only as a midwife in ordinary cases, and under strict compulsion to send for a medical practitioner on the occurrence of any abnormality in mother or child, and it seemed to me that when Parliament passed a Bill compelling the midwife to send for a medical man it was an obvious and logical conclusion that Parliament would provide for the payment of any practitioner so summoned, and I moved the insertion of a provision to that effect in the Bill. But Parliament found some technical excuse for not inserting such a provision. The omission is a serious flaw in the Act discreditable to Parliament. Parliament must correct this great fault, which if not corrected may have very deplorable consequences. The Act with this defect is a cruel wrong to the lying-in woman and is most unfair to the medical profession. I have every reason to believe that the Midwives Board desires the supply of this defect and has repeatedly urged the Privy Council to introduce legislation to this effect. The profession should appeal persistently to both the Midwives Board and to the Privy Council for redress. The case of the poor lying-in woman is altogether an exceptional one, and the exceptional legislation of 1902 must be completed by securing to the medical profession payment for services which Parliament itself virtually compels. And it should be done without taint of pauperism. The profession, too, will look to the Midwives Board to keep the practice of midwives severely restricted to the case of normal labours. It would be a breach of trust with the medical profession, and altogether retrogressive, to admit the right of imperfectly educated midwives to deal with labours that do not comply with the normal and physiological standard. With these criticisms I leave the question of the Midwives Act. With advancing intelligence and providence every respectable working man will want to give his wife the best chance in her puerperal time and will seek to place her under the best medical care he can command. And so I expect the medical profession, viewing obstetric work as essentially surgical work, with all the risks of an open wound and the credit of all possible asepticism to be gained, to maintain its supremacy and superiority in this great branch of medical practice—the elevation of which has corresponded with the transfer of responsibility from midwives to medical practitioners. On the score of humanity as well as for the credit of medicine, the practice of midwifery must be kept at the highest pitch of perfection.

(5) *The abuse of medical charities.*—It only remains for me to notice one more possible hindrance to the full success and prosperity of the medical profession. It is one that is kept well before the public but has not hitherto been effectively grappled with by the authorities of our hospitals and dispensaries—I mean the abuse of medical charities. There is no body of men to whom the public is more indebted than the committees of our hospitals and dispensaries with their anxious responsibilities, unless, indeed, it be the medical and surgical staffs of these charities, who perform gratuitous services, which in point of responsibility, physical fatigue, and mental wear and tear are little realised. But let them be well assured that they are risking the very existence of voluntary hospitals by the methods of distributing their alms. There is no excuse for them now considering the readiness of medical men in every district to meet the case of the industrial classes on reasonable and self-respecting terms and the high efficiency of the medical profession to deal with the run of the ills ministered to in the out-patient departments. The medical profession, on the other hand, must meet these classes half-way. I was one of a committee in the General Medical Council for seeking to hold up the character both as regards ethics and remuneration of the club system, and I am bound to admit that the members of the Council who met the representatives of the great industrial lodges and friendly societies of Great Britain were impressed with their reasonableness and their desire to meet fairly the claims and views of the profession. I still believe that good terms could be reached with these bodies, and in this hope and the hope for better discipline against all abuse of medical charities I rest my belief that the great working classes of the country will come to find themselves better looked after by *well-paid and continuous medical attendants* than by the casual, irregular, and demoralising system of gratuitous out-patient relief, however admirable and good in emergencies or extreme cases.

And now, gentlemen, you will be pleased to think that I am about to bring my remarks on the outlook of medicine to a close. Had I my life to begin again I should study

medicine, for the intense interest of it, for the companionships of it, and even for the security of a modest income which every earnest and enthusiastic and fairly intelligent man may expect. You remember Johnson's tribute to the memory of Robert Levett, the old apothecary who lived in his house, and without whose advice it was said the great sage would not have been content even with that of the whole College of Physicians:—

No summons mocked by chill delay,
No petty gains disdained by pride;
The modest wants of every day,
The toil of every day supplied.

We cannot all be Pasteurs, Listers, or Jenners, but we are their successors. We enter into their heritage, we apply their discoveries, we practise the principles which they established. It does not seem to be pecuniarily profitable to make researches or discoveries. Lord Lister probably never made or cared to make the income which some of his followers have very properly made by the use of his discoveries and methods. Both he and they have their reward. They both belong to the one great profession which has the strongest claim on the gratitude of the public, and in its very practice is attended with satisfactions beyond all mere financial considerations. If I am right, and if the profession is true to itself, it cannot cease to count for much in its social and political future of all civilised communities.

Lectures

ON

THE LYMPHATIC SYSTEM OF THE CÆCUM AND APPENDIX.¹

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THE lymphatic vessels of the intestine, from the duodenum to the splenic flexure of the colon, accompany the branches of the superior mesenteric artery and, after having passed through a variable number of glands lying between these branches, have a common termination in the large glands which lie around the stem of the artery at the root of the mesentery: their efferent vessels pass separately, or united into a single trunk, into the receptaculum chyli. At the stage of development when the small and large intestines are enveloped in a single common mesentery, and in a few cases where this primitive condition persists, it is very evident that the vessels and glands contained within this mesentery are incapable of subdivision into definite groups, except in the most arbitrary way. They are all mesenteric. Without losing sight of this fact, the change in the disposition of the intestine and its peritoneal investment, resulting in the separation and distinction of the mesentery inclosing the small intestine, from the transverse meso-colon inclosing the transverse colon, and the disappearance of the ascending meso-colon, permits the division of these lymphatic glands into three separate groups: (1) mesenteric, lying between the layers of the mesentery, draining the small intestine; (2) meso-colic, lying between the layers of the transverse meso-colon, draining the transverse colon; and (3) ileo-colic, lying behind the parietal peritoneum in the space bounded by the attachment of the mesentery below and to the left, the transverse meso-colon above, and the ascending colon to the right. It is this last group to which we have confined our attention in the present instance.

