is no doubt due to the relatively large proportion of protected persons within the community at risk. All the boys except two had had their primary immunization before joining the school. Of the two who had not, one contracted the disease. The other three boys who had the disease had been immunized in 1939, 1941, and 1940 respectively, thus suggesting that the protective power had lessened after five years and that a "boosting" dose was required. Nevertheless, it is reasonable to suppose that the primary immunization of these three boys had helped in combating the disease, as the two adult cases (the laundryman and porter) who had not been immunized were more severely infected. The immediate steps taken to heighten immunity in those not attacked were also effective.

(b) The difficulty of determining the significant carrier.—Much time was lost and two serious cases received their infection through the assumption that Mrs. T. and A.T. were the significant carriers. It was only an obstinate refusal to discard the school-town infection clue, even after negative swabs, that led to the M.O.H. at Hitchin being put on his guard and to the detection of the actual infectors.

(c) That a number of cases of pharyngeal diphtheria occurred from a skin infection of virulent gravis diphtheria.—Although not unknown, this is an unusual occurrence and should lead to a careful scrutiny for skin lesions in an unexplained prolongation of an outbreak.

The spring number of the *American OSE Review* is particularly interesting for a number of articles by Jewish doctors on their experiences in the ghettos and concentration camps established by the Germans. Dr. E. Herman gives an account of a typhus epidemic in 1941-2 in the Warsaw ghetto, where over half a million people were crowded together. "Liquidation" of the ghetto followed in 1943, being "preceded by a tour of S.S. men and Gestapo with monacles in their eyes in shiny limousines." There were about 80,000 cases in the epidemic; he tabulates the neurological syndromes found. Conditions in the Vilna ghetto were little less deplorable, and Dr. Dworzecki mentions that about 75% of the women ceased to menstruate for a varying period of time soon after being herded into it. The camp commandant ordered several women with severe scabies to be shot. Dr. Rosenblum briefly describes the destruction of the Jewish community in Warsaw by shooting, gas, and burning, and the plight of children left to wander in the ruins and forests.

PARTIAL HEPATECTOMY AND RIGHT HEMICOLECTOMY FOR CARCINOMA OF THE HEPATIC FLEXURE

BY

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The object of this paper is to call attention to the feasibility of carrying out an operation for the removal of a carcinoma of the hepatic flexure of the colon which involves the right lobe of the liver by direct extension. Coincidental partial hepatectomy at the time of gastric resection for carcinoma involving the liver by direct extension from the stomach has been performed by Wangenstein (1943, 1945). It is of interest also to remember that in 1923 Grey Turner stated: "Direct extension of malignant disease from the stomach or colon may render removal of a portion of the liver necessary, and I think this will become one of the most frequent indications, especially as it usually only involves the removal of a slice or wedge from the edge of the organ. In cases of this kind such an extension to the liver need not in itself be a bar to successful operation if the extension of the growth in other directions rendered its removal profitable." Some six years ago I performed a right hemicolectomy for a carcinoma of the hepatic flexure which invaded the right lobe of the liver, and it was necessary to remove a slice of liver with the growth; this patient remains well without recurrence at the present time, proving that the end-result of such an operation is most satisfactory. Recently, however, a much more formidable problem presented itself, and it was necessary to remove a large portion of the right lobe of the liver, including the gall-bladder, for a massive carcinoma involving the liver and hepatic flexure of the colon. Two months previously a surgeon who performed an ileo-transverse-colostomy as a palliative measure considered this growth to be inoperable on account of the extension to the liver. The clinical details concerning this patient are embodied in the case record given below. Since an operation for resection of a large lesion of the right lobe of the liver is a rare surgical procedure the technical details are described.

Case Record

A man aged 38 developed pain in the right lower abdomen when in India a year ago. It was sharp in character and was accompanied by diarrhoea. This attack subsided and he was able to continue his work. Several weeks later the diarrhoea recurred with four stools a day. He still experienced pain in the right lower abdomen. His appetite was good and he felt fairly well. Seven months ago the abdominal pain became continuous; he lost his appetite, and noticed that the bowels had become constipated. He gradually lost strength, and on examination a lump was found in the right iliac fossa. Three months before we saw him he reached this country and was admitted to another hospital. A hard mass was noted in the right hypochondrium, blood was present in the stools, and *Entamoeba histolytica* was demonstrated. An x-ray examination after a barium enema showed a large filling defect in the transverse colon. He was given a course of emetine therapy to exclude an amoeboma, but this treatment had no appreciable effect. An exploratory laparotomy was then performed after preliminary blood transfusion, and the mass appeared to be a large scirrhous carcinoma of the transverse colon just medial to the hepatic flexure and invading the gall-bladder and liver, to which it was densely adherent, but no secondary deposits were found. The growth was considered to be inoperable and an

ileo-transverse-colostomy was performed. The patient made a good recovery from the operation, the colicky abdominal pain subsided, the stools were normal, and his appetite improved.

