A COURSE OF
LECTURES ON SURGERY,

DELIVERED IN THE

MEDICAL SCHOOL OF CAMBRIDGE.

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LECTURE XIX.—ATROPHY CONTINUED.

The term applied to failures in development; the relation between embryonic and extra-uterine diseases rendering it desirable that the same terms should be applied to both.

Imperfections in shape generally occur at an early period of fetal life, and are permanent; do not usually present a resemblance to the natural forms of the lower animals; are often symmetrical; two limbs sometimes blended into one; hare-lip, cleft palate, &c.: malformation from wrong direction of developmental force; efforts in some parts to make amends for deficiency in others; malformation from persistence of embryonic structures; coincidences of malformation in several parts; effects of inflammation in producing malformation.

Imperfections in structural development causing early occurrence of the changes incidental to age, liability to disease and physical weakness; liability of similar tissues to disease at several parts of the body; the symmetry of disease; malformed parts sometimes exhibit structural imperfections; are they also more liable to disease than other parts? Liability to disease may be general in infants and also in adults: congenital deficiency of physical force, may be general or partial; flat foot; knock-knee; congenital luxation of hip.

Imperfections in growth; affecting parts or the whole; occurring in fœtus and after birth.

IN treatises on pathology the effects of atrophy are usually considered only so far as they occur in the fully developed tissues; but there seems no good reason for thus limiting our views of the disease. Atrophy, as you have already several times been told, is the result of a failure of the nutritive function in a part, occasioned either by an insufficient supply of the materials necessary for its support, or by want of appropriative force to assimilate those materials. Forasmuch, therefore, as development is one of the departments of nutrition, we may reasonably expect to find in it imperfections corresponding with those which are observed to take place at a subsequent period, and deserving to be classed under the same head with them. Development, indeed, is not merely one of the processes of nutrition, it is the most complicated and most important of them all; it is the one in which a failure is most to be apprehended, and is likely to take place in the greatest variety of ways. Upon it all the subsequent stages of nutrition depend: the formative powers are in the fœtus exercised in their highest capacity, for they are engaged in erecting a structure no

less than in maintaining it. Any imperfection at this early period is therefore fraught with tenfold danger,—with danger proportionate to the work of development which remains to be done. It requires no other argument to prove that the pathology of the embryo is highly deserving the attention of the surgeon; and, making due allowance for the peculiar manifestation of the nutritive forces at that time, you will find that the morbid conditions of the foetal state correspond very closely with those in the adult,—so closely that they ought to be included under the same terms, and studied at the same time.

It has been too much the custom to look upon development as a distinct process,—to regard it as the result of some force peculiar to the embryo, and to forget that it is after all but a modification of nutrition,—an exalted form, no doubt, but, nevertheless, only a modification of that same nutrition by which, under ordinary circumstances, the mutation of particles in a living body is effected, and by which a provision is made to meet the contingencies of accident, as well as the more regular loss caused by the exercise of function. So marvellous a process is the formation and growth of a fœtus, that we can scarcely bring ourselves to think that it is effected in the same manner, and by the very same forces, which are engaged in the simpler work of maintaining the existence of the body; and, forgetting or overlooking the important physiological fact of the relation between nutrition and development, we are, as a consequence, unmindful of the equally important pathological deduction that the aberrations of the one are identical, or nearly so, with those of the other; that they are indeed very often continued from the one into the other. If nutrition is but a permanence of the developmental force in a state of activity sufficient to maintain the life and structure of the body, it follows that the organ or system wherein development was manifested in a feeble or imperfect manner during the embryonic period, will be sure to exhibit marks of weakness or unsoundness in after life. How many of the diseases of adults are really dependent on an imperfection of the nutritive forces, which had its commencement in the embryo. Surely there can be no better mode of impressing upon you this simple, almost self-evident, but often forgotten truth, than that of applying to foetal aberrations the terms by which we are accustomed to designate the corresponding diseases in the adult. Since the morbid conditions of the one period are so nearly related to those of the other, they serve the purpose of mutual illustration, and we lose an essential clue to the right understanding of each unless we practically admit this relation by describing the allied diseases of the fœtus and the adult in the close connection naturally belonging to them.

