

SURGICAL TREATMENT OF CHRONIC
ARTHRITIS

EDWARD H. OCHSNER, B.S., M.D.

Attending Surgeon to Augustana Hospital; Adjunct Professor of
Clinical Surgery, University of Illinois

CHICAGO

In considering the surgical treatment of chronic arthritis it is of prime importance to distinguish the different types of arthritis, because I believe that a remedy which may be very beneficial in one type may be useless in another and even harmful in still another. I believe that much of the confusion and many of the failures can be traced to the lack of careful differentiation. Before the time of the discovery of the pus micro-organisms by Ogston, the tubercle bacilli by Koch and the gonococcus by Neisser this subject was in a chaotic condition, and even now much confusion exists in the minds of most medical men.

Within the limits at my disposal it is manifestly impossible to discuss in detail all the different types of chronic arthritis. I have consequently concluded to pay especial attention in these remarks to a consideration of one of the most common, distressing and fatal types, namely, arthritis deformans. Arthritis deformans is most commonly confused with septic, tuberculous, gonorrheal and syphilitic arthritis, gout, flat-foot and chronic articular rheumatism.

As stated above, in order that we may treat this affection satisfactorily, we must, first of all, have a fairly clear conception of each of these forms of arthritis, so that we may differentiate this particular form from the others in at least the great majority of cases which may present themselves to us.

In septic arthritis the onset is more acute; it is always accompanied by considerable pyrexia, usually with a chill, nausea, vomiting, malaise and severe pain; and, while occasionally several joints are involved simultaneously, the number affected in the end is not so great as in most cases of arthritis deformans. If the infection is due to one of the staphylococci, there is usually marked effusion into the joint, local heat, redness, pain and loss of function. The joint affection is probably always secondary to a primary affection, which can generally be located. There is always a marked leucocytosis.

I mention staphylococcus arthritis because I have had a number of chronic cases in which on aspiration I found staphylococci in pure culture in one or more of the joints, cases which had previously been diagnosed as arthritis deformans by capable observers.

Tuberculous arthritis, while running a chronic course, is distinctly more acute than arthritis deformans, more painful, at the onset accompanied with more fever, usually mono-articular, and, if when the patient first comes for examination several joints are involved, the history will practically always show that a considerable interval existed between the involvements of the different joints. There are other points, such as the von Pirquet cutaneous reaction, opsonic index and many more, which might be cited, but if reasonable care is practiced a mistaken diagnosis between tuberculous arthritis and arthritis deformans should not occur.

With gonorrheal arthritis the danger of a mistake in diagnosis is considerably greater, as I have seen several old cases of gonorrheal arthritis which had been repeatedly diagnosed as arthritis deformans. Gonorrheal arthritis is generally mono-articular, sometimes multiarticular and only rarely panarticular. These latter cases are sometimes confusing, but the history will always bring

out the fact that the onset was sudden and severe and that all the joints were involved simultaneously or nearly so. Often a history of gonorrheal infection can be obtained and sometimes the specific micro-organism can still be found on careful search.

I have never seen a case of syphilitic arthritis which could possibly be mistaken for arthritis deformans, but the possibility of such an error is mentioned by several writers, and I believe that on careful examination a sufficient number of unmistakable iuetic signs and symptoms, the great number of which I need not cite here, can always be found to make a differential diagnosis between syphilitic arthritis and arthritis deformans. If any doubt exists, a careful course in antiluetic remedies should be instituted before a final diagnosis is made.

Several authors make the statement that gout is sometimes confused with arthritis deformans. If one takes the trouble to get a careful history, this mistake can always be avoided, because in gout we shall always obtain a history of one or more severe acute attacks with intervening periods of complete remission.

While it is true that an abduction deformity simulating flat-foot is often found in the later stages of arthritis deformans, simple flat-foot, no matter how severe, should never be confused with arthritis deformans. I have seen this mistake made several times, but even a superficial knowledge of these two affections should make this error impossible.

