the subarachnoid space. It is therefore necessary, before evacuating the pus, to shut off the subarachnoid space by strips of gauze tucked in beneath the dura; these guarding plugs may be left *in situ* for two or three days, just as is sometimes done in the transpleural drainage of a hepatic abscess, or the transperitoneal drainage of an abdominal abscess.

The presence of a subcortical abscess is usually indicated by bulging of the brain, with pallor, broadening, and softness of the exposed convolutions. If the abscess lies deeply these characteristic appearances may be lacking. Exploration with trocar and cannula is, in my opinion, to be deprecated. The instrument may pass by the capsule, or, failing to penetrate it, may push it towards, and cause it to burst into, the ventricle. My own practice is to use a small flat seker, which passes with the least possible force through the softened brain tissue, and with which the resistance of an abscess wall can easily be felt. If by chance the instrument penetrates into a thin-walled abscess, pus at once flows out along it. The abscess having been thus located, I tie off such cortical vessels as may be necessary, and make a clean incision into the abscess with a sharp knife. The material of which the tube is made is of little importance provided it has sufficient rigidity; a rubber tube is rather too bulky for the size of its channel, but usually serves the purpose well enough. I have from time to time used tubes made of aluminium or of celluloid. Macewen employed decalcified bone tubes. Matters of greater importance concern the after-treatment. The tube, which should have been sutured to the edge of the dura or skin, must be kept clear by frequent gentle syringing, and should be retained in place for a long while, at least until all tendency for the brain to protrude has disappeared. It should be shortened only very gradually. If the brain protrudes persistently or increasingly either the abscess is insufficiently drained or some complication such as a second abscess or meningitis may be present. It is unwise, however, to interfere locally too soon, as there is always some oedema which tends to push the tube out. This period can be tided over by withdrawing fluid from time to time by lumbar puncture.

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ON

SOME DISORDERS OF THE LYMPH GLANDS.*

BY

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THE lymphatic system consists of a widespread set of vessels, most abundant in the skin, the intestine, and the connective tissues, in the course of which are aggregations of lymphoid tissue, termed lymph glands or nodes. The lymphatics take origin in the tissue spaces as capillaries. They are provided with valves, and drain into nodes arranged for the most part in groups, from which arise larger efferent vessels; these pass to one or more groups of nodes situated more deeply, and discharge ultimately into the main lymphatic channels—namely, the thoracic duct and the right lymphatic duct, which open into the origin of the innominate vein on the left and right side respectively.

In addition to the lymph nodes, lymphoid tissue is widely distributed throughout the body. The tonsils, including the pharyngeal tonsil, the thymus, and the spleen are composed almost entirely of this tissue; the alimentary tract is richly supplied with lymphoid elements, both as solitary follicles and as agminations in the lower part of the ileum (Peyer's patches), the appendix, and the colon.

The lymph nodes are collected into groups, of which the cervical, axillary, and inguinal are the principal ones near the surface of the body; more deeply, there are important collections about the trachea, in the root of the lung, in

the posterior mediastinum, in the transverse fissure of the liver, along both sides of the spine in relation to the aorta and its main branches, and in the mesentery. Over and above these are sundry collections and single nodes, the existence of which is scarcely appreciated until they are enlarged as the result of disease; examples are the epitrochlear, infraclavicular, and preauricular nodes.

It is by the lymphatics that certain substances are drained away from the tissue spaces with the help of phagocytic cells; fat is absorbed from the intestinal villi into the lacteals. The chief functions of the lymph nodes are to produce lymphocytes, and to form a barrier against infection of the more important tissues of the body. Not only microbes, but particles of soot, dust, and even neoplastic cells, are caught by this means and held back from the general circulation; no doubt many diseases of an infective nature abort at this line of defence. Lymphatic glands, then, are open to attack either by way of the lymphatics or of the blood stream.

Lymph nodes enlarge as the result of inflammation, of hyperplasia, or of infiltration by blood cells or new growth. An important series of changes, again generally associated with enlargement, is that which signifies retrogressive processes in the nodes; examples are fibrosis, caseation, the deposit of foreign substances, and abscess formation.

Lymph nodes in health are usually impalpable, and, unless the patient is unusually thin, nodes which can be definitely felt must be assumed to be pathological.

