of lymphosarcoma Hynes (1939) found the marrow normal in six, but there were 61 per cent. lymphatic cells in the remaining patient's marrow. In a series of over 100 patients I have found lymphocytosis of the marrow in only two conditions besides lymphatic leukaemia; these are glandular fever and aplastic-type anaemias. In glandular fever the lymphoid cells in the marrow are increased—in one patient there were 55 per cent.—but if these are discounted all the other normal varieties of cells are present in their normal proportions. In aplastic-type anaemia there may be a marrow lymphocytosis of 70 per cent. or more; but this is only relative, and the raised percentage of lymphocytes is due to the decrease of all the other marrow cells.

Patients similar to those described here have been reported by Nordenson (1935), Schulten (1937), and Storti (1937). There seems, therefore, to be little doubt that the finding of lymphocytosis of the bone marrow is strong evidence that the patient has lymphatic leukaemia.

Clinically the patients fall roughly into two groups: an acute group (Cases I and II) with a fairly rapid course to a fatal termination, and a chronic group (Cases III, IV, and V) whose clinical and haematological condition remains stationary for long periods. In the acute group radiotherapy seems to be of little value; in the chronic group radiotherapy can be advantageously withheld for a long time, and, as in the somewhat similar myeloid leukaemia patients (Israëls, 1939b), treatment can be restricted to normal anti-anaemic measures so long as no severe anaemia occurs.

Summary

In patients with lymphatic leukaemia the sternal marrow shows a lymphocytosis even when the clinical signs and the peripheral blood pictures are atypical.

This lymphocytosis is strong evidence for the diagnosis of lymphatic leukaemia, since it is not usually found in other conditions.

The clinical course and the treatment of these atypical cases are briefly discussed.

I am indebted to Dr. John F. Wilkinson and the other members of the honorary staff of the Manchester Royal Infirmary who have made available the facilities necessary for this work.

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THE SPREAD OF RETROPERITONEAL EFFUSIONS ARISING IN THE RENAL REGIONS*

BY

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Retroperitoneal effusions occur most commonly in the renal regions, and are the result usually of inflammation or trauma. The direction of spread of these accumulations depends on the arrangement of the fascia in the region, yet very few workers have ever attempted to determine accurately the fascial relations and attachments of the kidney. The really valuable contributions, such as those of Zuckerkandl (1883), Gerota (1895), Poirier (1907), and Southam (1922-3), can be counted on the fingers of one hand.

Experimental Investigations

In this investigation radiological methods were employed in addition to the usual anatomical procedures, and the observations are mainly based on the examination of twenty infants; many ordinary dissecting-room subjects have also been examined, though not by radiography. The method used was simple. A needle was inserted into the perinephric region through which a very fine barium emulsion was injected slowly under a pressure of about 75 to 100 mm. Hg. On an average each experiment occupied one and a half to two hours, and the spread of the emulsion was studied on the radiographic screen, plates being exposed at ten-minute intervals in most cases, or oftener if any interesting appearance was detected. After each experiment the specimens were dissected in order to determine accurately the position of the needle point and to establish that no barium had escaped into the peritoneal cavity, renal pelvis, or ureter. In twelve cases the needle point was in contact with the kidney or had penetrated or lacerated its surface, while in eight cases the point was in the paranephric fat behind the posterior layer of perirenal fascia. Seven experiments were failures and are not recorded.

The spread of the emulsion was remarkably constant. When the needle point lay close to the kidney in the perirenal space the barium emulsion, as shown by the shadow on the radiographic screen, soon assumed a more or less reniform appearance (Fig. 1), and it was established by subsequent dissection that the barium was outside the true renal capsule—between it and the perirenal fascia. At an early stage the space surrounding the suprarenal gland also became filled (Fig. 1), a graphic illustration of the fact that there is no complete fascial barrier, as some authors would have us believe, between the kidney and the suprarenal gland. Extension upwards was limited by the attachment of the perirenal fascia to the diaphragm, but the barium passed downwards, and to a lesser degree outwards, without any great difficulty. Sometimes there was an early spread downwards in the loose tissue around the ureter (Fig. 1), but more often the lower advancing edge of the barium covered a more extensive area. Laterally, as was established by dissection, the barium spread outwards to the level of fusion of the two layers of the perirenal fascia, but in a few cases the fusion was incomplete or the layers were readily disrupted, because the emulsion passed forwards for a variable

Two new corporations have been established in Washington for the relief of war suffering in Great Britain and France. One body, the American Society for British Medical and Civilian Aid, will work for relief in Great Britain; the other, the American Society for French Medical and Civilian Aid, is designed primarily to provide funds for the American Hospital in Paris, which now has 500 beds. Funds for British aid, raised, as in the last war, by public subscription in the United States, will be converted into goods in America, and will then be dispatched, partly through the American Red Cross for military wounded and sick, and partly through the Personal Service League for civilian sick and wounded.

