plastic and not suppurative; and that in cases of diffused septic peritonitis in which great distension and frequent vomiting set in a day or two after operation, but which eventually recover, there is possibly an increase of the peritonitis for a time. But it would be a great mistake to suppose that such symptoms coming on soon after an abdominal operation indicate a fatal termination.

I have already referred to the fact that some surgeons have recorded *post-mortem* observations on some of these cases of flatulent distension and have found no peritonitis, but have regarded the condition as one of primary paralytic distension. In operations on the gall bladder and bile ducts, usually the only parts manipulated, or even seen, are the pylorus, duodenum, and hepatic flexure of the colon, and yet I have seen several times most marked distension of coils in the whole abdomen after these operations. It is true such distension has not been associated with vomiting, or other bad symptoms, but yet it was very marked, and could not have been due to peritonitis, from manipulation of the affected coils or from contamination of the general cavity by septic fluids, nor could it have been due to thrombosis of the mesenteric vessels, as the distension was soon removed by enemata. It is an interesting question as to the nature of this distension when no peritonitis is present. The fact that it may result from traumatism in only one corner of the abdomen, would suggest that it may be a reflex nervous condition, very likely a primary paralytic condition, but not necessarily due to handling of the actual coils which are paralysed. But given excessive gas production within the bowel, the over-distension, and the kinking it will produce, may cause a secondary paresis and an actual obstruction. It is, however, unlikely that the gas production in a distant bowel would be affected by a cholecystotomy, and it is much more likely a primary reflex paresis of bowel, and is probably so in some other cases, in which there is more general manipulation of abdominal viscera. But whatever the cause of flatulent distension and vomiting may be after an abdominal operation, the treatment is the same: you must get expulsion of gas per anum, and faecal contents, too, if you can. I believe that there is nothing like very hot turpentine enemata for this purpose, repeated every few hours, and given with a soft rubber tube, left in the rectum for a short time after, to allow any gas which reaches the rectum to readily escape through the sphincter. No doubt purgatives may be of value, but I would much sooner rely on hot turpentine enemata. They should be as hot as the moment they are given as the nurse can bear her hand in, and the turpentine should be most thoroughly made into an emulsion with soap and a pint of hot water, and, if one pint fails, two or three pints very slowly introduced by a funnel and small rubber tube, with the pelvis elevated, may succeed. We may give a few grains of calomel, followed by a Seidlitz powder, as well, and repeat it. There is no doubt that in many cases in which tympanitic distension is marked and vomiting frequent, and the patient seems really very ill, this line of treatment will, if persisted in, remove the alarming symptoms. Possibly the frequent hypodermic injection of strychnine may help somewhat. Morphine must be avoided. Pain is not usually a marked feature in this condition; and morphine will tend to paralyse the bowel. And it is no use putting nourishment, even though it is liquid and peptonized, into the patient's stomach in such cases. We must so arrange the time of the hot turpentine enemata that nutrients can be retained for some hours.

Suppose the condition does not improve with this treatment, what is to be done? We must remember that in rare cases true mechanical obstruction may follow abdominal operations from causes which time will not allow me now to describe, and a faecal condition of the vomit would strongly suggest the presence of this condition, though I have seen faecal vomiting in septic peritonitis. The vomiting and distension of mechanical obstruction does not usually set in for some days after the operation, whereas in paralytic distension and peritonitis it starts about the second day or earlier. It would be well to reopen the abdomen if symptoms of obstruction persist in spite of treatment, and to deal with any mechanical cause of obstruction, or open the bowel above it, and in

cases in which we suspect the presence of a diffuse suppurative peritonitis, and have not drained the abdomen, the opening up of the cavity and insertion of one or more drains may lead to recovery, especially if combined with suitable position and subcutaneous saline injection, in large quantity. It is absolutely useless to open any given coil of distended small intestine for paralytic distension, whether primary or due to peritonitis; you cannot in that way evacuate the distended, kinked, and paralysed coils above it. You can reopen the abdomen and empty with your fingers coil after coil, but you run great risk of hastening the end from shock. Whether it is right to take this risk, in these almost hopeless cases, is often no easy matter to decide.