The principal source of confusion seems to arise from the fact that even prominent authors and clinicians fail to differentiate between that form of chronic arthritis which develops subsequent to acute articular rheumatism and true arthritis deformans; thus, for instance, Strümpell¹ says that a clear differentiation between the two cannot be made. To this statement I cannot subscribe; on the contrary, I believe that arthritis deformans is a disease as distinct from chronic rheumatism as is syphilis from tuberculosis and as easily distinguished from it. While we shall all agree that it is sometimes impossible to make a differential diagnosis between syphilis and tuberculosis, still we would scarcely describe the two affections in a text-book on internal medicine under the same heading; and yet, I believe, we should be just as much justified in doing this as are the text-book authors who describe chronic rheumatism and arthritis deformans under the same caption.

As stated above, this differentiation is very important because the two types of arthritis respond to entirely different treatment. True chronic articular rheumatism is always secondary to acute articular rheumatism, of which there may have been one or more attacks, each acute attack being ushered in by a severe illness, great pain, pyrexia, swelling, redness and tenderness of the affected joints. The joints to be affected during any one attack are usually all affected at the same time. Arthritis deformans, on the other hand, is insidious in its onset, chronic from its very beginning, as several years may elapse from the appearance of its first symptoms until it causes any considerable degree of disability. Thus, for instance, I have in mind a case in which the first symptoms appeared in 1892 and in which serious symptoms did not appear until 1897 and the disease had not reached its height until 1899.

While arthritis deformans may primarily be limited to one joint and often begins in one or two joints, one joint after another usually becomes involved until all or nearly all of the movable joints of the body are affected.

1. Strümpell, Adolf: *Lehrbuch der speciellen Pathologie und Therapie*, Ed. 15, ii, 517.

At this point I wish to call attention to a fact which will often give the key to the right diagnosis, namely, that within the first two or three years of the disease it is usually possible to find one or more joints just beginning to be affected, others in which the inflammatory process is at its height, and again others that have reached the quiescent or terminal state with its atrophies, exostoses and contractural deformities.

In chronic articular rheumatism are found the final results of an acute and subacute inflammation of the synovial membrane with little involvement of the extra-

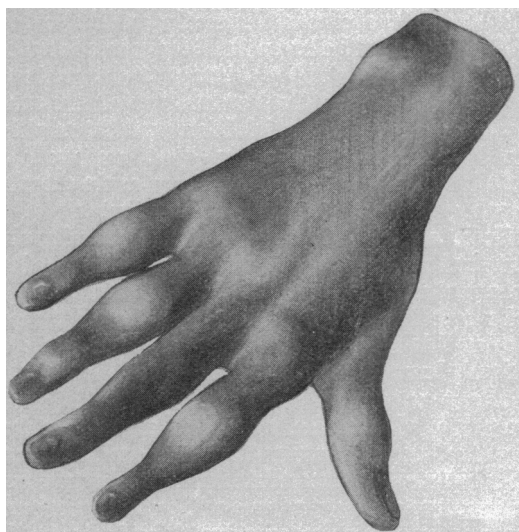


Fig. 1.—Arthritis deformans of medium degree of severity, two years after the beginning of the onset.

articular structures, and if deposits occur they are usually found more or less free within the joint capsule. In arthritis deformans the process seems to be largely confined to the joint cartilages and the extra-articular structures, with little, if any, involvement of the synovial membrane. This difference in structural involvement results in the production of two utterly dissimilar, but very characteristic pictures. In arthritis deformans the involvement of the cartilages and the extra-articular structures causes contractures, and the joints become permanently rigid and fixed, as illustrated in Figures 1 and 2. Thus Figure 1 is taken from a case of arthritis deformans of medium degree of severity two years after the beginning of the onset. In three of the joints the process is at its height, while in another the terminal contracture is beginning to develop. Figure 2 is taken from an old case showing these terminal contractures still more fully developed. It will also be noted that quite a number of these terminal contractures are contractures of hyperextension, a form of contracture which I have never seen in a case of chronic articular rheumatism. Figure 3 represents a case of chronic articular rheumatism.