Before describing the lymphatic vessels and glands it is necessary to state briefly the disposition of the ileo-colic blood-vessels, since the abdominal lymph vessels are closely associated with the arteries and veins, and all three systems

¹ The Arris and Gale Lectures delivered at the Royal College of Surgeons of England on Feb. 18th and 20th were based on the work recorded in this and the previous lecture (THE LANCET, April 20th, 1907, p. 1061).

of vessels should be considered together to insure, where possible, a common nomenclature. The ileo-colic artery arises from the superior mesenteric artery on the third part of the duodenum. At the lower border of the duodenum it leaves the root of the mesentery and proceeds downwards and outwards behind the parietal peritoneum towards the angle between the ileum and the ascending colon. At a distance of about an inch from the ileo-colic angle it breaks up into several branches—appendicular, anterior ileo-colic, posterior ileo-colic, ileal, and colic. At a variable distance from its origin it usually gives off the right colic artery, though this vessel may spring independently from the superior mesenteric trunk.

The terminal branches are inconstant in their mode of origin; usually the main artery gives off the appendicular and then divides into the anterior and posterior ileo-colic branches. The anterior branch gives off the ileal vessel, the posterior the colic. The appendicular artery descends in or near the free margin of the meso-appendix and terminates at the tip of the organ. It gives off branches, gradually decreasing in length, to the whole of the appendix. In many cases, however, one or more branches pass from the posterior ileo-colic artery to the proximal portion of the appendix. The ileal branch passes onwards in the mesentery to anastomose with the terminal portion of the superior mesenteric, and it supplies several inches of the ileum. The anterior ileo-colic descends in the ileo-colic fold and supplies the anterior surface of the cæcum, its terminal twigs reaching the root of the appendix; it also supplies a branch to the end of the ileum. The posterior ileo-colic descends behind the ileo-cæcal junction, supplying the back of the cæcum and the terminal portion of the ileum. As we have already noted, it often gives a branch or branches to the proximal portion of the appendix. The colic branch ascends along the inner side of the ascending colon and anastomoses with the right colic artery.

The following account of the lymphatic glands and vessels of the cæcum and appendix is based upon an examination of 25 specimens injected by the method of Gerota. The ileo-colic artery is surrounded from its origin to its division by a chain of lymphatic glands varying in number from 10 to 20, and in size from that of a pin's head to that of an almond. The chain is continuous, often without interspace, with the glands around the trunk of the superior mesenteric artery. Though the chain is frequently concatenate, it usually shows a tendency to fall into two groups, one lying on and below the lower border of the duodenum and the other above and around the point of division of the artery. For purposes of description it is of great convenience to divide the main ileo-colic chain into two groups, an upper group and a lower group. This division, as we have intimated, though frequently quite arbitrary, is not always so. The reasons which prompt us to make use of this subdivision will appear when the course of the lymphatic vessels coming from the cæcum and appendix is under consideration. It would be difficult to give an accurate description of these vessels without subdividing the main chain of glands.

At the point where the ileo-colic artery gives off its terminal branches the chain of glands becomes broken up into several groups which are associated with the branches of the artery. These groups are constant in position though not in the number of their constituent members, and are sufficiently distinct from each other to be described as separate groups; still they must be regarded merely as outlying portions of the main chain. Five groups may be described: (1) anterior ileo-colic; (2) posterior ileo-colic; (3) appendicular; (4) ileal; and (5) right colic.

The anterior ileo-colic glands vary in number from one to four, the usual number being three. They lie in the ileo-colic fold close to the wall of the cæcum; they may be continuous with the lower group of the main chain but it is more common to find an interval between them. The highest gland, which lies in the upper part of the fold just above the ileum, is almost invariably the largest. It is very unusual to find members of this group at a lower level than the lower margin of the ileo-cæcal junction.

The posterior ileo-colic glands are more numerous and less regularly disposed; this group is evidently the direct continuation of the main ileo-colic chain, and it is often impossible to mark the exact point of transition. The greater number of the glands lie in the angle between the ileum and the colon; some small glands are to be found lying in the groove between the cæcum and colon on the posterior surface of the cæcum and in about half the number of specimens we

have examined one or more project between the layers of the meso-appendix at its cæcal extremity.

FIG. 4.

Lymphatics of the cæcum and appendix. Anterior view.

The appendicular gland.—Between the layers of the meso-appendix at or near its free border a single small gland may sometimes be seen lying on the appendicular artery. (Specimens B, C, D, &c.) Its position on the artery is variable; it may lie some distance from the base of the meso-appendix or it may be quite close to its attachment. In one case (Specimen 30) it lay only partially between the layers of the fold. As the lower group of the main chain lies just above the attachment of the fold it seems evident that this gland is a prolapsed member of that group.

Ileal glands.—In the right end of the mesentery small glands lie in association with the ileal branch of the ileo-colic artery. They are most irregular in number and in size and only receive some of the vessels from the terminal portion of the ileum. As their efferents pass to the main ileo-colic chain we have regarded them as a subsidiary group of this chain.

The right colic glands, numerous but small in size, lie along the inner side of the ascending colon. They are in close contact with the wall of the colon, many of them being situated in the sulci in front of, and behind, the internal tænum. The lower ones are associated with the colic branch of the ileo-colic artery, the upper with the branches of the right colic artery. As their efferents terminate in the glands of the ileo-colic chain we speak of the whole row, from the cæcum to the hepatic flexure, as the right colic glands. Singularly few glands are to be encountered along the trunk of the right colic artery. In some of our specimens (A and N) we have seen one or two small glands, but in the majority none are to be found.