THE DISSEMINATION OF INTRA-ABDOMINAL MALIGNANT DISEASE BY MEANS OF THE LYMPHATICS AND THORACIC DUCT.

BY

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PRELIMINARY REMARKS.

IN April, 1905, I published in the BRITISH MEDICAL JOURNAL an interesting case of cancer of the thoracic duct and of the left supraclavicular glands secondary to latent carcinoma of the stomach. In January, 1906, I read before the Cardiff Medical Society a paper entitled, The Respective Roles Played by the Blood Vessels and the Lymphatic Vessels in the Local and General Dissemination of Intra-abdominal Malignant Disease. My present paper is based upon the two above-mentioned contributions, together with several cases which have since come under my personal observation.

It is well known that the lymphatic glands above the left clavicle (rarely those above the right clavicle) are occasionally involved secondary to malignant disease within the abdomen (stomach, intestine, rectum, pancreas, uterus), and it is also recognized that such enlargement may be the first, or, indeed, for a time the only, evidence of serious disease; and, moreover, that the primary mischief is often "latent," especially when it affects the stomach, since the supraclavicular glandular enlargement is most frequent when the growth is in the body of that organ. It has been computed that these glands are diseased in about 5 per cent. of the cases of cancer of the stomach, but this estimate is probably considerably below the mark. I make this statement for the following reasons:

(1) During the last fifteen months I have had under my own care five cases, and my colleague, Mr. William Sheen, has shown me two other cases, notes on which I am, by his courtesy, enabled to publish. (2) In some cases, although there may be no palpable enlargement of these glands, nevertheless careful percussion over or just below the left clavicle may demonstrate their presence. (3) In many cases there can be no doubt that the glandular enlargement is overlooked or referred to some other cause. (4) Careful necropsies, in cases of intra-abdominal malignant disease, may discover unsuspected glandular affection in this region.

The great rarity, in cases of abdominal cancer, of glandular enlargement above the right clavicle and its not uncommon occurrence on the left side, at once suggests that the infection is conveyed upwards by the thoracic duct, as there is practically no other channel of communication. The thoracic duct may act as a simple carrier of infection or it may be directly involved in the malignant disease, and the latter condition is undoubtedly more frequent than is generally supposed, and it should not be taken for granted that this duct is not involved, unless careful microscopical observations are made; for in three cases recorded below in which an autopsy was obtained, there was found in all of them, by my colleague Dr. Schölbberg, growth in the duct itself.

It is very remarkable to note to what a degree the thoracic duct is neglected in all medical and pathological

* It has been urged by some surgical writers that if we suspect primary paralytic distension, electricity should be tried before opening the abdomen.

works, and when one considers that practically the whole of the lymph from the abdominal organs travels per this duct it does not require a stretch of imagination to conclude that its rôle in the dissemination of malignant disease is very important.

In this connexion the well-known observations of Ponfick on the spread of tuberculosis by the thoracic duct are extremely suggestive, especially as he has demonstrated that the duct itself may exhibit tuberculous disease. When one considers that the cervical glands on either side of the neck may be equally frequently involved through local sources of infection, one cannot help asking the question: Is tuberculous glandular disease commoner on the left side of the neck than on the right side, on account of there being an additional channel of infection from the abdomen via the thoracic duct?

Objects of this Paper.

My objects in writing this article may be briefly enumerated as follows:

1. To point out that the lymphatic glands above and under cover of the left clavicle are much more frequently involved in intra-abdominal malignant disease than is generally recognized, and that this may be demonstrated in some cases (when the glands are not palpable) by percussion over the clavicle or in the infraclavicular region. In other words, the glandular enlargement which can be clinically demonstrated is not necessarily only "supraclavicular").

2. To show that the thoracic duct—and to a very much lesser degree the right lymphatic duct—plays a most important part in the dissemination of intra-abdominal malignant disease, either by acting as a carrier of infective material or by being itself directly involved.

