

A COURSE OF  
LECTURES ON SURGERY,

DELIVERED IN THE  
MEDICAL SCHOOL OF CAMBRIDGE.

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LECTURE XX.—ATROPHY CONTINUED.

*Rickets; nature of the affection; parts of the skeleton where its effects are most obvious; the changes consequent upon it; is sometimes accompanied by deficiency of growth; is an affection of childhood; condition of rickety bones in the adult marked by superabundance of ossification; peculiar effects of inflammation in rickety bones, causing thickening of calvaria and of the articular extremities, ulceration, fracture, &c.; these changes only occasional attendants upon rickets; treatment of rickets. Rickets of the spine producing lateral curvature; exciting causes; changes in spine and thorax accompanying it; the curve is sometimes antero-posterior in infants and in old people; relation of angular curvature to lateral; treatment of rickets of the spine.*

*Mollities ossium; nature of the affection; symptoms and changes attending it; differs from rickets, yet is often conjoined with it; senile atrophy; sometimes degenerates into mollities; mollities may affect one or more bones; treatment.*

In the natural order of development the phosphate of lime and other saline ingredients are added to the bones in such gradually increasing proportions as to give them sufficient solidity and strength to bear the growing weight of the body, and to resist the greater force of muscular action. It not unfrequently happens, however, in delicate children, where the nutritive forces are feeble, that this relation between the strength of the skeleton and the weight of the body is not correctly maintained; the structural development of the bones fails to keep pace with their growth, they consequently lose their shape, and are thrown into exaggerated or unnatural flexures by the weight imposed upon them. This condition is called "rickets;" it corresponds with the weak state of the ligaments described in the last lecture as giving rise to flat foot, knock-knee, &c., and attributed to a want of sufficient activity in the developmental forces, except in a few instances in which it was said to result from a sprain or a chronic inflammatory affection.

The term "rickets" is generally used in a wider sense than the one just intimated; it is made to include various conditions in which the bones lose their proper structure, beside the cases where they fail to attain it. I think it will be found conducive to a clear understanding of the diseases of bones, more particularly of the modes in which atrophy occurs, if we restrict the word rickets to signify only "a structural imperfection of the bones resulting from a want of

developmental force," that imperfection being shown chiefly by a deficiency of the saline ingredients of the bones. Thus understood, it is an affection occurring in early life before the frame has attained to its proper size and strength; it consists in a want of sufficient energy to effect the formative operations rather than in active disease. It is frequently associated with the corresponding affection of the ligaments and muscular system, but may exist alone.

While we thus regard rickets to be essentially of a *passive* nature, we shall not be surprised to find that an *active* disease is often superadded,—a disease of an inflammatory kind, producing still further weakening of the bones, removal of their earthy constituents, and various other changes. This active disease is not, however, a necessary part of rickets, it is but an occasional, and to a certain extent an accidental, attendant upon it.

The parts of the skeleton most frequently evincing the effects of this imperfection in the saline materials are those which bear the greatest weight upon the smallest compass, and which are therefore peculiarly dependent for their endurance upon the hardness of their structure; such are the shafts of the long bones, especially those of the lower extremities. The leg, about one-third from the ankle, is of all others the part most unfavourably situated in this respect. Here, accordingly, a deficiency in the earthy components of the bones will be first noticed. When the tibia and fibula retain their proper shape you will very seldom find any unnatural flexures in the extremities, or in the pelvis.

The specimens upon the table exemplify some of the more common deformities occasioned by rickets. In slight cases there is merely an increase of the natural flexures of the shafts. In these tibiae, for instance, the curves take the proper direction, though they are exaggerated. In more severe cases the tibia forms one curve, which is either forwards, or forwards and outwards. The femur is also bent forwards, or forwards and outwards, the head and neck being depressed so as to form a right angle with the shaft. Sometimes the lower extremity is thrown into an S shape, the shafts of the femur and of the leg bones being bent outwards, while the knee is thrown inwards, causing one of the forms of knock-knee. In such cases the outer condyle is prolonged downwards, instead of being shortened after the manner mentioned in the first lecture.

When the deformity in the lower extremities is so great as has been just represented, the pelvis is almost sure to be altered in shape more or less. Perhaps it is narrowed from before backwards, owing to the acetabula being pressed upwards, an unnatural flexure being made in the ilium and ischium on either side behind the acetabula; or the latter may be approximated to one another and to the sacrum, the pubes being thrust forwards so as to give a triadate form to the superior aperture of the pelvis. At the same time the size of the inferior aperture is greatly diminished, and its shape is altered by the approximation of the

rami and tubera of the ischia and pubes; the sacrum is also preternaturally curved, and the os coccygis thrown forwards. Of course when such alteration of shape takes place even in a slight degree, it must offer very serious impediment to the passage of a foetus through the pelvis.

