A COURSE OF
LECTURES ON SURGERY,

DELIVERED IN THE

MEDICAL SCHOOL OF CAMBRIDGE.

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LECTURE XXI.—HYPERTROPHY.

Is often a salutary process; its relation to reparative inflammation; distinction between the effects of hypertrophy and those of inflammation; instances of hypertrophy and the changes accompanying it; alteration of size and structure; senile hypertrophy of heart, sometimes accompanied by atrophy; of prostate gland, changes in the urethra and prostatic ducts accompanying it, symptoms; hypertrophy from increase of function, is not produced by increased rapidity so much as by increased force of muscular contraction; hypertrophy from excess of nutritive material; such excess more often induces atrophy and its results; hypertrophy from excess of nutritive or appropriative force; hypertrophy in development of shape, double monsters; reasons for referring them to excess of development in one ovum rather than to the fusion of two; portions of fœtus included in or attached to another fœtus explained by the same hypothesis; hypertrophy in growth, in development of structure; moles; nævi, consist of dilated vessels, and have no claim to be called erectile; cutaneous nævus, stationary or growing, treatment; subcutaneous venous nævus, stationary or growing, treatment; subcutaneous arterial nævus, alias aneurism by anastomosis.

WE say that an organ or tissue is in a state of hypertrophy when, owing to an excess of nutrition, it has attained to greater size, or has acquired a more perfect development of structure than natural. Hypertrophy is, therefore, as the term implies, the converse of atrophy, and we shall find that it contrasts with atrophy in the causes inducing it, as well as in the changes connected with it. It is of less frequent occurrence than atrophy, and produces less marked alterations in the structures affected by it. Nevertheless it constitutes a very important division of pathology—a division which, I think, admits of extension beyond the limits usually assigned to it, and which may with advantage be made to include a considerable number of morbid products hitherto unclassified.

When speaking of atrophy I endeavoured to impress upon you that it is, in a large proportion of cases, a natural process, an object of physiological rather than of pathological interest, and that it is to be regarded as morbid only when it exceeds certain bounds. We shall in like manner find that hypertrophy is very often a natural, indeed a salutary process, taking place in one organ to make amends for deficiency in another, or enabling a part to meet some unusual demand upon its function. In other cases it seems to occur as the

result of a freak, if one may so speak, of the nutritive forces; it then leads to needless or injurious exuberance of structure, and is strictly morbid in its effect as well as in its cause.

In this respect it corresponds with inflammation no less than with atrophy; for you remember that inflammation, occurring under certain circumstances, and restricted within certain limits, is a process most salutary, indeed essential to the continuance and well-being of the body; it is injurious only when it passes beyond that which we described as its reparative stage, or when it is uncalled for, there being no work of reparation to be done. This reparative stage of inflammation taking place without being required, or lingering after its work has been accomplished, is no uncommon cause of hypertrophy; on the other hand, when inflammation passes into its secondary or destructive stages, it sometimes gives rise to atrophy as one of its effects. It has been necessary to explain this relation of inflammation to hypertrophy on the one hand, and to atrophy on the other, otherwise you might imagine that a contradiction was involved in referring these opposite effects to the same cause.

Hypertrophy seems also to bear a further relation to the reparative stage of inflammation, in being, like it, a demonstration of that residual developmental force which exists in the adult for the purpose of meeting any extraordinary demands that may be made upon the nutritive powers. That this force, generally latent, and waiting the summons of some exciting cause, should sometimes start into activity when not required, is no more surprising than that the same force should occasionally exceed its legitimate bounds when it is exerted in the fulfilment of a necessary object. If in the foetal period supernumerary organs are produced by an exuberance of developmental force, and there can be very little doubt that they are so, we need not wonder at the occasional manifestation of that force in the adult when it is uncalled for, or at its proceeding to excess when it has been called into action by some natural demand. We shall find, as we proceed, that this does not unfrequently take place, and that hypertrophic changes in a part do often depend, so far as we can judge, simply upon an exuberance of the developmental or nutritive forces.

Although hypertrophy and inflammation are in some respects thus allied in their nature, and though the one is not unfrequently the cause of the other, it becomes necessary in ordinary cases to draw some line of demarcation between them. An organ, for instance, is increased in size; does the increase depend upon inflammation or upon hypertrophy? The decision of this question does not generally involve much difficulty. When the enlargement is of an inflammatory nature, a little careful examination will show it to be occasioned by distension of blood-vessels, or by the *effusion* of some new material upon the surface or into the substance of the organ. When the enlargement is the result of hypertrophy, it will be found to consist in the preternatural *growth* of the component structures of the part concerned. It may be, as in the bones, that the

inflammatory deposit becomes converted into a substance closely resembling the parent tissue, and intimately connected with it; the resemblance to hypertrophy is, in such a case, very close; but even here we can generally distinguish the increase of size occasioned by a new deposit from that which is dependent on the growth of the old bone. You will find it important to bear this distinction in mind, because parts are often described by careless observers and indifferent pathologists to be hypertrophied simply because they are enlarged, whereas the enlargement evidently results from the presence of a quantity of more or less assimilated lymph lying in the interstices of the tissue. Undoubtedly the distinction cannot always be made, for as has been said, the two processes are sometimes blended together, an inflammatory excitement inducing hypertrophic growth. The numerous instances in which this occurs we shall consider in the next lecture, under the head of "inflammatory hypertrophy."

