

other parts do not suppurate; in them the osteitis remains plastic, and causes the hypertrophy of which I have so often spoken.

Finally, in the third variety, of which we have an example before us, all the constituent parts of the bone are not only affected, but suppurate, and the suppurative inflammation is propagated, either along the periosteum or along the parenchyma of the epiphysis, and through the eroded diarthrodial cartilage to the neighbouring synovial membrane. This is undeniably the most dangerous form, the one which I call osteo-arthritis. It ends very often in death, or, if the patient survives, in an interminable necrosis.

It remains now to decide whether the diagnosis between these different forms can be easily made. It is easy for the subacute form, and for that one of the acute ones in which the outer surface of the periosteum suppurates without destruction of the membrane, and without deep suppuration of the bone. It can be established especially by the aid of the general symptoms, which are moderate in these cases, and by exploration of the cavity when the abscess has been opened. If the periosteum has not been destroyed, there is no denudation of the bone; if it has been, there is. The only real difficulty is to distinguish between superficial suppurating osteitis and general suppurating osteitis; that is, at the same time superficial and deep, or osteo-myelitis. These two forms differ, perhaps, in the intensity of the general symptoms, which is greater in the second than in the first. But this difference is scarcely appreciable when you have only one patient before you. In short, in both cases the fever and all the resultant functional troubles are very marked, and the differences of intensity are too slight to furnish a means of diagnosis. The pus has no distinctive characteristics; the oily drops mentioned by M. Chassaignac are found in both forms, as is easily understood, since these drops come from the fat of the bone, and in both cases the pus is supplied by the bone, of which both the outer and inner portions contain this medullary fat, which exists as well in the external vascular canaliculi as in the alveoli of the cancellous tissue, or in the central medullary canal of the compact tissue. The diagnosis, and especially the diagnosis which is important for the treatment, is completely established only by the presence of pus in the articulation, or the appearance through the opening of the abscess of the bare dislocated extremity of the diaphysis. When one or the other of these has been discovered (and the former is the more common), there is no doubt of the existence of deep complex osteitis, such as M. Chassaignac had in view in his description of osteo-myelitis.

The interest of this diagnosis is due to the following reasons: So long as the suppuration is superficial, and the articulation is not affected, the preservation of the limb is the rule, and the surgical treatment consists chiefly of free incisions, to open the purulent cavity and allow it to be washed. It is true that death by purulent infection or hectic fever may occur; but it is much less probable than when the suppurating osteitis is deep, because, as I have often had occasion to explain to you, pyæmia is chiefly due to suppuration of the marrow in osteo-myelitis.

The chances are, then, that the patient will get well when the disease is superficial. It is true that this will only be after a long-lasting necrosis, which will generally end with adolescence. On the other hand, when there are at the same time suppurative arthritis, suppurative osteo-myelitis, and osteo-periostitis, the chances of purulent infection and hectic fever are so great that amputation gives the patient a better chance to escape with his life.

LECTURE VIII.

TARSALGIA OF ADOLESCENTS.—(FIRST, SECOND, AND THIRD DEGREES.)

1st degree, tarsalgia with contraction of the peroneal muscles disappearing after rest, reappearing after walking—Methods of examination in this disease—Treatment by rest and the immovable apparatus. 2d degree, tarsalgia with contraction which disappears only by the aid of anæsthesia, treated by straightening the foot during anæsthetic sleep. 3d degree, tarsalgia with retraction—Treated by section of the tendons of the lateral peronei—Examination and discussion of the theories of MM. J. Guérin, Bonnet (de Lyon), Nélaton, Duchenne (de Boulogne) concerning *painful valgus*.

GENTLEMEN: We have before us two young men suffering from that affection to which I have given the name *tarsalgia of adolescents*.

I. The first has been in the wards for more than two months, and will soon leave us. Let me describe briefly his condition at the time of admission.

He is 17½ years old. Two months before his admission into the hospital he felt pains in his left foot. When questioned as to their probable cause, he replied that he knew of none. He had never had rheumatism; he had not sprained his foot; he enjoys general good health, and nothing about him indicates a scrofulous constitution. We learned only that he had grown rapidly during the last year, that six months ago he commenced work as a grocer's boy, and that this work compelled him to remain on his feet all day, and to take long walks. At first the pain was slight, it began at the end of the day, disappeared during the night, and did not reappear at all during the morning; then about three weeks later the pain became sharper, was accompanied during the day by a slight swelling, and became at times severe enough to force him to rest for half an hour or an hour, after which he was again able to walk and attend to his work. Then for about a fortnight before admission the pain during the afternoon was so severe that he limped, and was obliged to rest, and even to lie down two or three times toward the end of the day.

The day he presented himself at our consultation, I called your attention to the fact that his foot was turned outwards in the position

which characterizes that vice of conformation known as *valgus*, and that it was kept in this position by persistent contraction of the extensors and lateral peronei.

The next morning, after he had been in bed for nearly twenty-four hours, we no longer found the valgus and contraction observed the day before; the foot possessed all its movements, those of laterality as well as those of flexion and extension.