On examining this last picture it will be noted that all of the fingers are in a position of slight abduction and slight flexion and none of the joints in hyperextension. If such a hand is carefully examined the joints will be found flaccid, the capsular ligaments longer and looser than normal; there will be no bony ankylosis and the deposits found will be within the synovial membrane.

Patients with chronic articular rheumatism are greatly benefited by hot baths, sweats and Bier's active

hyperemia, while arthritis deformans patients are made markedly worse by these remedies.

The differences in the history of development, the characteristic deformity and the therapeutic test make a differential diagnosis possible in practically every case.

I regret exceedingly that I am unable to furnish absolutely positive proof as to the etiology of arthritis deformans, but I believe that it is the result of long-continued autointoxication as distinguished from single, repeated or long-continued autoinfection, as illustrated by nearly all of the other acute and chronic inflammatory joint affections. In other words, so far as the joint process itself is concerned, I believe that it is a chemical rather than a microbic process. I fully realize that in the present state of our knowledge, or rather lack of knowledge, of *intra-vitam* chemical tissue changes the preceding statement is not susceptible of positive proof. I wish, however, briefly to outline some of the facts and observations and deductions on which my belief is based.

So far as I am able to determine, there are no authentic cases on record in which a specific micro-organism, or, for that matter, any micro-organism has been found in true cases of arthritis deformans. On careful analysis of the reported cases of chronic arthritis in which micro-organisms have been found in the joints it is usually easy to determine that the affection was really not a true arthritis deformans, but one of the other types of chronic joint involvement. So far as I am able to determine, patients with true arthritis deformans never show leucocytosis; they never have marked pyrexia, not even as

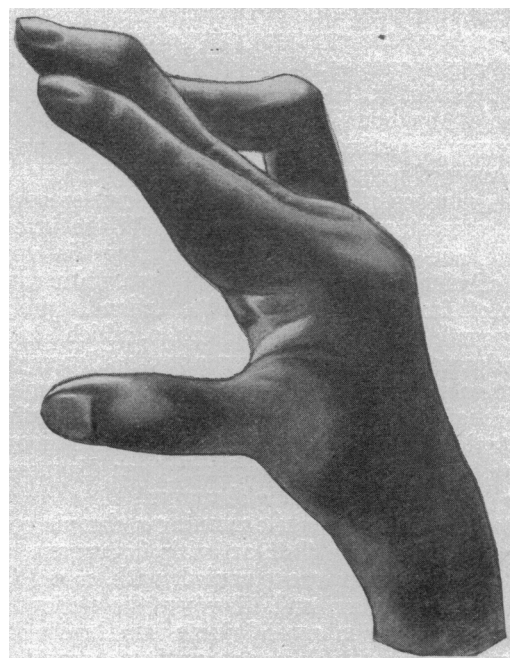


Fig. 2.—Well-advanced arthritis deformans, showing the terminal contractures. Note especially the hyperextension of some of the joints.

new joints become involved, unless they are suffering at the same time from some intercurrent febrile affection. There is little, if any, increase in synovial fluid, the swelling being confined almost exclusively to the capsule and periarticular tissues.

The first case that led me to differentiate between a chemical and microbic process was that of a patient who was suffering from very severe hemorrhoids and numerous rectal fissures, who admitted that she rarely had a bowel movement oftener than once a week and frequently

went two weeks. For several months she absolutely refused to take a cathartic from dread of the pain which a bowel movement would cause. She finally submitted to an operation, and the material that was found in the rectum at the time of operation and that was subsequently evacuated by the use of cathartics, for foulness and stench beggared all description. I have never seen anything like it since. I also recall three cases of coprostasis due to adhesions from old appendices and one case of beginning arthritis deformans in a case of very badly lacerated, ulcerated and eroded cervix. The three cases of arthritis deformans complicated with chronic appendicitis were very different from acute articular rheumatism following acute appendicitis, as first described by Finney and now familiar to all of us.

