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A Course of Lectures ON THE NATURE AND TREATMENT OF DEFORMITIES.

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LECTURE III.

TALIPES VARUS CONGENITUS.

GENTLEMEN,—To-day I propose for consideration talipes varus, another of the deformities or permanent malpositions to which the ankle-joint is liable, and by far the most common deformity met with in this articulation. In the 10,000 cases of deformity to which I have before referred, 688 were cases of congenital varus. Of these, 363 were affected in both feet; 182 in the right foot only, in 2 of which there was also talipes calcaneus of the left foot, and in 2 others congenital contraction of the knees; 138 in the left foot, in 2 of which there was spina bifida, in 1 the wrists and fingers were also congenitally contracted, 1 had malformation of the toes, and 1 talipes valgus of the right foot, 1 contraction of both hands, and in others both knees were contracted.

By talipes varus, then, you will understand a contraction of the gastrocnemius to its full extent, with contraction of the anterior and posterior tibial muscles (the direct adductors of the foot), combined with a semi-rotation of the anterior half of the foot; and, in confirmed cases, contraction and shortening of the fascia and ligaments of the sole. In adult cases, there is invariably a great increase in the transverse arch of the foot, occasioned by the pressure of the weight of the body forcing the fifth and fourth metatarsal bones inwards, and bringing them nearly to the metatarsal bone of the great toe (Figs. 8 and 9).

Fig. 8.

In young patients, there is frequently a congenital increase in the longitudinal arch, which shortens the foot without muscular contraction, the ligaments only being contracted.

The anatomical peculiarities of talipes varus are these. The os calcis, instead of occupying a longitudinal position, is found to be perpendicular; the astragalus is nearly out of its articular cavity, as in extreme talipes equinus; the os cuboides is approxi-

mated to the internal malleolus, with a greater or less separation from the astragalus on its outer side; the fourth and fifth metatarsal bones are slightly separated on the outer side from the os cuboides. The anterior half of the foot retains its natural position, so far as the bones are concerned. The powerful liga-

Fig. 9.

ments of the sole become stretched and elongated in one direction, and contracted in the other; and the internal lateral ligament, and those on the dorsum of the foot, suffer in a similar manner, from the change in the natural and proper relative position of the bones.

Here is a valuable illustration of a very important fact, of which we have many similar evidences; viz., that the ligaments will yield and become elongated when subjected for any length of time to an amount of pressure beyond that which, in the proper condition and ordinary exercise of an articulation, they would be called upon to bear; and that if, on the other hand, the ligaments are, by a change in the position of a joint, confined to a more limited range than in the natural position, those ligaments will contract upon themselves, and become obstacles to the restoration of the position. This is of vast importance, as a powerful influence is thus exerted upon the articulation, not only in cases of deformity, but under various circumstances where no deformity exists.

This innate power of contraction materially assists in perfecting the cure in all cases which admit of it; constituting, indeed, an indispensable auxiliary; for it renders permanently effectual means which would otherwise be but partially successful in the removal of deformity. In those cases which, owing to the existence of paralysis of a muscle or muscles, do not admit of cure, it performs a still more important part—namely, that of affording to the articulation efficient and constant support, without which no patient afflicted with paralysis could with impunity suspend the use of artificial supports, either for relief from the restraint of wearing them, or even for temporary rest after the active duties of the day have ceased.

The muscles which are found to be contracted in talipes varus, and which are the direct cause in maintaining the deformity, are—1, the gastrocnemius; 2, the tibialis anticus, and the tibialis posticus. Those which act secondarily or indirectly are the extensor and flexor longus pollicis, from their proximity to the inner side of the foot; and, in a less degree, the extensor and flexor communis digitorum. What has been said of the contraction of the ligaments does not apply to infants, as a rule; there are, however, even in very young patients, some severe cases in which the ligaments are also contracted.

There is no paralysis in congenital talipes varus. In the non-congenital, it is commonly met with; but I have never seen a congenital case in which there was loss of power. The muscles in the infant born with this deformity are moderately well developed, as several opportunities of examination after death have proved. As the child grows, however, if the deformity is allowed to continue, the muscles do suffer from dimi-

nished development, owing to the absence of exercise; as, in this deformity, there is scarcely any available motion to call forth the use of the muscles, although they retain their healthy functions. The limb thus affected is therefore atrophied throughout its entire extent, more especially below the knee. The condyles of the femur, at first sight, present an appearance of enlargement, which is owing solely to the diminished size of the muscles.