Questioning him about the pain, he replied that, for the moment, he did not suffer at all. Still, by pressing with one finger on the outer side of the foot a little in front of the external malleolus, in a rather circumscribed point corresponding to the junction of the calcaneum with the cuboid, I awakened some pain. Pressure on the inner side, a little behind the tubercle of the scaphoid, caused a similar pain, and the patient told us that those were the points where he suffered after standing and walking all day.

You then saw me extend forcibly the great toe with one hand, place the thumb of the other against the under portion of the head of the first metatarsal bone, and ask the patient to press back my thumb. He did it as easily as with the other foot, which showed that the peroneus longus, which, as you know, is designed to form and maintain the arch of the foot, was at that moment neither paralyzed nor inert.

It was evident that to understand the affection thoroughly we should have to examine the patient again after he had walked for an hour or two; so I told him to get up the next morning at six o'clock and walk about the wards until the hour of my arrival (eight o'clock).

When we came to his bed the next day, you saw that the left foot had again taken the position of valgus, which we noticed the first day at the consultation, that is to say, the outer border of the foot was raised and the toes slightly turned outwards, and on the inner side the head of the astragalus was notably more prominent under the skin, and hence apparently larger, than on the other foot. But this was only an appearance, for the day before, when the foot was in its natural position, there was no difference in size between the two. We could also see under the skin the tendons of the extensor longus, extensor proprius pollicis, and tibialis anticus; and we could both see and feel above the external malleolus the rigid prominence of the contracted peronei. Finally, we could feel and follow with the finger along the outer side of the foot the prominent cord formed by the tendon of the peroneus brevis. When asked to let his foot go, to relax the contracted muscles, the patient was entirely unable, in spite of his good will, to meet our wishes. Grasping the leg firmly with both hands above the ankle, and raising it from the bed, I shook it sharply from side to side, but was not able to give any lateral movement to the foot, while by the same manœuvre on the right side I produced marked lateral movement. Then fixing with one hand the lower part of the left leg, and grasping the sole of the foot with the other, I tried in vain to turn the latter outwards or inwards. All my efforts were transmitted to the leg, and the foot executed no lateral movement, that is, none of those which take place in the medio-tarsal and calcaneo-astragalian articulations.

On the other hand, I could easily give the foot the movements of flexion and extension, those which take place chiefly in the tibio-tarsal articulation.

Examining then the sole of the foot, I found exactly the same arch as on the other side, so that if I had wished to use the name so often employed by our predecessors, I should have had to say "painful arched valgus." Furthermore the skin behind the inferior projection of the heads of the metatarsal bones presented the normal folds which go with the existence and proper conformation of the plantar arch.

Of what disease were these the symptoms? Of a singular disease, the nature and anatomical lesions of which are still imperfectly known, and which has three dominant clinical characteristics: pain, provoked especially by prolonged walking; outward deviation of the foot, or valgus; and prolonged contraction or contracture of the anterior and exterior muscles of the leg, or, if you prefer, of all the muscles supplied by the peroneal nerve. It is evident that in this case the valgus was not congenital, that it was accidental, and even temporary, since it disappeared completely after rest.

The question then to be answered was this: was the pain caused by and closely connected with the contraction, or was the contraction only the consequence of the pain which was itself the primitive phenomenon?

To answer this question in the case of our patient, I turned to his clinical examination, and to the remembrance of a similar case in which I was enabled to make an anatomical examination.

In our clinical investigation I called your attention to two things: first, according to the commemoratives pain was the initial symptom, not only of the disease, but of all the attacks which occurred at the end of the day. During two or three weeks the young man suffered without noticing any deviation of the foot; the latter only appeared later, and, in every painful attack of an evening, the valgus appeared only some time after the pain. Moreover, the first day, when, after twenty-four hours' rest, the muscles were relaxed and the valgus had disappeared, pressure caused pain, not along the course of the muscles of which I have spoken, but over the posterior bones and articulations of the tarsus. For me then in this case there is no doubt, the pain was primordial, was increased by walking, and caused, by reflex action, the muscular contraction and deviation of the foot outwards.

But then what was the origin and seat of this pain?

Here, I invoke the result furnished by pressure with my fingers. The pain which that caused could have no other origin than the bones or the articulations.

But I prefer to refer to the case, unique, I think, in science,¹ in which I was enabled to make an autopsy.

It was a young girl, 18 years old, who presented the same symp-

¹ I should add that M. Leroux, of Versailles, communicated to the Société de Chirurgie (*Gaz. des Hôpitaux*, 1865) a case in which dissection of the foot showed articular lesions similar to those which I now mention. These lesions belonged to a case of tarsalgia of adolescents. But the foot was turned inwards, in varus, instead of being in valgus, as it was in all the cases which I have observed.

toms as this young man does, and who died suddenly of cholera a few days after admission to the Hôpital de la Pitié. The anatomical examination, the details of which I communicated to the Académie de Médecine,¹ showed us that the astragalo-scapoid and calcaneo-cuboid articulations were affected with dry synovitis, that in several points the diarthrodial cartilages were destroyed by a process of erosion or ulceration, and that below these points the corresponding cancellous tissue was red and infiltrated with blood as in osteitis of the first degree. These lesions, similar in several respects to those of chronic dry arthritis, and to the principal of which Brodie gave the name of *ulceration of the cartilages*, left me no doubt of their connection with the clinical symptoms in this young girl. The ulceration mentioned, the subjacent partial osteitis, and the dry synovitis had become painful during exercise, and the pain had brought about contraction of the muscles and valgus.

