LECTURES

ON

CYSTIC TUMOURS OF THE JAWS, AND ON
THE ETIOLOGY, GENERAL CHARACTERS
AND RELATIONS OF TUMOURS.

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LECTURE III.*

(Concluded from page 283.)

WE will now pass on to consider the relation which the different varieties of tumours bear to each other, and to the malformations by excess. As an example of the malformations by excess, let us take the supernumerary digits occurring on the hands and feet. They are distinctly hereditary; usually there is only one, placed either on the outer or inner side of each hand or foot; for they are almost invariably symmetrical. The additional digit may be represented merely by a tubercle containing a small mass of bone, or all the bones may be represented; it is, however, never absolutely perfect in structure. The nature of the supernumerary digits in man and some of the domestic animals, has been discussed by Professor Gegenbaur, (*Journal of Anatomy and Physiology*, 1882.) His paper has been recently translated by Drs. Garson and Gibon. By a train of reasoning, founded upon anatomical details, he shows that the formation of a supernumerary digit in man is the result of a reduplication of one of the terminal rays at the extremity of a limb. It cannot be referred to a reversion, for no multidigitate animal now exists, except the fishes, from which such a tendency might be traced. A supernumerary digit in man must therefore be considered a reduplication the result of a tendency to variation. In some instances, this reduplication is apparent, as in a specimen (No. 311) in the Museum of the Royal College of Surgeons, in which it does not extend further back than the first phalanx; but in the majority of cases the additional member may rather be considered a partial or imperfect reduplication resembling an outgrowth, by budding from the base of another perfectly developed digit.

The most remarkable point with regard to the supernumerary digits is a tendency which they occasionally exhibit to grow again after removal, even when this is performed at the joint by which they were connected with the hand. In one case, quoted by Mr. Darwin, this occurred twice. In this power of regrowth, they exhibit a resemblance to the recurring sarcomata, and manifest in this respect, as Darwin says, an embryonic condition. He regards their recurrence as a process of budding similar to that observed in the reproduction of the limbs of some amphibia after removal.

Some further insight into the nature of the tendency to abnormal growth giving rise to true tumours may be gained, perhaps, by reference to the congenital hypertrophies of extremities, leading to the production of the so-called giant-limbs. A specimen (No. 4061a) was presented recently to the College Museum by Mr. Macnamara, consisting of the left foot of a young woman greatly enlarged and deformed by a prodigious overgrowth of the skin and subcutaneous tissue of the sole; the whole limb below the knee was much longer than the opposite extremity, and the half of the brain, face, and tongue on the same side of the body were also distinctly enlarged. The left foot had been continuously increasing, out of proportion to the growth of the rest of the body, since birth. A similar growth had commenced on the sole of the right foot four months before the patient's death. A remarkable latency of the tendency to growth had therefore existed in this foot, which has been also observed in other cases, and may be compared to the latency of some tumours of congenital origin, as the dermoid cysts. These hypertrophied limbs show the imperfect nature of the tissue composing them, not only in their continuous growth, but also in a tendency to a form of ulceration somewhat resembling epithelioma, which I have observed in two cases. It does not appear probable that in the hypertrophied foot just referred to there was primarily an excess of formative material, but rather that, owing to some faulty organisation of the

tissues, its growth was not correlated with that of the body generally.

Similarly, in the case of a supernumerary digit, the formative elements of the limb need not necessarily be in excess of the normal standard, until, by a bifurcation or by a budding-out of the cells of a rudimentary digit, the rudiment of an additional member is formed.

An analogous process occurring at the earliest period of embryonic life, at the anterior or posterior extremity of the blastoderm, would lead to one of the forms of double-headed monster in the one case, or to reduplication of the lower extremities in the other. And, if we refer a similar budding-out of redundant formative tissue to a much later period of embryonic life, when the various structures have acquired their natural form, the abnormal growth will involve a few of the individual cell-elements of the structures, and as a result we shall have the various tumours appearing in early life (or in the process of development of the affected organ), as the multiple exostoses and enchondromata, and the adenomata.

Further still, if we trace the manifestation of the same tendency to a much later period of life, we may, perhaps, thus form an idea of the origin of the sarcomata and cancers.

An imperfectly formed supernumerary digit (as shown in specimen No. 310a Royal College of Surgeons' Museum), consisting only of a small nodule of bone surrounded by skin and attached to the ulnar side of the metacarpal bone, cannot by any definition be separated from true tumours, as the exostoses, which are distinctly hereditary.