The effects of rickets are not so frequently observed in the upper extremities, because they have less weight to bear, and because the developmental processes, and the nutritive functions generally, are conducted with more energy in them than in the lower limbs. Still even here the bones sometimes show symptoms of the affection; the clavicle may be unusually curved, or the humerus bent outwards at the point of insertion of the deltoid, as though it had been pulled from the straight line by the action of that muscle. The ulna may exhibit an exaggeration of those curves which in the natural state are scarcely perceptible, being bent towards the radius in its upper part, and away from it below; and the arch of the radius may be preternaturally increased.

It is to be observed that most of the shafts of bones which you here see, the tibia and fibula in particular, are thickened and flattened at the bent point. The flattening is not from before backwards, as it would have been were it a mere mechanical result of the flexure, but from side to side, which, together with the thickening, must be occasioned by a process of growth accompanying the curvature, and taking place so as to supply new material in the very direction where it is most wanted. The increased deposit of bone is chiefly upon the concave side. In these rickety thigh bones, for example, the *linæ asperæ* are prolonged backwards, so as to form nearly a straight line, although the flexures in the fore part of the shafts are very considerable. The sides of the shafts also in these flattened bones are so closely approximated that scarce any medullary tubes are left.

The changes are not entirely confined to the shafts, for the articular extremities, especially that of the lower end of the thigh bone, may become flattened out under the pressure to which they are subjected, and they are also sometimes increased in width by deposit of bone upon their margins. This latter change is most likely to take place when the cartilages are removed, and the exposed bony surfaces chafe upon one another in the movements of the joint, an occurrence not unfrequent in this affection. I lately examined two rickety skeletons where the upper end of the humerus on both sides was greatly enlarged, and the articular surfaces appeared to have been for some time partially deprived of cartilage.

In cases where the deformity exists in several bones, a deficiency of growth is generally found to coincide with the imperfection of structure. The extremities are seen to be remarkably short, the arm and thigh bones being often peculiarly so. The deficiency is on the whole more striking in the lower than in the upper limbs. Mr. Shaw, in a paper published with the "Medico-Chirurgical Transactions," has directed attention to this defective growth of rickety limbs.

He finds also that the bones of the face do not increase in proportion to those of the cranium, so that the impress of the child remains stamped upon the figure of the adult. The prominent forehead, with bulging frontal eminences, and the small face, is in such persons an evidence of physical weakness rather than of intellectual strength.

I have said that the time at which the flexures of rickets first show themselves is when the young child begins to bear upon its feet, but the deformity is sometimes seen before this; occasionally even in the uterus the bones are bent by the force of the muscles, and the child is born with the limbs greatly distorted.

In the ordinary state of rickets the only morbid condition discoverable on an examination of the bones is a deficiency of earthy matter; they are more flexible, and admit a knife to pass through them more easily than natural. Chemical analysis also accords with this description; the phosphate of lime, and the other earthy salts, being found in small quantity. Beyond this there appears to be no particular change, the animal substance presenting nothing unnatural.

As years roll on it is a remarkable fact that these bones, once so soft, flexible, and wanting in earthy matter, become preternaturally hard, unyielding, and overloaded with saline substance. You see how dense the crooked shafts of these *tibiæ* are. They were no doubt taken from an adult who had been a sufferer from rickets in his childhood. This secondary change is in most cases sufficient to make compensation for the unfavourable shape which the bones have assumed; indeed, men who were rickety in early years are sometimes notorious for the amount of strength they possess, the skeleton being very hard, and the curved shape of the bones giving to the flexor muscles an unusual advantage.

Moreover, the ossifying process which had been so tardy at first, not merely continues its work of solidification to a late period, so as to render the bones harder than common, but it very frequently displays its protracted activity by throwing out exuberant bony processes, and by reducing under its sway parts which should remain soft and supple. Thus you will find rickety bones thicker than usual, or their spines and processes very large and rough, or there is an osseous deposit at the margins of their articular surfaces; and sometimes the tendons and ligaments are ossified at their points of attachment. The sutures of the cranium become obliterated, and the lines of junction are raised into flattened ridges. Now and then there is a great tendency to the formation of bony growths which sprout from various parts of the skeleton. You may have read in surgical works the case of a man who was so rickety in his youth that almost every bone was distorted. At 18 he began to grow stiff, and at length losing the use of all his limbs, he became like a statue; he died at 60, and his skeleton was found to be one continuous bone from the top of his head to his knees, many osseous growths branched from his head and haunches, and a portion of bone was found imbedded in one of his muscles.