In accordance with this view we will extend the term atrophy to embrace those deficiencies in the development of the fœtus which correspond with failures in the nutrition of the adult. Here a wide field is opened to our investigation, in which we must be content to examine the surface. It is impossible in a single lecture to convey any deep or accurate knowledge

of it, and a superficial view will sufficiently answer the purpose of bringing the more important facts under your notice.

In each of the three effects of development—the shape, the structure, and the size of the foetus—there are abundant instances to be found where the nutritive forces have proved unequal to the task required. Let us, therefore, examine in order a few of the more striking examples, taking first such as occur in the formation of the *shape* of the embryo; secondly, the imperfections in the evolution of its *structure*; and, thirdly, the cases where, in whole or in part, it fails to attain to its natural size.

Of course the present lecture will not be occupied exclusively with the subject of developmental imperfections, or rather with the pathology of the foetus; because, as has just been said, the aberrations of nutrition commencing in it are continued into the extra uterine state, so that it will be our task to follow them from the one period to the other, and to observe how some of the morbid conditions of the adult are related to corresponding affections of the foetus, thus tracing them back to their source, and endeavouring to gain some information as to their nature from the time and manner in which they may be supposed to originate.

The deficiencies in the *shape* of the embryo are, for the most part, observed to result from some want of power at an early period, because the chief outlines of its figure are bestowed upon it in the first few months. They occur in various parts of the body; in those which are first developed nearly as frequently as in others, and in external and internal organs alike. As a general rule it may be stated, that when the proper period has passed for the development of a part without its being accomplished, the defect is permanent. A slight approach to the natural condition may be effected by the attempt of some parts to make up for, and accommodate themselves to, the failure of others. In the case of cleft palate, the interval is in a certain degree lessened, even after birth, by the growth of the opposite sides of the fissure, and by the formation of supernumerary teeth at the margins of the maxillary alveoli, but the change is slight, and no material alteration in the shape of the deformed organs is ever effected by the unassisted operations of nature. The work of development takes place not only according to a given plan, but the several stages of it occur in given periods; hence it results that if they are defective in their appointed times, an opportunity to repair the loss is never afforded, and the evidence of the failure remains for life.

Much has been written at various times to show that the human foetus, during the period of its development, passes through a series of changes which correspond with the perfect or fixed type of certain lower animals. If this were true to any great extent, it is clear that the different forms of arrested development in it would find their counterpart in the animal kingdom. A cursory glance at the various specimens here produced will tell you that such is not generally the case. The notion has, I think, arisen from a misconception of the

relation really existing between man and the other animals, and its reception has again led to a further misunderstanding upon this point. That relation consists in the fact that all animals are, in accordance with the uniformity of nature's laws, developed to a certain extent upon the same plan from which each one departs to meet its individual acquirements. The human foetus corresponds, therefore, only in a general manner, and in its early condition, either with the embryonic or the perfect forms of other animals, and it is seldom that the ill-shaped products of arrested development in it present anything beyond a very distant resemblance to the natural condition of those animals. The effects upon man of this general similarity of plan—this oneness of type, which pervades the animal kingdom, is seen rather in the excessive than in the defective developments of the human embryo; for we shall find, when we come to the consideration of that subject, that the superfluous organs very often have their representatives in the perfect forms of other animals.

The examples of imperfect developmental force to be found in this and other museums, are very numerous. I will only mention to you a few which illustrate some particular points. Here is a foetus of about eight months presenting no trace of either upper or lower extremities; it is a mere trunk, rounded off at the lower end, with a head attached to its upper part. The failure is not always observed to be quite so symmetrical. This foetus, for instance, has the left lower extremity tolerably well formed, but there is no semblance of a limb on the right side. I remember also a young woman whose right arm was well made, and of the proper size, the left arm being represented by a little process like a finger projecting from the shoulder. Indeed it is rather remarkable that failures of development are so often confined to one side of the body; and we cannot but observe, in reference to this point, that since the force of nutrition is so liable to vary in corresponding parts of the body during the period when there can be few accidental circumstances to disturb the tendency towards a symmetrical construction, it is no wonder that in extra-uterine existence, the casualties being so greatly multiplied, an absence of symmetry with regard to disease should be the rule, and its presence the exception.

