uric acid, the variations in which, as well as its deposition in the tissues, are secondary.

In nephritis, except when uremia develops, the uric acid excretion is probably more nearly normal than that of urea; that is, uric acid is probably more easily eliminated.

To summarize our present knowledge of the conditions which control the elimination of uric acid: The source of uric acid in mammals lies in the nucleins and their decomposition products, the purin bases. The uric acid eliminated in the urine arises partly from the nucleins and purin bases due to the breaking down of cell nuclei in the body itself, that is, the endogenous uric acid; and partly from the nucleins and purin bases contained in the food, the exogenous uric acid. The amount of endogenous uric acid excreted in twenty-four hours is the minimum which the individual normally excretes; it does not change in quantity, though it varies with individuals; it is influenced only by the mode of life, but in no way by the quantity or character of the constituents of food which do not belong to the group of nucleins and purin bases. The exogenous uric acid is always an addition to the endogenous uric acid, and depends in amount entirely on the quantity of certain purin bases contained in the food. Of the free purin bases only the oxypurins, hypoxanthin and xanthin, increase the uric acid elimination; of the bound bases both oxypurins and aminopurins increase the uric acid; the methylated purin bases do not effect the uric acid elimination, but increase the purin bases in the urine. Of the oxypurins, both bound and free, one-half is excreted in man as uric acid; of the bound aminopurins some appear one-half, some one-fourth as uric acid. The fraction is in each case independent of the individual, and is practically constant.

Uric acid is not an end product of metabolism, but is intermediary between the purin bases and some lower oxidation product which has lost the purin characteristics. This product may possibly be urea, but this is certainly unproven in man and only probably in lower animals. In the carnivora allantoin, in the herbivora glyocol, forms a large portion of the recoverable (recognizable?) oxidation products of uric acid.

What the relations of uric acid to gout may be has only begun to be worked out, but it is evident that it has very little to do with many of the pathologic conditions for which it has been unduly held accountable, and for which it can at best be regarded only as an index.

TUBERCULAR JOINTS AND THEIR TREATMENT.*

DAVID C. PEYTON, M.D.
JEFFERSONVILLE, IND.

The frequency of tubercular disease of the joints, and the necessity for early diagnosis, serve as an excuse for this paper on a subject about which so much has been written. The writer desires to emphasize the fact that the present article is intended only as a résumé of some of the more important well-proven and accepted conditions which make it an imperative duty of both the general practitioner and surgeon to be able to recognize a tubercular joint in its incipency, for on our ability to diagnose this trouble early depends the success of treatment. We must recognize that joint tuberculosis is at first a local manifestation. We must disabuse our minds of the idea that it originates only in the children of

tuberculous parents, and of the idea that all joint pain is rheumatic.

Tuberculosis in the region of a joint is essentially of the bone, although it may have originated in the synovial membrane. It is a disease of bacillary infection, which may occur from without or through the blood vessels. If the joint structure is in a healthy condition, the effect of the lodgement of these micro-organisms is *nil*. But, on the other hand, given some slight injury, or a cell weakness, the natural defensive power is weakened, the point of attack is fortified and we have the beginning of a disease process which, if not very early diagnosed and treated in the most radical way, finally results in abscess, necrosis, ankylosis, loss of limb or loss of life.

The irritation caused by the tubercle bacilli often excites inflammatory processes, and if staphylococcus infection is added suppuration ensues and the nodule may finally be gotten rid of; but suppuration is not to be regarded as an essential of a tubercular process. The action of bacilli is necessarily destructive, but by their presence phagocytosis immediately becomes active.

Tuberculosis of the joints may occur at any age, and is very frequent in children. The inflammation may begin either in the synovial membrane or the ossifying tissue of the head of the bone.

In the realm of causes we have lack of food and sunshine, foul air, etc., or the action of any process serving to lower the natural cell resistance of the part, and we have the onset of the disease. The general symptoms are rigidity, swelling, pain, flexion and disturbed relation as to length. After a very slight injury the child begins to limp, and remember this one symptom can never be regarded as a habit in a child, for it limps only from cause. A muscular atrophy takes place above and below some of the joints, making very prominent any hypertrophy that may exist. The pain is often characteristic, for it occurs in severe attacks at the instant the patient falls asleep, due, of course, to the momentary muscular relaxation and consequent approximation of the two ends of the inflamed bone. This, of course, is a symptom of a rather advanced state, but often we have a reflected pain, in knee, hip, abdomen, or chest, with altered contour of the body in various positions, the pain often at first only slight, possibly only a slight uneasiness or restlessness at night. This with the various other manifestations should serve as a warning signal to arrest our attention and cause us to make a most thorough investigation of the condition before us.

Flexion is also often an important symptom, and is associated with muscular rigidity, which is one of the earliest and most persistent symptoms of joint disease.

The writer is not unmindful of the difficulty sometimes encountered in a differential diagnosis of tubercular arthritis from the several other inflammatory diseases involving the joints. But it does seem that by a most careful analysis of the cases presenting to us distinct joint lesions we should be able in most cases to make a differential diagnosis.

The tendency of tubercular arthritis is toward destruction of the joint, with subsequent attempts at ankylosis of the two surfaces, either by bony or fibrous tissue, and frequently in a bad position. The patient, however, who is thus left to an uncertain nature, may die of a long-continued suppuration, the result of a mixed tuberculous infection before this process is completed.

* Read before the Mississippi Valley Medical Association.