In the ordinary state of rickets, as has just been mentioned, the pathological condition is simply a want of the proper quantity of earthy salts. But there may arise a greater degree of activity in the complaint, something of an inflammatory nature affecting the bones, causing the absorption of the earthy matter already existing in them, and leading to other changes. Under such circumstances the bones will be found more vascular than natural, with serum infiltrated into their substance, and perhaps they are stained with blood. Sometimes the cartilaginous matrix is converted into a soft reddish substance, or there may be cavities in it filled with serum or bloody fluid; these cavities now and then have a distinct smooth lining membrane.

The changes just described are observed when this inflammatory activity supervenes at an early age, before the bones have acquired much strength. When it takes place later it leads to a different result. In the first place it causes an interstitial absorption of the osseous structure, reducing the exterior wall of the shaft to a rough, fibrous, woollen cloth-like state, and the bone in other parts to a light porous crumbling condition, so that it is easily broken, or yields in sharp curves. The young person from whom this cast was taken with sharp bends at the lower parts of both arms and legs, and some twisting as if fracture had occurred, was probably a victim to the affection I am describing. The cast represents other deformities, such as twisting of the back, flattening of the chest, &c.; and it is worth remarking, that the limbs are bent, the fingers and toes flexed, and the feet twisted inwards as in club-foot, which is a consequence, probably, of the unopposed clonic contraction of the flexor muscles taking place after the manner described in a recent lecture. You will seldom witness such severe results as in this instance, but will not unfrequently find the curved parts of rickety bones showing some indications of the same thing. The bones of animals brought from foreign climes to pine away in this country, those of monkeys in particular, are very often the subjects of this change. Here is a great part of the skeleton of a monkey extensively diseased; the bones are friable, easily broken, or even crumbled to powder. In some places they are ulcerated; one or two gave way before death, and the rough porous ends made their way through the soft parts, and presented externally.

You see that most of the bones of this monkey are *thickened* by the deposit of dry crumbling powdery bone upon their exterior—another result of the affection we are now considering. The skull is so in a very marked degree, the bones of the cranium being three or four times as thick as natural, and they are light, porous, and fragile, so that a finger-nail would penetrate them, indeed they might be almost rubbed to powder between the fingers. The same thing takes place in the human skeleton, and in the skull more frequently, and to a far greater extent than in the other bones. On this frontal bone of a child, for instance, there is deposited on either side of the middle line, a layer of loose friable bony substance, much resembling

that in the bones of the monkey. This calvarium from an adult is an example of a more advanced stage of the same affection. It is three quarters of an inch thick, very porous, and easily broken, covered on its exterior, and lined on its inside, by thin fragile laminæ of bone, corresponding to the outer and inner tables of the skull, which are perforated by numerous large holes, and furrowed by deep channels for the passage of vessels. It is not certain that either of these specimens were taken from rickety subjects, but they precisely resemble others of the same kind which are known to have been so.

It is probable that, in course of time, these thickened bones become harder, their loose cancellous structure being gradually filled with osseous matter. We may thus trace the chain of events which have led to the thick, dense, heavy calvaria here shown; and you may see the stages passed through in the progress from one condition to another.

My own opinion is, that although this sort of inflammatory affection, leading to interstitial absorption, ulceration, fracture, and such like, on the one hand, and to thickening, with occasional induration on the other, is an occasional attendant upon rickets, it has no necessary connection with that disease. It frequently attacks bones which have shown no signs of rickets, as those of the monkey just shown to you. The changes produced are simply such as a slight amount of inflammation occasions in the fragile bones of delicate scrofulous persons, or in sickly animals. The fact of the appearances just mentioned being presented by several bones in the same person, is no objection to this view, because every museum affords examples of the simultaneous occurrence of inflammatory changes, thickenings, ulcerations, &c., in all the long bones of both extremities, and in the head. The skeleton seems to be peculiarly liable to the appearance of disease in many parts. It is no wonder, therefore, that rickety bones, deficient as they are in structure and in vital force, and unequal to the work required of them, should be subject to continued inflammatory disorder. It is also but probable that when so affected they will present changes similar to those observed in the bones of scrofulous and feeble persons under the same circumstances.

The true pathology of rickets consists, not in a deficient supply of nutritive material, but in a want of power to appropriate that material, so that the structure remains imperfect, and liable to disease. It is of no use, therefore, to cram the sufferers with various preparations containing the earthy salts, for there is no lack of these in the blood. The patients are generally pale, flaccid, sickly children, in whom the bones share want of nutritive energy and physical force in common with the muscles and other organs. The great indications, therefore, are to correct any disorder of the digestive system, and to endeavour to invigorate the body by light nutritious diet, fresh air, cold ablutions, &c., together with some medicinal tonic, such as quinine or iron. It is sometimes necessary to prevent the progress of the deformity in the lower extremities by steel supports, which may assist in bearing the weight

of the body. The child with weak legs should be carried out in the air, and allowed to crawl about, but not to stand upright for any length of time.