When investigating the lymphatic system of a patient in whom any enlarged nodes are found, let the first inquiry be upon an anatomical basis: in what group or groups is the enlargement present? The superficial nodes are examined systematically by careful inspection and palpation. Moderate enlargement of the cervical nodes may cause some fullness of the neck; the recognition of this feature may call attention to the presence of soft glands—as, for example, in acute leukaemia—which otherwise might escape detection. Stiffness of the neck, and perhaps torticollis, may be associated with enlarged cervical nodes; so also may a neuralgia accompanied by tenderness and hyperaesthesia of some part of the scalp or a headache which arises in the neck and spreads upwards over the vertex. In the axilla, care must be taken not to mistake fat for enlarged nodes. Sometimes superficial nodes in unusual places are to be seen or felt—for instance under the scalp, near the zygoma, and in the intercostal spaces. Of the deep groups, those within the abdomen when sufficiently enlarged may be recognized by palpation, or by signs of pressure upon neighbouring structures to which they give rise—as, for example, to jaundice with ascites when those in the transverse fissure of the liver are affected, and, be it remembered, multiple tumour formation within the abdomen is most often associated with lymphatic glands. It should also be borne in mind that an "odd" tumour within the abdomen—odd perhaps in regard to its characters or to the symptoms, or lack of them, to which it gives rise—is not seldom of lymphatic origin. An examination of the blood in such cases must always be made, lest a laparotomy be performed unwittingly in a case of, say, chronic leukaemia.

When disease of the lymph nodes has led, as in the case of tuberculosis, to caseation or to calcification, such nodes may frequently be demonstrated by x rays, and so the cause of indefinite abdominal pains, perhaps associated with more or less pyrexia, may be cleared up. Should caseous glands, as revealed by palpation and/or radiography, be situated mainly in the right iliac fossa, the portal of entry is most likely the appendix; less often it is the Fallopian tube. In either case, when associated with symptoms, laparotomy is indicated for removal of the offending structure.

Lymph glands within the thorax cannot be detected by ordinary physical examination, save when they are very considerably enlarged and coalescent. When this is so, however, they may give rise to certain physical signs. Greatly enlarged lymph nodes in the anterior mediastinum may cause a visible tumour in the neighbourhood of the sternum, with percussion dullness and signs of pressure upon veins. A similar state of things in the posterior mediastinum may yield impaired percussion resonance in

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the spaces between the vertebral border of the scapula and the spine. Weak breath sounds, with or without bronchial breathing, may also occasionally be present. These signs, however, are uncommon, and are only to be expected when the glandular enlargement is considerable. When present, they are probably caused as much by collapse of lung, or by actual infiltration of the organ by the same tissue as is concerned in the glandular enlargement, as by the nodal swelling itself. In the earlier stages of glandular enlargement within the thorax recourse must be had to x-ray examination, performed both in the antero-posterior and in the oblique positions; this investigation should always be undertaken in cases in which lymph nodes elsewhere are enlarged by a disease which is known to cause general lymphatic enlargement.

I.—Local enlargement results most often from local infection, the materies morbi being conveyed by the lymphatics. The area drained by the particular group enlarged must therefore be searched for the portal of entry. Local enlargement of nodes in the neck is very common, especially in children, the reason no doubt being that foci of infection are so frequent in the tonsils, teeth, nasopharynx, and scalp. This is so whether the infection is pyogenic or tuberculous. In an adult, in the absence of an obvious inflammatory focus, the possibility of metastatic deposits must be considered, seeing that carcinoma of the tongue and of the oesophagus are frequent diseases. If a gland is felt in the left supraclavicular fossa and none higher in the neck, a metastatic deposit from a carcinoma of the stomach or a retroperitoneal sarcoma must be thought of. Glands in the cervical group of one side, again in the absence of gross local infection, are generally the first to be enlarged in Hodgkin's disease.