Hypertrophy is observed chiefly in the muscular and glandular organs; these being the parts liable to the greatest variation in their nutrition, and an increase of size is the common and obvious result of it. The most familiar instances of this change are met with in the heart, the bladder, and the kidney. Here is a remarkable specimen of hypertrophy of the right ventricle of the heart. You see the great size of the cavity; the thickness of its wall, and how coarse and well-marked its component bundles of fibres are. The semilunar valves of the pulmonary artery are diseased and agglutinated at their edges, so as to diminish the orifice to the size of a goose quill; this obstacle to the passage of blood from the ventricle was the cause of its hypertrophy. From a similar cause—stricture of the urethra—the muscular coat of this bladder is increased to five or six times its natural thickness; and the cases in which one kidney is enlarged to nearly double its proper size, in consequence of disease in the ureter or pelvis of the other kidney, are by no means uncommon. The enlargement of a muscle under such circumstances is attended with, and indeed occasioned by, a corresponding increase in the size of its ultimate fibres, which, at the same time become redder, their nuclei more distinct, and all their qualities more fully developed. The vessels of the hypertrophied part are also enlarged and more active; and it may be presumed that the nerves undergo a similar alteration. All this, and more than this, is well illustrated by the changes occurring in the pregnant uterus: as the period advances the organ enlarges, its fibres become developed into a closer resemblance to muscular structure, and are separated from one another by an increase of the cellular tissue between them; at the same time, the uterine vessels are enormously dilated, thickened in their coats, and lengthened, so as to be rendered very tortuous. It appears, also, from the researches of Dr. Lee, that the uterine nerves, which in the unimpregnated state were scarcely visible, now undergo a change corresponding with that of the fibrous structure, and of the vessels; and that ganglia may be discovered in the course of their trunks.

I have said that the increase of size is a common and obvious result of hypertrophy, a certain amount of improvement in the *quality* of the structure being coincident with it. But the changes in this respect are very slight, amounting to little beyond a more perfect formation of fibre, and a clearer development of nuclei. There can scarcely be said to be any alteration of structure, any advance in organization sufficient to contrast with the fatty and earthy degeneration which we found to be such frequent attendants upon atrophy. The nearest approach to anything of this kind that has been observed is the instance of the pregnant uterus just mentioned, and a few cases in which the fibro-cellular tissue of the gall-bladder and the ureter has been found converted into a structure resembling muscular fibre, after long-continued obstruction to the passage of the bile or urine through them.

The instances of senile hypertrophy bearing most relation to senile atrophy, are the gradually increasing preponderance of the earthy and fatty materials in the frame which has been sufficiently discussed already,—the enlargement of the heart and the enlargement of the prostate gland. It appears at first a startling announcement that a progressive increase in the size and weight of the heart takes place throughout life, even at the time when the demand upon the nutritive and circulatory forces is gradually diminishing. But the fact is sufficiently explained by the changes occurring in the arterial system; the loss of elasticity in the larger, and the weakened contractility in the smaller vessels, the deposit in their coats, and a variety of causes, concur to impede the circulation, and to make a greater demand upon the heart's action. Sometimes, in spite of its increased bulk, and its effort to make amends for deficiencies in other quarters, it shows in certain imperfections of its structure the effects of the failure of its nutritive powers attendant on old age; though large, its fibre is liable to become flaccid, and perhaps impregnated with oily matter. It may be that these imperfections in its structure, and the consequently diminished contractile power of its fibres are, in some measure, an indirect cause of the increase in its size. This remarkable association of hypertrophy in size with atrophy in structure was exemplified not long ago in the case of an old man who died suddenly in the hospital, of rupture of the left ventricle, when he was recovering from the effects of phlegmonous erysipelas, following the removal of a finger. We found the coats of the aorta and other large vessels extremely diseased, and the heart enlarged to nearly twice its usual dimensions but flabby; its fibres were of a pale yellow colour, tearing easily, and when examined under the microscope they were seen to be loaded with oil, so that in some places scarcely any remnant of true muscular substance existed.

The cause of the prostatic enlargement, so common in old age, is by no means clear; perhaps it depends upon some chronic inflammatory condition. It affects part or the whole substance of the gland, converting it into a coarse, tough, gristly structure, in which the interlobular cellular tissue forms no inconsiderable share, for it, as well as the proper glandular elements,

is thickened and indurated. The urethra passing through the gland is lengthened and widened; in this specimen it measures nearly an inch and a half in circumference; it is also frequently altered in shape, flattened from side to side, or twisted by unequal enlargement of different parts of the gland. The prostatic ducts, opening into the hinder part of the urethra, also become widened, and their orifices so much dilated that the point of a catheter may readily pass into them, instead of travelling along the urethra. The necessity of bearing this fact in mind was impressed upon me some years ago by dissecting a bladder, the cellular tissue about the lower part of which was literally riddled with false passages: some of them communicated with the bladder, others terminated in blind pouches behind it, and two were close to the peritoneum, so that a little more force would have perforated that membrane. The catheter had been repeatedly used to relieve retention of urine, and the point of it passing into the dilated orifices of the prostatic ducts had been thrust onwards, and so caused the false passages. You perceive that it is an accident very likely to happen unless cautious gentle manipulation be employed. We not uncommonly find, as in this instance, fibrous tumours developed in the substance of the prostate gland under these circumstances; and such tumours, or growths of certain portions of the gland, particularly of the part just behind the urethra, which has been called the third lobe, may form considerable projections into the bladder.