We are obliged to be content with endeavours to prevent the further progress of the deformity, and allow the bones to solidify in their bent shape, for we cannot effect much benefit by attempts to straighten them. A few cases are related where the bones are said to have resumed their natural shape more or less completely. One is quoted from Ravaton, of a girl, aged 13, who, in consequence of rickets, was only three feet in height; she was confined to her bed with continued fever for three months, during that time the bones straightened and lengthened, so that at the end of it her stature had increased to five feet one inch.

In civilized society, and in females, the spine is more frequently the subject of rickets than any other part of the body, which probably depends in some degree upon the fact that it has to bear the weight of the head and trunk during so many hours. In the sitting posture, for instance, the lower limbs are at rest, but the spine gains little relief; indeed it has an opportunity of recovering from fatigue only when we recline at full length. The great cause, however, which interferes with the healthy nutrition of the bones and muscles, and renders the spine unable to bear the weight imposed upon it, is unquestionably the pernicious habit of wearing stays and tight dresses, whereby the free movements of the body are impeded, and a liability to disease and curvature engendered. The truth of this is proved by the class of persons who are the subjects of the affection. They are most commonly young ladies, (accoutred as I have mentioned,) who are growing fast, and who are by the rules of society, and the commands of governesses, constrained to certain positions, being obliged to sit upright at their work or at lessons for several hours together. At the very time, therefore, when the powers of nutrition have the great work of growth to accomplish, they are placed under the most unfavourable circumstances by confinement to close rooms, and by the tight garments with which the trunk is covered; in addition to this, the girl is obliged to maintain an erect posture during great part of the day. No wonder that the spine yields, and that curvature of the back is so very common in the young ladies of this country. Another class of persons subject to the affection is to be found in the lower ranks, among children who are burdened with heavy weights; such as butchers' boys, and girls obliged to take the charge of infants. Very seldom do we find any trace of it in children who are allowed to run about in the open air, and to enjoy the free use of their limbs.

When the spine yields from one of the causes above mentioned, it does not do so, as we might have expected, by an increase of the natural curves, but new ones are formed, and these almost always take place in a lateral direction; hence the term lateral curvature is given to this affection, for the sake of distinguishing it from the antero-posterior or angular curvature, which results from ulceration of the bodies of the vertebræ.

It generally occurs first, and in the greatest degree, about the middle of the dorsal region, and is more frequently directed to the right side than to the left. It is a gradual bend, many vertebræ being involved in it. Though we say that it takes place on one side, and call it a lateral curve, you will see from these specimens that it is not strictly so. The bodies of the vertebræ are directed obliquely forwards, and to one side, so as to give the column a twisted appearance, the bones yielding at the hinder and lateral parts of their bodies near the vertebral notches. In this situation they are often reduced to less than one half of their natural thickness, and their surfaces are rendered exceedingly concave here, in consequence of the projection of the upper and lower laminae, which are, as it were, squeezed out, much in the same manner as the articular facets of the long bones are pressed out at their margins when severely affected by rickets. The intervertebral substance is also greatly compressed on the concave side of the curve, and reduced in thickness so much that the projecting edges of the vertebral laminae not uncommonly meet over them and inosculate; the adjacent bones may be in this manner ankylosed together for a considerable space. On the opposite side of the curve a contrary effect is produced, the intervertebral substance is spread out, and the bones are wide and rather convex on their surfaces.

Then, as a consequence of these curves in the spine, certain changes are induced in the general shape of the chest sufficiently illustrated by this specimen, which you see is flattened from side to side, so that its diameter in that direction is reduced one-third, and the sternum is rendered proportionately prominent. The flattening of the chest and the prominence of the breast-bone are most considerable on the same side with the concavity of the curve, because, in consequence of the twist in the vertebræ, the transverse processes are here turned rather forwards, the ribs are directed almost straight from them, so as to form scarcely any angle, and there is no bulging of the chest at the part corresponding with the angles of the ribs. On the opposite side the transverse processes of the vertebræ are turned backwards, and the ribs following them are then suddenly bent forwards, so as to make a very sharp angular prominence of the chest, which bulges behind the vertebral column. The ribs and transverse processes are pressed together in the inside of the curve, and so occasionally affect the nerves passing through the vertebral foramina. This may account in some measure for the shooting pains in the chest sometimes experienced by the sufferers from this affection. The movements of the chest are necessarily impeded by all this alteration of the shape and position of parts, the patient suffers from dyspnoea, and, as you had an opportunity of seeing in the dead room of the hospital not long ago, the lungs are emphysematous, more particularly on the side corresponding with the concavity of the curve. You may have noticed also that the aorta and oesophagus were bent, so as to follow the flexures of the spine.