These drawings represent a strange set of malformations in the lower extremities. Here the foetus is seen to taper gradually to a point below the pelvis, instead of being furnished with lower limbs. In this instance again there is a similar process appended to the lower end of the body, except that it is larger, swells out at its lower extremity into a sort of double foot, and dissection has shown it to contain the bones and many of the other components of two limbs; that is to say a tendency to the normal duplicate formation is evidenced, but the developmental force was not sufficient to carry it out in full, being able to produce only an imperfect double member instead of two complete and separate limbs. This third specimen is a near approach to the natural condition, for the two lower extremities seem to be well formed in every respect.

except that they are wrapped up together in one common sheath of skin. You have probably seen a similar condition of the fingers and toes, two or more of them being joined by skin—web-footed as it is called—when the imperfection occurs in the toes. These drawings afford illustrations of various intermediate conditions between the single digit-like terminations of limbs and the complete formation with the natural complement of separate appendages. In some, although there is but the outward semblance of one finger, dissection shows the part to contain the rudiments of two or more digits bound up and compressed together; and in others the several fingers had acquired a perfect structure.

Hare-lip is one of the slightest and most common instances of failure in the development of shape. It results from the more or less incomplete formation of skin at the line of junction between the central or nasal, and the lateral or maxillary processes which unite together to compose the face. The fissure is found on either or on both sides but not in the middle of the lip, unless indeed the central process, together with the portion of integument formed from it, be absent, when there is a frightful chasm. Happily such a deformity is very rarely witnessed. Frequently the imperfection of development is not confined to the skin, but extends through the bony and other structures of the part, leaving a deep fissure which runs up into the nose and backwards through the palate. The fissure is narrow according to the extent to which the lateral and mesial processes have been enabled to approximate, so as to form the palate and complete the line of the alveolar ridge.

Sometimes it happens that a part is misshapen, not so much in consequence of a deficiency of formative power, as from the wrong direction in which it is displayed. In this specimen of a monstrous pig's head, for instance, the vomer, intermaxillary and nasal bones, and other structures which should have descended into the interval between the jawbones to form the snout and middle part of the face, are turned up towards the forehead, producing a curled trumpet-like proboscis in that direction. You observe that the maxillary and palate bones from opposite sides have approximated in the middle line, so as to fill up the gap, and complete the alveolar arch and the palate. Here, then, appears to be no lack of creative force and no deficiency of nutritive material; but they have been employed in a wrong direction, and have established a snout upon the forehead instead of placing it in its proper position above the mouth.

In the specimen just shown, and in many other instances you may remark the effects which are displayed in one part to make amends for deficiencies in the development of others—the struggle as it were to attain as near as possible to the normal type. In the absence of the middle portion of the palate and alveolar arch, which should have been formed by the vomer and intermaxillary bones, the lateral processes have closed in so as to fill up the gap. This skull of a man, in which a cleft runs through the palate and

alveolar processes on both sides, is also an example of the same kind, though the attempt is confined to the production of supernumerary teeth upon the maxillary margins of the fissure. These supply in some measure the place of the incisors which are absent in consequence of the imperfect formation of the intermaxillary bones.

Again, an imperfection of shape is not unfrequently owing to the persistence of structures, which, in the natural course of things should have been removed, as in the instances of imperforate anus and vagina, the adhesion of the eyelids, and the closure of the pupil. These and some other malformations result from a want of sufficient developmental force to clear away certain remnants of the foetus, which having served their purpose are no longer required. In this specimen you see a large fold of intestine strangulated by a loop of tough fibrous tissue passing from the mesentery to one part of the bowel; this loop is probably the unabsorbed remains of the obliterated omphalo-mesenteric duct. You observe how thick and strong it is, which suggests the remark that these persistent embryonic structures partake of the growing property of the body in common with the other tissues and enlarge in equal proportion with them, although they may be to all appearance quite useless, sometimes even as in the instance before us, positively injurious. The same thing occurs and we are less surprised at it, in those few structures which are naturally permanent in extra-uterine life, but whose function ceases with the foetal state; such as the hypogastric arteries and the urachus; the round ligament of the liver, and the eustachian valve in the right auricle of the heart. They all elongate and most of them increase in thickness and strength with the growth of the body.