In my opinion, the same things have occurred in this young man, and in the three or four other examples which we see every year in these wards of different degrees of the same disease.

Let us now see, gentlemen, what there is that is strange or uncommon about this affection, and how far we can explain it.

The first thing that strikes us is that we are in presence of a variety of articular disease, chronic dry arthritis, which is found in the other articulations only at the end of adult life and the beginning of old age, and in these the tarsal articulation appears to be confined exclusively to adolescence. For it is found in subjects who, while they are growing rapidly, are exposed to fatiguing toil, and compelled to take long walks, often with the addition of a more or less heavy burden.

What connection is there between the growth of the skeleton and this arthritis, or rather arthro-osteitis with ulceration of the cartilages? I cannot say. To explain the osteitis of adolescents, I referred to the exaggeration of nutritive work going on about the epiphyses. But here in the astragalus there is no epiphysis, and the one on the posterior portion of the calcaneum is far from the articular surface on which the lesions appear; in my autopsy it was already united, and no lesion existed in it. We must then admit that completion of growth predisposes, without accompanying union of the epiphyses, to the lesion which now occupies our attention, and I invoke the process of growth because this is another of the diseases of youth. I do not deny its existence in children, although I have never seen an example, but you will not meet with it in the adult. You will see adults affected with irremediable valgus, but they will tell you their deformity began at the age of 16, 17, or 18 years.

But is the contraction of the muscles equally uncommon? No, and yes. I say no, for the clinic often shows us spasmodic contractions in connection with articular lesions. Think of coxalgia, at the beginning of which you find the joint fixed, often in extension, sometimes in very marked flexion, by all the peri-articular muscles, and especially by the psoas. Then remember the arthrites of the knee

¹ Gosselin, Tarsalgie des Adolescents (valgus douloureux), Lésions anatomiques de cette Maladie. (Bull. de l'Académie de Médecine, 1865, tome xxxi. p. 144.

with permanent flexion due to contraction of the biceps, semi-tendinosus, and semi-membranosus. Finally, does not temporary torticollis, which is also a disease of childhood and adolescence, appear in many cases to be caused by a contraction due to rheumatic arthritis of the cervical articulations?

But let us remain in the region of the foot. I have sometimes seen in adults, and I have shown in my clinic two patients who, whilst suffering from gonorrhœal tibio-tarsal arthritis, had a deviation of the foot inwards, which was clearly due to contracture of the tibialis posterior. These were not the muscles of which we are speaking to-day, but the contractures were due to an articular affection.

That which is unusual and very difficult to explain, is the constancy of the contracture of the anterior and outer muscles in adolescents affected with tarsal osteo-arthritis. This constancy is such that I can understand perfectly how eminent clinicians should have considered the disease as located in the muscles. When MM. Jules Guérin and Amédée Bonnet¹ (de Lyon) described painful splay-footed valgus, and advised as principal treatment tenotomy of the lateral peronei, it is incontestable that they believed in a deformity produced by contraction, and then retraction of these muscles.

When Nélaton compared this disease to writers' cramp, he thought it was a contraction, becoming painful, of the peronei and the extensors, just as in writers' cramp there is painful contraction of the flexors and extensors of the thumb.

This same idea of a lesion primarily muscular, led M. Duchenne (de Boulogne) to an analogous theory, according to which the origin of that variety of valgus in which the foot remains arched is an exaggerated contraction or contracture of the peroneus longus. Beyond the fact that it is impossible to prove this theory, it has the inconvenience of taking into account neither the initial pain, which is much more marked over the tarsal bones than along the course of that muscle, nor the articular lesions which I pointed out, nor the tendency to ankylosis which is one of the possible terminations of the affection. It offers also this singular contradiction that, according to it, as I shall soon tell you when speaking about another patient, contraction of the peroneus longus would give, with the exception of the hollow instep, exactly the same physical and functional symptoms as would incomplete paralysis of the same muscle, which latter, according to M. Duchenne, would produce the flat-footed valgus.

Furthermore, it was because in my opinion there were, together with an origin in the skeleton, consecutive effects, singular and important lesions of the muscles, in this strange disease of youth, that I proposed for it, in 1865, the name, which prejudices nothing of this nature, of *tarsalgia of adolescents*.

I add that in this patient we have to deal with what I have called the first degree of tarsalgia, that in which the pain, and especially the contracture and the valgus disappear after a few hours' rest, to reappear when walking has been renewed and kept up for a certain time.

¹ Bonnet, Thérapentique des Maladies articulaires, Paris, 1853.