In the infant, as a rule, the foot is simply inverted, and presents an uniformly round appearance, the anterior half being perfect; *i. e.*, the bones and ligaments are in their natural and proper relative positions (Fig. 10). In the adult, however,

Fig. 10.

there is more or less thickening of the cellular tissue covering the points which are subjected to pressure in walking. The anterior half of the foot is forced upwards by this pressure, and is often entirely off the ground beyond the point trodden upon, which gives the appearance of increased deformity. The plantar fascia is rarely affected in infancy, whilst in adults it is commonly contracted.

Cause. The cause of congenital talipes varus is next to be considered. An authority upon this subject has stated that there is a "structural shortening of the muscles contracted", by which can only be understood an organic alteration, having for its result a diminished development, and therefore a malformation. So far as my means of observation have extended, they do not warrant the adoption of such a conclusion. I have examined several cases after death; one a child three months old, who died from hydrocephalus, and who had not been operated upon, in consequence of the existence of that disease. In this case, the bones were all of their proper relative size and proportions, having their proper articulating surfaces, the only change being the malposition. The muscles, as far as could be observed with the naked eye, presented a perfectly healthy appearance, and possessed the natural proportions and development. Another of the cases I thus examined was a child sixteen months old, upon whom I had operated eight months previously. The foot was perfectly cured of the deformity, and the child had used it freely without artificial support; nor was there the slightest evidence of any tendency to return to the malposition. Upon dissecting off the skin and cellular tissue, I could discover no trace of a cicatrix, either in the tendon of the gastrocnemius, or the anterior or posterior tibial muscles. The anterior tibial tendon, which, from its length and superficial position, afforded a fine opportunity for examination, presented an uninterruptedly smooth glistening appearance, without the slightest indication of its having ever been divided; so much so, indeed, that a doubt passed over my mind, for the moment, whether it had actually been severed. The posterior tibial tendon and the tendo Achillis were then carefully examined in the situation of the puncture in the skin, and both were as perfect as that of the anterior tibial. No trace of the division of either could be discovered upon this examination. I brought the tendons away with me, and macerated them, when a linear cicatrix was visible in the anterior and posterior tibial, but not in the tendo Achillis:

Taking the last of these two cases then (an illustration of many), and bearing in mind that this child had exercised its foot in the natural position, unassisted,—if structural shortening of the muscle existed, to what are we to attribute the increased length which must have been given to the tendon by the operation? We do not find the tendons yield, even with the steady and continued application of considerable force; the lengthening must, therefore, have been at the cost of the muscular fibre. Now muscular fibre, during life, possesses more power than its passive agent, the tendon, as is frequently seen in the rupture of the most powerful tendon in the body—the tendo Achillis—in a sudden and violent muscular effort. It is difficult, therefore, to be reconciled to the possibility of the muscle itself yielding, by a separation of its fibres,—the only way in which increased length could be obtained, if structural shortening existed.

The only conclusion at which I can arrive is, that the muscle is contracted upon itself, and thus is a cause of the deformity, and that the lengthening, by which the cure is effected, is produced by the drawing out, if I may so express myself, of the contracted muscle. This, however, does not take place immediately upon the operation, but is occasioned by the contraction of the cicatrix while it is resolving itself into its permanent condition.

Then comes the question—What is the cause of the contraction of these muscles? Is it owing, as some imagine, to any spasmodic action during uterine existence? There is no evidence of such a cause, for if spasmodic action produced it, that must involve some organic or functional derangement or disease of the nerves supplying those muscles, and what evidence have we of this? No case of irregular muscular action has presented itself in all the congenital cases that have passed under my observation, from the infant of a week old to the adult of fifty-three years. If, therefore, a disease, or cerebral or spinal irritation exists *in utero*, it also ceases to exist *in utero*, and this is not easily reconcilable with our every day experience, for diseases which originate *in utero*, present themselves and become more developed after birth. Congenital hydrocephalic conditions, syphilitic, etc., present themselves at, and exist after birth. In fact, if the muscular contraction arose from this cause, it would be contrary to every rule, and at variance with all experience; and I cannot adopt such a conclusion.