That the results of a deficiency of developmental force should be found in two or more parts of the same foetus is no more than you might expect. In this specimen which I have before shown you there is a cleft in the palate in addition to the absence of extremities. In this acranial foetus one of the lower extremities is deficient, and numerous instances of the latter kind might be adduced. The liability of organs symmetrically placed to corresponding malformations has been already mentioned, and the same relation is often to be observed between the upper and lower extremities. It is a question of much interest, which I have taken some pains to investigate, whether any other organs besides those symmetrically placed are often associated in a want of sufficient vigour to perfect the evolution of their shape; but there does not seem to be any relation of this sort deserving to be recognized as a law. It is true that defective formation of the lower extremities is frequently coincident with cleft palate, but they more often exist separately. A more close connection seems to hold between the development of the posterior laminae, which in the early condition of the embryo pass backwards from the central axis to enclose the nervous centres and those which advance forwards from the same point to cover in the abdomen; it happens in consequence, that the instances of protrusion of the bowels and exposure of the contents of the abdomen

from imperfect formation of its parietes are not uncommonly associated with spina bifida or an imperfect state of the cranium. Here are drawings of cases in which there were coincidences of these malformations on the anterior and posterior aspects of the body. This dura mater, destitute of falciform process, was taken from the same patient with this pulmonary artery in which there are two semilunar valves instead of three; a coincidence of deficiency in these two parts has been observed in other cases.

There can be little doubt that inflammatory and other diseases occurring in the foetal state do occasionally interfere with and even arrest the developmental processes, leading in that way to various deformities. It is not easy to decide how much is in particular cases due to this influence. In acranial specimens, such as these you have just seen, the absence of calvarium has been supposed to depend upon an accumulation of fluid within the cerebral membranes, distending them, preventing the ossifying process, and at last bursting through them. Again, a diseased state of the valves at the base of the pulmonary artery will prevent the ready escape of blood from the right cavities of the heart, and causing thereby an undue pressure upon one side of the septum, may interfere with its growth and so lead to a permanent opening between the two ventricles. However, it is not probable that inflammation is a very frequent cause of the imperfect formation of shape, because a foetus in utero, more particularly in the early stages of its existence, is removed from most of those accidental causes which are such common excitors of that disease in the adult.

The second division of our subject, viz., imperfections in the evolution of the *structure* of the embryo, is still more interesting, and also more important in a practical point of view. I say more important because it is more frequent and extensive in its operation; the soundness of each particular organ and its ability to maintain a healthy state of nutrition throughout life being in a great measure dependent upon the perfection of its formation in the embryonic period. You cannot fail to perceive at once how essential to any correct views in pathology, must be a fair estimate of this relation between the force of foetal development and the vigour of nutrition in after life. Unless it be taken into account how can we explain the various seeming anomalies that are daily witnessed. In one man the heart goes on beating without fail through a long series of years, and at last ceases to contract, because the several organs are worn out, and fail to respond to one another, and to supply the stimulus necessary for each other's action. In a second person, before half so many years have expired, the same organ, perhaps, without giving any warning of its approaching failure, suddenly ceases to do its work, and its fibres are found to have lost their natural structure, and to be transformed into oily matter. In a third person the valves, by repeated attacks of inflammation, become thickened, contracted, and inefficient, so that the muscle labours on with difficulty, and at length is unable to overcome the obstacle, so as to circulate blood

enough to supply the wants of the system. This may take place even before the adult age has been attained. Now, all these three persons may have been situated in nearly the same external circumstances, exposed alike to the various exciting causes of disease, and required to perform pretty much the same amount of duty. The difference, therefore, observed in each with regard to the power of endurance of the great organ of circulation, and in its liability to disease, must depend upon some congenital peculiarity,—must be related, in short, to the different degrees of energy with which the development of its structure was conducted.