We have in the tuberculin test a most certain agent in rendering a diagnosis possible. You are all no doubt familiar with its use for diagnostic purposes, so that I shall only treat of the most salient points to be observed in its use. The patient's temperature line and other conditions should be most carefully noted for two or three days prior to the injection, when the patient should again be carefully observed and a careful comparison of the temperature curve made. If we have a deposit anywhere, we get the tuberculin reaction—chill, fever, etc. If no reaction follows the injection within forty-eight or sixty hours, and we have reason to suspect the presence of the tubercular disease, then we are warranted in a second injection. The most perfect asepticity is to be observed.

The writer is aware of the dangers to be encountered from its employment, but does not consider them nearly so great as the evil consequences of a so-called expectant or do-nothing plan of treatment as a result of the uncertainty of early diagnosis in these cases. Of course, the dangers should be carefully considered and compared with the expected benefits to be derived by reason of a certainty in diagnosis before resorting to its use.

In coming to the question of treatment of this very prevalent disease it is the purpose of the writer to advocate a most radical plan, which should be adopted just so soon as a diagnosis has been made. He believes that the great majority of the varied and many kinds of expectant and waiting plans of treatment are unscientific, and not founded on facts. This statement is borne out by statistics which show a most unsatisfactory state of results. It may be safe to rely on rest, fixation of joint, fresh air, etc., for the first ten days or two weeks, provided an early diagnosis has been made. It is a mistake to delay active interference for weeks, depending on an already weakened and incapacitated nature to arrest the disease process, and our error is usually repaid by the formation of pus, bone necrosis, ankylosis, loss of limb, or possibly loss of life. If we but return for a moment to the pathology of this condition we must be impressed with the error of these older and generally accepted plans of treatment.

The surgical treatment of tubercular joints presents for our consideration the following operative procedures, according to the state of advancement of the joint involvement: Arthrotomy, arthrectomy, excision or resection, and amputation.

By the early and free opening of the affected joint, thus insuring free drainage, and thoroughly irrigating it with a hot normal saline solution, the writer has gotten some eminently satisfactory results. The irrigation should be repeated daily for a week or ten days, or even longer, according to the degree of involvement. Even where the process has gone to suppuration or beginning necrosis we may expect the most marked benefits from this plan of treatment, which is especially to be commended in all patients under 18 years of age, for by the more radical operations we may destroy the epiphyses, with consequent arrest of development or growth. However, in the advanced state of the disease, whether in the adult or the child, the more radical operations are not only advisable, but are imperatively demanded to save usefulness of limb, or at least limb if possible, and sometimes life. Where necroses with fistulæ have formed, their removal by arthrectomy or excision is to be insisted on. It is especially in the smaller joints that the most satisfactory results are obtained by arthrotomy and arthrectomy.

To recapitulate, the importance of an early diagnosis can not be overestimated. The early adaption of some of the radical means of treatment for this disease in its incipency with eminently satisfactory results, seems to the writer to be founded on scientific reasons, especially so when we are brought face to face with the facts that a postponement of their application means that a little later on we are forced to adopt them when these same conditions have reached an advanced state of destruction, and that, too, with less satisfactory results. Finally, no surgeon not imbued with the fullest sense of his duty looking to the most perfect technic should attempt these radical operations.

DIPHTHERIA OF THE NOSE.

W. SCHEPPEGRELL, A.M., M.D.
NEW ORLEANS.

Diphtheria of the nose will be here considered as a primary disease, and distinguished from the more common variety in which the diphtheritic inflammation of the nasal passages is secondary to diphtheria of the throat, or even from that form which is sometimes found in epidemics, in which the diphtheritic process originates in the mucous membrane of the nose, but soon appears in its usual form in the throat.

In its characteristics, diphtheria of the nose differs widely from diphtheria of the throat. The constitutional disturbances are frequently so mild that they attract little attention on the part of the patient, and in the majority of cases, the physician is appealed to only on account of the continued obstruction of the nostrils or the attending epistaxes. Renal and neurotic disturbances are rare, and paralysis of the velum palati, so frequently found in ordinary diphtheria, is not referred to in the literature on the subject. The absence of these complications is worthy of remark, on account of the greater absorbing capacity of the nasal mucosa as compared with that of the throat. We are all familiar, for instance, with the rapidity with which cocaine is absorbed in the nostril and the greater tendency to constitutional disturbances than when this alkaloid is used in the throat.

In primary diphtheria of the nose, as in diphtheria of the throat, a fibrous exudate forms on the mucous membrane. This pseudomembrane may be removed, but the attempt is usually followed by bleeding and the membrane reforms. The constitutional disturbances are not marked, and resemble the first stage of an ordinary coryza. The main annoyance to the patient is the interference with nasal respiration and the discharge from the nose. Epistaxis is not uncommon, and frequently is the first symptom that attracts the attention of the patient or of the parents to the unusual character of the nasal affection.

As in diphtheria of the throat, the bacilli are located in the mucous membrane and do not spread through the system. The constitutional disturbance, when present, is due either to the local irritation, the absorption of toxins, or the effects of the interrupted or impeded nasal respiration.

The discovery of the Klebs-Loeffler bacillus has been of invaluable assistance in demonstrating that diphtheritic rhinitis is the same morbid process as diphtheria of the throat. Every case, in which a pseudomembrane is found in the nasal passages and which is not due to the application of the electrocautery or acids, should be examined for the Klebs-Loeffler bacillus.