Later his condition began to deteriorate, with the development of severe secondary anaemia, and in spite of three blood transfusions of 1 pint (568 ml.) each, the red blood corpuscles fell to 2,400,000 per c.mm. and the haemoglobin to 35%. There was severe pain in the region of the tumour and he was transferred to the Royal Cancer Hospital. On examination the patient looked ill and pale, and had obviously lost much weight. There was a large mass in the right half of the abdomen extending from the right hypochondrium to the upper limit of the right iliac fossa; it was extremely tender and appeared somewhat fixed. Sigmoidoscopy revealed no abnormality; a smear from the bowel showed no cysts or amoebae. There was marked secondary anaemia; red blood corpuscles numbered 1,900,000 per c.mm., and the haemoglobin was 28%. The plasma proteins were normal; plasma ascorbic acid was subnormal. A fractional test meal showed no abnormality. Radiological examination of the colon after a barium enema revealed a large irregular filling defect at the hepatic flexure extending 2 in. (5 cm.) into the transverse colon and 4 in. (10 cm.) into the caecum. This had the appearance of a carcinoma. The patient was given three blood transfusions of 3 pints (1.7 litres), 1½ pints (0.85 litres), and 5 pints (2.84 litres). The last massive transfusion was given because of a rapid deterioration in his general condition, probably due to haemorrhage occurring from the growth into the colon. It was decided—and the patient and his wife wished it—to perform an exploratory laparotomy to determine whether the mass could be removed. This operation was performed on Feb. 12, 1947, and a large mass was found involving the hepatic flexure of the colon and the right lobe of the liver. No metastases were found elsewhere in the liver or in the rest of the abdomen, and the ileo-transverse-colostomy was perfectly satisfactory. It was decided to perform a right partial hepatectomy and right hemicolectomy. The patient has made a good recovery. Microscopical examination of the tumour showed a highly cellular adenocarcinoma.

Technique of Partial Hepatectomy

After visual inspection and careful palpation of the right lobe of the liver the line of section is determined so that the excision is performed through normal tissue wide of the growth. The right lateral ligament of the liver is divided and the organ is delivered as far as possible into the wound by manual traction. The incision begins on the lateral aspect of the right lobe and the diathermy knife is used. It is essential to divide small areas of the liver at a time so that haemorrhage is completely controlled. This is effected by digital pressure on the liver tissue with gauze and by the insertion of mattress sutures of catgut, using special liver needles. It is pointed out that owing to the thickness of the right lobe of the liver it is impossible to insert through-and-through sutures from the antero-superior to the postero-inferior surfaces, and each suture therefore takes in about half the thickness of the organ. When the middle of the lobe is reached an incision is begun on the antero-internal aspect, passing posteriorly to the gall-bladder. The intrahepatic branches of the right hepatic artery are secured by the application of pressure forceps and are ligated. It is useless to employ pressure forceps to control haemorrhage from hepatic tissue apart from these well-defined vessels. This incision progresses to the middle of the lobe until it meets its fellow from the opposite side. The cystic duct and cystic artery are then ligated in continuity and divided, thus liberating the excised portion of the right hepatic lobe. The raw area of the liver is inspected, and bleeding points are touched with the diathermy coagulating knife; thus all haemorrhage is controlled. This area is covered with several layers of gauze, which are removed at the end of forty-eight hours. Alternatively it can be shut off by means of the great omentum, but it is necessary to drain

the area because of the leakage of bile for several days in the post-operative phase. It is possible that the use of fibrin foam may in future prove of value in dealing with haemorrhage from the cut surface of the liver.

Pre- and Post-operative Treatment

Before an operation of this magnitude is performed investigations are made as to the patient's general fitness, and any abnormalities are rectified whenever possible. Special attention is given to the cardiovascular, respiratory, and urinary systems. The blood is examined to determine the degree of secondary anaemia and whether there is protein deficiency. A severe degree of secondary anaemia will be present, and a number of pints of blood are required to bring the haemoglobin content up to a level of at least 70%. The blood ascorbic acid is estimated, and the patient is given this substance in doses of 100 mg. twice daily, together with thiamine and riboflavine in doses of 3 mg. thrice daily. A high-protein and high-carbohydrate diet is given, with plenty of fluid.

Blood transfusion is started during the operation, and this continues into the post-operative phase, the amount transfused depending on the patient's condition. Intravenous fluids are given for at least during the initial forty-eight hours until intestinal peristalsis returns, when the patient can begin to take small quantities of fluid by mouth. He requires a minimum of 3,000 ml. of fluid in twenty-four hours, composed of 400 ml. of plasma and the rest of glucose-saline. After partial hepatectomy the patient is apt to become dehydrated and to develop secondary anaemia; a blood transfusion may be required to rectify this condition. Casein hydrolysates are given in order to increase the protein intake, and in spite of the daily doses of ascorbic acid the blood values of this substance may be subnormal. The availability of superficial veins for transfusion purposes may become distinctly limited, and in this patient it was necessary to use the right external jugular vein, which was quite satisfactory. When the raw area of the liver is drained anteriorly through the right paramedian incision, and not through a stab incision in the right loin, it is advantageous to employ postural drainage by turning the patient into the ventral position for twenty minutes every two hours by day. Skilled nursing and meticulous attention to all details in the management of the patient are essential, and the rehabilitation programme must be carried out very gradually whenever the liver has been subjected to trauma. Jaundice may develop during convalescence in patients who have had wounds of the liver, and they must be kept under careful observation for a long time after discharge from hospital.

Summary

Attention is directed to the operation of partial hepatectomy combined with right hemicolectomy for carcinoma of the hepatic flexure of the colon infiltrating the right lobe of the liver. The technique of partial right hepatectomy is described and the pre- and post-operative management is given. The case history is cited of a patient for whom this operation was performed successfully, and another patient is cited who is alive some six years after resection of the anterior aspect of the right lobe of the liver combined with right hemicolectomy for carcinoma of the hepatic flexure of the colon.

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A circular from the Ministry of Health announces that the Food and Drugs (Milk and Dairies) Act, 1944, will not be brought into operation this year. The Act regulates dairy farms and farmers and the production of clean milk.