In a case of acute axillary gland enlargement it is likely that this results from infection of the hand, in which case there may be red streaks extending up the arm, due to lymphangitis. The local wound on the finger may be a seemingly trivial affair—a prick by a rose thorn or by a needle. The infection, which develops with great rapidity, is mostly due to *Streptococcus pyogenes*, and it is in this class of case that sensitized *S. pyogenes* vaccine, combined with concentrated scarlet fever antitoxin, is proving so useful. Infection with *Spirillum minus*, the causal organism of rat-bite fever, may also result in an acute local enlargement and tenderness of lymph nodes—in which case there is a history of the patient having been bitten by a rat, a ferret, or a kitten, usually on the hand, three to four weeks previously. The bite heals, probably without incident, but with the onset of symptoms the site of the wound becomes red and painful, and pyrexia of a relapsing character develops. In a pyrexial period the whole limb may be swollen, and though the lymph nodes draining the area are those mainly affected there may be some generalized lymphadenitis; the specific rash may be found in the skin. This infection usually yields quite quickly to full doses of neokharsivan given intravenously; so much so that if a suspected case does not respond to two doses of 0.6 gram, given at an interval of five days, it is improbable that the illness is due to this cause.

II.—In generalized enlargement, when the nodes are found to be enlarged in two or more groups, the materies morbi may be conveyed by the blood stream; in some infections this general enlargement has a definite diagnostic value—as, for example, in glandular fever, in rubella, in the septicaemic or secondary stage of syphilis, and in bubonic plague. Another disease suggested by the discovery of general lymphatic enlargement in childhood and adolescence is acute lymphatic leukaemia, but here the nodal swellings are by no means the major part of the process, and may be relatively inconspicuous in comparison with the severity of the general state. If the glandular enlargement has arisen insidiously, and if the patient's general state is not acute, the probable explanation lies in the direction of such diseases as lymphadenoma, tuberculosis, leukaemia, and sarcomatosis. The differentiation of these conditions depends upon the specific features of the glands and certain general signs presented by the patient, including a consideration of the blood picture.

The specific features of enlarged glands calling for special note are: the number and distribution within the group;

the size; whether the glands are discrete or coalescing; their mobility; involvement of the skin and surrounding structures; consistency; and sensitiveness. It is important to remember that nodes which are adherent to one another, or to surrounding structures, are the seat of a disease process which has spread through the gland capsule—as in tuberculosis frequently, acute pyogenic infection occasionally, and malignant disease—or that the affected nodes have been treated by irradiation. In chronic cases more or less enlargement of glands in several groups suggests lymphadenoma, chronic leukaemia, or lymphosarcoma. Of these three diseases chronic leukaemia gives rise to the least difficulty in diagnosis because of its distinctive blood picture; whereas lymphadenoma is the most difficult, seeing that there are no enduring criteria on which to rely.

Of chronic leukaemia there are two main varieties—chronic myelocytic and chronic lymphatic leukaemia. It is the patient suffering from the latter condition who is likely to consult his doctor because of swelling in the neck or axilla due to glandular enlargement. It is a disease of adult life and has, as a rule, an insidious onset. It may occur in elderly persons, in whom it is prone to be quite latent over a long period. All the superficial groups are apt to be affected, but often unequally, the mass in the neck, axilla, or groin perhaps causing considerable deformity. The individual nodes in a group are of much the same size, soft rather than hard, discrete yet bunched up together, showing no tendency to break down or to involve the skin, insensitive to palpation, and quite painless apart from any discomfort which may be caused by the size of the mass. Deep glands may also be involved, and the spleen is always enlarged; sometimes it is as large as in chronic myelocytic leukaemia. The disease is compatible with good general health for a number of years, but sooner or later more acute symptoms are wont to arise, with pyrexia, loss of flesh, marked anaemia, stomatitis, tonsillitis, diarrhoea, and haemorrhages, though the last-named symptom is less common here than in myelocytic or in acute lymphatic leukaemia. The diagnosis is established, or rejected, by examination of the blood. A typical count in a patient first presenting himself for examination is: Red cells 3.5×10^6 per c.mm., haemoglobin 65 per cent., colour index 0.9, white cells 200,000 per c.mm., of which 96 per cent., or 192,000, are lymphocytes. The Leishman stained blood film shows a monotonous blue expanse of lymphocytes, mostly of the small variety, like those of normal blood, in marked contradistinction to the variegated beauty of the well-stained myelocytic film. Glandular enlargement is not a marked feature of myelocytic leukaemia; the nodes in the superficial zones may be just palpable, but are not greatly swollen.