There is another very important fact in connection with these cases; namely, that at whatever age you examine the foot and leg of patients afflicted with congenital deformity, the muscles are found to be perfectly under the control of the will. Although the severe malposition may, during a life-time, have prevented the exercise of those muscles, except to the most limited extent, yet both the adductors, which are contracted, and the abductors, which have been kept at nearly if not quite their full amount of extension, retain their functions, and suffer only from diminished development.

You can, at your leisure, examine patients now in the wards, some of them very severe cases; and you will find that, upon requesting them to try to turn the foot in either direction, inwards or outwards, although they cannot in these endeavours alter the position of the foot, yet both the adductors which are contracted, and the abductors which are extended, instantly contract by the effort of the will.

The only cause to which I can attribute this deformity is position *in utero*, whereby the feet are kept inverted during the growth of the child, if not constantly to their full extent, yet nearly so, and always during the passive state of the fœtus, and thus admit of contraction of the muscles taking place, as is witnessed in some of the non-congenital deformities.

The mothers of these children will generally assign as a cause some fright or sudden mental impression, occurring during pregnancy. One case upon which I operated, the child of a very talented woman, was attributed by the mother to a fright which she received while travelling by railway. The train got off the line, and the step of the carriage in which this lady was seated was observed by her to be twisted, and to that she attributed the deformity. I can understand a *malformation* being produced by a fright received *previously* to the complete formation of the child—that is, during the first few weeks of its embryotic existence—but not after the form is perfected; and malformations with talipes varus congenitus, as shewn in the statistics I have quoted, are so rare as to be quite exceptional.

These cases present, as a rule, no trace of malformation. Mothers are so accustomed to anticipate evil when in the "interesting condition", their minds, as well as their bodies, are occasionally so prolific, that they not only create distorted feet,

but almost every form that is to be found in the animal and vegetable world. A preference is, however, generally evinced for such objects as are more particularly gratifying to the senses of sight and taste. There is no dependence to be placed upon such testimony. In the larger proportion of the cases included in the statistical table, no cause whatever could be assigned by the parents.

Persons who are afflicted with this deformity possess no available motion in the ankle-joint, which, so far as the exercise of it is concerned, is perfectly useless, the limb in walking being kept stiff from the knee downwards, the anterior superior surface or dorsum of the foot looking directly forwards, the sole backwards, and the inner edge presented upwards, the outer and upper edge being the part trodden upon (Figs. 8, 9). When both feet are affected, the anterior portion of the one foot overlaps that of the other on each step taken, the deformity being more striking in appearance in these cases than in any that we are called upon to treat, as there is no possibility of disguising it. This was the deformity with which Lord Byron was afflicted, and it was, as is well known, a perpetual source of severe irritation to him. Some go so far as to attribute to this cause the blots which marred the character of that gifted man. It is certain that the poorest suffer mentally from the presence of deformity, and will make any sacrifice to obtain relief.

Upon the dorsum of the foot, the part subjected to pressure, a cushion is formed of condensed cellular tissue, which protects the bones from injury, and enables the patient to get about with tolerable comfort. In some cases, however, great pain and irritation are occasioned in walking, which compel many of these patients to follow sedentary occupations, such as those of a tailor, shoemaker, etc. Occasionally, this cushion ulcerates out completely, from inflammation set up by the irritation caused in walking, after which all exercise is attended with severe suffering, from the absence of all protection to the bones. A medical gentleman, aged 32, afflicted with this deformity in its most severe form, was prevented from following his duties by this accident, which induced him to submit to the operation.

As a rule, this deformity is unattended with malformation. I have, however, seen some cases in which there was no muscle in the front part of the leg below the knee, a condition which is generally accompanied by contraction and malformation of the knee-joints. This state is indicated by a total absence of any definite outline, the toes falling in a somewhat contracted position, the foot and toes, in front, presenting a perfectly smooth appearance. So marked is this appearance, that it is immediately recognised after having been once observed.