Closely analogous to such imperfect supernumerary digits are the accessory and detached glandules and adenomata met with near or in the mammary and thyroid glands. Lücke* mentions a case in which a tumour grew in a superadded lobe of the thyroid gland. It was of the size of a fist, and occupied the submaxillary region. The patient, a man aged 21, stated that the tumour was noticed soon after birth, but that it had grown quickly only in later years. It was obviously "a lobule of the thyroid affected with colloid degeneration", or, in short, an accessory lobule of the thyroid gland having the structure and general characters of an adenoma.

In dissecting a breast recently, I found a firm nodule, about the size of a hazel nut, lying near the axillary border of the gland, but completely detached from it. The nodule consisted microscopically of fibrous tissue containing large tubules or duct-spaces lined with short columnar epithelium; these were, in places, enormously dilated. Smaller ducts branching into small terminal pouches or acini were also observed. This nodule deserves almost the name of an accessory glandule, owing to the high type of its structure, which differed from that of the normal gland rather in the confusion of its arrangement than in other respects. It may be regarded, with much probability, as an intermediate step between the ordinary adenomata and the accessory mammary glands occasionally met with in the axilla. For while the high type of its structure connects it closely with the accessory glands, it is shown to be allied as closely with the adenomata, by the existence of a small tumour above and on the inner side of the nipple in each breast. These lay upon, and were partially embedded in the breasts, were separated easily from the gland tissue, and resembled the detached nodule in their microscopic structure. The growths produced no symptoms during life, and were probably stationary. The patient, a woman aged 59, died of bronchitis after the removal of an epulis of the lower jaw. Lücke states that he has frequently observed circumscribed adenomata of the breast near the axilla.

Analogous tumours are met with in other organs, as the glandular polypi of the rectum in children; these may be regarded also as superadded portions of mucous membrane, composed chiefly of gland-tissue.

Surely these supernumerary glandules and adenomata may, in all respects, be compared to the supernumerary digits; like them presenting different degrees of perfection in their development, and like them also produced by a process of reduplication or a budding-out of some portion of the part from which they spring.

There are, also, some examples of overgrowth in glandular organs of the same nature as the giant limbs to which reference has been made. As, for instance, the immensely hypertrophied breast in the College Museum (No. 4789), weighing thirteen pounds. It had enlarged for only a year and a half before removal from a girl, aged 19; the other breast was affected in the same manner. Most worthy of remark in this case is the fact that, a continuously progressive enlargement of both breasts should have occurred about the period when adenomata commonly appear; yet this was a true hypertrophy,

* Given at the Royal College of Surgeons, June 1882. The latter part of the Lecture, treating of the relations of tumours to each other, has been extended, but the conclusions have not been altered.

* *Op. cit.*, Band ii, 1 Abth., s. 283.

for the glandular structures equalled in the perfection of their development the normal breast. The fibrous tissue was much increased.

Now, having indicated a relationship between accessory glands and adenomata, let us further examine the relation between the adenomata and the cancers. There is a much closer resemblance in the general structure and arrangement of these two groups of tumours than is generally recognised.

The glandular tissue of an adenoma of the breast consists of gland-tubes and acini in varying proportions; but we find also in most tumours, solid columns or rods of small epithelial cells, which may be traced through various stages of development to the formation of gland-tubes. They are the representatives in the tumour of the solid ingrowths of the epiblast forming the rudiments of the mammary gland. By means of these solid columns of cells, we can trace the relation between the more highly organised epithelial tissue tumours, or adenomata, and the most elemental forms constituting cancers. It can be made out in most specimens of cancer of the breast, that the epithelial cells are arranged in irregular, tortuous columns; and that the alveoli, filled with cells, which are said to be characteristic of cancer, are not closed spaces, but columns of cells cut transversely or obliquely. This fact is exceedingly clearly shown by some sections of cancer of a male breast which I have.* These columns of cells may be considered analogous to the rudimentary cell columns of adenomata; but in the cancers of the breast, the further development into gland-tubes does not take place as a rule, although, in some instances, it is observed. The epithelial cells are much larger than those of adenoma; many of them are multinucleated, and appearances of division may be seen.

The glandular structure of cancer is most beautifully shown in cancers of the thyroid gland and of the large intestine. The morbid growth in the thyroid consists of gland-tubes lined with one or more layers of regularly arranged columnar or spheroidal epithelial cells.†

Between the chief types or species of tumours, there are intermediate forms which connect these great groups. Thus, the epithelial elements in some cancers of the breast, much more nearly resemble adenoma than in others. I have sections of a firm mammary tumour, removed from a woman aged 37, which had been growing eighteen months. The sections show, under the microscope, largely dilated ducts filled with large multinucleated epithelial cells, in places undergoing granular degeneration. From the walls of the ducts solid buds of similar cells project into the surrounding fibrous tissue; and these solid outgrowths of epithelium may be traced through every stage to the formation of duct-like tubules, lined with several layers of large irregularly shaped epithelial cells. This tumour, perhaps, nearly occupies anatomically a position intermediate between adenoma and cancer of the breast.