To my mind there is absolutely no evidence in favor of the supposition that arthritis deformans is of a nervous origin. The few cases that have come to autopsy and have been subjected to careful microscopic examination show no changes whatever in the nervous system, and, while the great majority of organic nervous diseases, excluding tumors, occur in males, the great majority of cases of arthritis deformans occur in females. These are facts which should surely make us slow in ascribing arthritis deformans to some obscure nervous origin. The repeated statements in text-books that it is probably due to a nervous lesion recalls the fact that for decades past when authors were unable to find any plausible explanation for a disease they were prone to ascribe it to a miasm or to some obscure nervous lesion,

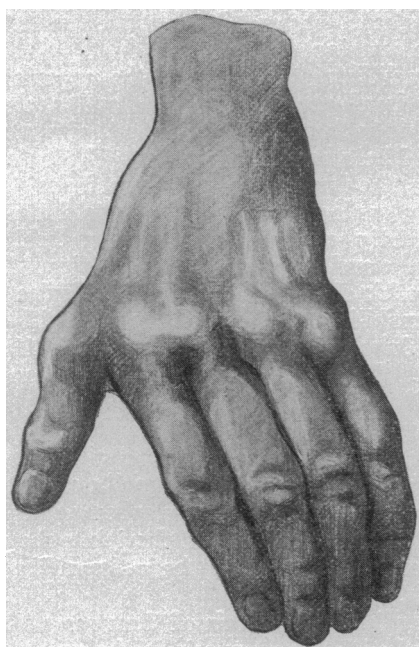


Fig. 3.—Well-advanced chronic articular rheumatism.

and I believe that this supposed nervous origin of arthritis deformans is only a similar superstition.

Even a very superficial consideration of the methods of treatment that have been in vogue in the past brings out some very startling and interesting facts, many of which would be amusing, if they were not pathetic. I will not cite any of the remedies that have been recommended heretofore, because I believe the less one knows about them and the quicker one forgets them, the better it will be for ourselves and our patients. A rather extensive perusal of the literature on arthritis deform-

ans, which, because of the great amount that has been written, must necessarily be incomplete, gives the information that one hundred and twenty-seven different remedies are being recommended for this condition. The number of times that I found each of these remedies advised varied from one to forty-two. Many are only tentatively suggested; again others are very strongly recommended. This is a condition of affairs very similar to that which existed in the treatment of diphtheria prior to the introduction of antitoxin, and the fact that all of these remedies are recommended simultaneously in the literature of a decade is rather strong presumptive proof that none of them are of any real value, because

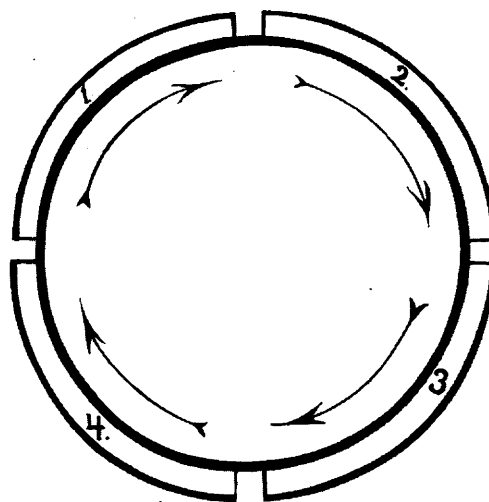


Fig. 4.—Diagram showing graphically the components of the vicious circle.

if any one approached a specific in its action the others would soon be discarded entirely.