The same remarks apply of course to the other internal organs,—to the lungs, liver, kidneys, &c. Sometimes one of these, sometimes another, is so constituted, as to last only for a short time, and this imperfection in its nutritive energy, traceable to some failure in its primary construction, may be evidenced by the liability evinced in it to inflammatory attacks, to morbid growths, or to degeneration of structure. This holds good with regard to the external organs; to a somewhat less extent it is true, because they are more subject to extraneous influences, so that we cannot, from their diseases, form so correct an estimate of their intrinsic defects. One class of persons show symptoms of congenital weakness in the visual apparatus; they are perpetually troubled with inflammatory and other affections of the eyes, which occur in spite of the greatest care, and do not cease to molest them till the organs are rendered completely useless. In many individuals who are in other respects healthy, the skin is continually evincing an inherent delicacy by eruptions, erysipelas, and other disorders; and in some persons the several great organs are so feebly bound together, that a slight jar is sufficient to sever the slender thread that connects them, though there may be no especial disease of any one. In frames so delicately constituted, a fainting fit or a fright may be fatal.

You will understand that this congenital deficiency of nutritive energy is quite a distinct thing from want of physical force, and is often dissociated from it. There are many persons of slender delicate make, and small physical force, whose nutrition is actively and effectively conducted, whose organs wear out slowly, work well together, and are destined to last to a good old age; *vice versâ*, we not unfrequently meet with individuals endowed with great physical force, but in whom, owing to a deficiency in the endurance of their nutritive energies, one organ breaks down after another, and they die early.

Such are the modes in which the imperfection of structural development is evinced. First, the several organs are rendered by it peculiarly subject to those wastings and degenerations of structure which have been described to belong properly to old age, but which often occur at an earlier period; namely, the fatty degeneration of organs, the yellow deposit in the arteries, cataract, arcus senilis, &c. All, or most of these, are events so common in the decline of life, that they are scarcely to be considered as an evidence of disease in old people; but when they occur in

younger persons, or in some organs in a greater degree than in others, they do really constitute morbid affections; and they are of no little moment, for they depend upon an inherent or congenital deficiency in the nutritive forces, and are therefore very little under the influence of treatment. Secondly, an imperfection in structural formation renders an organ more liable to be affected by disease strictly so called, such as inflammation in its various forms, abnormal growths, &c. Thirdly, physical weakness is a result of the same imperfection in development.

In considering the pathology of any particular organ, it is well to bear in mind these distinctions, particularly that between the occurrence with preternatural rapidity of those changes which are coincident with age, and so natural to it, and the liability to inflammatory and other diseases, because they are likely to be overlooked or confounded; and though both may depend directly or indirectly upon the same want of preservative or nutritive force, they differ in their nature and in the mode whereby they produce their effects, as well as in the treatment they require.

We may trace the results of this congenital deficiency of nutritive force in the liability to disease which is often shown by the same tissue at various parts of the body. The disposition of inflammation to linger about a particular class of structures, the mucous, serous, synovial, cellular, or osseous, is matter of every day observation; and you may remember that your attention was particularly directed to this fact when we were considering the subject of scrofula. I then remarked that the disease is often confined to the skin in one patient, to the cellular tissue in another, to the absorbent glands in a third, and to the bones in a fourth. When we find scirrhus affecting one of the bones, we infer with tolerable certainty that other parts of the skeleton are involved in the same manner; and you have repeated instances of seeing how frequently cutaneous *nævus* appears at several points in the same child.

Again, the correspondence of the changes which take place in tissues of the same class, as a result of senile atrophy, is an instance of the like kind, and a matter of some practical interest. The horny or albuminous structures, such as the cuticle and the nails, become dryer, harsher, and more brittle, so that the latter crack and splinter more easily than in young persons, the cornea becomes more opaque, and the lens also loses its perfect transparency. The gelatinous tissues at the same time suffer a diminution of elasticity, acquiring a stiffness and rigidity scarcely compatible with free and easy movement; frequently they are still further altered by ossification gradually taking place in them. It now and then happens that a singular tendency to this change is evinced by the ligaments, fasciæ, and other fibrous tissues, long before the period at which senile changes usually commence. A remarkable instance of this is afforded by a skeleton in the Museum of the College of Surgeons, in which large plates of bone pass from the ribs to the scapulæ and pelvis, and from these to the extremities, uniting the several parts immovably together, as though they

consisted of only one piece. All these bony plates take the direction of the fasciæ, tendons, and muscles, and evidently result from the conversion of them into bone.