Mr. Harrison Cripps‡ has described and figured tumours of the rectum, which appeared to lie between the innocent and malignant groups—tumours which resembled the adenomata in the slowness of their growth, in the regularity of the arrangement of the epithelial tubes, and in the perfection of the epithelial lining, but which recurred after removal. Tumours of other organs, as the uterus and palate, might also be referred to in illustration of this point. Again, the rare co-existence of adenoma and cancer in the same breast may indicate a genetic connection between the two forms of tumour.

In many respects the adeno, or sero-cystic-sarcomata, may be said to form a connecting link between adenoma and cancer, both in the age at which they occur, and in their clinical characters and structure. Notwithstanding the diversity in their naked eye characters, they consist essentially of gland-tissue embedded in various forms of sarcoma tissue. The gland-tissue presents the most diverse characters, from tubules lined with most regularly arranged columnar epithelial cells§ to simple columns of round cells.¶ The more highly organised of these tumours are connected with the fibro-adenomata by those more rapidly growing, softer, and smoother adenomata, the basis of which is composed of ill-developed connective tissue, containing abundance of spindle-shaped nuclei, or even crowded with round nuclei. A specimen, No. 4779A in the Royal College of Surgeons' Museum, serves as an example. It was removed from a woman aged 36, and had been noticed for two

years. Again, the more lowly organised forms of adeno-sarcoma are allied to the cancers by rare tumours, of which the following may be taken as an example. A tumour of the breast was brought me for examination; it had been removed from a middle-aged woman, living two years after operation, and was of a firm, indistinctly fibrous texture. It consisted, microscopically, of distinct spindle cells, coalescing to form fibrous-tissue, which inclosed columns and masses of small round epithelial cells. The columns, in a few places, possessed a lumen or central space. From the unusual combination of its structures, this tumour may be considered intermediate in type between the adeno-sarcomata and scirrhus cancers.

But in no instance is the direct continuity from glandular tissue to cancer exemplified with greater clearness than in the proliferous growth of sero-cystic disease of the breast; every possible transition is observed in these growths between rudimentary gland-tissue and cancer.*

In the first of these lectures, an endeavour was made to show the same relation between the highly organised and elemental multilocular cystic tumours of the jaws.

Certain benign glandular tumours of the skin show in general structure a close resemblance to epithelioma;† and the ordinary pavement-cell epithelioma, even, may be regarded as of glandular type in so far that it is an imitation of the earliest stage in the development of the cutaneous and mucous glands.

But if the existence of transitional forms can be proved between the innocent and malignant types of the epithelial-tissue tumours, these are as patent as any anatomical fact can be in the connective tissue series, whether of the hard or soft parts. Fibrous tumours occur in every variety, from the dense compact nodules, composed of parallel bundles of well-formed fibrous tissue, to the soft and sometimes semi-gelatinous growths, which, however, are not malignant. The loose fibrous tissue, of which the latter are composed, contains numerous round and spindle-shaped nuclei, of which the development into fibres can be distinctly traced. A specimen, No. 3,283 in the Museum of St. Bartholomew's Hospital, possesses such characters; it lay within the sheath of the ulnar nerve, and had been growing for nineteen years: a distinct capsule surrounded it.

The next step towards malignancy is to those tumours to which Sir James Paget gave the name of "recurrent fibroids"—the fibro-sarcomata; they are composed of fibrous tissue‡ with a few spindle-cells scattered among the fibres, or of small spindle-cells imperfectly fused into fibres. Such tumours are only locally malignant. Cases are met with, in which the growth has existed for nine or ten years before the patient applies for relief; and they may recur as many as eight times§ after removal without affecting the lymphatic glands or internal organs. Descending still lower in the scale of organisation, we reach the spindle-celled, and finally the round-celled variety of sarcoma, in which the elemental round-cell makes not the slightest effort in the direction of organization, not even to the formation of a spindle-cell.