3. To attempt to demonstrate that the secondary infection of different parts in cases of malignant abdominal disease can be explained on anatomical grounds.

4. To throw out a few suggestions which may be of some help to future writers on this interesting subject.

For the sake of simplicity I shall confine myself to the dissemination of malignant disease of the stomach.

Literature on the Subject.

Although textbooks are somewhat silent on the subject now under discussion, nevertheless careful search will show that there are several interesting contributions to be found, which I will now refer to briefly.

Weigert¹ gave the first full report of a case of cancer of the thoracic duct, describing the *post-mortem* appearances in a male aged 57. The primary lesion in this case was situated in the rectum. The secondary lymphatic infection involved the left inguinal glands and the pelvic and retroperitoneal glands along the great vessels, and from these by contiguity the thoracic duct was infected and completely occluded in one part of its course for a distance of 2 cm., although there was no evidence of distension of the lymphatics of the abdomen except in the region of the cisterna lymphatica at the origin of the thoracic duct. The glands in the neck are described as normal on both sides. Microscopically the growth was a cylindrical-celled carcinoma.

Unger² states that at the time he wrote 10 cases were on record. In his case of cancer of the uterus there were secondary growths in the thoracic duct and in the left supraclavicular glands, as well as in several other parts.

Troisier recorded 3 cases in 1897 and 1898. In the first the primary growth was supposed to be in the left adrenal body, while secondary growths occurred in the thoracic duct and left supraclavicular glands, and in other parts. In the second the primary growth was in the uterus, and secondary growths occurred in the thoracic duct and left supraclavicular glands, and in other parts. In the third case the primary growth was in the stomach, and secondary growths occurred in the thoracic duct and in other parts.

W. T. Hillier³ in 1903 recorded a case of cancer of the thoracic duct and of the left supraclavicular gland secondary to cancer of the rectum.

In April, 1905, I described a case similar to the above.

These cases are all interesting from the fact that the thoracic duct itself was involved.

Many other cases have been recorded of disease of the glands above the left clavicle in cases of intra-abdominal malignant disease, but in most of these the thoracic duct

has either not been affected, or its condition has not been mentioned, or it has not been microscopically examined.

In connexion with the literature of this subject the following remarks in Cunningham's *Anatomy* are interesting:

It is well known that the supraclavicular glands sometimes become enlarged subsequent to the appearance of malignant conditions in the abdomen and the mediastinum, and more particularly subsequent to affections of the oesophageal portion of the stomach. The course along which infective material travels in these cases is not yet known, for as yet no afferent vessels have been traced to the supraclavicular glands from the mediastinum.

CASE I.

Case reported fully in the *BRITISH MEDICAL JOURNAL*, April, 1905. The primary growth was in the posterior wall of the stomach, and secondary growths were found in the liver, coeliac glands, thoracic duct, and left supraclavicular glands. The gastric symptoms were "latent," and the first evidence of disease was the glandular enlargement.

Microscopical sections showed that all parts of the thoracic duct exhibited growth, and that this involved the supraclavicular glands by direct extension along the walls of the efferent lymphatic trunk of these glands.

CASE II.

A man, aged 57. He complained of pain in the epigastrium, flatulence, vomiting, and weakness. There was marked emaciation, there was a hard glandular mass above the left clavicle, and marked dullness in the left infraclavicular region, but no tumour could be discovered in the abdomen. A *post-mortem* examination could not be obtained.

CASE III.

A man, aged 48. He complained of slight gastric symptoms (uneasiness, occasional vomiting, loss of appetite, etc.) and weakness. There was marked wasting and anemia. Abdominal examination showed nothing. No glands could be discovered above the left clavicle, but over the middle of this bone there was well-marked dullness. A few hard subcutaneous nodules were found in the left axilla, one of which was removed and showed columnar-celled carcinoma. In about two months' time a large tumour was felt in connexion with the body of the stomach. At the autopsy was found cancer of the anterior wall of the stomach. The coeliac glands were involved, and a considerable number of glands lying under cover of the left clavicle were affected, and many small nodules of growth were found under the skin in the left axillary region. The walls of the thoracic duct showed on microscopic examination an infiltrating growth identical in appearance with that found in the subcutaneous nodules.