The dorsal curve does not exist alone. Two others

almost invariably take place in an opposite direction, one in the upper dorsal or cervical, the other in the lower dorsal or lumbar region. Each of these is less marked than the middle one, but the two together just about equal it, so as to restore the balance, and maintain the head erect above the pelvis and trunk. They also resemble the primary curve in not being strictly lateral the bodies of the vertebræ being turned a little forwards and sideways, so as to give a spiral twist to the whole column, which is most obvious when you look at its fore part.

You will very rarely meet with an exception to the rule that these curves in young persons, depending upon weakness and yielding of the bones, take place in a lateral direction. In infants, however, and old people the spine is sometimes bent from before backwards. Not long ago a child, aged twelve months, was presented in the out-patient room at the hospital, with an antero-posterior curvature in the lumbar region, which evidently depended upon the spine being too weak to carry the trunk and head. It was a sickly child with a large head, lolling about in its mother's arms, and generally leaning forwards, whence the direction of the curve. Here is a specimen of spina bifida where the column is bent from before backwards, owing to the want of support consequent on a failure in the development of the vertebral arches, and the inability of the bodies alone to bear the weight of the head, which was preternaturally increased by an accumulation of fluid in the ventricles of the brain. In the second childhood of old age the weakened spine again shows a similar disposition to bend beneath the weight of the head and trunk, giving rise to roundness of the back, and the stoop generally attendant upon that time of life.

I believe the lateral curvature of the spine resembles in all essential points the ordinary rickets of the extremities, depending, like it, upon the development of the osseous structure being insufficient to enable the bones to bear the increasing weight of the body. Like rickets, it is for the most part an affection of a passive kind, occurring during the period of growth, and is devoid of pain. Sometimes, however, it puts on active symptoms, progresses more quickly, and seems to depend upon an injury or some inflammatory disturbance.

In an affection of the spine nearly allied to the one just described particular bones are apt to suffer more than others, and these undergoing absorption or ulceration are actually destroyed instead of being merely compressed. The vertebræ above and below falling into contact become pressed together, so as to form an angle which projects backwards, and the superabundant arches corresponding to the destroyed bodies of the vertebræ are thrown into a wide curve over this angle, so that abundant room is still left for the passage of the spinal cord, and paralysis of the lower limbs very rarely ensues. This distortion generally takes place in children or young persons, and is situated near the middle of the dorsal region, or between the shoulders; hence the name "hump-back" is given to it. Slighter bendings in opposite directions take place above and below the chief one, which have the

effect of maintaining the head erect, just as we found to be the case in lateral curvature; the change in the conformation of the chest is also much the same, the ribs being flattened at the sides and the sternum thrown forwards.

It seems not improbable that angular curvature of the spine corresponds with the changes just described as being produced in other bones by inflammation supervening when they are the subject of rickets or in persons of scrofulous or sickly constitution. This specimen of angular curvature corroborates the opinion, the vertebræ above and below the chief seat of disease porous, friable, and easily broken, a condition not unlike that of the monkey's bones just shown you.

The changes leading to angular curvature are often unattended with pain or other inflammatory symptoms. The back is observed to "grow out," and in course of time it ceases to do so; no particular cause being assignable for the commencement or the cessation of the disease. It is probably often attended with the formation of an abscess at the seat of the mischief, though that abscess very seldom presents externally. It remains in a quiescent state, becoming enveloped in a thick wall of false membrane, or it is gradually absorbed. I have found such an abscess in the examination both of recent and long-standing cases, and have known it come forward several years after the commencement of the deformity in the back.

It is further to be observed, that in both lateral and angular curvature of the spine, as in the corresponding affections of the other bones, there is in after life a decided disposition to an excessive formation of bony matter. The vertebræ become harder, and they are ankylosed together, in these specimens, by bridges of bone passing from one to the other over the intervertebral substance, thus strengthening the column and at the same time preventing the possibility of a return to its natural shape.

After what has been said respecting the pathology and causes of lateral curvature, you will have no difficulty in apprehending the principles of its treatment. In addition to the measures most conducive to the general health, a moderate exercise of the part should be permitted. Do not enforce a rigid and tiring routine of exercises with dumb bells, &c., for this is likely to overstrain and weaken the back, and induce an increase in the disease; rather encourage the patient to take such recreation in the open air as she is able to enjoy. Allow her to lie down when she feels disposed, not upon any particular couch made to suit the fancy of others, but in such position as is found to be most easy. Let the dress be fitted so as not to interfere with the movements of the arms or the body. Institute the alterations gradually, and take care not hastily to deprive the spine of an accustomed support. Sponging with cold water once or twice a day, friction, champoing, &c., will all be found serviceable. By judicious management the progress of the deformity may be arrested in the greater number of cases, and, more than this, you will sometimes have the satisfaction of seeing the spine become straighter as the patient grows stronger.

