

Dr. H. Milton Ferguson; a man with typical history as to onset, fever, spleen, glands, hemorrhage, lymphemia, etc.), the nucleated reds were a striking feature in the blood findings, fully as numerous, I should say, as in cases of the splenic variety that I have examined.

In these respects, *i. e.*, the persistence of the leucocytes and of the nucleated reds, the blood count differs from that of most other observers. Richter³ saw an intercurrent acute inflammatory rheumatism fail to make an impression on the blood count. And Müller⁴ saw under the influence of a sepsis, the blood count, in a case of lymphatic leukemia, rise from 180,000 to 400,000. While no differential count was made, he thinks the increase was in the polymorphonuclear forms rather than the mononuclear.

ON THE RELATION OF TUBERCULOSIS OF THE KNEE TO INJURIES OF SAID JOINT.

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The observation that injury of a bone or joint is frequently followed, after a variable interval, by chronic inflammation at the seat of injury, such chronic inflammation assuming the nature of a white swelling, or of destructive suppuration, or of caries, has long been familiar to the medical profession.

When, thanks to the labors of Volkmann, Koenig, Koch and others, the true nature of these chronic processes was incontrovertibly shown to be tubercular, the question of their relation to the trauma to which they were attributed, became one of great interest to the surgeon and pathologist as well as from a medico-legal point of view.

Tuberculosis being a specific bacterial disease, always depending for its causation on the presence of a well defined and constant bacillus, what part, if any, does injury of a bone or joint play in the subsequent development of tuberculosis at the site of such injury?

Since in the discussion of this subject, what applies to one joint is generally true of other joints and bones, I shall for the sake of convenience use the terms *bone* and *joint*, instead of speaking specifically of the knee-joint, though the latter, on account of its large size, extensive area of cartilage and synovial membrane, its exposure to frequent injury, the frequency of the occurrence of tubercular processes in it, and the ease with which its interior can be exposed and examined, is more than any other joint adapted for the study of the questions under discussion.

The accession of a tubercular arthritis or osteitis following closely, or after a few weeks, upon an injury of these structures, occurs with such sufficient frequency, that few clinicians at the present time deny the connection of the trauma, as one of the factors at least, with the production or localization of the local tuberculosis.

The importance of the trauma has no doubt been overestimated, especially before the etiology and pathology of tuberculosis were thoroughly understood. The tendency to attribute to two successive occurrences the relationship of cause and effect, has here, as in many other instances, greatly retarded a correct

interpretation of the phenomena under consideration.

That injury is not an *essential* or necessary factor in the causation of bone and joint tuberculosis, is shown by numerous cases in which the most careful investigation fails to disclose any history of preceding trauma. It follows that, even where the latter has occurred, the causative relation between it and the tuberculosis following can not be absolutely proven and may always remain a matter of some doubt.

Admitting, however, that such causative relation exists, how can we account for it, and what significance can reasonably be attributed to it?

Looking at the matter in the light of modern pathology, we can not admit that a trauma or any of its consequences can produce or furnish the essential factor of the disease, the tubercle bacillus. The trauma can at most serve as a means of introducing the bacillus into the system, or determining its point of attack if already there present. In other words, in order that the trauma may enter into the causation of the local disease the bacillus must either be present in the system at the time the injury is sustained, or be introduced at the time of the injury, or subsequently, before the effects of the trauma have disappeared. If previously present, the trauma may act as an *exciting cause* for the local tuberculosis by creating an area of lessened resistance for the attack and localization of the bacillus. If on the other hand the bacillus should gain access to the system *after* the occurrence of the injury and before the abnormal local and general conditions created by the latter have subsided, the trauma may assume the rôle of *predisposing cause*, by furnishing a favorable soil for the bacillus and enabling it to gain a foothold. I say local and general conditions, because tuberculosis being a communicable disease, there can be no doubt but that its invasion is favored by lessened vital resistance, both local and general, and by enforced confinement and other unfavorable conditions brought about by an injury.

Both clinical experience and pathologic investigation go to prove that the majority of cases in which tuberculosis of a bone or joint develops at the site of an injury, belong to a class in which the disease had been established in other parts of the body before the injury was sustained, in which the latter must therefore be regarded as merely an exciting or localizing factor. The bone or joint tuberculosis in these cases is metastatic or secondary, the infecting material being derived from some older tubercular focus located either in the lymphatic glands, lungs, alimentary canal, urinary or sexual tract, or the skin. Such old foci were found by Orth in 79 per cent. of fatal cases from Koenig's clinic. Making some allowance for cases in which they may have been overlooked or have healed by cicatrization, the percentage may be safely assumed to be still higher. While the mere presence of these foci does not prove them to have been the source of infection for the bone and joint disease, their presence is at least very significant. Unfortunately such old tubercular centers, if small, and especially if latent, will often escape detection during life by even the most careful examination.

Direct tubercular infection of bone or joint through an open wound is so exceedingly rare, that only a single case, and this not without some features which render it doubtful, reported by Mittendorpff, has found its way into literature.

This leaves a small contingent of cases in which to all appearances at least, the local tuberculosis must be

³ Discussion of Fraenkel's article in *Deut. Med. Woch.*, 1895, Nos. 89, 43 and 45.

⁴ *Deut. Archiv f. klin. Med.*, Bd. 50, S. 78.

regarded as primary, in which, in other words, the tubercle bacillus having gained access to the system by way of the air passages or alimentary canal, becomes located and develops in the injured bone or joint without having first caused a lesion in any other part of the system. Analogous processes no doubt occur in cases of osteomyelitis, periostitis and other infectious diseases following injuries not accompanied by wounds of the skin.