To me a case of arthritis deformans presents the following picture: We have, to begin with, some factor which causes articular and periarticular irritation. This, in turn, causes more or less constant pain, which results in malnutrition and loss of resistance. If the process is not brought to a halt, this soon results in a vicious circle, which I have tried to illustrate by a schematic drawing (Fig. 4), one factor causing the next until the patient finally becomes so exhausted that she or he becomes a bed-ridden cripple and finally an easy prey to an intercurrent affection. An analysis of the remedies recommended gives the impression that students of this disease have more or less vaguely comprehended the situation, but because of the lack of definite knowledge as to its etiology their attempts to relieve it have been practically futile. Here, as in all other affections, we should make every effort to prevent the development of the disease, and I believe that this is actually being done and many cases of arthritis deformans are being prevented by surgeons all over the country every day when they remove foci of chronic infectional obstruction, thus preventing chronic toxemia.

Next in importance to prophylaxis is the early recognition of the cause and its removal if possible. I now recall three early and yet typical cases of arthritis deformans, the further progress of which was stopped by the prompt removal of offending appendices; two very advanced cases in which the patients were distinctly benefited by the excision of the affected appendices, but in which the disease had advanced so far that only a relative cure was accomplished; one patient suffering

from recurrent appendicitis and hemorrhoids, who refused operation and has become progressively worse; one advanced case, the patient suffering with hemorrhoids and anal fissures, in which the disease was arrested and great improvement resulted after the rectal trouble was relieved.

If the case is an advanced one in which the original cause has ceased to be operative or in which we are unable to locate the primary lesion, it becomes necessary to devise some other means by which we can obtain at least partial relief. For a number of years I have made a critical study of this and allied affections, and have treated a number of such cases with what I consider reasonable success. I believe that I am now in a position to outline a plan of treatment which will relieve these patients of their most distressing symptoms, save them from the mental and physical distress of being dependent, bed-ridden invalids and make them comfortable, often self-supporting members of the community.

In analyzing the remedies previously employed one will find that the effort has been made, consciously or unconsciously, to break in on the vicious circle at various points. The right cause not having been found, it was, of course, impossible to destroy the vicious circle at this point, and for this reason also none of the remedies previously recommended seemed able to break the vicious circle at the next point, the point of irritation of the joint itself, so most of the remedies have been directed at the next two points, pain and malnutrition, but, so far as I am able to determine, rarely, if ever, with success. Opium and all of its derivatives and many of the coal-tar preparations have been recommended as anodynes in this affection, but we all know that while certain of these remedies will temporarily relieve distress they all further impair the nutrition and thus make the patient less and less able to bear the subsequent pain; consequently they make the patient worse rather than better and have been generally discarded by the best practitioners, except in the extreme terminal conditions of the disease. Many of the remedies are given with the hope of improving the general nutrition, but it is impossible to improve the nutrition of a patient so long as she is continuously suffering pain. I know of no one thing that more surely reduces the resistance of a patient and prevents improvement in nutrition than does long-continued pain. This fact convinced me that if we could by some natural means—that is, without the use of opiates and other drugs—stop the pain, we could then secure good nutrition and thus break in on the vicious circle and save our patients.

It occurred to me that the one way we could accomplish this was by securing absolute rest of the affected joints, but this was not so easy of accomplishment, because in some of these cases nearly every movable joint sooner or later becomes affected and I have had several late cases in which practically all of them were affected simultaneously. An additional obstacle was the fact that most of these joints are partially ankylosed, with either flexor or extensor deformity with one or the other group of muscles at a distinct mechanical disadvantage, and the mere application of a retention dressing, no matter how secure or rigid, would not relieve the muscle spasm completely so long as this deformity was allowed to persist. During my work with tuberculous joints I discovered that the relief of pain in an inflamed joint involved the recognition of two separate and distinct principles: first, the application of an absolutely

rigid, close-fitting retention dressing; second, the application of this dressing with the limb in such a position that the antagonistic muscles surrounding the joints are in absolute equilibrium, so that the extensors shall have no mechanical advantage over the flexors nor the abductors over the adductors. If this ideal position is secured by absolute immobilization, pain in any chronically inflamed joint will cease from within a few hours to a week. The treatment of these old cases of arthritis deformans in which the above vicious circle has been fully established and in which the primary cause can either not be found or has become non-operative (as I believe it has in many cases), practically resolves itself into the relief of pain by natural means without the use of opiates and other drugs, and consists in the application of a snug, firm, absolutely immobilizing retention dressing with the antagonistic muscles at equilibrium. If the contractures are very pronounced and the limb or limbs cannot be brought into the desired position without causing extreme pain, the patient is anesthetized, the contractures broken up, and if necessary the tendons lengthened by tendoplasty, the limbs placed in plaster-of-Paris dressings in the desired position and allowed to remain there until the pain and irritation have entirely subsided.