The plexuses of origin of the lymphatic vessels have been well described by various writers. We shall only briefly consider them in order to refer to some points of interest. According to Kelly and Hurdon² the lymphatic plexus of the appendix may be divided into three layers—superficial, middle, and deep—lying respectively under the peritoneum, under the circular muscular coat, and under the muscularis mucosæ. Each layer consists of a capillary plexus draining into larger collecting vessels which issue from the wall of the organ at the attachment of the meso-appendix.

² Kelly and Hurdon: The Vermiform Appendix and its Diseases, 1905.

They consider that there are channels which afford communication between the three systems, but that they must be insignificant as the injection did not often pass from one to the other. We are not able to say whether the injection passes readily from the subserous layer to the submucous, but we find that the injection does pass readily from the submucous to the subserous, and that by inserting the needle into the submucosa all the vessels in the wall of the appendix can be injected. Further, Kelly and Hurdon state that only a limited area of the surface lymphatic plexus, representing the area draining into one collecting vessel, can be injected by one puncture. They say, "This demonstrates the existence of valves between the capillaries and the first system of collecting vessels and it demonstrates also the absence of valves in the capillaries a focus of infection inside such an area would therefore be practically isolated from the rest of the appendix." We have found no difficulty in injecting the entire subserous network of the appendix and even also of the apex of the cæcum from one puncture in the appendix. We believe, therefore, that there is not only free communication between the various systems of plexuses but also between one part of a plexus and another. We cannot entertain for a moment the idea that an infected area is isolated from the rest of the organ by the arrangement of its lymphatics. The plexuses of origin in the cæcum resemble in every respect those of the appendix.

The lymphatic vessels which issue from the appendix divide themselves into three sets. The first set consists of the vessels which drain the organ from its tip to near its root; the other two sets are formed by the vessels which arise from the root. The vessels forming the first set vary in number from eight to 15; leaving the wall of the appendix they enter the meso-appendix and ascend between its layers with the branches of the appendicular artery to its main stem around which they form a leash of from four to six vessels. These accompany the artery to its origin where they meet the lower group of the main ileo-colic chain.

FIG. 5.

Lymphatics of the cæcum and appendix. Posterior view.

Many of them end in the glands of this group; others, however, ascend to the glands of the upper group in which they end at variable levels. In some cases a gland in front of the duodenum is seen to be injected by vessels running directly from the appendix. When such vessels are traced to their origin we find that they may arise from any part of the appendix, and quite as frequently from its proximal as from its distal portion.

The appendicular gland when present receives vessels

from various parts of the appendix, from the apical portion as in Specimen C, from the body as in Specimen B, and from the root as in Specimen 30. In those cases where there is an accessory artery or arteries the lymph vessels from the proximal portion of the appendix accompany them and are received by the posterior ileo-colic glands. The vessels which drain the root of the appendix are arranged in anterior and posterior sets. The anterior vessels run from the appendix over the anterior surface of the cæcum and enter the ileo-colic fold. They invariably pass the glands here situated and end in members of the lower ileo-colic group. In some cases even this group may be passed, as is shown in Specimen 75, where vessels can be seen to thread their way among the lower group glands and to enter a gland of the upper group just below the duodenum. Posteriorly, vessels arise from the root of the organ and ascend over the posterior surface of the cæcum and in the cæcal attachment of the meso-appendix to the posterior ileo-colic glands. Some vessels, in this case also, are seen to pass this group without interruption to reach glands of the lower group of the main chain. Possibly the great number of glands in the ileo-colic corner may account for the fact that we have not seen in any instance a direct vessel of this set to the upper group. The vessels which drain the cæcum are simple in their arrangement. From the apex the vessels run with those of the root of the appendix and enter the same groups of glands; anteriorly they run in the ileo-colic fold to the lower group; posteriorly with the posterior ileo-colic vessels to the posterior ileo-colic glands and the lower main group. In one specimen, No. 87, a vessel issues from the muscular coat of the cæcum near the apex, descends on the appendix for a short distance, and then ascends with the appendicular vessels to a gland of the lower group at the origin of the artery. Tixier and Viannay³ describe a similar vessel in one of their specimens, but were unable to follow it to its gland. From the anterior surface of the body and base of the cæcum the vessels pass to the ileo-colic fold. Many of them enter the anterior ileo-colic glands, which appear to intercept in particular those vessels coming from the base of the cæcum and from the lower part of the colon. Some vessels, chiefly those from the lower part of the anterior wall, end in the lower main group and in some cases (Specimen 83) even in glands of the upper group. In one case (Specimen 74) one of these vessels turned backwards in the upper part of the ileo-colic fold and entered a posterior ileo-colic gland. From the posterior surface vessels run from the body and base of the cæcum to end in the posterior ileo-colic glands. Some vessels, however, pass these glands and end in the lower group of the main chain.

The vessels from the terminal portion of the ileum may be divided into three sets. The greater number of the vessels issuing from the last six inches of the small gut pass into the mesentery and end in the glands of the ileal group. But this is not the only path. If injection is made into the ileum as far out as six inches from the ileo-colic junction vessels will be seen to arise from the plexus, run to the right along the gut, to end in the anterior ileo-colic glands or in the lower main group. Another vessel pursuing a similar course along the free margin of the gut turns into the ileo-appendicular fold and enters the cæcal end of the meso-appendix, terminating in a gland of the posterior ileo-colic group. From the posterior surface of the extremity of the colon short vessels pass directly to the posterior ileo-colic glands. The vessels arising from the ascending colon pass transversely over the anterior and posterior surfaces of the gut and enter the numerous small glands which we have named the right colic glands. Here, as in the case of the vessels proceeding from other parts of the intestine, the glands do not intercept all the vessels; many pass inwards and end in the glands of the main chain.

