

mild degree of trauma—as a rule so slight that the patient never remembers a knock or strain.

The bone lesions are as a rule closely related to joints—to those parts of a bone where mild trauma is a common occurrence, and explains how the common lesions in the spine, the upper and lower ends of the femur and the upper end of the tibia are all closely related to metaphyses and joints where recurrent mild trauma is very prone to occur, due to constant movement plus the strain of the body weight.

However, tuberculosis disease can and does attack any bone or joint in the body, from the jaw to the joints of the foot, and in the majority of cases of bone tuberculosis one or more joints are involved. This is because the primary bone lesion may be near a joint and subsequently erode through into that joint, or it may first appear in the synovial membrane associated with the joint. This gives rise to the arthritis which causes the signs, symptoms and incapacity. In either case, the period elapsing between infection of the bone and the appearance of the first symptoms is at least two months. The latent period is completely symptomless.

In the difficult task of diagnosis of bone tuberculosis, the patient's history will often help. Attention should be directed to the story of the onset, the duration of symptoms, any loss of weight or energy, the occurrence of night cries and the character of the pains, if any. The family history may reveal contact between the patient and an open case of tuberculosis. A young child with tuberculosis, without such contact, will probably be a consumer of raw milk.

It is characteristic that the symptom which first insinuates itself upon the patient's attention does so very gradually, and he seldom associates the beginning of his trouble with any particular day: if he does then the condition is probably not tuberculosis. Another very hopeful point may be the relationship of the onset with an injury. If the patient has fallen and bruised his knee six to eight weeks ago, and "ever since then" it has been painful and troublesome, we can eliminate tuberculosis, but not if the injury took place two or three months before and there has been a completely quiescent period of six to eight weeks between the injury and the first symptoms.

Generally, the first thing noticed by the patient is an interference with function rather than pain. Indeed, pain and tenderness are slight at first, the characteristic features being limitation of the full range of movement, and a swollen, warm, and somewhat tender joint with the enlargement due to swollen synovial membrane rather than to fluid. The limitation of movement is due to muscle spasm which reflexly attempts to protect the affected joint against excess movement.

The next important part of the examination consists in obtaining a good X-ray of the affected part. It is of the utmost importance to realise that it is possible to have tuberculosis active in bone and joint with a completely normal X-ray. Ordinary acute osteomyelitis produces no radio-graphic signs for about three weeks; with tuberculous disease of bone, unfortunately, radiographic evidence lags markedly behind infiltration for there is a delay of some weeks or months between actual invasion of the bone by tubercle bacilli and demonstrable erosion of the bone. Therefore a negative X-ray means nothing. Since the nature of the disease is such that an early definite diagnosis is impossible we must put up with a provisional diagnosis and act on it as quickly and stringently as if it were definite.

Treatment. Tuberculous disease of bone is the result of blood stream infection with tubercle bacilli which have been carried from some other focus, such as bronchial or mesenteric glands, or from the lung. Therefore the presence of clinical tuberculosis in a joint implies blood stream infection and it is impossible to say what other

structures have been or will become involved. Multiple lesions are common. Thus adequate treatment of orthopaedic tuberculosis must be directed along two lines: firstly, the general treatment of the disease by the principles of rest in bed, good food, fresh air and sunlight; secondly, the local treatment of the bony lesion. During the treatment of the general condition the patient's resistance to disease is increased and the liability to further complications is lessened; this part of the treatment is continued until the patient's ability to combat the disease has been demonstrated and the local lesion has become quiescent—as well as any other tuberculous foci which may be present. When these conditions have been satisfied, the optimum time for surgical treatment has arrived. Once this disease comes under medical supervision, treatment and follow-up, a period of 15—20 years can easily pass. Sometimes this period may be the minimum of six to seven years, provided the patient is a child, and has been diagnosed and treated early in the disease and is followed up for a period of five years. Adults take very much longer to shake off the disease, while old people seldom completely recover.

The local treatment is carried out in conjunction with the general treatment, and our aims are:—

1. To correct any deformity and to favour local healing by rest in a carefully chosen position.
2. To restore free movement whenever possible, or if that is impossible to bring about sound ankylosis.
3. To remove diseased parts or tuberculous pus when necessary.
4. To prevent secondary infection.

Spinal Tuberculosis.

Spinal tuberculosis is a disease of children rather than of adults—approximately half the cases originate before the age of five years. One, two or three vertebræ may be affected, and there is involvement of the intervertebral discs. The commonest site of attack of the disease is the body of the vertebræ, but other parts of the vertebræ may be the first involved. When the former occurs the body of the vertebræ becomes eroded and weakened, and, due to the pressure caused by body weight, the adjacent anterior edges start to buckle. This is the commencement cause of the lordosis or hunchback appearance characteristic of advanced spinal tuberculosis. Due to destruction of bone, there will be a formation of tuberculous pus, which forms an abscess in the front of the affected vertebræ, a condition more common in adults. As the amount of pus accumulates, so will it require more room, and this end is achieved by the pus tracking from the region of the vertebræ downwards in the sheath of the psoas muscle, to form a mass in the iliac fossa or in the thigh. It may track round a rib and appear as a discharging sinus near the sternum. It may track backwards and point as a cold abscess in the lumbar region. If the condition proceeds unchecked the collapse of the vertebræ and the deformity produced, together with pressure from the pus, may lead to symptoms of pressure on the spinal cord; this may go on to the stage of complete paralysis of one or both legs.

The treatment of this type of tuberculosis consists of rest in bed in such a position as to abolish the pressure on the affected vertebræ, and the abscesses are periodically aspirated to avoid extension and the development of pressure on the cord.

This state of affairs continues until such time as the diseased bone shows the X-ray appearance of cessation of destruction and commencing repair. Then the patient starts being raised to the upright position, and weight is kept off the spine by means of a plaster jacket or other support. This is eventually changed for a light supporting jacket which prevents any sudden or excessive movement. The period in recumbency is usually something like six

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