It is scarcely necessary to condemn the practice of making the patient lie in certain positions upon a hard mattress or board, the spine being stretched from time to time with pulleys, for it is now hardly ever adopted. The recent proposal of treating the deformity like a club foot and dividing the lumbar fascia and some of the muscles, is not likely to gain ground in an age of pathological inquiry like the present. Viewing the operation in its most favourable light, it will at once strike you that it is only one of the secondary and compensatory curves which would be in the least affected by it, and, therefore, evil rather than good would be accomplished by its success.

In severe cases, where the deformity is evidently increasing, it will be found desirable to furnish some artificial support to the spine, by steel props or crutches extending from the pelvis to the shoulders. If these be well made and fitted into the dress, they will afford great relief and will enable the patient to take exercise, of which she would be otherwise deprived. The means above mentioned for improving the general health and strengthening the back should, of course, be combined with these measures as far as possible.

A curvature of the spine does not necessarily indicate any very strong disposition to rickets in the rest of the bony system. It generally commences after the period at which rickets is displayed in other parts, and very frequently exists alone. You need not, therefore, be apprehensive of any deformity of the pelvis because the back is bent, unless there be some manifestation of rickets in the lower extremities.

There is another disease of the bones, not uncommonly described under the title of rickets, and sometimes confounded with it, respecting which it may be well to say a few words. The disease referred to is called "mollities ossium." It is rather a vague term, and has been made to include a variety of affections,—cancer of the bones and rickets among others. In the sense in which we use it at the present day it signifies a disease of rare occurrence, so rare that you may never see a case in your lives. Nevertheless, it is a distinct disease, and the recorded cases that you will meet with in your reading, as well as the specimens in pathological collections, are sufficiently numerous to render it deserving of your attention.

It generally takes place in the following manner:—A woman (the affection is more common in women than in men) who has reached or passed the middle age, suffers an attack of rheumatism, paralysis, or a severe labour, which gives a shock to the system and prostrates her strength so that she does not quickly rally from it. After continuing in indifferent health for a time, she suffers pains in the limbs which are aggravated at night, and are thought by herself and her medical attendant to be rheumatic. However, the pain continues and is accompanied by increasing weakness, loss of appetite, and an alkaline state of the urine. Perhaps she is pregnant again, and though the disease may not make much progress during the time, each labour prostrates her powers still lower and aggravates

her sufferings. After unusual pain at some one part, the bones are observed to bend there, or they suddenly break during a slight exertion. Things go on in the same manner—one bone giving way after another, till the patient becomes utterly powerless, and in a few exaggerated cases she is described to have been reduced to a mere helpless mass of flesh. The course of the complaint is sometimes extended over several years; the amount of pain varies much, and the patient generally dies of exhaustion before she has reached the condition just mentioned.

Now, you will find many cases scattered up and down among surgical works, which correspond more or less closely with this account; some of them were evidently instances of cancerous disease, the real nature of the malady not having been understood by the writers; but in others the bones had undergone the change characteristic of mollities ossium, of which the chief feature is atrophy. Without being reduced in size they have undergone interstitial absorption, and are in consequence much altered in density; they are light porous, and fragile; the Haversian canals are dilated, and the cells of the cancellous texture are large; often the spongy substance is entirely removed from the interior of the shafts of the long bones, and the outer wall is so thin that it yields under the pressure of a finger nail. The cavities produced by absorption of the osseous substance are loaded with fat or oily matter, which has soaked its way into the remaining structure. So that the bones are very difficult to clean. Sometimes the interior of the bone is occupied by a soft, reddish, jelly-like substance, or by coagulated blood: now and then the red substance is absorbed, leaving cells filled with transparent fluid and lined by a membrane. These latter appearances seem to have been found when the progress of the disease was rapid or attended with much pain. In most specimens of the disease the change that has taken place does not consist simply in partial absorption of the bony substance, accompanied by the effusion of a new material into its place; but, further, the osseous tissue which remains is throughout unhealthy, soft, and deficient in earthy matter, so as to admit of being cut easily with a scalpel. It is saturated with oil, and in some places will crumble between the fingers. In a specimen examined by Dr. Bostock, the earthy salts composed less than an eighth, instead of forming about one half of the whole substance.

The extent to which this change proceeds in the unabsorbed osseous structure, varies as much as the nature of the material effused into the vacant spaces. Here is a thigh bone from a man about 60 years old, which broke as he was turning in bed; and you see how soft and crumbling as well as porous it is. In this other specimen, where the whole skeleton is exceedingly light, and the absorption has proceeded to as great an extent as in the former, widening the cells and canals, hollowing out the bones, and reducing their walls to wafer-like tenuity, the remaining osseous substance is tough, and appears to be nearly sound. We do not know the history of the latter case; probably the change took place slowly; the bones resemble those found in per-

sons who have been long bedridden, and subject to simple atrophy from disease.