The affection is commonly attended with more or less dysury and irritability of the bladder, causing frequent desire to pass water, or amounting even to incontinence. This distressing symptom is favoured by the widened rugose condition of the prostatic portion of the urethra, which, together with the enlargement of the gland, renders the *sphincter vesicæ* incapable of performing its functions. The same circumstances will of course interfere with the action of the dilator and expulsor fibres, which in their natural condition expand the urethral orifice at the same time that they compress and expel the fluid contained in the bladder: of course as the prostate becomes enlarged and indurated the insertion of these fibres is removed further from the urethra, and they can exert less influence upon it. The difficulty is often increased by a circular elevation of the gland around the orifice, or by pendulous growths overhanging it and acting as a valve so as completely to prevent the expulsion of urine from the bladder. These causes combine to render old men liable to retention, as well as incontinence, of urine. Patients occasionally present themselves at the hospital who have been in the habit of using the catheter night and morning for several years, and who are quite unable to pass water without it; others suffer an attack of retention now and then, and recover the power of micturition after the catheter has been used for a few days. If the case be neglected, and no measures taken to relieve the distended bladder, the urine begins to ooze away through the urethra after a few hours, and I have known a patient to lie in this state for several

days, who was supposed to suffer from incontinence instead of retention. This dribbling prevents the distension exceeding a certain amount, and saves the bladder from rupture, which is in consequence a disaster very rarely occasioned by enlargement of the prostate. The retention is likely to take place when the patient has inadvertently allowed the bladder to become too full, and the overstretched muscular fibres have lost their ability to contract. It is necessary, therefore, to repeat the use of the catheter two or three times a day, so that the bladder is never allowed to become full. You will see the propriety, in such cases, of using a long instrument, and one of sufficient size to escape the orifices of the prostatic ducts.

Of the three causes mentioned on former occasions as influencing nutrition, viz., the supply of nutritive material, the amount of force to appropriate that material, and the exercise of function, a variation in the last is the most frequent cause of hypertrophy. This you will be quite prepared to expect, from your knowledge of the general laws of nutrition, and the close relation that always exists between nutrition and the exercise of function. If the failure of the one is an almost invariable attendant upon the diminution of the other, it is to be presumed that they will be in like manner related in their excess. This we might anticipate from our acquaintance with the laws of nutrition, although it may seem to be in some measure opposed to the fact that every exertion is attended with a corresponding waste of structure; that each contraction in a muscle—each impression communicated by a nerve, is accompanied by some change and accelerated decay in the muscular and nervous systems. It seems that the balance of nutrition is so exquisitely poised, the powers so nicely adapted to the wants, as not merely to repair the necessary waste occasioned by the ordinary exercise of function, and even to repair with *increased perfection* the unusual waste occasioned by *extraordinary rapidity* in the exercise of function, but they go a step beyond this, and actually produce a greater *quantity* of structure to meet a demand for more *powerful* exertions. It is necessary, more particularly in considering the hypertrophy of muscular structures, to bear in mind this difference between the effects of unusual rapidity and unusual force of contraction. The one creates a more perfect, the other a larger, muscle. You do not find that much increase in the size of a muscle is occasioned by an augmentation merely in the number of its contractions; thus it is well known that the heart often goes on for months, or even years, beating at a rate far above the natural average, without undergoing any hypertrophy. The nervously-palpitating organ gains no increase of substance; indeed, owing to a variety of causes, such as a diminution in the quantity of the circulating fluid, a want of proper bodily exercise, &c., these hearts are generally very thin; but if an impediment to the ready circulation of the blood occur—if a valve be diseased, the structure of the arterial coats impaired, or the qualities of the blood be altered so as to render its passage along the vessels less easy, then the walls of the heart soon become thickened,

although the number of its beats may not be increased. The hypertrophy takes place also in that ventricle which is nearest to the cause of obstruction.

The view that hypertrophy is occasioned rather by an increased demand upon the force than upon the number of muscular contractions, is illustrated by numerous examples of every day life. The muscles in the legs of the pedestrian do not generally enlarge beyond their natural size unless he walks in a hilly country. The arms of the blacksmith and the legs of the rope-dancer exceed the ordinary proportions, because the one wields the sledge hammer and the other throws the body into strange positions. You do not find the muscles large in those mechanics whose work requires celerity of movement rather than force. On the contrary slim light-made men are best suited to such occupations, and they are notoriously the most active. It seems as though muscular hypertrophy and rapidity of contraction were scarcely compatible; at least they seldom coexist in any great degree, and the prolonged, dull, systolic sound of the heart attendant upon hypertrophy of the ventricle contrasts well with the quick sharp vibration occasioned by the more rapid contraction of a thin organ.

It is to be observed in these cases of hypertrophy of the heart that the cavities are enlarged and the orifices increased in size; the valves undergo a corresponding change, so that unless a disease of them be the cause of the hypertrophy, they remain for the most part efficient, and they, as well as the cordæ tendineæ and carneæ columnæ connected with them, become thickened and strengthened in proportion to the greater resistance required of them.

The thickening of cuticle upon the hands, feet, and other parts subject to much friction, the changes in a mucous membrane and its epithelial covering, when it happens to be long exposed to the external air, and the enlargement of one mammary gland or kidney when the corresponding organ is deficient, are among the numerous instances of hypertrophy occurring for the purpose of enabling structures and organs to meet the unusual demands made upon them.