If it has been necessary to use a great deal of force or to do an open operation a plaster-of-Paris mold is applied over cotton. When the reaction has subsided or the wound has healed, a new plaster-of-Paris mold reinforced with basket splints and wheat gluten bandages is applied over stockinet. In this manner a splint can readily be constructed so that it will be comfortable, absolutely rigid, light and durable, the four essentials in a retention dressing of this kind.

For immobilizing the joints of the upper extremity a small pad is placed in the axilla and a shoulder-cap applied; this is fastened to the chest with a soft roller bandage. The elbow is placed at a little less than a right angle, the forearm rotated inward slightly, so that the anterior surface looks directly toward the body, the thumb slightly extended, the fingers held perfectly straight and a mold applied in this position. For immobilizing the hip I use a plaster-of-Paris spica extending from the umbilicus to the pubis and to within an inch above the knee with the thigh abducted 10°, ventral flexion 5°. The knee is immobilized at an angle of 175° and the ankle at 85°.

The above-described positions are chosen because they are the ones which secure muscle equilibrium and fortunately at the same time are also the positions giving the muscles the best opportunity subsequently to limber up the joints and in case any of the joints should be permanently ankylosed it leaves the limbs in the most useful position.

What now is the prognosis of these cases thus treated as compared with the prognosis in the past? So far as I am able to determine, patients with true arthritis deformans treated by the usual methods in vogue in the past have generally become progressively worse, so that they have become bed-ridden invalids in from three to seven years after the onset of the disease. During all of this time they have suffered a great deal of pain; a considerable part of the time they have been unable to support themselves, and the last year or more they have required the constant personal care and attention of one or two attendants. When they once become bed-ridden they become utterly helpless, require at least one personal attendant and are either a great financial burden

to their relatives or to the community. If the treatment above outlined is instituted early, if the cause can be found and removed, this unfortunate condition can often be prevented, as the following brief history will illustrate:

CASE 1.—On March 14, 1907, a woman, aged 47, presented herself suffering from beginning arthritis deformans which began with an involvement of the proximal phalangeal joint of the ring finger of the left hand three years previously. At the time of examination most of the metacarpophalangeal and phalangeal joints of both hands were involved, also wrists and knees. The patient's complexion was muddy and anemic; nutrition fair. In the history she gave the information that nineteen years previously she had had an attack of typhoid fever. The patient was examined repeatedly with negative results. Finally one day, on examining her, a tenderness was discovered at McBurney's point. On closer questioning it was found that she occasionally felt pain in this region, and on analyzing the history carefully it was determined without question that the previously mentioned attack of typhoid fever had really been a severe unrecognized attack of appendicitis. The appendix was exposed by a McBurney incision, was found 7 cm. in length, curled up, universally adherent, lumen markedly constricted near its proximal end, the distal end filled with fecal matter. The appendix was removed in the ordinary manner, the patient made an uneventful recovery so far as the operation was concerned, her nutrition began to improve, a healthy complexion replaced the previous muddy anemic one, the joint irritation slowly subsided, and for the past year or more she has been in perfect health.

The question arises what shall be done with those patients who are not yet helpless, but in whom we are unable to find the cause. For the present, I shall have to give the advice that they be left alone, unless they are thoroughly familiar with the disease, know what is in store for them if they follow the ordinary methods of treatment, and are willing to persist in the treatment above outlined until relatively cured. The only cases in which I have suffered defeat have been those of patients who have come in the intermediate stage when the cause could no longer be ascertained and before they were absolutely helpless.