This brief description is sufficient to show you that *mollities osseum* differs from rickets in so many respects as to deserve a distinct name and a separate notice. In the first place, it occurs at a later period of life, commencing generally long after adolescence and sometimes taking place in advanced age. Secondly, it is an active disease, consisting, not as rickets essentially does, in a mere failure of the building processes, but depending on an alteration and rapid absorption of the materials which compose the skeleton—a pulling down of the structure after it has been completed. It presents the corresponding symptoms of pain and fever, and as you have just seen, effects other changes in the bones besides a mere wasting of their texture. It is quite true that rickets is not always a passive disease, consisting in a want of developmental force; it sometimes puts on a more active form, and then resembles the affection we are now discussing. This near relation between the two diseases, a knowledge of which is essential to the right understanding of either, has induced me to bring them both under your notice at the same time.

The two affections present another feature of resemblance in the liability occasionally manifested by both to a deposit of light, crumbling, spongy substance upon the surfaces of the bones, causing an enlargement of the articular ends as well as of the shafts, and leading more particularly to that enormous thickening of the cranium which has just been mentioned to you. Many specimens of that alteration are to be found in different museums: some of them are reported to have been taken from patients suffering from rickets, and others from the victims of well marked *mollities ossium*. I believe that in both instances the alteration is dependent upon a slight chronic inflammatory action, and is often associated with a tendency to ulceration. This ulceration is by no means necessarily attended with suppuration. It consists, indeed, merely of interstitial absorption taking place with great rapidity in certain parts, so as to create cavities, or even solutions of continuity in the bones, and it illustrates the close connection that exists between interstitial absorption and ulceration.

In old age, you are aware, the bones undergo an atrophy corresponding with the failure of the nervous and muscular system. So long as it is proportionate to the failure in other parts the change is quite natural. Sometimes, however, it exceeds the proper bounds, and proceeding too rapidly degenerates into a disease to which no name can be more appropriately given than that of "*mollities*." The symptoms of the affection taking place under these circumstances, as well as the appearances produced, are very similar to those which occur in *mollities* during early life, except that they are not generally so well marked. Here is the skeleton of an aged person; the bones are exceeding light and fragile, the cancellous texture is almost cleared away from the interior of the shafts, and the spongy parts of the bones are so delicate, that you can scarcely touch without breaking them. Most of the bones preserve their natural

shape and size, but the ribs are flattened so as very greatly to diminish the transverse diameter of the chest. In cases of this sort the spine is often curved from before backwards in the dorsal region, according with the constant stooping posture of the old person; and the bones revert in some measure to the rickety condition of childhood, in that they lose their proper quantity of phosphate of lime, and bend under the weight of the body; they are besides generally loaded with oily matter, contained in the cells of the medullary tissue, or infiltrated into the osseous structure. Sometimes they break when very slight force is applied, the point at which fracture is to be apprehended being intimated for some weeks beforehand by pain like that of rheumatism. This humerus, which has been shown you before, was broken by the action of the muscles when the patient, an old man, was helping himself up stairs by laying hold of the hand-rail; he had complained of pain in the part for some weeks previously, and no doubt a change, corresponding with that occurring in *mollities* and in some cases of rickets, had been proceeding in it—a change consisting in interstitial absorption or ulceration.

Although it has appeared advisable to speak of *mollities* at the present time, in order to show its relation to the rickets of the young, and the changes that occur in the skeleton of the old, you are not thence to infer that it should be classed strictly under the head of atrophy. It is a disease of more active nature than the word atrophy would seem to import. It is not the result of a mere *failure* of the nutritive forces, but depends upon some *disturbance* of the nutritive functions—possibly of an inflammatory kind—whereby too speedy a disintegration of the tissues is effected. As we have seen, it is often appended to atrophy, and some of the conditions resulting from it correspond with those of atrophy, but it seems to be one stage of morbid process in advance.

*Mollities* generally attacks the whole skeleton, or nearly so, though all the parts may not suffer quite in equal degree. A few cases are on record of its affecting isolated bones of the extremities. I remember a healthy man, aged 35, who came to the hospital four years ago, with an affection of the right ulna, which appeared to consist in *mollities* of the bone. The ulna was quite flexible in the middle, as though the structure of the bone had been destroyed at this part. Movements of the upper and lower ends upon one another gave very little pain, and were attended with only an indistinct crepitus. The man could move the fore-arm and hand very well, though they felt weak. He said that about six weeks previously he began to suffer aching pains, which were thought to be rheumatic, about the part affected; these pains had subsided lately, the fore-arm at the same time becoming more weak. We could discover no symptom of disease in any other bone. I never saw this patient again, but was told, two years after his appearance at the hospital, that he was at his work as a labourer in the fields.