Tumours of bone also may be studied with much advantage in regard to this question, for the amount and type of the osseous tissue produced offers a direct criterion of their power of organisation. It is only a step from the exostosis composed of perfect bone to the osteo-sarcoma; and this interval is broken by the diffuse osteomata, which may involve an entire bone, as the superior maxilla, or may form a large osseous mass prominently projecting from the greater part of one surface of a bone. These diffuse osseous tumours are perfectly innocent, and are composed of true bone. The osteo-sarcoma, on the contrary, are malignant, though in a low degree; and the osseous tissue produced in them may be compared to that of callus; the fibrillar or fibro-cartilaginous matrix of which had been formed, but had become calcified while still in an intermediate stage of its development to true bone. Again, the extent to which a sarcoma of bone is calcified, varies from the production of the heavy osseous masses resembling pumice-stone, to the soft sarcomata containing only a few spicules of bone, and composed chiefly of round-cells and spindle-cells. Tumours springing from the periosteum are rarely observed, which may exist for years without showing any signs of malignancy. In structure they consist of immature fibrous tissue, containing numerous round and fusiform nuclei. An example of such a tumour is in the Museum of St. Bartholomew's Hospital (No. 454). It is a firm, partially calcified growth, about a foot in diameter, springing from the middle of the shaft of a tibia. The tumour was first noticed eight years before amputation, and shortly after the

* Diagrams illustrating these points were shown at the lecture.

† See Lücke, Pitha, and Billroth's *Handbuch*, Band iii, Abth. 8, s. 94; and War-
rington Haward, *Trans. Path. Soc.* vol. xxxiii, p. 291.

‡ *Trans. Path. Soc.*, vol. xxxii, p. 87, plate vii, fig. 3.

§ As No. 4790a, Royal College of Surgeons' Museum.

|| As No. 4783a, Royal College of Surgeons' Museum.

* See Nos. 3147 to 3151 St. Bartholomew's Hospital Museum.

† See *Transactions Pathological Society*, Vol. xxxiii., p. 335.

‡ See 4780a, Royal College of Surgeons' Museum.

§ See No. 4789b, Royal College of Surgeons' Museum.

patient had sustained a fracture near the middle of the leg. She was a woman aged 72 years, who appeared well in health, and there was no evidence of the existence of secondary deposits.

Lastly, some tumours of epithelial origin are met with which are so slightly differentiated, so elemental, that they cannot be distinguished, except in rare instances, from round-cell sarcomata. I refer especially to the melanotic tumours which originate in connection with the pigmented epithelial cells of the rete Malpighii.

Many other facts might be quoted to show that there are tumours occupying positions intermediate between the innocent and malignant types. But these will suffice to prove that a sharp distinction, as regards their anatomical structure, cannot be made between the innocent and malignant tumours. In proportion as a tumour is more highly organised will it be more innocent, more stable, and more circumscribed; while in the measure in which its tissue is elemental or "embryonic," will it be more malignant, more diffused, and more rapidly growing. We may, perhaps, infer, from these facts, as Sir James Paget* has already suggested, that the different varieties of tumours may be produced by evolution and involution through hereditary transmission; the evolution taking place from the higher to the lower forms, as from adenoma to cancer. Considerations have also been brought forward which indicate a probability that the formation of tumours is the result of the same tendencies to variation as those giving rise to the malformations by excess, such as accessory glands or glandules, multiple exostoses, or, perhaps, even the supernumerary digits. The existence of many tumours, the evolution of which cannot be traced, should not deter us from applying this law for the explanation of the origin of morbid growths; for many types may be produced by an involution or fading away of the tumour diathesis. And the exhibition of such latent tendencies especially, may be excited only by increased blood-supply and nutritive disturbance in a part.

As a general rule, the different varieties of morbid growths appear within certain periods of life, indicated in the last lecture; and however this may be brought about, it appears probable that the nature of each variety may have been partly determined by the nutritive condition of the affected organ or tissue at the time of the formation of the tumour.

The hereditary transmission of tumours in the same form, and at approximately the same stage of life, is in accordance with the law of inheritance at corresponding periods of life; a law by which Mr. Darwin† explains the appearance of peculiarities at certain stages in the metamorphoses of insects; such as the modifications of a larva to the surrounding conditions in its structure and instincts, by which it is enabled to lead an independent existence. This law is exhibited under the normal conditions in the changes occurring at puberty, as the perfect development of the generative organs, and the growth of hair at various parts of the body; in the atrophy of the ovaries and breast at the termination of the fruitful period; and in many other phenomena, as for instance the eruption of the teeth. If we analyse the manner in which it is brought to bear we must suppose that the influence of hereditary tendency is transmitted to each and every cell in the body up to the latest period of life; and that the form and peculiarities, as well as the hereditary diseases of the individual, are the combined result of the inherent tendencies of all the ultimate elements of the body.