A superabundant supply of nutritive material is not a common cause of hypertrophy to any great extent, particularly in the higher tissues. In some persons and in many animals, an excess of the carbonaceous elements of food is attended with an accumulation of fatty matter in the body; but the quantity of muscular fibre and of the other important structures possessing active qualities cannot be thus forced much beyond the natural standard. Something no doubt may be done in this way, and the muscles are often well developed in persons who are highly fed and who partake freely of animal diet. In the greater number of cases, however, an increase of diet beyond the required amount induces a disordered or enfeebled state of the nutritive functions rather than hypertrophy. It may be that the disorder does not occur in the chylopoietic or primary assimilative system, and that a large quantity of nitrogenous products are admitted into the blood, causing a plethora of it. When that is the case the muscular

and other organs are very liable to suffer in their nutrition, from being pampered in so rich a soil, and actually evince the defect by becoming atrophied and undergoing fatty degeneration or by a predisposition to inflammation. It may seem strange that a condition resembling that produced by a deficient supply of food should follow the indulgence in too liberal a dietary; but it is a fact which very little observation will suffice to exemplify, one which the most successful practitioners have always kept steadily in view. How often do we see children reduced to skeletons and rendered pale and sickly by overfeeding, who improve in health and become plump and ruddy when a more sparing diet is enforced. Perhaps the stomach and digestive organs retain their integrity in spite of the load imposed upon them, so that the real cause of the illness may escape detection. It is well known that a variety of inflammatory affections, and the worst results of inflammation, particularly *gangrena senilis*, take place most frequently in persons who have been accustomed to live freely and to partake largely of animal food and fermented liquors. The numerous modifications of gout also are most frequently met with in these persons. Indeed, that disease seldom occurs in the temperate unless there be a decided hereditary predisposition to it.

It is not easy to decide what share an accelerated flow of blood through the vessels of a part may have in producing hypertrophy, because such condition of the circulation is scarcely ever maintained for any length of time unless it be associated with or occasioned by some alteration in the nutritive forces. We should infer that a flow of blood disproportionate to the requirements of an organ would, like too great richness of the blood, lead to an impairment of nutrition rather than to a superabundance of structure. The exuberant growth of hairs which you may have observed to take place under a poultice, more particularly in the neighbourhood of an ulcer or other cause of excitement to the circulation and nutrition of the neighbourhood, is scarcely an instance in point, because the warmth and moisture exert, probably, at least as much influence as any activity of the capillary vessels occasioned by the poultice.

The third cause affecting nutrition which we have to consider in reference to hypertrophy is a variation in the appropriative power of the tissues. One cannot help feeling, *a priori*, a disinclination to admit the probability of an increase in this power taking place beyond the natural standard, unless it were occasioned by some unusual demand upon nutrition consequent on the exercise of function or some such cause; and it may be that a deeper and more accurate knowledge of physiology and pathology will prove the correctness of this feeling. There are, however, numerous instances of hypertrophy, which we can at present explain only by referring them directly to an excess of nutritive force—to an active demonstration, as I have described it, of that remnant of the developmental and growing force which should be exhibited in the adult only upon extraordinary emergencies, but which does now and then break through the checks imposed upon it, and shows its effects in a variety of ways.

Before entering upon this division of our subject, it will be desirable to say a few words respecting the instances of hypertrophy that occur in development, because they seem to be closely allied to the hypertrophies which, in after life, result from an excess of appropriative force, and we shall thus prepare the way for the more full and ready comprehension of the latter.

The very best and most complete examples of hypertrophy from mere exuberance of the nutritive processes, are those furnished in the course of development; such as the formation of supernumerary organs, an additional finger or thumb upon one or both hands, and instances of the like kind. Here are two sets of digital phalanges placed upon one metacarpal bone. This duplicity of course depends simply upon the process which was shot forth as the basis of the part, being originally in two instead of one. The same thing may occur to a much greater extent in the limbs, in the head, or even in the body of the embryo; indeed the degree of duplicity in the foetus will be proportionate in great measure to the early stage of development at which it commences. There is, I think, little doubt, that the formation of a double monster is due to an excess of development evincing itself in the primitive condition of the ovum, taking place in the same manner, due to the same causes, and in every respect corresponding to the production of a double finger. The mode of origin of these monsters has, it is true, long been a matter of dispute; some physiologists attributing them to the fusion at a more or less early period of two originally distinct ova. But the question may now be considered to have been fairly decided by the investigations and arguments of Professor Vrolik, of Amsterdam, who has paid much attention to this subject, and has written lucidly and at considerable length upon it. His reasons for rejecting the hypothesis of the fusion of ova in favour of that of excess of developmental power, and for preferring to regard them as examples of singleness tending to duplicity rather than of duplicity tending to singleness, are as follows, and I cannot do better than give them nearly in his own words:—

1st.—Double monsters form one series among whose several members the degrees and modes of deviation from singleness gradually increase and pass without one abrupt step from the addition of a single ill-developed limb to the nearly complete formation of two perfect beings. As the lowest degree of duplicity, may be mentioned that of a single part of the body; for example, a double or supernumerary finger; as the highest, a complete double monster with two heads, four upper and lower limbs and two trunks, such as the Siamese twins. And between these two extremes there are different forms of duplicity which gradually run into one another. Now, if this be true, no hypothesis can be acceptable if it do not plausibly explain the origin of the whole series of double monsters; or if, though it may suffice to explain the facts in one part of the series, those in another part are opposed to it. And here is a fair objection against the hypothesis of fusion of two originally perfect and separate embryos. Grant that we might explain by it the formation of the

more perfect instances of duplicity; still, if the same hypothesis is altogether opposed to the simpler forms of duplicity, it is surely not tenable. It cannot explain the existence of a superfluous limb; for the limbs are mere offshoots, and are produced at so late a period, that if we could imagine two embryos to come into contact by their shoulders or pelvis, and a fusion of those parts to take place, we should still have to explain how one of them, leaving an arm or a leg behind him, could for the rest of his substance—head, trunk, and all—wholly disappear.

