

you able to predict the recovery with greater confidence, and at an earlier period, than you could do otherwise, but you have often the first intimation of complications, either during the fever or during the convalescence, through some unaccountable departure from the *norm*, or regular gradual increment and decrement, of the pulse. In fatal cases, where the death is from pure typhus, the pulse usually becomes more and more rapid, and at the same time weaker and smaller, up to the very hour of death. In complicated cases, where the complication is not very dangerous, the pulse may be merely quickened for a day or two, or the crisis may be protracted, or the pulse may begin to rise again, after a quite distinct critical subsidence. In very dangerous complications the pulse is out of all bounds, and no rule can be assigned for its irregularities. But in regular and normal cases, being uncomplicated—i. e., not having any positive organic or inflammatory complication,—the decline of the pulse, even by a few beats, before, at, or about the twelfth day, carries as an after consequence the decline of the fever; and, on the other hand, a delay of the crisis very much beyond this is to be regarded with suspicion, though not by any means necessarily of fatal tendency.

But the most curious inference which I have been able to draw from the cases of typhus which we have been observing for the last two months is this:—If, in a particular case, you observe that the pulse keeps steadily to the *norm* or law of uncomplicated typhus, as I have endeavoured to exhibit it; if the rate of the pulse increases steadily and gradually up to the ninth, tenth, eleventh, or twelfth day, and then, at any period between the eleventh and fourteenth day, is observed to be undergoing a correspondingly regular decrease, not rapid, but regular and gradual; *in such a case of regular crisis indicated by the pulse-rate, it is almost insignificant, as regards the prognosis, that the other symptoms continue formidable-looking for days*; for in all such cases that I have observed, without exception, the patient has got well in the end, and that without further treatment. Thus I can tell you from experience that, after a regular crisis of this kind, the tongue may be as black as pitch, and so dry that it feels like a bit of roasted leather, delirium may go on, the patient may be out of his bed many times in a night, the skin may be hot and dry, the eruption brilliant or livid for days together; still, if you have the favourable state of the pulse, and if there is no complication, *the patient will get well*. The pulse is your criterion. Whenever it is fairly turned, and declining in rate, especially if it is at the same time gaining in strength and volume, you may be at your ease, unless there is reason to suspect a complication; and even then you may be at your ease, if the complication is not severe. But observe, *only if you do not interfere*. The proper course in such a case is to take confidence from the pulse, and avoid interference. *You can afford to wait*. And only one more word to-day, but it is a very startling one, and yet true according to my experience: even if the delirium should become worse after the crisis, as indicated by the pulse; nay, more, even if the patient has had little or no delirium before, and *begins* to be delirious for the first time after the pulse has begun to show symptoms of crisis; still, it is better to wait, for in all probability he will be quite well in a few days, provided you do not disturb the course of the fever.\*

## CONTRIBUTIONS

TO THE

## PRACTICAL SURGERY OF DISEASES OF CHILDHOOD.

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### NO. V.—ON THE TREATMENT OF CARIES OF SINGLE BONES OF THE TARSUS AND METATARSUS BY EXCISION OF THE ENTIRE BONE.

The treatment of caries in young subjects offers many points of great interest, and some, it must be confessed, of almost equal ambiguity. One of the first points to which the surgeon's attention must always be directed in such cases is, to ascertain whether the affection of the bone is merely one of the consequences of constitutional cachexia, and therefore is (in strictness of language) a symptom merely; or whether, on the con-

trary, it results from local injury or other limited cause, and therefore is the essential disease. Although this is a matter which can only be settled by careful inquiry into the symptoms and history of the individual case in hand, still some general ideas on the subject will not be without their use. I am disposed to believe that we are too apt to regard all carious disease in childhood as "strumous," and that the common use of this convenient term has led us to unduly depreciate local measures. There is, on the contrary, very good reason for believing that in many of the cases so described no symptom of struma or of tubercular disease has ever existed, and that the removal of the part affected will place the child in a condition of perfect health. It is quite true that in many cases such removal is not necessary, and that spontaneous cure will take place if the part be kept at complete rest for a long period. I am not, however, speaking here of such slighter cases, but of those in which a great part, if not the whole, of one or more bones of the tarsus or metatarsus is carious, and where rest, or partial removal combined with rest, has failed to bring about recovery. I say that in a very large proportion of such cases there is good reason for tracing the disease to a local injury; and that the total removal of the bone is much preferable to the use of the gouge and chisel.