Whatever may be the sequence of events leading to the development of bone or joint tuberculosis, accumulated clinical experience has established the fact, that injury is very rarely followed by the disease except in individuals who either have previously carried the disease in other parts of the body, whose family history shows evidence of a tubercular taint, or who are burdened with that peculiar predisposition or tendency to tuberculosis known as scrofula. While the correctness of this statement may not seem to be borne out but rather disproven by many cases when they first come to the surgeon's notice, its truth will be confirmed if the patient and his family can be kept under observation for a few years. About six years ago I treated a boy 8 years old, for tuberculosis of the tarsal bones, attributed to a slight injury. At that time there was not the slightest evidence of hereditary taint, but since then the boy's father and father's brother have died of pulmonary tuberculosis, and a daughter of the father's sister is now in an advanced stage of the disease.

Clinical observation has established the further fact, that the kind of injuries most frequently followed by tuberculosis, are those of a milder type, such as moderate blows, sprains or bruises; while fractures, dislocations and severe crushing injuries are very rarely so followed. The conditions produced by a mild trauma seem to furnish a favorable soil for the tubercle bacillus, while the more intense reaction following severe injuries seem to antagonize it. Koenig has, however, seen tuberculosis develop at the seat of recent fractures; according to this authority, severe trauma is more frequently followed by tuberculosis of bone than of joints.

Applying the foregoing considerations to the study of tubercular processes in and about the knee-joint, in what manner, and to what extent, can injury influence their occurrence?

The cancellated structure of the adjoining epiphyses of the tibia and femur furnish a favorable locality for the arrest of infectious material carried along in the circulation, and is frequently the seat of tubercular foci which have a tendency to communicate by extension with, or rupture into, the knee-joint. We can readily see how an injury would favor this occurrence, either directly by the force of the trauma, or indirectly, by the abnormal conditions brought about.

Traumatic synovitis with hemarthrosis, or with serous effusion and precipitation of fibrin, conditions very commonly found after injuries of the knee, seems to furnish a very favorable soil for the tubercle bacillus. The large area of serous membrane and the size and distensibility of the joint predispose to large effusions, with consequent slow absorption, thus increasing the danger of infection. It is also evident that neglect of proper treatment of the morbid conditions produced by the trauma will enhance this danger.

The importance of old tubercular foci in the causation of tuberculosis of the knee is indicated by the fact that their presence was demonstrated by Orth in

over 88 per cent. of fatal cases from Koenig's clinic.

In conclusion I may state then, that according to the present state of our knowledge, the proper significance to be attributed to trauma as related to local tuberculosis is, that it prepares suitable soil and conditions for the arrest and development of the tubercle bacillus, and that such localization may take place in consequence of a trauma, where otherwise it would not have occurred. While local tuberculosis very frequently occurs without the intervention of a trauma, and as the question of its accession depends largely on previously existing conditions and hereditary influences, and the causative relation between an injury and a subsequently developing tuberculosis can not, in a given case, be with *certainly* maintained, yet it would probably be impossible to eliminate this element in case of alleged damages by reason of tubercular disease following upon, and at the site of an injury and setting in before the evidences of such injury have disappeared. In other cases the connection is so problematic that it should not be considered as a ground for damages.

DISCUSSION.

PROFESSOR RIDLON—I came to learn and be instructed rather than to speak, but I am interested in this subject of tuberculosis of the joint, and the few words I may say would be entirely from a clinical standpoint. I have seen a fairly good number of tuberculous joints in my experience in orthopedic surgery; it seems to me that tuberculosis of the joint rarely if ever follows a serious injury unless the case is treated too much; it frequently follows slight injuries. In fractures and dislocation I have not seen tuberculosis; if unrestrained passive motion were employed by the surgeon I believe the joint would, without any question, from either fracture or dislocation, become tuberculous. But in sprains and contusions where the conditions are so slight that the physician is probably not consulted, or perhaps does not consider it important enough to treat, cases which are used while there is a little tenderness, a little stiffness, if they continue to be used and if the swelling and slight tenderness and slight stiffness remain long enough, these joints will ultimately become tuberculous. I think it depends on the individual in whom they are situated, but they do become tuberculous sooner or later if they are allowed to go on in their slightly inflamed condition. The point then that I would like to make in this relation is this: In severe injury do not use passive motion unless you are willing to take the risk of developing tuberculosis; unless you are willing to be responsible for tuberculosis of that joint; in slight injuries, in most cases at any rate, endeavor to impress upon the sufferer the very great importance of his condition and the necessity of submitting to treatment until all symptoms of inflammation have subsided. Those are the main things that strike me in this connection as an orthopedic man. I only see those cases, gentlemen, that you do not cure. I do not see the many that you do cure.

CYSTS OF THE VERMIFORM APPENDIX.

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Cysts of the vermiform appendix have until recently received but little attention. These cysts are without doubt inflammatory in origin. The inflammation results in destruction of a portion of the mucous lining and obliteration of the corresponding canal. The secretion of undestroyed portion of membrane forms a cyst.

These cysts are usually of small size, although Virchow has reported one which attained to the size of the fist. Van Hook reports thirty-two cases. The writer removed one from a pregnant woman, in which there was marked hyperesthesia over the right inguinal and lumbar regions, more marked, indeed, than seemed justified by the local lesion. The patient miscarried the day following. Microscopic examination disclosed