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distance between the transversus muscle and its fascia. Medially, strict localization to one side was a constant finding, the inner margin of the shadow being almost a straight line (Figs. 1 and 2). This unilateral spread was maintained until a late stage in the experiments, and then, often quite suddenly, a break-through occurred to the opposite side. This invariably took place in the lower lumbar region (Fig. 3). In five specimens no rupture occurred until the pressure was raised to over 200 mm. Hg, and in one case there was a break-through just below the diaphragm, but this did not happen until some time after the barium had broken through in the

FIG. 1.

FIG. 2.

FIG. 3.

FIG. 1.—The barium emulsion has distended the space between the renal capsule and perirenal (renal) fascia. Note that the suprarenal compartment is also filled and that the barium has spread downwards in the loose periureteral tissue.

FIG. 2.—The barium has filled up the renal fossa and has spread downward to the pelvis. Note the strict unilateral localization, except in the lower lumbar region, where the break-through to the opposite side will occur.

FIG. 3.—The barium has broken through in the lower lumbar region and is extending upwards on the opposite side. Note the upward spread around the inferior vena cava, and the downward spread in the loose tissue surrounding a patent peritoneal vaginal process.

(These drawings are traced directly from the radiographs.)

lower lumbar region. There was no indication of any tendency to spread upwards into the thorax through the various openings in and behind the diaphragm. Extension into the pelvis usually occurred with almost surprising ease in the loose retroperitoneal tissue, and in one case the barium passed downwards along the inguinal canal (Fig. 3). At first sight it appeared that the peritoneum must have been punctured and that the barium was distending a patent vaginal process, but dissection showed that the spread was in the extraperitoneal connective tissue and that the peritoneal sac was uncontaminated. In seven of the twelve cases in this group the barium spread upwards from the lower lumbar region around the inferior vena cava (Fig. 3), and it was curious and interesting to observe that in no case did the barium extend inwards alongside the renal or suprarenal vessels—an indication of the close attachment between the perirenal fascia and the adventitial coats of the vessels.

When the needle point lay in the paranephric fat behind the posterior layer of perirenal fascia, the manner of spread was almost identical, except that diffusion appeared to be more rapid, the barium shadow did not outline the kidney and suprarenal, and there was no tendency to spread downwards along the ureter. The localization to one side was as distinct as before, and when extension to the opposite side occurred it did so in the lower lumbar region. There was still no invasion of the thorax, but there was less tendency to localization on the lateral side, the barium passing into the flank between the transversus muscle and transversalis fascia. Below, the barium passed between the iliacus fascia and muscle

in several cases, and in one specimen it passed into the thigh postero-lateral to the femoral artery. The explanation of these results is to be found in the arrangement of the fascia.

Analysis of Results

Correlation of the experimental results with the appearances found on subsequent dissections has confirmed the general accuracy of Southam's observations, and it will be clear from the following brief description of the fascial arrangements why retroperitoneal effusions originating in the renal region should spread in the manner described above.

The kidney and suprarenal are surrounded by a loose investment of thinnish fascia, which is separated from the contained viscera by a variable amount of perinephric fat. This perirenal fascia consists of two layers: an anterior between the peritoneum and the renal capsule, and a posterior between the renal capsule and the fascia overlying the diaphragm, psoas major, quadratus lumborum, and transversus abdominis (Fig. 4). Poirier first cast doubts on the statement, still current in many textbooks, that the anterior layer extends across the front of the kidney and its vessels, to become continuous over the aorta and inferior vena cava with the corresponding layer of the opposite side, and he pointed out that perirenal suppuration remained localized to the side of origin, whereas it would spread readily to the opposite side if the anterior layers of perirenal fascia were continuous. He stated that the fascia can be traced as far as the pancreas and the root of the mesentery, there to become lost in the connective-tissue elements present in this situation, and Southam supports this statement. My experiments confirm the view that the two anterior layers are discontinuous, but they show that the anterior layers actually became attached to the bodies of the lumbar vertebrae and intervertebral disks a short distance in

FIG. 4.—A transverse section to show the arrangement of the perirenal (renal) fascia and the perinephric and paranephric spaces. Note the attachment of the anterior layer of perirenal (renal) fascia to the bodies of the lumbar vertebrae.