The efferent vessels of the gland groups into which the lymphatics of the cæcum and appendix pass run as follows: those from the anterior ileo-colic glands enter the lower main group; in one specimen (83) vessels may be seen to end in the upper group. Those from the posterior ileo-colic group run to the lower group. In one specimen (N), an efferent from one of the posterior ileo-colic glands, injected from the back of the cæcum, passes upwards to a gland on the right colic artery. The efferents from the appendicular gland run to one of the glands of the lower group. Efferents from the lower group run to glands of the upper group, while the

³ Tixier and Viannay, *Lyon Médicale*, 1901, No. 13, pp. 471-79.

efferents of the upper group pass to the glands around the trunk of the superior mesenteric artery.

The anatomy of the lymphatics of the cæcum and appendix has been much obscured by an unnecessary subdivision of gland groups and by a redundant nomenclature. Poirier and Cuneo⁴ describe three groups of glands lying in the meso-appendix; they term these the retro-ileal, the sub-ileal, and the juxta-cæcal appendicular glands. Clado in his classic memoir⁵ attaches prime importance to a gland situated in the base of the meso-appendix close to the cæcum; this gland he considers to be the chief recipient of the vessels of the appendix. This view was supported by Lafforgue,⁶ who gives tables showing the number and frequency of occurrence of the glands in the meso-appendix. These descriptions limit the attention to the glands near the appendix; in the paper by Tixier and Viannay⁷ we have another illustration of this contracted view of the lymphatics of the appendix in this remark: "Lafforgue, who has studied the glands of the appendix, has well shown that this organ is often furnished with more than one gland." They proceed to show that the lymphatic vessels of the appendix drain into three groups of glands, cæco-appendicular glands lying in the outer angle of the meso-appendix, ileo-appendicular at its inner angle, and meso-appendicular glands lying between these; all these groups are inconstant in presence and number. They advance a step in pointing out that there is more than one lymphatic current from the appendix.

By far the most complete and satisfactory description is that given by Polya and von Navratil⁸ from the study of 13 injected specimens. This paper seems to have escaped general notice, as it is never quoted, and it did not come within our knowledge until our own work was well advanced. In the main our observations agree with theirs, but they are able to quote only one case in which lymphatic vessels from the appendix pass to the higher glands of the ileo-colic chain. Kelly and Hurdon⁹ gave an elaborate account of the lymphatic plexuses, vessels, and glands of the appendix. In the main their description agrees with that of Poirier and Cuneo, but they describe four types of lymphatic circulation from the appendix. We have purposely avoided any classification into types because there is such variety in the arrangement of the vessels and distal glands that it would be possible to multiply the types to any extent and their enumeration would merely obscure the main and important points. The subdivision of the glands into small groups with the consequent increase in the number of names leads to great confusion, of which we find numerous examples in the literature. The gland described by Clado, lying in the outer angle of the meso-appendix, is commonly placed by other authors in the inner angle. In all these descriptions too much importance is attached, perhaps unwittingly, to the glands in the meso-appendix. The specimens from which our description is made show that the glands in the meso-appendix are merely prolapsed members of the posterior ileo-colic gland group and of the lower group of the main ileo-colic chain. The gland which we have termed "appendicular," lying in or near the free border of the meso-appendix, is met with at various levels, sometimes only projecting between the layers at their attachment, sometimes just below the attachment, and sometimes a considerable distance below. When the specimens are compared it becomes very evident that the gland is merely one of the lower group glands. Similarly, the gland or glands which are sometimes found in the upper outer angle of the meso-appendix close to the cæcum are really members of the posterior ileo-colic group; consequently this gland, or glands, on which so much stress is laid by Clado and others, is always present, but does not always lie in the meso-appendix. The group certainly does not require a special name. But the presence or absence of glands in the meso-appendix is a matter of the slightest importance, in view of the fact that these glands even when present do not intercept more than a few of the appendicular lymphatics. It is of importance, and it is the point to which we wish to draw attention, that

lymphatic vessels from any part of the appendix, root, body, or tip, run past the glands in the vicinity of the organ to glands of the main ileo-colic chain, reaching even those members of the upper group which lie on the duodenum. On this point we were entirely uninformed by previous descriptions and it is of great importance to recognise the fact that practically any gland of the ileo-colic chain, from its upper to its lower end, may be a primary gland for the appendicular vessels.

FIG. 6.

Lymphatics of the cæcum and appendix. Two appendicular arteries are present with lymphatic vessels accompanying each.

The account of the lymphatic system of the appendix given by Lockwood differs materially from that of other authors. He says: "I have so frequently found a chain (of glands) along the inner side of the right colon behind the ascending meso-colon, that I have come to the conclusion that this is the course which the appendicular lymphatics mainly pursue." Others without doubt open into the mesenteric glands.¹⁰ There is also a statement to the effect that the lymphatics of the appendix form connexions with the chain of glands lying close to the common and external iliac arteries. In a footnote Lockwood maintains his position against the criticisms of Poirier and Cuneo and of Kelly and Hurdon. We have found in all our specimens the numerous glands which lie along the inner side of the ascending colon and we conclude that these are the glands referred to. But these glands, the right colic glands, drain the colon and have nothing to do with the cæcum and appendix. Some of our specimens (Nos. 55 and 83) show that the main ileo-colic chain may lie close to the ascending colon and it is quite possible that in cases of appendicitis, from which Mr. Lockwood's observations were made, when the glands are perhaps considerably enlarged and when the ascending colon is distended, they may appear to lie in the position described by him. It seems probable that the chain of glands which he has observed is really the ileo-colic chain and is not formed by the right colic glands; we find in his description strong confirmation of our contention that in diseases of the appendix this chain in its entirety may be affected. We have not met with any communication between the lymphatics of the cæcum and appendix and the glands lying along the common and external iliac arteries. A great deal of attention has been directed to the statement of Clado that there is a communication between the lymphatics of the appendix and those of the ovary and uterus, in the so-called appendiculo-ovarian fold. Clado states that he found this communication in two injected specimens. Tixier and Viannay in one case

⁴ Poirier and Cuneo: *Les Lymphatiques*, tome ii., fasc. 4, of *Traité d'Anatomie Humaine*; translated and edited by C. Leaf.