2ndly.—There is no positive or constant relation between the external and internal organs as to their degrees or modes of duplicity. In the most complete duplicity of the exterior, for example, the heart is often single, or even shows signs of having been arrested in its development; and, on the other hand, in the more nearly single forms, the heart is usually either partially or completely double.

3rdly.—Except in cases of posterior and superior duplicity, and some singular examples of attachment of the umbilical cord of one foetus to the head of another, there is never more than one placenta and one cord, and the latter usually contains only a single set of vessels, which divide when they reach the abdomen.

4thly.—The twins are of the same sex. There is no well-proved exception to this important rule.

5thly.—The union of the two bodies takes place only between similar parts, which is explained according to the theory of two ova by the hypothesis of an *attraction de soi pour soi*; a very indifferent explanation, seeing that the evidence of the existence of any such attraction rests entirely upon the facts which it is invented to account for.

The instances where more or less perfect foetuses have been found imbedded in a cavity, or attached to some part of the surface of the twin, are to be explained upon the same theory of an excess of development, rather than by the hypothesis that one ovum has become included in, or attached to, the other. For in the several members of this class there is a regularly graduated series from those in which the superfluous part is only an ill-developed limb, or a mere sac containing a portion of intestine, or some shapeless masses of cartilage, to those in which the parasite differs from the chief in nothing but its inferior size, and its dependence for nutrition. Most commonly the parasite is very imperfect and only vegetative, its nutrition depending entirely on the body to which it is fixed, through which it both receives its nutritive materials and discharges its excrements; and the one increases with the other. These appendages seem to do no harm, for though the individuals who bear them are generally thin and delicate, that debility is most likely dependent upon some congenital defect, or want of proper distribution of developmental and nutritive power, rather than upon any drain occasioned by the parasite. At any rate, it is not wise to attempt their removal, inasmuch as all the examinations yet made prove that the parasite is deeply and by important organs connected with its supporter.

An excess of developmental force does not often manifest itself to any great extent in the *structure* or in the *growth* of the body; certainly not in a degree at all comparable with the variations in *shape* which have been just mentioned. Now and then the body runs on to a gigantic stature, or the limbs grow out of proportion to the trunk, or the head is preternaturally large in comparison with the extremities, but these peculiarities are often due as much to defective development in one part as to its excess in another. So with regard to the internal organs, it very rarely happens that one or more of them grow beyond their natural size out of mere excess of developmental energy. The enlargements that take place in them may be almost always attributed, directly or indirectly, to some intervening secondary cause. Varieties there are in the respective sizes of different parts in different sexes, families, and individuals, but these do not deserve to be admitted into a pathological series.

Under the head of an excess in structural development, we may include those discolorations and peculiar conditions of the skin commonly called "moles." They consist for the most part of a slightly thickened state of the cutis, which has a brownish or dark colour from the presence of an unusual quantity of pigment. Sometimes the mole is quite smooth and soft, and looks not unlike a portion of the skin of a negro, at others it is wrinkled, uneven, or tuberculated, and not unfrequently it is covered with hairs in greater abundance and of more luxuriant growth than properly belong to the skin at the part affected. Now and then this exuberant growth of hair exists alone, children being born covered in parts, or on the whole surface of the body, with a hairy coat, like that of an animal. Not unfrequently the integuments, more particularly those of the face, are stained of a port wine or claret colour; perhaps one cheek, or the whole of one side of the face, is thus disfigured, the skin being in other respects natural; or there may be, in addition, a thickened tuberculated state of the skin, or a dilated condition of the capillary vessels. These several kinds of mole, or "mothers' mark," are almost always congenital. They increase only with the growth of the child, and do not, therefore, require treatment. Bateman says that he once saw an instance in a lady of remarkably fair and delicate skin, where a numerous crop of small moles appeared, in slow succession, upon the arms and neck. Mr. Lawrence once assisted Mr. Abernethy to remove from the back of a lady a huge mole, measuring a foot square, which had been originally a "mark," and had continued to grow after birth. These are very rare instances. If the moles become inflamed, they are said to be liable to ulceration and gangrene, and sores formed upon them are with difficulty healed.

I have said that in some moles the cutaneous vessels are dilated much beyond their natural size. There is another class of affections called "*Nævus*," in which an enlargement of the small vessels of the skin, or subcutaneous tissue, constitutes the chief, if not the only, important feature. There are three chief varieties of *nævi*, differing according to their situation, and the

vessels in them. In the most common class of cases the *nævus* consists in a dilatation of small capillary vessels ramifying in the substance of the skin—cutaneous *nævus*. Secondly, the plexus of small vessels beneath the skin is involved, forming the subcutaneous *nævus*; or, the veins being chiefly affected, it might be called subcutaneous *venous* *nævus*, to distinguish it from the third class, which may be called subcutaneous *arterial* *nævus*, because in it the small arteries are chiefly involved. This third kind of *nævus* is well known, from the descriptions given by John Bell. It was named by him "*Aneurism by anastomosis*," on account of its active pulsating character. It is far less common than either of the other two.