In lymphosarcoma the tendency is for the glandular groups to be unequally transformed into large masses, the individual nodes varying in size, insensitive, soft rather than hard, of limited mobility, and for the whole mass to be fixed to the deeper structures. The liability to deep gland involvement is great, especially of the mediastinum, so much so that the first signs are usually either those of pleural effusion, which may be bilateral and recurrent, or of intrathoracic pressure—for example, dysphagia, cough, fullness of veins, recurrent laryngeal palsy, or sympathetic paralysis. The patient is usually a young adult, and more ill in the early stages than in the corresponding phase of chronic leukaemia or lymphadenoma. The disease is often pyrexial; the diagnosis is confirmed by biopsy. A case of this sort which I saw with Dr. Gilbertson at Hitchin in 1923 is apparently unique in that the patient, a young woman aged 20, has seemingly made a complete recovery.

Her story was that for five months she had had pyrexia, which was irregular, but seldom rose above 100° F. The right pleural cavity had already been aspirated on four or five occasions, the quantity of fluid removed varying from half to three and a half pints; the fluid was not blood-stained and did not clot. Recently the left upper extremity had become swollen, and the face was a little puffy; signs of effusion in the left pleural sac appeared and the subcutaneous veins on the left side of the abdomen became prominent. Enlarged glands, which were painless, sensitive, firm, and fixed, were found in the left supraclavicular fossa. The patient was transferred to hospital, where a biopsy proved the disease to be endothelial sarcoma, and radiography showed

a large mass in the mediastinum. During the four months she spent in hospital fluid was withdrawn from the right side of the chest eleven times, and from the left seven times. Dr. Finzi treated her with x rays; the mediastinal mass and cervical glands disappeared, and she remains in good health five years afterwards.

Concerning lymphadenoma much has been recently written, and I would call special attention to articles by Rolleston, MacNalty, Fraenkel, Bennet, and Ewing. The term "lymphadenoma," as at present ordinarily employed, probably does not indicate a single specific disease, but a variety of diseases more or less resembling one another in important clinical and pathological features;—just as we now speak of the enteric group, which includes a number of fevers closely resembling one another in important features, but each one due to a specific bacillus, though formerly all were included in the term "typhoid fever."

The differential diagnosis of "lymphadenoma" on clinical grounds is often quite impossible, especially from tuberculosis (including endothelial tubercle) and from lymphosarcoma. But if the initial site of glandular enlargement is on one side of the neck, or, rarely, in the groin; if the whole group is affected, but not equally, the largest glands being towards the centre of the mass; if the area involved seems as though stuffed with glands, which are generally of equally firm consistency, discrete, and tending to remain so for a long time, relatively painless and insensitive, and with no indication of involvement of the skin or of abscess formation, the diagnosis is probably lymphadenoma. In lymphadenoma the liability to inclusion of all the superficial groups is relatively great; although there is much diversity in the rate at which this happens, there is a marked tendency for orderly spread of the enlargement from neck to axilla, and from axilla to groin, or vice versa. In the early stages the general condition of the patient is good, but, coincident with the spread of the glandular enlargement, a secondary anaemia is prone to develop; the patient becomes easily tired, is liable to sweats, pruritus, pigmentation of the skin (apart from that which may result from treatment by arsenic or by irradiation), loss of flesh, and pyrexia, which is sometimes of a relapsing character. Evidence of involvement of the intrathoracic glands, and, less often, of the abdominal groups, may be forthcoming; sometimes it is these nodes which are enlarged in the first instance. Lymphadenomatous tissue is prone to infiltrate other organs and tissues of the body, more especially the spleen and the liver, and the presence of palpable enlargement of the spleen is a valuable additional point in favour of the diagnosis. Lymphadenomatous deposits in the spleen arise both in the Malpighian corpuscles and in the pulp; the presence of these white deposits has caused the spleen to be called "hard-bake" or "German-sausage" spleen, and the recognition of these changes is of the utmost importance in confirming the diagnosis at the necropsy. Similar foci of infiltration are sometimes to be found elsewhere—in the pleura, in the lung, in the marrow, in the skin, and, most important of all from the clinical point of view, in the vertebrae; here they may cause pressure either upon the spinal cord with the production of paraplegia, or, by constriction of the intervertebral foramina, lead to severe "root pains" referred to the area of distribution of the corresponding spinal nerve.