front of the attachment of the posterior layer of perirenal fascia (Fig. 4), and that this union is firm above but becomes progressively weaker as the lumbo-sacral junction is approached. The posterior layer is carried medially in front of the fascia covering the quadratus lumborum and psoas muscles, but separated from them by a variable amount of adipose tissue known as the paranephric fat. Near the mid-line, where the fatty tissue is less plentiful, the posterior layer merges with the psoas fascia, and also becomes attached to the sides of the lumbar vertebral bodies and intervertebral disks, immediately anterior to the origin of the psoas major (Fig. 4), but, like the anterior layer, the attachment is firmer above than below.

Above, the perirenal fascia includes the suprarenal gland, a fact proved by the almost simultaneous filling of the renal and suprarenal loculi in the experiments (Fig. 5). This showed further that the fascial layer between the two organs is incomplete, or so tenuous in parts as to present no significant barrier to the spread of fluid. The anterior and posterior layers of perirenal fascia become fused above the suprarenal gland and gain attachment to the fascia on the under aspect of the diaphragm (Fig. 5), a union which is usually very firm, as Southam has emphasized. Laterally the two layers unite at a short distance from the outer renal margin, forming a vertical ribbon-like fascial condensation which merges with the transversalis fascia (Fig. 4). Southam states that this well-marked band is constantly present, but this is not so, either in infants or in adults; nor is the union laterally between the two layers always as firm as he asserts, for in some experiments the barium escaped without great difficulty from the perirenal pouch on the outer side. Inferiorly, as most writers state, the two layers remain discontinuous, the anterior gradually fading into the extraperitoneal tissue in the lumbo-sacral region, and the posterior blending with the iliacus fascia (Fig. 5).

FIG. 5.—A sagittal section through the renal region showing the arrangement of the perirenal (renal) fascia.

Summary and Conclusions

A description is given of the spread of fluids: (a) from the perinephric space, included between the two layers of the perirenal fascia; and (b) from the paranephric space, lying between the posterior layer of perirenal fascia and the fascia overlying the muscles behind the kidney and the suprarenal gland.

The experiments detailed proved that there is no complete barrier separating renal and suprarenal fascial compartments.

It is shown that the spread is strictly limited to one side until a late stage, and that extension to the opposite side invariably occurs in the lower lumbar region.

Sometimes extension occurred downwards relatively early in the loose periureteral tissue, and invasion of the pelvis often took place with almost surprising ease. There was a tendency to upward spread along the lower part of the inferior vena cava, but no sign of invasion of the thorax through any opening in or behind the diaphragm.

The experiments proved that there is no continuity between the anterior layers of perirenal (renal) fascia on the two sides, and that these anterior layers, contrary to the usual description, gain a direct attachment to the lumbar vertebrae and intervertebral disks.

The experimental findings are correlated with those found at subsequent dissections, and a brief description of the arrangement of the fascia in the retroperitoneal regions is given.

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ADVANTAGES AND DISADVANTAGES OF ENDOTRACHEAL ANAESTHESIA*

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This is a subject with which anaesthetists are familiar. We cannot pretend to add anything new except our point of view. Endotracheal anaesthesia has had a vogue. Within recent times it might even be said that in some quarters it had become fashionable and was used where simpler methods might have been equally efficient. There are surgeons who welcome endotracheal anaesthesia even when it is far from essential. And there are surgeons who are content, and even prefer, to work amid difficulties to themselves and dangers to the patient rather than have intubation anaesthesia. Both enthusiasm and prejudice have long been equally powerful impediments to the progress of medical science.

We consider that the routine application of the same anaesthetic agent or the same method of its administration in a series of surgical cases without regard to the condition of the patient or the work of the surgeon is quite wrong and cannot be defended on scientific grounds. From the anaesthetist's point of view there is a definite group of surgical cases in which endotracheal anaesthesia is essential to the safety of the patient.

Advantages of Intubation

It is our intention merely to note some of the advantages that specially appeal to us in endotracheal anaesthesia. By means of intubation the anaesthetist is, once and for all, rid of the dead space of mouth and pharynx, as well as the essential factors in reflex respiratory spasm—the glottis and anoxaemia. As a result of intubation we have the perfect airway which is not affected by the mechanics of the dead space. Thus we have at all times absolute control of the depth of anaesthesia with the expenditure of a minimum of anaesthetic agent.

In the surgery of the upper abdomen and of the pelvis the advantages of intubation anaesthesia are often very

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