The simplest form of cutaneous *nævus* consists in a dilatation of the minute vessels which branch and radiate from a common centre in a star-like manner. This has been called, from its shape, the "*spider nævus*." It is very often seen upon the face, is not always congenital, and commonly remains stationary, not attaining to sufficient size to attract attention, or to require treatment. Sometimes it increases spontaneously, or is excited into growth by some irritation, such as the pressure of a tight hat or a blow. It may be easily cured by the application of nitric acid, which should be used freely, so as to effect the whole *nævus*, otherwise it is likely to act as a stimulant only, when it makes matters worse. These simple cutaneous *nævi* may extend over a wider surface, as in the man lately in Mark's ward, in whom two fingers and the neighbouring part of the hand were of a purplish red colour, owing to a permanently dilated state of the vessels which had existed from birth, and had increased only in proportion to his growth: the colour was easily removed by pressure, returning again as soon as the pressure was discontinued, and the integuments appeared to be in other respects quite healthy. Not unfrequently the colour is more persistent, depending upon a deposit of pigment into the tissue of the cutis, and occasionally the *nævi* burst, and discharge considerable quantities of blood. This may take place periodically, at certain seasons of the year, or at the catamenial periods.

The common cutaneous *nævus* that we are called upon to treat consists in a more extreme dilatation of the minute vessels of the skin, and has a greater disposition to grow. It spreads like a wart, by involving the adjacent cutis, as well as by an increase of the primarily affected tissue, and so forms a bright red, scarlet, or purplish elevation of the skin, which is generally flat, finely granulated, or nodulated upon the surface, and bears some resemblance to a strawberry or a raspberry. The edge is often defined, sometimes overhanging the surrounding skin, and not unfrequently there are minute spots of dilated vessels near the circumference. These *nævi* feel quite soft, and slight pressure suffices to drive the blood out of them, but they soon resume their former appearance after the pressure is removed, and swell up as if they would burst when the child struggles or cries. In a few instances they have been observed to be attended with

a sensible increase of heat above that of the adjacent skin. They seem to be made up of a congeries of cells, freely communicating with one another, and with the surrounding vessels; there can be little doubt that they really consist in a dilated sacculated condition of those vessels, bearing much the same physical relation to them that an absorbent gland does to the lymphatic ducts connected with it. This cellular spongy structure being filled with blood, and bearing a rough resemblance to that of certain erectile tissues, the term *erectile* has been applied indiscriminately to all the varieties of *nævus*, which is altogether a misnomer, for this simple reason, that *nævi* are entirely devoid of that which constitutes the distinguishing feature of those tissues, viz., an inherent power of erection. They are quite dependent upon the general circulation for their distension. If it be excited, as when the child cries, they swell up, and they subside again when it is quiet. This one point is sufficient to show the impropriety of applying the term "*erectile*" to *nævi*, and proves it to be an instance of the loose careless manner in which the same names are given to structures essentially different, on account of slight superficial general resemblances. The cells of the *nævus* do not even possess the ordinary contractile properties of vessels, so that if they are cut into they pour forth blood profusely. It is important to bear this fact in mind when the knife is used for the purpose of extirpating them, and to take care that the incisions be carried wide of the morbid structure.

These cutaneous *nævi* are very common; they occur in various parts of the body, more frequently upon the head, trunk, and upper extremities than upon the lower limbs. Frequently two or more are found upon the same child. The most effectual and simple mode of treatment is to remove them by ligature. Pass underneath the mass a needle, which is to remain, then another needle at right angles to the former, armed with a double thread, cut away this second needle, and tie the *nævus*, so that one half is constricted by each thread. Of course the needles and threads may be used in any other way that is better suited to the particular case; and you will read of a variety of plans for effecting the strangulation of *nævi* described in surgical works. I have generally found the simple method just mentioned to answer perfectly well. You should be careful to tie the threads very tight, so as to secure the complete strangulation of the mass. When this is effectually done, it sloughs away in a few days, and the wound heals. Very little constitutional disturbance is occasioned by the operation; I never knew any serious result to follow, although I have repeatedly treated large *nævi* in this way. The scar is small, and is less unsightly than you would imagine. It is necessary to take care and include the whole *nævus* in the ligature, otherwise the remnant is likely to grow, and a second operation is required. Cutaneous *nævi* when small may be checked, and their cure sometimes attained by the application of cold, or by keeping them moist with a strong astringent fluid. The touching them with strong nitric acid is a means of treatment which

often answers very well, but it is less speedy and less effectual than the ligature. It may be used freely. An eschar forms and generally separates without much bleeding. It is not absolutely necessary to effect the complete extirpation of a *nævus*, because inflammation excited by the operation may be sufficient to cause effusion of lymph into the remainder of the morbid structure in such quantity as to harden and prevent its further growth, or even to cause its shrinking and lead to its permanent cure. Indeed one of the plans of treating *nævi* has for its object the excitement of inflammation and the effusion of lymph. With this object vaccination is often practiced upon the surface, or in the immediate neighbourhood of the *nævus*, and sometimes with success. Setons are also used, and stimulating fluids have been injected into the swellings. All these are more troublesome and less certain in their effect than the ligature or nitric acid, and should not be employed unless there be some decided objection to those measures, or when the *nævus* is very small. It is to be remembered also, that unless sufficient inflammation be induced to arrest the disease, the irritation caused by these proceedings has generally the effect of exciting a more rapid growth of the *nævus*. When the *nævus* is situated upon the scalp, its cure may be sometimes effected by pressure steadily maintained with a piece of lead or a mould of plaster of Paris, made for the purpose. This mode of treatment is of course attended with a good deal of trouble; frequently it does not answer the object; when it is successful it leaves a scar, almost as bad as that occasioned by the ligature; moreover, unless very carefully applied, it is likely to irritate the *nævus* and make it grow quicker.