CASE IV.

A man aged 51. In this case there were all the signs and symptoms of cancer of the body of the stomach, a large tumour being present. There was marked glandular enlargement above the left clavicle, and this could be felt to extend beneath the bone, and could be demonstrated by percussion for some distance downwards. I was unable to obtain a *post-mortem* examination.

CASE V.

A man aged 55. There was evidence of undoubted cancer of the stomach. Secondary growths were found in several situations. There were no evidences of secondary growths in the pleura or lungs. No glands could be felt above the clavicles, but there was very marked dullness in the left infraclavicular region. This patient is still alive, but he is rapidly sinking.

CASE VI.

A woman, aged 37, in the Cardiff Infirmary, under the care of my colleague Mr. William Sheen. She has cancerous disease of the rectum, with a large glandular mass above the left clavicle which has rapidly increased in size under observation.

CASE VII.

The notes of this interesting case are given at the end of this paper by my colleague Dr. Schölberg.

GENERAL REMARKS ON THE MODES OF DISSEMINATION OF MALIGNANT DISEASE OF THE STOMACH.

In an analysis of 1,574 cases of cancer of the stomach secondary growths were found as follows (Welch):

Lymphatic glands (abdominal, cervical, inguinal), 551; liver, 475; peritoneum, omentum, and intestines, 357; pancreas, 122; pleura and lung, 98; spleen, 26; brain and meninges, 9; other parts, 92.

Cancer of the stomach may be disseminated in three ways (two or three may be combined), namely:

1. *By Direct Extension.*—It may extend to surrounding parts (peritoneum, omentum, diaphragm, pancreas, spleen, liver, intestine, etc.). Of course, such extension may be further disseminated by the lymphatics or by the portal vein, or by both of these channels.

2. *By the Portal Vein.*—The portal vein would, of course,

convey the infection to the liver. When the liver becomes affected, the malignant disease may be still further disseminated:

(a) By the lymphatics. Most of the lymph from the liver travels per the hepatic glands, thence to the coeliac glands, and thence by the thoracic duct. Some of the lymph from certain parts of the liver travels upwards to the glands in the chest, and thence proceeds chiefly via the thoracic duct and partly via the right lymphatic duct. Certain lymphatic anastomoses may be the means of infecting other parts (see Diagram 2).

(b) By the hepatic vein, and hence via the pulmonary artery.

(c) By direct extension to the diaphragm and pleura or other neighbouring parts.

3. *By the Lymphatics.*—The whole of the lymph of the stomach travels via the gastric glands to the coeliac glands, and thence via the thoracic duct, so that infective material will reach the general circulation through the thoracic duct (unless this be blocked), and it may or may not involve the walls of this duct. On reaching the heart it will proceed via the pulmonary circulation, and it may stop in the lungs, or proceed still further, and be then disseminated in an embolic fashion to distal parts, and may even by this means reach some abdominal organ.

Anatomy of the Lymphatics in so far as it Affects the Dissemination of Cancer of the Stomach.

There are two somewhat popular errors which can be at once corrected by an appeal to anatomy. These are:

(a) The supposed infection of the hepatic glands by cancerous material coming direct from the stomach. As a matter of fact, the lymph from the gastric glands travels via the coeliac glands to the thoracic duct, as also does that coming from the liver via the hepatic glands. Consequently if in a case of cancer of the stomach the hepatic glands be involved, this means that the liver has first been infected (probably through the portal vein, or possibly by extension). In this connexion, however, one may state that in some cases of cancer of the stomach growth sometimes extends up along the hepatic lymph vessels against the flow of the stream of lymph.