⁵ Clado. *Comptes Rendus de la Société de Biologie*, 1892, vol. iv., p. 142.

⁶ Lafforgue: *International Journal d'Anatomie et de Physiologie*, 1893.

⁷ Loc. cit.

⁸ Polya and von Navratil: *Deutsche Zeitschrift für Chirurgie*, 1903, Band lxxix., S. 421.

⁹ Kelly and Hurdon: Loc. cit.

¹⁰ Lockwood: *Appendicitis, its Pathology and Surgery*. Second edition.

found a gland in this fold. Lockwood supports these statements from clinical observations. Poirier and Cuneo formally deny the presence of such a communication and Polya and von Navratil have not been able to find it. We have never seen a trace of this communication in any of our specimens, and we do not believe that it exists. Kelly and Hurdon suggest that there is such a communication between the lymphatics of the appendix and those of the ovary by means of the subperitoneal lymphatic plexus which exists everywhere in that tissue, but they have been unable to find lymphatic vessels running from the appendix in the appendiculo-ovarian fold. Comparatively little attention has been given to the vessels of the cæcum in the past. This may be due to the fact that this organ is far more difficult to inject than any other part of the intestine. Most writers simply state that the vessels from the cæcum run to the neighbouring glands. We would emphasise what has been already stated, that while the majority of the vessels from the body and base of the cæcum are intercepted by the anterior and posterior ileo-colic glands, some of these, together with those of the apex of the organ, frequently pass beyond these glands to high glands of the ileo-colic chain, that vessels of the cæcum may ascend in the meso-appendix, and that they freely communicate with the vessels of the appendix.

We have now to consider the practical importance of the information we have derived on the lymphatic system of the cæcum and appendix. We find here a large agglomeration of lymphatic glandular tissue devoted to a comparatively small portion of the alimentary canal. It is evident that this mass of glands is of great importance and that its defensive powers will frequently be called upon. The changes which may take place in the glands of the ileo-colic chain as a result of disease are of the greatest practical importance. Acute inflammation may occur as a result of infection from the appendix in cases of appendicitis, or from the cæcum in rare cases of typhlitic ulceration; tuberculosis is met with not infrequently, and the glands may be invaded by secondary deposits in cases of malignant growth of the cæcum and appendix. Acute inflammation of the glands of the ileo-colic chain in cases of appendicitis is possibly more common than is generally recognised, although it is rare for suppuration to occur. Quenu¹¹ states that it is common in cases of fulminating appendicitis to find the glands of the chain enlarged and inflamed and he believes that the presence of a tender area reaching from the right iliac fossa upwards and inwards towards the middle line is an indication of glandular inflammation and affords some guidance as to the severity of the infection. If it were possible during operations for acute appendicitis to ascertain the condition of the glands of the ileo-colic chain it is likely that they would frequently be found in the condition described by Quenu. Few cases have been recorded in which suppuration of these glands has occurred. Ricard¹² reports a case in which an operation was performed for acute appendicitis. The patient left the hospital apparently well but returned with acute symptoms necessitating a re-opening of the abdomen. Ricard found a chain of infected glands, some of which were full of pus. They were extirpated with a good result. Bloodgood¹³ describes a rare case of appendicitic abscess situated between the layers of the mesentery. The patient was a child; "one could palpate in the middle zone of the abdomen, a mass about the size of two fists slightly moveable from right to left but not from above down (on opening the abdomen) beginning at the cæcum and extending at least to the third lumbar vertebra between the folds of the mesentery there was a mass on separating the exudate at the junction of the ileum and cæcum pus was encountered and a large abscess cavity was found extending towards the vertebral column between the folds of the mesentery." On careful consideration of this case it is difficult to avoid the conclusion that the abscess was due to suppuration of the glands of the ileo-colic chain.

In view of the frequency of appendicitis the comparative rarity of glandular suppuration is somewhat surprising. Corner¹⁴ suggests that it is due to the fact that the glands become tolerant and inured to the products of bacterial action, so that they are very rarely excited to the pitch of suppuration. It is possible that glandular abscesses are frequently overlooked; for example, an abscess originating

in the posterior ileo-colic glands may easily be opened during the course of the operation without any suspicion of its nature being aroused. It must be remembered in this connexion that, as we have already shown, lymph vessels run directly from the appendix to any gland, even the highest, of the ileo-colic chain, and that there is therefore no reason why the highest gland should not become infected and suppurate just as readily as the lowest. It is conceivable, therefore, that a glandular abscess, due to infection from the appendix, might form in front of the third part of the duodenum.

The ileo-colic chain of glands is frequently affected by tuberculosis. It is common enough in children suffering from abdominal tuberculosis to feel a mass of enlarged glands in this situation, and on examination of these glands in a series of necropsies they frequently show signs of previous disease. Corner¹⁵ describes the case of a boy who had a well-defined mass in the region of the cæcum of about the size of a cricket ball. On opening the abdomen the omentum was found adherent to the mass. "After gradually stripping this off a large rounded mass was found lying in the mesentery, adherent to the cæcum, the ascending colon, and partly to the transverse colon. During manipulation a weak spot in the wall of the swelling gave way, tuberculous caseous pus escaping the cavity extended upwards and inwards towards the root of the mesentery." The cavity was cleaned and obliterated by suture, recovery ensuing. Gerard Marchant¹⁶ reports two cases in which he had treated diseased glands in this region by operation. In one case during the removal of the appendix it was found that there was a mass formed by two caseous glands, apparently in the ileo-colic fold. They were enucleated with ease. In a second case during an operation for appendicitis a mass of enlarged glands was found on the anterior surface of the cæcum; these were curetted and cauterised. In the majority of cases the affection of these glands will be merely an incident in a general tuberculosis of the mesenteric glands. Should operative treatment become necessary the intimate relation of this glandular chain to the ileo-colic artery and vein must be borne in mind; if these vessels are damaged by a too vigorous attempt to remove the diseased glands the vitality of a considerable portion of the intestine will be endangered.