The subcutaneous *nævus* is a similar affection of the vessels ramifying beneath the skin, presenting appearances corresponding with its position and the larger size of the vessels there situated. It forms a soft swelling beneath the integuments, which is increased by the struggling or crying of the child, and is affected by pressure in the same manner as the other forms of *nævus*. When small it is often ill-defined, and its characters are not very marked, so that it would be difficult of diagnosis were it not for the fact that we seldom meet with any other quickly growing tumour beneath the integuments of a new-born child. The skin may be quite healthy; sometimes the blue colour of the *nævus* may be seen through it, or the affection may have spread to the superjacent integuments, and a cutaneous *nævus* may be found covering, and perhaps masking, the subcutaneous, so that after treating the former the latter is perceived growing up under the cicatrix. Not uncommonly the skin covering a subcutaneous *nævus* is imperfectly formed, having an opaque, white, smooth, shining appearance, not unlike cicatrix, so that unless told the contrary, you might infer that some ineffectual attempts had been made to treat the growth by ligature or caustic. These subcutaneous *nævi* sometimes grow quickly, and attain a great size. Lassus had seen one as large as a man's head. Latta saw one weighing fourteen ounces at the age of two years, which at birth had been only of the

size of a bean. When large they form inelastic globular swellings, projecting the integuments, and feeling, just as a varicocele does, not unlike a mass of worms coiled up together. Dissection also shows them to resemble varicocele in structure, being formed of dilated vessels, with saccular projections from those vessels.

In your reading upon this subject you will find many different statements respecting the structure and nature of nævi. I express to you the decided opinion that they consist simply of a dilated or enlarged condition of vessels, because it is the most probable supposition, and because it accords best with the different appearances they present; cases also every now and then occur where the structure of the nævus is clearly shown to be such as I have described it. For instance, some of you may remember a lad in the hospital with cutaneous and subcutaneous nævi in various parts of the body; about the ankles were some which presented the ordinary appearance of cutaneous nævi, looking like a congeries of cells filled with blood. In the immediate neighbourhood of these were numerous small incipient nævi, which, with a magnifying glass could be clearly seen to consist of ramifications of small dilated vessels, and the transition from this stage to the other was no doubt easily effected by the further enlargement and saccular dilatation of these vessels. In the soles and under the heels of both feet were several blue elongated nævi, partly concealed by the thicker cuticle of the part, and looking much like varicose veins. The left side of the scrotum was also occupied by nævi, which followed the course of the small subcutaneous vessels, and could be clearly seen as represented in this drawing, to consist in dilatations of veins, which had in many places a beaded appearance; a varicose condition of the vessels extended into the perineum almost to the anus. The case was a remarkable instance of the nævus diathesis being strongly marked, and it illustrated the real pathology of nævus singularly well. The nævi were so numerous and extensive as almost to bid defiance to any treatment that might be instituted with the view of extirpating them. Fortunately they increased very slowly, and it seemed probable that as the lad grew older they would cease to spread, we therefore determined to leave them alone.

The subcutaneous nævi are most frequently found upon the face, by the ear, under the eyelids, near the edges of the lips, and sometimes they occupy a large portion of a lip or one side of the cheek. In these cases they affect the whole thickness of the lip or cheek from the skin to the mucous membrane. When occurring in other parts of the body they are almost always situated immediately beneath the skin. We now and then read of cases in which tumours closely resembling nævi have been found at greater depths from the surface, and not long ago I removed from the neck of a little girl a mass composed of a spongy cellular structure, the cells of which communicated freely, were separated only by thin septa of fibrous tissue, and were filled with blood. It extended beneath the edge of the sterno-mastoid muscle, and before the operation

had much the feeling and general appearance of nævus.

The treatment of these nævi has always been a subject of great interest to surgeons, because they may grow very large, involving the adjacent structures in such a manner that they often cannot be removed without serious mutilation of the parts affected by them, which is the more important from their being so commonly seated in the face. It is to be remembered that having attained to a certain size they do in some instances become stationary. This remark, which applies to the cutaneous, no less than the subcutaneous, nævus, and which has not been sufficiently enforced by writers upon the subject, should have its weight, when the operation required for the extirpation of the growth would be attended with danger or much deformity, and should influence the assertions you make to parents respecting the probable result, in case the treatment be permitted. There is a man living in this town, the left side of whose cheeks is greatly swollen and affected in its whole thickness by a dilated or "nævus" condition of the vessels; they form purple elevations of the skin on the one side, and the mucous membrane on the other. The blood can be easily squeezed out of the parts, and quickly returns. The affection existed in his infancy, and has not undergone any increase so long as he can remember. A little observation will show you many cases similar in kind, though less in extent.