(b) It has been supposed that some of the lymph from the stomach instead of travelling by the thoracic duct may proceed upwards into the chest by other lymphatic vessels, and this idea has been used to explain the not infrequent involvement of the pleura (especially on the right side) and mediastinum in cases of cancer of the stomach. As a matter of fact, however, this supposition is anatomically incorrect; for though lymph comes downwards to the receptaculum chyli by two small descending thoracic vessels (from the lower intercostal spaces), nevertheless none goes upwards, unless, of course, the thoracic duct be blocked, in which case collateral channels may come into play. A consideration of the anatomy of the lymphatic vessels may explain fairly well the seats of election of metastatic deposits in cases of the stomach, though many difficulties are encountered for the following reasons: The anatomy of the lymphatic vessels has not been absolutely worked out, lymphatic anastomoses are very numerous and often most difficult to demonstrate, the thoracic duct or any of the smaller lymphatic trunks may be wholly or partially blocked in some part or parts, the lymph stream flows under but slight pressure and "reversal currents" may possibly occur, phenomena may occur comparable to the so-called "retrograde embolism," and, lastly, malignant disease may invade the wall of a lymphatic vessel and thence travel in any direction either with or against the stream. Even though the above points must of necessity be borne in mind, thus making dogmatic statements impossible, nevertheless there are certain general anatomical points which are very helpful, in the investigation of this subject.

The diagrams here given are, I am afraid, somewhat complicated and open to criticism, but I think they will serve to illustrate roughly the points which I am attempting to bring out.

The Dissemination of Cancerous Disease of the Stomach.

As already pointed out, cancer of the stomach may spread to other parts in three ways: (1) By direct extension to neighbouring parts, and thence by the lymphatics of those parts or by the portal vein by way of the liver;

(2) by the portal vein; (3) by the lymphatics of the stomach.

Let us suppose that infective material is carried away by the lymph from the stomach. The lymph from the greater part of the stomach travels by way of the gastric glands, the coeliac glands and the thoracic duct, but a portion of it (coming from the left part of the stomach) travels by way of the splenic glands to the coeliac glands and thoracic duct. This infective material would in its transit probably cause malignant enlargement of the above glands, and be arrested in the glands, or it may travel earlier or later up the thoracic duct (with or without involving its walls), and

Diagram 1.—Thoracic duct and right lymphatic duct. a, termination of thoracic duct; b, supraclavicular glands; c, subclavian lymphatic trunk; d, jugular lymphatic trunk; e, lymphatic vessels from chest (mediastinum, thoracic viscera, intercostal spaces, etc.); f, descending lymphatic trunks from lower intercostal spaces; g, lymphatic trunks from abdominal organs and from lower parts of the body; h, right lymphatic trunk; i, jugular lymphatic trunk (right); j, subclavian lymphatic trunk (right); k, lymphatic vessels from right upper intercostal spaces and right upper part of mediastinum.

would then reach the general circulation, and it may be arrested in the pulmonary circulation (producing local secondary growths), or it may travel still further and be disseminated in an embolic manner to distal parts. Now if the walls of the thoracic duct become involved, the malignant disease may travel by extension along this either with or against the stream, so that it would be easy to see how distal glands may be affected (preaortic, iliac, inguinal, etc.), and also to see how the supraclavicular and bronchial glands may be involved.

Again, suppose that the thoracic duct becomes blocked—partially or wholly—at its upper end, then, again, the lymph stream may travel in the opposite direction to its normal flow, so that in this way also the lower abdominal glands and even the inguinal glands may become affected.

since the lymph will attempt to get an entrance into the great veins by means of anastomotic channels.

Next, let us suppose that the infective material travels by way of the portal vein. In this case it, of course, reaches the liver and sets up secondary cancer in that organ. How now is the disease further disseminated? As already pointed out, it may go still further by direct extension to surrounding parts—diaphragm, etc.—or it may go via the hepatic vein, thus reaching the general circulation. The third method of dissemination is, however, the most important—namely, that by the lymphatics. Now, if infective material gains entrance into the lymphatics of the liver, it may proceed further by various channels, according to the part of the liver involved:

(a) It may go to the hepatic glands, thence to the coeliac glands and thoracic duct, and its further course is determined by the conditions already mentioned.