It is in connexion with malignant disease of the cæcum and appendix that the exact anatomy of these lymphatic vessels and glands becomes of the greatest importance. Indeed, it is extraordinary how little attention has been directed to this question in the past. It may be partially explained by the fact that the attention of surgeons has been so much bestowed on the perfection of the mechanical means of restoring the continuity of the intestinal canal after a malignant growth has been removed that the possibility of removing the lymphatics at the same time has received little attention. Another factor which has militated against any serious attempt to remove the lymphatic apparatus in connexion with the cæcum is the fear always present in the mind of the surgeon who is removing a portion of intestine of interfering with the blood-supply of the intestine at the suture line. Furthermore, it is an accepted doctrine that glandular infection does not occur in the early stages of malignant disease of the intestine; whether this doctrine is worthy of the belief which has been accorded it in the past is open to question. To illustrate the methods usually adopted at the present time in dealing with the glands in cases of carcinoma of the cæcum a quotation may be given from one of the most recent and complete works on abdominal surgery. Moynihan,¹⁷ in his description of the operation of excision of the cæcum, after giving the preliminary steps, says: "The ascending colon must then be freed from the posterior abdominal wall to which it is often adherent. For this purpose the parietal peritoneum to the outer side of the colon is incised and raised up towards the colon. The stripping must be continued towards the middle line, behind the termination of the enteric mesentery, so that any enlarged glands—and of these there may be many—are made free also as a general rule the tumour mass will by this means be rendered sufficiently mobile to permit of its easy withdrawal from the abdomen in some few instances, however, owing to the density of the adhesions, or the shortness of the enteric mesentery, or to the enlargement of glands this may

¹¹ Quenu: *Revue de Chirurgie*, 1902, vol. xxv., p. 749.

¹² Ricard: *Ibid.*, 1900, vol. xxi., p. 267.

¹³ Bloodgood: *American Journal of the Medical Sciences*, vol. cxxvi., 1903, p. 601.

¹⁴ Corner: *THE LANCET*, Dec. 23rd, 1905, p. 1825.

¹⁵ *Loc. cit.*

¹⁶ Gerard Marchant: *Revue de Chirurgie*, 1900, vol. xxi., p. 268.

¹⁷ Moynihan: *Abdominal Operations*, 1905, p. 332.

not be possible. In such circumstances the mesentery is tied off in sections and divided on the proximal side of the enlarged glands." It will be seen that although any palpably enlarged glands are removed by this method no attempt is made to deal with a possibly infected lymphatic area.

A method of removing a growth of the cæcum or ascending colon has recently been published by F. S. Bird.¹⁸ His description of the operation is as follows:—

The tumour is located and its removal being decided on the transverse colon is pulled down, two forceps are applied to it close together, a heavy one on the proximal side, and the gut is divided with large scissors in one cut. Swabs are used to avoid soiling the cavity, and the heavy forceps attached to the gut is allowed to hang out of the wound, a proceeding which puts the mesocolon on the stretch. The branches of the middle colic artery are easily found, for they stand out by reason of the tension and the fact that they are the thickened arteries of an elderly person. Two or three branches have to be secured. The right colic artery now invites attention and can readily be tied far back by a single ligature; this devascularises a large portion of meso-colon, which can be speedily severed by large scissors. The amount of gut at present hanging out of the wound is considerable, as the cæcum "is in the air" without support. The resulting traction shows the ileo-colic trunk in strong salience. Forceps are then placed on the ileum, about four inches from the junction of the great and small intestine, and the gut is divided; the distal end now depends from the wound, so that the whole portion to be resected is hanging by the ileo-colic artery and some peritoneum. This blood-vessel is ligatured far back, the isthmus of tissue left is divided close to it, and the resected gut, two forceps, and the ileo-colic glands fall out of the wound altogether. There is no need to investigate the important ileo-colic lymphatic area, for it has gone.

By this operation Bird appears to secure some of the lower glands, the anterior and posterior ileo-colic groups, but it is evident from the fact that he secures the right colic and the ileo-colic arteries separately, that the important glands of the main ileo-colic chain are not removed.

Considerable permanent success has, however, attended the removal of malignant growths of the intestine, on these lines. In the case of carcinoma of the sigmoid colon, this may be easily understood; these growths are usually of the constricting variety; they produce obstruction of the intestine, in the majority of cases, long before any tumour is palpable and at a comparatively early stage of the disease. Surgical interference becomes necessary for the relief of the obstruction; the condition is recognised and, in favourable cases, the growth may be removed while still in an early stage and probably before glandular infection has taken place. In the case of malignant growths of the cæcum and ascending colon it is a different matter; such growths are almost always recognised as palpable tumours before they have produced symptoms of intestinal obstruction of such severity that operative treatment is imperative. That is to say, they have reached a later stage and are much more likely to have given rise to glandular infection at the time the condition is recognised. It is impossible for us to bring forward any figures demonstrating the frequency of glandular metastasis in cases of malignant disease of the cæcum and ascending colon, or of the extent of the glandular affection. Such cases as we are referring to are comparatively rare; a record of the history after operation of a number of cases would be very difficult to obtain, and even if we were possessed of such a record it would be impossible to say what proportion of the recurrences was due to persistence of the disease in the lymphatic glands and what proportion was due to liver metastasis already present at the time of removal of the primary growth and what to local recurrence.