In some instances of congenital varus, the ligaments of the knee-joint are found to admit of a slight rotatory motion of the tibia upon the femur, so that after the foot is cured, rotation inwards takes place, and unless attention is called to this circumstance, the cure will be questioned; for although the foot may be perfectly flat upon the ground, and allow of flexion to the full extent, yet upon walking the toes will be directed inwards. In delicate children, the deformity, if confined to one leg or foot, occasions an irregularity in walking, which at times gives rise to lateral curvature of the spine, from the undue motion which is kept up in the spinal column, through the lameness of one extremity. This does not apply to cases in which both feet are affected, as in those instances there is no motion which is not common to both sets of muscles. This deformity is met with in every amount of severity, in the infant as well as in the youth and adult. In the infant, the greater severity is owing to slight displacement of the bones, occasionally met with, which gives the foot almost an appearance of compression. In the older patient, there is always contraction of the ligaments, and not unfrequently of the plantar fascia, as I have mentioned. This state, however, differs materially, even in adult cases. For instance, some feet, upon examination, will appear as immovable as a mass of bone, whilst others, in patients of the same age, and with the same amount of deformity, possess a considerable amount of motion. Occasionally, in infants, you will find that with but little force, the foot can be brought into its proper relative position, and even in severe infantile cases a great improvement in appearance can at all times be produced by the hand alone. The foot, however, when released, returns with an elastic impulse to the malposition. This is not the result of spasm, but a return of the muscle to the contracted state after having been forcibly drawn out. It differs from spasmodic action in this, that the foot always returns immediately to the malposition, whereas in the spasmodic action, as we see in non-congenital cases, the foot will be

retained for some short time in the position into which it has been forced. There is also this important difference, that after the removal of the deformity, in congenital varus, the patient possesses perfect voluntary control over the muscles, whilst in the spasmodic cases, the same irregular muscular action continues, and is not to be controlled by the efforts of the will.

[To be continued.]

A Course of Lectures ON URINE, URINARY DEPOSITS, AND CALCULI.

DELIVERED AT THE PATHOLOGICAL LABORATORY,
DURING THE SESSION 1857-58.

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LECTURE VI.

THE ANATOMY OF THE KIDNEY. ITS ACTION IN HEALTH AND DISEASE. *Cortical and Medullary Portions of the Kidney. Pelvis. Mammilla. Infundibula and Calyces. Artery. Vein. Nerves. Lymphatics. Secreting Apparatus. The Uriniferous Tube. Of the Circulation in the Kidney. Epithelium. Of the Basement Membrane of the Tubes and of the so-called Matrix. On some Points connected with the Physiology of the Kidney.* ON THE FORMATION OF CASTS OF THE URINIFEROUS TUBES. *Of the Cast. Circumstances under which the Renal Secretion may be altered in Quantity or Quality. On the Absorption of Substances from the Stomach, and their Excretion in the Urine.* MORBID CHANGES AFFECTING THE STRUCTURE OF THE KIDNEY. *Of Bright's Disease. Dr. Johnson's Investigations.*

[Concluded from page 557.]

Circumstances under which the Urine may be altered in Quantity or Quality. In the remarks I am about to make, I shall consider it as proved that the solid constituents of the urine are separated by the cells lining the uriniferous tubes, while the water filters through the walls of the capillaries of the Malpighian body. Albumen and extractives may escape from the latter capillaries, and also from those surrounding the tubes. The material of which casts are formed probably enters through the walls of the tube, but it may also pass into the tube from the Malpighian body. Diuretics may act in two ways—1. By causing increased transudation of fluid from the Malpighian tuft, in which case pale urine, containing very little solid matter, will escape in considerable quantity; 2. By stimulating the cells to separate from the blood a larger amount of solid material, in which case a highly concentrated urine, rich in solid matter, will be secreted in greater proportion than in health. If the action of the cells be interfered with in any way, congestion of the capillaries around the tubes will occur; hence those of the Malpighian body will be distended, and albumen will probably pass into the tubes. In certain diseases, there seems to be a tendency on the part of the kidneys to throw off morbid material which exists in the blood. If, under these circumstances, the flow of blood to the kidneys is not compensated for by rapid removal of these matters, congestion, perhaps running on to inflammation, occurs, and there is danger of serious damage to the organ.

It is in this manner that the albuminuria following scarlatina, and that coming on from exposure to cold, are to be explained. This subject has received full consideration from Dr. Johnson, in his work *On Diseases of the Kidney*, and also in that *On Cholera*. The action of many irritating diuretics is to be explained in a similar manner. A quantity of cantharides, which would do no harm to a strong healthy man with sound kidneys, would produce dangerous congestion and inflammation, with rupture of the capillaries of the Malpighian body, in a person who was recovering from an illness, or in one whose kidneys were affected by disease. In the one case, the secreting power of the cells appears increased by the action of the drug; while in the other they are incapable of effecting