(b) It may (see Diagram 2) possibly travel by way of the gastric glands.

(c) It may go downwards to the deep glands of the anterior abdominal wall, and from here it may travel (1) to the external iliac glands, and thence via abdominal glands to the thoracic duct; (2) by anastomoses it may go deeply to the sternal glands, or superficially upwards or downwards (see Diagram 2).

(d) It may go to various groups of intra-thoracic glands (see Diagram 2).

From the above it will be seen that the liver is largely responsible for much of the dissemination of cancerous disease of the stomach.

Another way of putting the above points is as follows: How do the lymphatic glands in different parts become infected?

In over one-third of the cases analysed by Welch secondary growths were found in the lymphatic glands. It is, of course, obvious why the gastric glands and the coeliac glands should be infected, but

it is not so easy to understand why other glands should be affected (lower pre-aortic, iliac, inguinal, glands of deep abdominal wall, glands in the chest, clavicular glands, axillary glands).

(1) How do the deep abdominal glands below the level of the coeliac glands (lower pre-aortic, iliac, etc.) become involved? These glands must, when diseased, be affected

against the normal flow of the lymph stream. Infective material can practically only reach these glands in two ways—either by the lymph stream running downwards to get to the lymphatic circulation by anastomotic channels on account of partial or complete blocking of the thoracic duct or by a direct extension of growth downwards along the walls of the lymphatic vessels.

Other possible modes of infection are secondary involvement of the liver followed by infection proceeding downwards along the abdominal wall and hence per external iliac glands upwards (see diagram), or embolic infection of certain organs (kidney, intestine, etc.) with subsequent lymphatic infection.

Infective material may reach the inguinal glands from the deep abdominal glands (see above) either by extension or by backward flow, or it may reach them from the liver and the anastomoses in the anterior abdominal walls. Another possible mode of involvement of these glands and of the deep abdominal walls is per backward flow in the portal vein (due to obstruction).

(2) Infective material travelling upwards in the thoracic duct does not go by way of the supraclavicular glands (see diagram). In order to explain the infection of these glands, we must suppose either that they are involved per extension of growth along the thoracic duct and the lower end of the internal jugular lymphatic trunk, or else that infective material travelling up the thoracic duct may be re-gurgitated into them either from expiratory efforts or from a condition of more or less blocking of the upper end of the thoracic duct. Both these explanations may be true, but I think that the former is the more probable, since the thoracic duct is far more frequently involved in malignant disease than is generally supposed. Another possible method of infection is by the anastomoses along the abdominal and chest walls by way

Diagram 2.—A, Liver; B, stomach; C, pancreas; D, spleen; E, intestines (except rectum); F, pelvic viscera (bladder, rectum, uterus); G, lungs; H, heart; K, pericardium; L, oesophagus; M, diaphragm; N, chest wall; O, abdominal wall; P, umbilicus; R, kidney; S, testicle or ovary; T, posterior abdominal wall; V, posterior thoracic wall; a, hepatic glands; b, gastric glands; c, pancreatic glands; d, splenic glands; e, intestinal glands (superior mesenteric, ileo-caecal, colic, inferior mesenteric); f, pelvic glands; g, internal iliac glands; h, external iliac glands; i, common iliac glands; m, pre-aortic glands; n, lateral aortic glands; o, coeliac glands; p, anterior diaphragmatic glands; q, middle diaphragmatic glands; r, posterior diaphragmatic glands; s, sternal glands; t, anterior mediastinal glands; u, middle mediastinal glands; v, posterior mediastinal glands; w, supraclavicular glands; z, axillary glands; y, glands of deep abdominal wall; z, inguinal glands; 1, thoracic duct; 2, descending thoracic lymphatic trunk; 3, ending of thoracic duct; 4, subclavian lymphatic trunk (left); 5, jugular lymphatic trunk (left); 6, jugular lymphatic trunk (right); 7, right lymphatic trunk; 8, subclavian lymphatic trunk (right). This diagram also illustrates how the lymphatic glands in the chest empty their lymph into the thoracic duct or into the right lymphatic duct according to whether they are situated on the left or on the right side.

of the axillary glands (see diagram). Of course the infective material may reach the thoracic duct by way of diseased chest glands (see diagram).