Nearly connected with the subject we are now considering is the symmetry of disease, for it cannot but be highly probable that corresponding regions on the two sides of the body should have the same natural force of nutrition, and be liable to the same modifications of it, and to the same alterations of structure. We have already found this to be true as regards the development of shape, a malformation in one half of the body being, in very many instances, attended with a similar imperfection in the other; and the attention of pathologists has of late years been directed by Dr. Budd and Mr. Paget to the natural tendency which is manifested by diseases, more particularly diseases dependent upon some general cause, to show themselves in a symmetrical manner on the two sides of the body. These drawings of cutaneous eruptions, and these specimens of syphilitic ulceration of the cranium, are sufficient illustrations of the fact. Indeed the symmetry of disease is almost a necessary sequence of the symmetry of development, and, as I remarked when alluding to the same point in connection with the malformations of the embryo, one is disposed to wonder that it does not more generally occur, both in foetal and in adult life.

It is to be observed that imperfection in the development of structure, though by no means necessarily associated with malformation, frequently co-exists with it. Thus the portion of integument surmounting an incomplete hare-lip is very generally pale, smooth, without hair bulbs or glands, and looks like cicatrix, so much so that unless aware of the fact, you are likely to imagine that an unsuccessful operation has been performed. Scar-like patches of skin are also not uncommonly found upon a malformed limb; and the coverings on the sac of a spina bifida consist generally of thin shining transparent membrane, in which very little cuticular structure has been developed. The same is the case with the meningeal envelopes in hernia cerebri, and in acranial foetuses.

Then comes the question, and an interesting question it is, whether malformed organs are in a peculiar manner subject to disease? *A priori* considerations lead us to expect that they would be so, because we have hitherto found a close relation in the force with which nutrition is conducted during the several stages of existence. I am, nevertheless, unable to produce sufficient data to decide for certain, that any such rule generally holds good. It is a common thing for patients with cleft palate to be troubled with inflammation of the lining membrane of the nose, palate, and fauces; but this may be occasioned by the difficulty experienced in the transmission of food, as much as by any congenital weakness in the membrane itself. An objection of the same kind may be raised to most of the instances in which malformation is attended with deficient force of nutrition and preternatural liability to disease, because the malformed parts are more or less

destitute of function, and are on that account likewise feeble in their vital powers. In this specimen, where the number of valves at the base of the pulmonary artery is two instead of three, you may perceive a morbid warty condition at one of the angles of junction between the valves.

A congenital imperfection in the nutritive forces, and a corresponding liability to disease is not necessarily confined to certain organs, still less to those which are malformed. We have often to regret the want of vital as well as of physical force which pervades the entire frame of the young child. Sometimes it is evident from birth, the infant being thin shrivelled and sickly when first ushered into the world; or, having appeared plump and well nurtured enough at first, its nutritive powers seem unable to cope with the altered circumstances under which it is placed. Instead of thriving and increasing in bulk and weight it falls off and becomes thin and wizened without any sufficient cause that we can discover. The appetite may be good, perhaps ravenous, and there is no discoverable disease of the abdominal and other viscera. The child continues to waste, being gradually reduced almost to a skeleton, and dies of inanition, or falls an easy prey to cold or any slight inflammatory attack that may happen to supervene.