Nevertheless, the subcutaneous nævi often increase to an inconvenient size, presenting an unsightly appearance, or they may burst, and give rise to alarming, even fatal, hæmorrhages. It is, therefore, advisable to take some measures to extirpate them, or to arrest their progress. A variety of means are adopted: of these the simplest and most effectual is the ligature; it is generally employed unless there are some decided difficulties or contraindications to its use. You may sometimes succeed in saving a part of the superjacent integuments by reflecting them from the nævus before the needles are passed beneath its base. In doing this it is necessary to beware of wounding the nævus, because the bleeding is likely to be profuse if the incisions be carried into the morbid structure. Extirpation by the knife is not often resorted to for fear of hæmorrhage. Not unfrequently these nævi are in such situations that extirpation by the ligature or the knife cannot easily be accomplished, or would be attended with much deformity. In such case we endeavour to effect a cure by exciting inflammation. With this view stimulating liquids have, in a few instances, been injected into the nævi; but the danger of this practice has been demonstrated by an immediately fatal result in one case, and by severe sloughing in some others, so that it is not to be recommended. Vaccination scarcely excites sufficient inflammation; even setons only affect the nævus in the immediate neighbourhood of their track, so that the threads require to be passed in several directions if it be large. In some instances I have increased their effect by soaking the threads in a solution of nitrate of silver previous to their insertion. The best treatment that I

have yet tried for the subcutaneous nævi, where the ligature is objectionable, is that suggested by Sir B. Brodie, of breaking down the structure with a probe, previously steeped in fused nitrate of silver, and introduced through a small incision made in the skin covering the nævus. The bulb should be removed, and the end of the probe rounded; the instrument must be pushed freely about in the morbid structure, for the cure probably depends rather upon the laceration of the tissue than upon the action of the nitrate of silver. Once I cured a large subcutaneous venous nævus situated on the left side of the occiput by tying the left occipital artery, which was a good deal enlarged. A nævus of the same kind on the ear, was a short time before treated successfully in this hospital by a ligature to the posterior auricular artery. This kind of operation, however, has failed in the greater number of instances in which it has been tried. It is likely to answer only when the nævus is supplied by one chief vessel, that vessel being enlarged. Mr. Wardrop relates in the twelfth volume of the *Lancet*, a case of extensive subcutaneous non-pulsating nævus affecting the nose, eyebrow, and orbit, in a child aged five months, which was quite cured by tying the common carotid artery in the same side; and another case of the same kind of nævus affecting the parts about the angle of the jaw in an infant where sloughing of the mass, which had commenced before the operation, terminated fatally on the thirteenth day after the carotid was tied.

The last form of nævus, the arterial subcutaneous, or the aneurism by anastomosis, is much more rare than the others, and is very seldom congenital; indeed it generally makes its first appearance in the adult. It grows quickly and throbs or pulsates so forcibly as distinctly to raise the finger placed upon it, and to cause much pain and annoyance to the patient. When it shines through the skin it is seen to have a bright red colour. Like the other nævi, it yields under pressure. In almost every instance it has been situated upon the face or head, and in the orbit more frequently than in any other part. The ligature of the common carotid artery is the treatment that has been adopted in most of the recorded cases of this affection, and in three out of four it has proved successful.

CASES OF CRANIOTOMY,

WITH REMARKS.

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Read before the Bath and Bristol Branch of the Association, March 21, 1850.

THE capital operations which devolve upon the accoucheur are far less numerous than those which fall to the lot of the surgeon; but at the same time they may be far more repugnant to his feelings and attended with a much greater responsibility. An amputation, for instance, is a mutilation which involves the sacrifice of a limb only, but craniotomy may require nothing less

than the destruction of a life. To save the life of one fellow creature we are reduced to the dreadful alternative of destroying that of another. Any attempt therefore, to point out more precisely the only circumstances which render such homicide justifiable ought to meet with a hearty response from the profession in all quarters. It is not many months since Dr. Radford, of Manchester, made an appeal, for this purpose, to the profession, through the medium of the *Provincial Journal*, and it is to be hoped that every assistance will be afforded him in arriving at a satisfactory solution of this most important question. It is with this view, and from a conviction that the results even of a limited experience are valuable in such an investigation, that I bring forward the following eight cases of craniotomy.

They occurred to me during rather more than eight years of midwifery practice, (from 1842 to the present time,) amongst a total of 1613 cases. Of these, 1178 were attended under my superintendence by the pupils of the Bristol Medical School. The remaining 435 were chiefly attended by myself and consist of my own private patients, together with the patients of the St. Augustine and St. George's Dorcas Society, during the time that my brother and myself were connected with that institution.

The cases of craniotomy are as follows:—

CASE I.—A. T., 10, Limekiln Lane, a patient of the St. Augustine and St. George's Dorcas Society. Has had two children previously: the first, a female, was very small and born alive; the second, a male, died two or three days after its birth. Both labours were very long and severe. I saw her for the first time at six o'clock P.M. on Friday, December 12th, 1842. I found, on examination, the os uteri dilated to the size of a crown; the pains being not very frequent. The child's head was so high as to be almost out of reach. Soon after this the membranes were ruptured, but still the head made no progress, and the pains did not increase either in force or frequency. I left her and saw her again on the same evening, at about eleven. The labour, however, was in much the same state as to progress, and continued so until the evening of the next day, (Saturday 10th,) by which time the forcing pains had become very violent and frequent, but still the head did not descend. This state of things lasted until Sunday morning, about four o'clock, when the pulse became frequent and feeble, and the patient seemed much exhausted. The pains returned often, but were somewhat diminished in power. After an unsuccessful attempt to deliver, with the vectis behind the pubes, I requested a consultation with my father, who arrived shortly afterwards; and we at once determined to delay no longer, but to deliver by craniotomy. I accordingly opened the head and evacuated a considerable portion of the brain. As the pains were still insufficient of themselves to expel the head, the crotchet was used, and the child, a large boy, extracted without much difficulty. The head was large and firmly ossified. It presented with the forehead behind the pubes. At the time when the head was just at the