The foregoing is an outline of a disease first described by Hodgkin in 1832; there are certain other features which are sufficiently common in the group to merit attention. The frequency with which some infection has occurred recently in the territory drained by those glands which are first affected is often a striking point in the history. A story of sore throat is by no means uncommon, and Sir Thomas Horder has told me of a case in which the axillary glands, became the seat of lymphadenoma shortly after a septic infection of the finger. The tonsil is frequently the site of focal sepsis, and is regarded by many authorities as one of the portals of entry of the rheumatic virus and of the tubercle bacillus. It may possibly be the portal of entry also in those cases of Hodgkin's disease in which the cervical nodes are the first to be enlarged; yet it is very rarely that the lymphoid tissue of the tonsil, the thymus, or the Peyer's patches is involved in the disease. Though the enlargement of the nodes is usually slow and painless,

it may, on occasion, be rapid and painful; I have seen a case in which a mammary abscess was mimicked, and, at another time, sudden painful enlargement of glands in the right lower quadrant of the abdomen might easily have cost the patient her appendix. Exceptionally, one group of nodes only may be affected, and it is my firm belief that visceral infiltration may occur in the absence of demonstrable enlargement of lymphatic glands.

Of great interest is the relapsing pyrexia sometimes seen in this disease. In a monograph on the subject recently published by the Ministry of Health (see *Journal*, May 12th, p. 819) A. S. MacNalty states that

"Lymphadenoma with relapsing pyrexia may be classified into two main types:

1. A form in which the external lymphatic glands exhibit enlargement with or without enlargement of internal lymphatic glands.
2. A form in which the internal lymphatic glands are alone affected."

During the pyrexial periods the affected glands may become more swollen; the liver and spleen also, if involved, may increase in size, subsiding somewhat during the apyrexial interval. To quote MacNalty again:

"In a typical case, following on a period of low pyrexia, or of normal or of subnormal temperature, there is a steady rise occupying two to four days to a maximum of 102°, 103°, 104°, or even 105° F. For about three days the temperature remains at a high level, and then there is a gradual fall by lysis which usually occupies about three days also. The temperature then becomes subnormal, at any rate for a few hours. During the pyrexial period, as a rule, the patient feels exceedingly ill; he has aching pains in the back and limbs, together with chills, profuse sweats, and loss of appetite. His expression is one of distress and anxiety."

The duration of either the pyrexial or the apyrexial periods is not constant, and they do not seem to bear any relation to one another.

Help in diagnosis is sometimes obtainable from the pathologist. Unfortunately, there is no blood picture characteristic of the disease—all that can be said is that a blood count showing an anaemia of the secondary sort, with no gross alteration in the absolute and differential leucocyte count, is not incompatible with lymphadenoma. The intradermal tuberculin test is negative save in those cases, by no means rare, in which tuberculosis and lymphadenoma coexist. There is as yet no serological test to help us. Even after the histological examination of a suitable gland—that is, one in which the disease process is still active—removed during life the diagnosis may be largely a matter of individual opinion; there is the typical variety which shows the characteristic histological features described by Sir Frederick Andrewes, and which all will admit as Hodgkin's disease, but in other varieties, which do not conform to this, the histologist who makes the diagnosis may make a lucky shot or be merely bluffing.

So also with regard to etiology there are many guesses, many suspicions, much perplexity. Lymphadenoma is probably an infection, and a stronger case has been made out against the tubercle bacillus than against any other known microbe, the indictment being that under unknown conditions the tubercle bacillus is able to produce these changes in some tissues and organs, especially in lymphoid tissue, which differ from those of true tuberculosis.

So the disease, at present, is a mystery. Even the nomenclature is not settled; it answers in various quarters to Hodgkin's disease, to lymphadenoma, to lymphogranuloma, or to lymphomatosis granulosa.

Clearly, then, lymphadenoma is a condition calling urgently for research. At St. Bartholomew's a special fund, the Rose Research Fund, has been received for the investigation of lymphadenoma; clinical and pathological workers are co-operating in a special endeavour to elucidate it further. A team is in being, and a certain amount of progress has been made. Material is as yet scanty, and the fund will not be available for an indefinite period. We therefore invite practitioners to help us to "pluck out the heart of my mystery" by sending any patients with enlarged glands of doubtful or uncertain nature for investigation. Sir Thomas Horder and I will readily take them into the hospital, and, if required, we have the surgical collaboration of Professor Gask.