If the patient does not come under treatment until she is bed-ridden much can still be done for her. She can be relieved of all of her pain, much of her deformity and malnutrition; often she can be rendered self-supporting and always enabled to look after her own personal wants.

As an illustration of the above I wish to give briefly the history of one of the worst cases of arthritis deformans I have ever treated.

CASE 2.—An unmarried woman, aged 29, came to me in the summer of 1897. She was scarcely able to walk a distance of two blocks; she was greatly emaciated and gave the history of first experiencing slight pain at the point of insertion of both tendons of Achilles five years previously. Gradually and insidiously one joint after the other became involved, so that when I first saw her nearly every movable joint of the body was affected. In the meantime she had consulted many physicians, including several prominent specialists and also numerous quacks, including faith-healers, etc. During the next two years I tried various remedies then advised in the treatment of this affection, including the application of hot air and wet compresses. The patient, however, became progressively worse, more and more helpless, bed-ridden, so that by 1899 she was absolutely helpless. She could not walk, stand, lie or sit, but had been resting in a semirecumbent position on a specially constructed couch. Finally she became so helpless that she could not even turn the leaves of a book which was resting before her on a reading table; even her jaws and spine were partially ankylosed. In 1900 she was sent to the hospital; on admission she weighed 78 pounds. She was anesthetized, the contractures broken up, immobilized as previously out-

lined and slowly began to improve. The last time I saw her, about five years ago, she weighed 140 pounds, and was up and around; to be more precise, she was stirring the batter for a cake. She informed me that she was doing considerable housework, nursing her aged sick mother, and was able to attend to her own personal wants with the exception of putting on her own shoes and stockings. For the last five or six years she has sent me a piece of her own needlework every Christmas.

While such a condition is not to be looked on as a perfect cure, it is surely a very much less deplorable condition than that which existed before this treatment was instituted. I have several patients who had been bed-ridden for years who are now making their own living.

In concluding, I should like to emphasize the following points: first, that a clear differentiation is absolutely necessary to the successful treatment of these chronic joint affections; second, that beginning cases of arthritis deformans should be carefully studied, the cause ascertained and removed whenever this is possible; third, that for the present at least it is well to be rather cautious in the treatment of the intermediary cases; and, finally, that even in the very late and apparently hopeless cases the patients can usually be greatly benefited by proper treatment.

2104 Sedgwick Street.

NITROUS-OXID-OXYGEN ANESTHESIA BY THE METHOD OF REBREATHING

WITH ESPECIAL REFERENCE TO THE PREVENTION OF
SURGICAL SHOCK

WILLIS D. GATCH, M.D.
BALTIMORE

The following article gives the results of a trial of nitrous-oxid-oxygen anesthesia in the service of Professor Halsted at the Johns Hopkins Hospital. My object at the outset was to develop a method of administering these gases so simple, cheap and effective as to make possible their more general use. As nitrous-oxid and oxygen are expensive and are to be obtained only in heavy cylinders, it seemed to me that the solution of the question of their administration, so far as cost and convenience are concerned, must lie in using them over instead of wasting them after one inhalation. I have, therefore, studied the effects of rebreathing these gases with a view to determining to what extent this may be permitted without injury to the patient. My results have led me to believe that within certain limits the method is not only harmless but beneficial.

For the sake of clearness I shall consider the facts to be presented under three headings, namely: (1) the apparatus employed; (2) the method of administration; (3) the clinical results.

THE APPARATUS

This consists of a holder for the cylinders of gas, a rubber bag, a face-piece, and the connecting tubing. The holder, as will be seen from Figure 1, consists of a basket of iron, triangular on cross-section, into which two cylinders of nitrous oxid and one of oxygen may be placed. Small set-screws hold them in position. One of the lateral bars of the basket is made into a handle for carrying it about. In the operating-room we have a special stand for this holder. Such a stand is unnecessary, however, as the holder may be placed on a table or chair. To the upper part of the holder is bolted an L-shaped tube, each arm of which is about 2