The very rare involvement of the right supraclavicular glands is accounted for by the only possible method of infection being from the mediastinal glands, etc., on the right side, secondary to hepatic cancer (see Diagram 1).

It is fairly obvious that the thoracic duct must, in most cases, carry in one or other way the infection to the supraclavicular glands.

(3) Why are certain abdominal organs so frequently affected—peritoneum, liver, spleen, pancreas?

The peritoneum and omentum are affected by direct extension or by an infection per the subserous lymphatic anastomoses.

The liver (see Diagram 2).

The pancreas: From Welch's analysis it will be seen that this organ is affected in about 8 per cent. of all cases of cancer of the stomach. The anatomical relations of the stomach to the pancreas explains this as occurring from direct extension, and infection may also occur via the splenic glands (see Diagram 2).

The spleen may be infected by direct extension or by arterial embolism, and, moreover, it is to be remembered that the lymphatics from the left end of the stomach empty themselves via the splenic glands (see Diagram 2).

The most obvious manner in which the lungs become involved is by embolic infection, the material reaching the general circulation through the thoracic duct. The pleura or lungs may also be infected from the liver, and thence through the diaphragm or the glands in the chest (see Diagram 2).

The method of infection of the sternal and mediastinal lymphatic glands is illustrated in the diagram.

The mode of infection of the walls of the chest or abdomen and of the axillary glands is shown in the diagram, always remembering that infection may travel along the walls of the lymphatic vessels in the opposite direction to the normal flow of the lymph stream, and also that the flow may probably be diverted in direction from slight causes.

CONCLUDING OBSERVATIONS.

There are certain interesting points in connexion with this subject which may be shortly enumerated as follows:

1. The thoracic duct undoubtedly plays an important rôle in the dissemination of intra-abdominal malignant disease and of tuberculosis. This duct may act as a "simple carrier" of infective material or it may be directly involved, and in some cases it may be actually obstructed. In connexion with blocking of this duct it is very remarkable that chylous ascites is so rare and also that dilatation of other lymphatic channels can so seldom be demonstrated.

2. The supraclavicular glands on the left side are more frequently involved in intramalignant disease than is generally supposed, and in many cases careful percussion will show the presence of glandular enlargement in the clavicular and infraclavicular regions, and may even thus give a clue to the nature of the abdominal affection. It is possible that these glands become infected through "regurgitation," but a more likely method of infection, and one which can be demonstrated in some cases, is by direct communication of the disease along the walls of the thoracic duct, extending to the lymphatic vessel coming from these glands. The right clavicular glands are very seldom involved, and the reason for this is fairly obvious on studying the lymphatic anatomy.

3. The possible mode of infection of other parts—chest, liver, inguinal glands, abdominal wall, etc.—have been discussed.

4. It is probable that many cases of so-called primary mediastinal growths may really be of secondary origin, since it is well known that cancerous disease, especially of the stomach, may be very "latent," and, moreover, a small growth of the stomach, though it has been the cause of marked secondary growths, may even be overlooked at the autopsy unless especial care be taken.

Although I am fully aware that this paper is open, in many respects, to considerable criticism, I hope that it will at least stimulate research on the lines which I have indicated. My observations on this subject will, I trust, show the importance of careful percussion of the left clavicular and infraclavicular regions in cases of doubtful intra-abdominal malignant disease, and also the importance of an examination of the thoracic duct at autopsies.

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CASE F.

D. D. male, aged 44, occupation, collier. Admitted to the

Cardiff Infirmary on December 23rd, 1905, under the care of Mr. William Sheen.

CLINICAL ABSTRACT OF CASE.

History of the Present Condition.—In February, 1905, the patient began to suffer from pain after food and vomiting; he was treated for indigestion without success, steadily losing flesh up to the time of admission.