Very nearly allied to this is the want of energy of the nutritive forces, which I have described as the essential feature of the scrofulous constitution. Something of the same kind takes place at a later period of life. We every now and then find an adult suffering under general atrophy, that is, becoming gradually thinner and weaker without any assignable cause. It is true that in a great number of instances a careful inspection will discover that the atrophy depends upon a disease of some particular organ, the stomach, liver, or one of those engaged in the chyle and blood making processes. But this is not always the case, the disease sometimes appears to consist in a mere failure of the nutritive forces throughout the entire system. The patient becomes thinner and weaker, less capable of exertion, and less able to resist exposure; the signs of old age, those sure intimations of decay and heralds of approaching death, set in at an early period; the hair turns grey, the teeth drop out, and the general decline of strength is shown by the predisposition to disease which becomes so strong that the slightest spark is enough to light the fatal torch. How commonly do we hear that a patient has been observed to look ill and to have been getting thin and weak for some months before the onset of a severe inflammatory affection or the appearance of a scirrhus. The fact is, that the body has "filled the circle marked by Heaven," in other words, the period is exhausted during which the developmental or nutritive force impressed upon its tissues was sufficient to carry them. It is very important to take cognizance of the early symptoms which indicate such a failure in order that we may be able to form a probable estimate of the severity of an incipient illness, and may be led to greater caution in its treatment. A just appreciation of the incipient stages of this condition

will often induce us to decline even the minor operations, such as the removal of wens, because the patient is very likely to suffer erysipelas in the neighbourhood of the wound, and has very little power to abide the attack. You have often heard patients advised to endure their malady rather than run the risk even of a slight incision, because the marks of failing nutrition disproportionate to their time of life showed them liable to the dangers incident on operations, and a little experience will teach you the folly of neglecting such hints.

A congenital weakness or imperfection of *physical construction*, which is a distinct thing from the want of vital force just mentioned, may often be observed, although the quantitative nutrition is active enough. You will see children in whom there is no deficiency of growth, indeed, they may be more bulky than others of the same age, but who are weak, soft, and flaccid, without energy either of body or mind. Such children have a pale waxy complexion, are dull and inactive, and show no disposition to move, they lie wherever they are placed like mere helpless lumps of flesh, and sleep incessantly; their limbs may be bent about in any direction, the muscles offering no resistance; and when they are placed upon the nates, the spine bends back, and the head falls forwards. They very often die in infancy. If permitted to live they retain more or less of the qualities just mentioned, remaining indolent, physically weak, and disposed to corpulence.

Sometimes this imperfection in the physical construction is evidenced in certain parts of the frame more than in others; in the ligaments for instance. As soon as the child in whom this weakness exists begins to bear upon its feet, the plantar fascia and ligaments of the sole yield under the weight, the arch of the instep sinks in, and the bones are pressed flat upon the ground, causing a contusion of the vessels and nerves which lie there. The ankle bulges inwards, and the child acquires an awkward gait, shuffling over the inside of the foot, instead of mounting fairly upon the balls of the toes. This deformity often takes place, or is first noticed, about the age of puberty, when growth is rapid, and the weight of the body increases quickly. It may be induced by a sprain, a tight shoe, or slight inflammatory affection; in short, by anything that weakens the foot, and impairs the nutrition. Hence it is sometimes the result of over fatigue, and is observed in children who are obliged to walk far, to dance much, or to carry heavy burdens. Stout, heavy, loosely built persons are more liable to be troubled in this way than those who are slim and well knit.

You will often be consulted about these cases, and will find them difficult to remedy, because any mechanical assistance is sure to impede the movements of the part, and so to interfere with the activity of its nutrition. On that account strapping and bandaging are generally injurious, but the slight support of a well-fitting boot affords some comfort and relief; the patient should not be allowed to stand much, but should be

encouraged to exercise the toes and feet when he is in the sitting posture, and to apply the douche with cold water or salt water once or twice a-day. By these means an increase of the deformity may be prevented, though we can scarcely expect the foot to resume its natural form.