Text-books have little to say on the subject of lymphatic infection in cases of cancer of the intestine. It is well known that it does occur but of its frequency and extent we know little. It must be remembered that, as we have shown, lymphatic vessels having their origin in the cæcum and colon pass directly not only to the subsidiary gland groups of the ileo-colic chain but even to the lower and upper groups of that chain. This is particularly well seen in Specimen 83, where a vessel arising on the anterior surface of the cæcum is seen running in the ileo-colic fold, past the glands there situated, past the lower group of the main chain, to end in a gland of the upper group. This condition is not so frequent in the case of the cæcal lymphatics as in those of the appendix, but it does occur and account must be taken of its occurrence. It is obvious, therefore, that if infection of the glands takes place by a process of embolism, the lower glands of the main chain, and even the upper glands are just as likely to become infected, and that as early in the course of the disease as are the glands in close relation to the cæcum.

In operating for malignant disease, if any attempt is

made to remove glands which are possibly infected, the upper glands of the ileo-colic chain must receive attention. It seems advisable, therefore, in these cases to apply those principles which have been found so successful in the treatment of malignant disease of other organs—viz., to remove not only the organ containing the primary growth but the lymphatic glands receiving vessels from it, the vessels themselves, and the tissues in which these vessels lie. This can be done without a doubt; indeed, there is in the whole body no organ which is so happily placed as the cæcum in this respect; it is possible to remove all the glands receiving vessels from the cæcum and all the vessels, without leaving any subsidiary channels untouched, as must be done in the case of other organs, such as the breast. And this without any very serious extension of the operation usually practised—indeed, with considerable gain, the more radical operation giving a far better control over the blood supply and enabling the surgeon to recognise and avoid important structures which may be wounded and have frequently been wounded in the past. In cases suitable for radical treatment the operation which is suggested by the arrangement of the lymphatics is as follows. After opening the abdomen and exposing the field of operation the lower border of the third part of the duodenum is defined. The peritoneum over this is divided for a short distance and careful search is made for the ileo-colic vessels. The fatty tissue surrounding the vessels, which will contain the uppermost gland of the ileo-colic chain, is pushed downwards and the vessels cleaned by gauze stripping. At this stage the greatest possible care must be taken not to wound the duodenum. The artery and vein are then ligatured in two places and divided, the point of division of the artery being about half an inch from the superior mesenteric trunk. This step will devascularise the whole of the ascending colon, and it is well at this stage to select the point on the colon, at the hepatic flexure or, if an excessive amount of contraction of the colon has been caused by the growth, on the transverse colon, where the gut shall be divided. The peritoneum is then divided from the duodenum to the selected point on the colon, but the section of the gut is deferred until towards the end of the operation. In doing this it will be necessary to secure some branches of the middle colic artery, and if the right colic artery has a separate origin from the superior mesenteric it will also need attention. The peritoneum of the anterior layer of the mesentery is then divided in a line reaching obliquely downwards to the ileum. The ileo-colic and right colic vessels, with the accompanying chain of glands, the fatty tissue, and the overlying peritoneum, are then stripped downwards to the ileum and cæcum and outwards to the colon. In doing this the ureter will be encountered and must be carefully avoided. The cæcum is then lifted up and the peritoneal reflection from it and from the outer side of the colon on to the posterior abdominal wall is divided; a portion of the posterior layer of the mesentery of the small intestine will also require section.

The cæcum and appendix, the whole of the ascending colon, and the terminal portion of the ileum, with the ileo-colic and right colic vessels and the accompanying lymphatic chain, can then be withdrawn from the abdomen, only remaining attached by the continuity of the intestine. At the previously selected point the colon is divided. Some care is needed in determining the point at which the ileum is to be cut through. The terminal portion is supplied by an arcade formed by the ileal branch of the ileo-colic artery and the terminal portion of the superior mesenteric artery. In order to obtain a sufficient blood supply to the ileum at the point of section it is necessary to divide it at some distance (about six inches) from the ileo-cæcal valve at about the point where the last part of the superior mesenteric artery runs downwards in the mesentery. If it is divided too close to its termination the blood supply of the cut end will be endangered owing to the removal of the ileo-colic artery.

It is not within the scope of this paper to discuss the various methods of restoring the continuity of the intestinal canal after a portion has been removed. A satisfactory method of completing the operation will be to close the ends of both ileum and colon, to draw the termination of the ileum up to the transverse colon, and to effect a lateral anastomosis between the two. In this way the mesentery will be drawn over the raw area on the posterior wall of the abdomen and may be held in position by a few points of suture through the peritoneum. The question naturally

¹⁸ Bird: THE LANCET, Feb. 17th, 1906, p. 440.

arises, Is it necessary to perform this formidable operation in cases of malignant disease of the appendix? If an undoubted malignant growth of the appendix is found, particularly if it extends on to the cæcum, then it certainly would be advisable to do so. A study of recorded cases demonstrates the fact that frequently the condition has not been suspected until a microscopical examination of the appendix, which has usually been removed for recurrent attacks of appendicitis, has been made. In such cases the extensive operation is probably unnecessary.