Sometimes the disease attacks the pelvis of child-bearing women, causing softening of the bones and sad deformity. In these cases also it is attended with

pains, like those of rheumatism, which set in soon after a confinement. It very seldom affects the pelvis of women who have had no children; hence it may happen that a female, who has been delivered of full-sized infants without any particular trouble, becomes the subject of this disease, and suffers increasing difficulty at each succeeding labour, owing to the growing deformity of the pelvis, till at last delivery by natural means becomes quite impossible. The Cæsarian section has been performed in several instances of this kind. These casts show the extent which the deformity sometimes reaches. The proper circular shape of the pelvis is quite lost; the acetabula and the promontory of the sacrum almost meet in the middle, the rami of the pubes are in contact, and the tubera ischii approximated.

Mollities ossium, as has been already said, is a disease of rare occurrence, and happily so, for it is very little under the control of art. When it has once commenced it generally proceeds unchecked either by medicine or therapeutics, reduces the patient to a most distressing state of deformity, and terminates only in death. Various remedies have been tried, but it is useless to enumerate them, for they have all failed. Mercury, as might have been anticipated, when given in sufficient quantity to affect the system, has only made matters worse. Dr. Good relates, in his "Study of Medicine," the case of a lady, aged 28, in whom both thigh bones broke spontaneously, and other bones became soft and compressible, there being at the same time great debility. Under tonic regimen the bones united by callus, she appeared to be in a fair way of recovery, and was in full hope of regaining her former health, when she was suddenly carried off by an attack of pleurisy.

The facts which have been brought under your notice in this day's lecture serve to illustrate the close relation that exists between diseases apparently different, and the great difficulty of fixing their boundary lines with precision. Such lines, it is to be remembered, scarcely exist on the field of nature, and though it may be desirable to draw them artificially for the purpose of systematic teaching, it is evident that we only fall into error when we endeavour to make the distinctions accurate or clearly defined. Here we have a passive affection—rickets—occurring in childhood, and dependent upon an imperfect appropriation of earthy salts by the bones; secondly, an active disease—mollities—appearing in the adult, and attended with deterioration and absorption of the animal as well as the earthy constituents of the bones; and, thirdly, the atrophy of old age. One might have imagined that these three affections would be sufficiently marked to render it an easy matter to distinguish them in practice; but we have found that a very slight cause, a scarcely perceptible amount of inflammation, is sufficient to induce, either in rickets or in senile atrophy, a state closely corresponding with mollities; hence the confusion that has always prevailed in this department of pathology, and the difficulty of forming a decided opinion in each particular case.

We cannot also fail to remark the frequent connection between atrophy and inflammation—a connection proved by every-day experience, no less than by the examples adduced in this lecture. Whatever has the effect of depressing the physical energies or lowering the nutritive powers is almost sure to render the person or organ impaired an easy prey to inflammation, and not to inflammation only, but to many other diseases. The weak frame is most susceptible of cold and malaria; the cautious experienced operator dreads the loss of blood, because he knows that it will render his patient liable to erysipelas, secondary abscesses, and a variety of complaints which militate against the chance of success; and we constantly find that the sufferers under cancer or other serious malady have been getting thin and weak for sometime previous to the attack. I again revert to this point, though your attention has been directed to it before, because it is a fact of the highest practical importance,—one which cannot be too frequently impressed upon you.

## BRIEF NOTES OF

## MEDICAL CASES,

SELECTED FROM HOSPITAL AND PRIVATE PRACTICE.

By C. M. DURRANT, M.D., IPSWICH.

## HEMORRHAGE FROM THE MOUTH.

AN officer in a Dragoon regiment, aged 26, on awaking, found his mouth partially filled with blood, which upon examination by his medical attendant, was found to exude from the mucous membrane, between the cheek and upper jaw of the left side. The hæmorrhage was very readily restrained by pressure, and the quantity lost did not exceed ten or twelve ounces. He had been much exposed to cold, wet, and great fatigue in salmon fishing, grouse shooting, &c., in Scotland, often standing for some hours in water up to the waist. In addition to this, he had suffered while in Scotland from a severe attack of the then prevailing English cholera.

Prior to my seeing him the hæmorrhage had ceased; his countenance was pale and anæmic; pulse between fifty and sixty, his natural pulse being forty-five: tongue clean; evacuations clay-coloured, the liver having for some years been inactive; urine clear and natural in quantity; abdomen yielded a doughy sensation, with some fulness about the course of the colon. No enlargement of liver or spleen. He is of a consumptive family, but the lungs and heart were both healthy.

*Treatment*—Free action upon the liver and bowels by alterative aperients; salines, with the syrup of the iodide of iron. There was no return of hæmorrhage.

*Remarks*.—The above case affords a good illustration of passive hæmorrhagic exudation from the mucous membrane. The habitual inactivity of liver, the naturally slow and languid circulation, together with the depress-