The deformity commonly called "knock knee," much resembles "flat-foot," inasmuch as it depends in part upon weakness and yielding of the lateral ligaments, but not entirely, for the lower end of the femur becomes altered in shape, particularly the outer condyle. If you examine the skeleton you will see that in the erect posture the outer condyle is more in the line of gravity than the inner condyle; being, therefore, subject to a greater amount of pressure, it sometimes yields, becomes flattened or shortened, and allows the leg to incline outwards, which, of course, gives to the knee the appearance of projecting inwards. Though shortened from above downwards, the condyle is not lessened in its antero-posterior diameter, at least it projects as far backwards as the other, so that when the limb is bent, the leg assumes its proper line of relation with the thigh, the deformity being observed only in the straight position. Moreover, in consequence of the deficiency in the length of the condyle, if the knee be flexed, the patella, which should form the most prominent bony point anteriorly, sinks into a hollow, so as to be placed even in a line behind the internal condyle.

Like "flat-foot," this deformity is commonly first observed when the child begins to bear upon the lower extremities, and it appears in both knees. It may, however, be confined to one, and may commence after the age of puberty, being then, for the most part, traceable to a sprain, bruise, or slight inflammatory affection. Some assistance may be derived from irons, so fitted as to bear part of the weight of the body, and made with a hinge at the knee. The general principles of treatment are the same as in flat-foot.

Now and then children are born with such looseness of the capsular ligament of the hip, that the head of the thigh bone is permitted to ride upon the dorsum of the ilium. In such cases there is generally a good deal of deformity in the bones, the head of the femur being much altered in shape, the rim of the acetabulum wanting, and the ligamentum teres absent.

The affection of the bones called "rickets," which should be described here, will form the subject of the next lecture, and I will proceed at once to mention some of the failures that occur in the third branch of development—viz., growth.

It may be that the fœtus, though of legitimate shape and proper structure, is deficient in *size*; indeed this branch of development is so subject to variation, that we infer the age of an embryo with less precision from its size than from the extent to which the external form and general characters of the body are developed.

Most commonly the imperfection of growth is equal in all parts of the fœtus. They may be all small but still proportionate to one another. Sometimes, however, the failure is limited to certain regions; perhaps

the extremities are small in comparison with the trunk and head. Or it may be more limited still; in the College of Surgeons a fœtus is preserved in which the extremities are remarkably short; the hands and feet are of sufficient size, but the limbs have not grown to a proper length.

In like manner after birth the growing process may proceed too slowly, or may cease prematurely in the whole body, the dwarfish form thus produced exhibiting a fair proportion between the size of the head, the trunk, and the extremities. Many persons are far below the average stature, whose figure presents no unsightliness, no want of relation between its several parts. The dwarf, General Tom Thumb, lately exhibited, was a remarkable instance of this.

It very often happens, however, that the proper relation between the growth of the head and trunk, on the one hand, and that of the extremities on the other, is not preserved. In one class of persons the limbs remain short, the defect being especially remarkable in the thighs, but the head and trunk continue to increase, so as to produce short, stumpy, square-built frames. Sometimes indeed the disproportion is very great and unsightly. Dwarfs of this kind are not uncommonly seen, and contrast strongly with those Lilliputian, but well made figures just mentioned.

In the other class of persons the disproportion of growth is the exact converse of that last described. The head and trunk, including the pelvis, remain small, whereas the extremities, more particularly the thighs and arms, shoot out to preternatural length, so that the figure is long, straight, thin, and lath-like.

A difference of length is very seldom to be observed between the two extremities. When such is the case it generally results from some disease or paralytic affection in the shorter of them.

CASE OF HEREDITARY CATARACT.

By SAM. S. DYER, Esq., M.R.C.S., RINGWOOD.

AMELIA WISEMAN, aged 10 years. Has never had very good sight; it has been gradually failing five years, and quite lost for three.

July 23rd, 1849.—General health good; pupils perfectly circular; margins even, and very dilatable under the influence of strong light. Colour of cataracts nearly white, of equal degree of shade from centre to circumference.

Assisted by my father, I operated upon both eyes this morning, using Scarpa's needle, tearing the capsule, and reclining the lens. There was no difficulty about it, and the child bore the operation well.

25th.—There has been but little constitutional disturbance. On looking at the eyes for the first time since the operation, there appears a good deal of conjunctival inflammation; the pupils are clear, and she distinguishes the number and form of objects.

28th.—Going on favourably.

August 3rd.—This morning I find there is a portion