On December 17th, a week before he came to the infirmary, he began to suffer from pain over the upper part of the left side of the chest, and over the left shoulder. A vein over the front of the left arm became swollen and cord-like and the region over the left side of the chest and left shoulder became swollen, the swelling subsequently extending down the left arm to the wrist.

On Admission.—Patient looks thin and ill. Tongue furred. Temperature, 98° F. Weight, 8st. 10½lb.

Head and Neck.—Pupils equal. No trace of enlarged or tender glands to be felt on either side. No enlargement of the veins of the neck.

Arms.—The left arm is uniformly swollen down to the wrist, the skin showing here and there purple patches of discoloration. Seven inches below the acromion process the right arm has a circumference of 9½ in., while the left is 11½ in.; at the elbow joint, with the forearms flexed at 35°, the figure for the right side is 9½ in., and for the left 10½ in.

Chest.—Normal.

Abdomen.—No distension. On palpation a tender lump the size of a Tangerine orange can be felt to the left of the epigastrium; it is not attached to the abdominal wall, and appears fixed in position.

Urine.—Normal.

On December 27th the stomach contents were examined for free hydrochloric acid, after a test meal, and this was found absent. On January 5th, 1906, Mr. W. Sheen performed an exploratory laparotomy. The walls of the stomach and the omentum were found infiltrated with a hard growth. An enlarged gland was removed from the gastro-colic omentum for microscopic examination, and the abdominal incision was then closed. Acting on the suggestion of Dr. Mitchell Stevens, an incision was then made over the left supraclavicular fossa, the deep fascia was cut through, and several enlarged glands were removed. This incision healed by first intention. Subsequently, eighteen days before the death of the patient, the area around the scar in the neck became swollen, and was incised; some milky fluid was evacuated, and a sinus formed which discharged large quantities of chyle until a day before the patient died. Death took place on February 23rd, 1906.

Abstract of Post-mortem Examination.

External appearances:—Marked emaciation; sinus situated in the left supraclavicular fossa, which admits a probe for a distance of 2½ in. The scar of the abdominal incision is firmly healed.

Head not examined. *Thorax:*—The thoracic contents were removed with the whole of the abdominal contents, so as to maintain the relation of parts to the thoracic duct. The duct was readily found extending from the abdomen to the neck as a firm white structure with irregular enlargements attached to its walls. The abdominal lymphatics over the aorta were fused into a mass, enlarged, and were affixed to the lower end of the thoracic duct. The duct was considerably increased in size at its passage through the diaphragm, and then continued its course with variations in its circumference until the neck was reached. Here it ended in an enlargement, which was partly fixed to the lower part of the thyroid; the connexion with the subclavian vein did not exist, the duct terminating in the sinus already mentioned. The distribution of the growth in the abdomen, apart from the primary cancer of the stomach, was mainly lymphatic. All the glands in the abdomen were enlarged, including those extending over the brim of the pelvis. The liver showed no secondary deposits in its substance, but on its surface a few small plaques of growth were visible. The under surface of the diaphragm was covered with a large number of small nodules of cancer.

The lungs showed no secondary deposits.

Microscopically the primary focus in the stomach showed an adeno-carcinomatous type of growth, the enlarged abdominal glands, thoracic duct wall, and supraclavicular glands reproducing the original arrangement, the only difference being that in the thoracic duct wall the stroma was less well developed.

While reporting these cases of cancerous infection of the thoracic duct, to which Weigert originally drew attention, it is not without interest to record that recently I found in the *post-mortem* examination of a case of tuberculous peritonitis in a child that the only secondary infection discovered was a tuberculous enlargement of the glands in the left supraclavicular region, the lungs and branchial glands being to all appearances normal.

Osler⁴ emphasizes the importance of enlarged cervico-axillary glands associated with disease of the corresponding apex of the lung with latency of the pulmonary lesions.

REFERENCES.

- ¹ Virchow's Archiv. vol. lxxix. ² Ibid. 1896. ³ Trans. Path. Soc. ⁴ Principles and Practice of Medicine, p. 322.