In the first place, with respect to the essential nature of the disease, whether constitutional or local, parents and friends of sick children attribute any local ailment, as a matter of course, to one of the slight accidents which so often happen to children, especially those of the poor. The connexion, however, between the alleged cause and effect is in so many instances imaginary that the statement is often passed over as not worth attention; yet in many cases, when an investigation can be made, it will be found to support the parents' view of the case. Where the child's friends are careful and intelligent persons, we shall often be able to trace the perfect health of the child and the perfect usefulness of the limb before the accident; the clear evidence of injury limited to the seat of the present disease; the persistent thickening, with pain and redness, gradually leading to loss of function, and slowly ending in abscess. All this time the general health has been unaffected, unless by pain and confinement. If an operation be performed on a case of this kind, and end fatally, we do not usually find any indication of strumous disease in other parts of the body. If it end fortunately, the child is restored to perfect health. The confinement and suffering through which he has passed of course leave him weakly, and therefore exposed to the invasion of disease; but nothing shows that he has any special tendency to phthisis, or glandular affection, or any of the other well-known tubercular or strumous diseases. My own conclusion from the results of my experience (although on such a point as this individual experience is an unsafe guide) is, that such children are often carried off soon after their recovery by acute affections, but that they very rarely come under treatment for strumous disease. If the fact be so, it is entirely consistent with the theory of the local nature of the disease, but quite irreconcilable with that of its constitutional origin. Restoration to health and activity induces the child to join eagerly in the sports and exercises from which he has been long excluded, and thus he exposes himself, while still too delicate to bear such exposure, to the influences of over-fatigue and change of temperature. But if it be a fact that such children rarely suffer afterwards from other strumous diseases, this would be inexplicable on the supposition that the original affection depended really on a constitutional cause. Long confinement to bed, protracted discharge, extensive operations, and loss of blood, are not much calculated to eradicate the strumous taint from the constitution; so that, if the disease really depended on such a taint, a relapse after operation for strumous joint should be about as common as after one for cancer; yet everyone knows that this, at least, is not the case. Tubercular disease, it may be objected, does often coexist with disease of the joints of the kind usually denominated "strumous." This is true, but would at the most prove no more than that strumous children are liable to be affected by these low inflammations. It would not of itself prove that these low inflammations are excited by the strumous diathesis. But we may, I think, go a step farther, and say that there is often very good reason for believing that the tubercular disease of the viscera, so far from being the cause, is, in truth, the effect of the disease in the joint. This would be more and more the case according as the joint affected is more important, and the symptoms produced by its affection more acute. Thus the extensive suppuration, great pain, and profound constitutional disturbance which often attend morbus coxarius, render that disease, as I believe, peculiarly liable to be followed by consumption, and make it the more

\* See Cases 30, 31, 33, 35, 39—males, for evidence of the statements in this last paragraph.

incumbent on the surgeon to endeavour to rescue his patient by operation at the earliest possible moment after he has convinced himself that the disease is otherwise incurable. This point I have dwelt upon in my last paper (*THE LANCET*, vol. ii., 1864, p. 236). In diseases of the knee in childhood there is usually far less constitutional disturbance, and seldom any exhausting suppuration; and in affections of the smaller joints the general symptoms are even less prominent. Yet it should not be forgotten that the loss of exercise is in itself a most unnatural and undesirable thing for a growing child, and, if only on that account, it is advisable to cut short the period of disease by any operation which does not entail mutilation or loss of function.

If the reader is inclined to think these observations self-evident, I would beg him to consider whether they are consistent with the ordinary practice of surgery in caries (strumous caries, as it is almost universally called) of the bones of the tarsus. This disease I believe to be, in the majority of instances, caused entirely by injury occurring to a child who is probably weak and delicate, but not necessarily strumous, if by that term be understood "prone to the deposition of tubercle in the viscera." Being caused by local injury, the disease is at first limited to the bone injured, or possibly affects two contiguous bones—rarely more. In the great majority of cases, I believe, the disease begins in the substance of the bone, not in any joint. If the diseased bone be not removed, or the disease do not undergo spontaneous cure, it spreads slowly until neighbouring joints are affected, and their synovial membranes become converted into the pulpy granulation-tissue so familiar to us in this disease. These granulations propagate the disease to other bones and joints till a large part of the tarsus is implicated. Then the ankle-joint itself becomes involved, and the foot must be amputated. At each of these successive stages the disease is usually quite limited. In the first period, the neighbouring tarsal joints will be found healthy; when the tarsus is extensively implicated, the ankle-joint is in most cases still unaffected; when the ankle also is diseased, the disease does not extend upwards beyond the lower epiphysis of the tibia; and at any of these stages the total removal of the diseased bones is usually effectual in permanently arresting the disease.