A SERIES OF CASES OF GOITRES REMOVED UNDER COCAINE ANÆSTHESIA.¹

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ORDINARY goitres are fairly common throughout Wales and Monmouthshire, and in some counties they occur with great frequency, whilst in three counties—viz., Pembroke, Carnarvon, and Anglesea—they are rarely met with. Two years ago Dr. William Williams, medical officer of health of the county of Glamorgan, and I sent a circular letter with questions relating to the prevalence of goitre to every medical practitioner within the above areas and we received replies from 231. We have not yet completed our investigations, but I am allowed to make use of some of the facts that we gleaned from this inquiry. There are many districts where goitres are very prevalent and few in which they are absent. With regard to the causation of ordinary goitres, the opinion of medical practitioners who have observed the rapid transformation of the sparsely populated rural districts of Glamorgan and Monmouth to the present densely populated condition is of great importance and value. For example, Dr. T. Hall Redwood of Rhymney states that 30 years ago ordinary goitres were common in his practice, but since the construction of the new waterworks they have practically disappeared. Similar views have been received from others practising in the county of Glamorgan. The following extract from a letter I received from Mr. —, upon whom I operated for goitre in July, 1903, is of interest in connexion with what seems to me to be the effect of change of water-supply upon the development of goitre. He says: "I am one of six children; the first four were born near Aberystwyth and the other two were born after my parents removed to Glamorganshire, where they obtained drinking water from a deep well in the garden. 1. My eldest sister was ten years old when we came to Glamorgan and a few years after she had a goitre and was an invalid on that account for seven years, before the late Mr. Greig Smith operated upon her in October, 1895, and was under treatment for some months afterwards. 2. My eldest brother was eight years of age when he came to Glamorgan, and before he was 12 years of age developed a goitre, and was operated upon by Sir Frederick Treves in November, 1893, at the London Hospital. He lost his voice for three months and eventually recovered it completely. 3. I came to Glamorgan when six years old and a goitre appeared when about 10 to 12. It grew steadily until it was removed by yourself when I spent the first week of my summer holidays of 1903 at your private hospital, and have been well ever since. 4. Next brother, free from goitre, and went to Leatherhead to school when 10 years of age. 5. Sister, had goitre, noticed when 19 years of age. 6. Sister, had no goitre, and went to school at Bristol."

The eldest three of the above family developed goitres within a few years after going to their new home, and the two boys showed symptoms between 10 and 12 years of age. The younger members of the family spent more time away from their home and the absence of goitre is ascribed to this fact by my correspondent. I have known a lady from a non-goitrous district go to reside in Derbyshire for two years and to return with a well-marked goitre; she was treated by injection of perchloride of iron at great risk to her life and with permanently ugly scarring of the neck. All the above facts support the view that goitres can be acquired

fairly quickly by living in a goitre-producing district and as far as I can judge from analysis of the evidence collected, the distribution of goitres in Wales and Monmouthshire supports the view that the causation of this disease is to be found in drinking water. For example, I would instance parts of the counties of Cardigan, Carmarthen, and Pembrokeshire, which form a smooth undulating plateau with rounded hillocks and gently hollowed valleys. There is total absence of prominent rugged escarpments or precipitous hillsides or narrow valleys running in east and west or north and south or any other preponderating direction. I know of goitres developing in this district in people who have spent their whole life on the top of the hills, as well as in those who have always resided in the lowest part of the valley.

Diagnosis.—In the majority of cases there is no difficulty in recognising the character of a goitre in the neck, but in a case of symmetrical lipoma of the neck in a woman, aged 62 years, I did not suspect its character until operation for its removal was done. The lipoma had none of the ordinary attachments to the skin and moved up and down with deglutition. In intrathoracic goitres and in those which are partly within and partly without the thorax—"the diver" type—Professor Kocher has demonstrated the value of examination by the fluorescent screen in determining whether operation is practicable by observing the mobility of the lower border of the intrathoracic shadow of the goitre.

[Mr. Lynn Thomas here exhibited photographs of the different types of goitres. 1. Symmetrical enlargements of the lateral lobes of the thyroid gland (it weighed three and a half pounds after removal). 2. Enlargement of one lobe. 3. "The diver" type of goitre (Kocher). The isthmus and the left lobe were enlarged. Cyanosis, dyspnoea, and dysphagia existed and when the head was bent forward the goitre was well within the thorax. It was a difficult case and trying to the patient when the intrathoracic portion was delivered. The late Alderman Dr. Naunton Davies was present and said that the operation reminded him of the pre-anæsthetic days. 4. Malignant goitre with enlarged glands on the right side. 5. Goitre of isthmus photographed six days after operation.]

Treatment.—The number of operations that I have performed are as follows:—

No mor-	} 55, under local anæsthesia (cocaine, 1 per cent.), including 4 Graves's disease.
talities.	
	1 without any anæsthesia.
	17 under general anæsthesia, including 5 Graves's disease.
	1 death from respiratory complications { Graves's.
	1 " " hyperthyroidism
	1 " " sepsis (one of my early cases).

Another case of Graves's disease died suddenly and without any warning in the operation theatre before anything was done. I had had the patient under observation at the Cardiff Infirmary for some weeks; during that time I fully explained to her that the nature of the operation was only ligature of an artery, and apparently I enjoyed her full confidence. After she was carried into the operation-room she chatted with me quite pleasantly and I left her for a few minutes to get ready for the operation when she expired quite suddenly, without any warning, before I returned. Had I injected cocaine subcutaneously, or even manipulated her neck, I could find a plausible explanation for the cause of death.

The case in which I used no local anæsthesia was due to my hypodermic syringe breaking after Kocher's screen had been fixed round the patient's neck and the preliminary marking of the skin incision had been completed. As this accident meant abandoning the operation I decided to proceed at once by telling the patient that the chief pain she would suffer would be from insertion of the needle. She stood the operation very well and next day when I was removing the drainage-tube and skin sutures she told me that the worst pain she felt was during the injection of the cocaine, which in the circumstances meant incision of the skin.

I always use Kocher's "collar incision" whenever possible as it gives ample room and exposes the blood-vessels at right angles to their course and leaves a scar which is scarcely perceptible. When Professor Kocher was the guest of the Cardiff Medical Society last year I took the opportunity of expressing my appreciation of his method and of pointing out that the description of the scar left by the "collar incision" had been described in Wales over 1000 years ago—in legend. We are told that St. Winifred had her head severed from her body, and that St. Beuno performed the operation

¹ A paper read before the Medical Society of London on April 22nd 1907.