In the rare occurrence of cancer or sarcoma congenitally or in very early life, we see an exception to the law of inheritance at corresponding periods. This may, perhaps, be referred to the tendency in characters due to reversion to appear at an early period of life; or to one of the numerous variations in hereditary transmission. Sir James Paget tells me that he has observed cases in which the offspring of cancerous patients have manifested the disease in infancy or at a much earlier period of life than the parents. And Mr. Hutchinson, in a recent lecture, mentioned the fact, that in all the cases in which malignant tumours appear very early in life a distinct history of direct transmission can be obtained.

The following are some of the conclusions to which I have endeavoured to lead. Although some tumours appearing before puberty, and, possibly, a few even later, may be derived from rudiments formed in embryonic life, yet many others, and especially the sarcomata and cancers, originate in the tissues existing at the time of their appearance. The malignancy of these tumours may be referred to the elemental or lowly organised character of their

constituents rather than to their embryonic nature. Finally, the evolution of the different varieties of tumours from certain primary forms may be inferred; and the primary forms are allied to, and possibly originate by, the same tendencies, which, under other conditions, may produce some of the malformations by excess.

In concluding I must express my indebtedness to some authors, whose work I have not been able always adequately to acknowledge; and especially to Sir James Paget, from whose classical lectures I found it impossible to do otherwise than model some parts of Lecture II.

AN ACCOUNT OF TWO HUNDRED AND EIGHT CONSECUTIVE CASES OF ABDOMINAL SECTION PERFORMED BETWEEN NOV. 1st, 1881, AND DECEMBER 31st, 1882.*

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ANALYSIS OF THE SERIES.

	Cases.	Deaths.	
Exploratory Incisions...	13	0	Mortality 5 per cent.
Incomplete Operations ...	8	4	
Operations for Cystoma:			
One Ovary...	36	2	112 cases; 3 deaths. Mortality 2.6 per cent.
Both Ovaries ...	28	1	
Parovarian Cysts ...	12	0	
Hydrosalpinx ...	16	0	
Pyosalpinx...	20	0	
Removal of Uterine Appendages:			
For Myoma ...	26	2	39 cases; 5 deaths. Mortality 12.8 per cent.
Chronic Ovaritis ...	12	3	
" Menstrual Epilepsy...	1	0	
Hepatotomy for Hydatids...	2	0	
Hydatids of Peritoneum ...	2	0	
Cholecystotomy for Gallstone ...	2	0	
Radical Cure of Hernia ...	1	0	
Nephrotomy for Hydatids...	1	0	
Nephrectomy ...	1	0	
Intestinal Obstruction ...	1	1	35 cases; 4 deaths. Mortality 11.4 per cent.
Solid Tumours of Ovary ...	3	1	
Hysterectomy for Myoma ...	10	2	
Cysts of unknown origin ...	1	0	
Tumours of Omentum...	1	0	
Pelvic Abscess opened and drained ...	7	0	
Chronic Peritonitis ...	4	0	
	208	16	Mortality 7.7 per cent.

When Simpson coined the word ovariectomy to describe conveniently the operations which were being done in large numbers, and with great success, by Charles Clay of Manchester, he conferred a benefit which was acceptable at the time; but he added a burden to our nomenclature which has become a real element of confusion. The word "ovariotomy," of course means cutting the ovary, not its removal, and therefore it describes an incomplete operation far better than the complete excision of the gland. By custom, its use was limited to the removal of large cystic tumours of ovarian origin, and it was a long time before solid tumours of the organ were recognised and included in the list of ovariectomies. But a far more serious mistake than this was made and is still maintained by Mr. Spencer Wells and others, by the inclusion of parovarian cysts in the list of ovariectomies. When we carefully read the descriptions of the early cases of "ovariotomy" in England, those between 1827 and 1842, we find that there is not a single real ovariectomy amongst them; they were all cases of removal of parovarian cysts. The first ovariectomy—that is, the first removal of a diseased ovary—in this country, was done by Charles Clay on September 27th, 1842.

I do not need to tell my present audience that the existence of a parovarian cyst does not necessarily involve any disease of the ovary or tube, nor that, in the great majority of cases, the ovary and tubes are not even associated intimately with the tumour. When they are so associated, they can be easily separated from the cyst, and their removal is no more necessary than is the removal of the uterus. Pathologically there is no relationship whatever between a parovarian and an ovarian cystoma; and, surgically, the only points they

* *Clinical Lectures and Essays*, p. 412.

† C. Darwin. *Animals under Domestication*, vol i, p. 75.

* Read before the Birmingham Branch.