With these views of the nature of carious ulceration of the bones of the tarsus in children, I need hardly say that I consider local interference by operation to be indicated at the earliest possible moment, in all cases where general symptoms are absent, and where the disease, after a reasonable trial of rest &c., is not undergoing a spontaneous cure.\* It is useless to confine the child to bed in hopes of the separation of a sequestrum; for the disease may go on for an indefinite period, to the destruction of the whole mechanism of the foot, without the formation of any sequestra, and the sequestra which do sometimes form are generally only secondary formations, the removal of which does not cure the disease. If, on the other hand, the diseased bone be completely removed, so that only perfectly sound and healthy parts are exposed in the wound of the operation, the disease will usually be at once arrested; and when the cavity has filled up, the child will be quite well. If a sequestrum exists, it should of course be removed; and if the neighbouring bone appears softened, it should be scraped. Also, if the caries does not affect a great part of the bone, the common practice of gouging out the carious spot should be first tried; but it is seldom successful. In cases of caries limited to the surface of the bone, the actual cautery has proved occasionally successful at the Hospital for Sick Children. But what I wish chiefly to urge in the present communication is the great advantage to be derived, in cases where the greater part of any of the tarsal or metatarsal bones is carious, from the removal of the whole bone. In a previous paper "On Excision of the Hip," I have pointed out, as one of the great obstacles to success in that operation, the uncertainty which must always exist as to the extent to which the softened bone usually found in the acetabulum requires removal—that is to say, how much is incurably disorganized, and how much will recover if the other diseased parts are removed. In consequence of inevitable errors on this head, we often find that the exposed sections of bone take on the same carious action as the original joint-surfaces, and the operation is partially frustrated. The same is the case in the gouging operations practised on the tarsus. But in the case of the

hip, we have no choice; in that of the tarsus usually we have. When only one bone, or only two contiguous bones, are affected, it is usually easy to remove the whole organ diseased; and when this is done—that is to say, when a wound is left which contains nothing but the soft parts and the healthy articular cartilages of the contiguous bones, I have never yet seen a case in which the wound did not heal soundly, and I believe permanently; and this is, therefore, the practice which I now always adopt in cases where limited disease of the tarsus affects only one bone to a considerable extent. Such cases are, I repeat, very common in childhood.

Some surgeons believe that to leave articular cartilage exposed in a wound is dangerous. This idea appears to be derived from the false analogy of wounds of the knee-joint, and of the symptoms attributed to inflammation of its cartilages. It is remarkable that the every-day experience of amputations performed through joints should not have shown that it is an error. A wound almost surrounded by exposed articular cartilage will heal without any bad symptom. Thus, in a case in which I excised the astragalus and scaphoid bones, leaving exposed in the wound the whole cartilaginous surface of the tibia and fibula above, the cartilaginous facets of the os calcis below, and those of the three cuneiform bones in front, all of these cartilages being natural, no unusual amount of inflammation took place, and the healing process, though it went on slowly, met with no impediment. In another case I had an opportunity of examining the stump of an amputation through the knee-joint, in a child between two and three years of age.\* The child died from constitutional causes forty days after the amputation; but the stump had healed seventeen days after the operation, with remarkably little inflammation; and the patella was found as freely movable in the stump as in the natural joint, nor was any trace of inflammatory degeneration of the cartilages noticed.† Again, although the cases on record are too few to form the basis of a decisive opinion, it may be reasonably alleged as probable that a wound in which no bony tissue is exposed is more likely to heal kindly and soundly, and is less liable to pyæmic infection, than one where a large surface of cancellous bone is laid bare, with all its cells cut open. How often we see such wounds sluggish and refusing to unite. How often the divided bone participates in the inflammation going on around it, softens, and finally becomes carious; or dies, and has to exfoliate. And if this is the case with healthy bone, when exposed and divided in operation, it is still more often the case with bone already softened by low inflammation.

(To be continued.)

## ON THE DIFFERENCES BETWEEN WHOLESOME AND UNWHOLESOME AIR.

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DAVY showed, a long time ago, that the proportion of carbonic acid in respired air may be very much augmented without any physiological result. According to his experiments, as much as 20 per cent. of the atmosphere may consist of carbonic acid without injury to the animals breathing it. If anything like this amount of carbonic acid produces so little effect upon us, what shall we say of the 0.5 per cent., which is almost the highest per-centage of carbonic acid ever found in an ill-ventilated and crowded room in this country? And what shall we say of the assertion that the difference in salubrity between the air in the neighbourhood of a "midden" and the air "over North Scotland (towns excepted)" is due to the circumstance that there is 0.0774 per cent. of carbonic acid in the former, whilst the latter contains only 0.0336? In a recent number of the *Chemical News* (Dec. 31st, 1864) I find an account of a paper of Dr. Angus Smith "On the Composition of the Atmosphere;" and it appears from this account that he attributes the wholesomeness or unwholesomeness of

\* Path. Soc. Trans., xiv., 217. The preparation is preserved at the Hospital for Sick Children.

† At the time of writing these lines, there is an adult in St. George's Hospital, under Mr. Pollock's care, with amputation at the knee-joint (by the anterior flap), in whom the wound has almost united in three weeks.

\* It has become almost a matter of routine to give such patients cod-liver oil, or iron, or iodine in combination with one or other of the former; and, when such medicines agree with the child, they are no doubt useful in giving him strength to endure the depressing effects of the disease; but I have never seen the least reason for thinking that they have any effect on the diseased bone.