

Manipulation of the spine under general anesthesia

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In 1952, W. G. Bradford and I¹ reported on a series of 100 cases in which manipulation of the spine had been performed with the patient under general anesthesia. This is a follow-up of that study, now reporting a series of 723 cases treated during the past 11 years. Subsequent to the gathering of data for this study, over 250 additional patients have undergone this procedure.

The value of manipulation

Other writers in the osteopathic profession also have reported on manipulation under anesthesia, including Soden,^{2,3} Clouse,⁴ and Clybourne.⁵ More recently, a number of writers outside the osteopathic profession have been commenting on manipulation, both with and without anesthesia. Some of their comments are interesting. For example, Menors⁶ concludes:

A conservative regimen which includes manipulative treatment of lower lumbar intervertebral disc syndrome under anesthesia eventuates in a sufficiently high percentage of satisfactory results to warrant its use as an essential part of conservative therapy.

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On the other hand, Bell, Viek, and Santangelo⁷ feel that manipulation is of no benefit, and comment, "The old tricks of manipulation continue to be reiterated."

In a paper entitled "Manipulation in Back Pain," Parsons and Cumming⁸ begin by stating:

That manipulation will relieve back pain in many instances, few will argue. There the agreement ends. Those who manipulate swear by it. Those who don't, condemn it. Those who don't manipulate warn of all the catastrophes that can result from the practice, while the patients of those who do flock to their offices for relief. This conflict comprises one of the medical anomalies of the twentieth century. . . .

The purpose of this paper is to examine this anomalous situation, to speculate on the etiology of the pain, and to describe a method of manipulation that for 20 years has brought gratifying results with none of the disasters that so many predict. The reason we took up manipulation was an interest in backache, with the early discovery that many patients who failed to respond to routine medical treatment went to a manipulator and received immediate relief. This discovery was followed by acceptance of the classic advice, "If you can't whip 'em, join 'em," at least to the extent of borrowing their technique.

Schaubel⁹ presented a paper which was partially abstracted as follows:

Chronic low-back pain of indefinite etiology is most probably caused by a periarticular fibrositis or adhesive capsulitis involving the joints of the spine and their surrounding tissues. The problem is similar to that of the frozen shoulder and manipulation should be considered.

Acute injuries to the low back probably cause tears of the muscles, connective tissues, and joint capsules, along with some degree of impaction or distraction and subluxa-

Manipulation of the spine under general anesthesia is a valuable procedure, but cases must be specifically selected. In the case of the herniated nucleus pulposus syndrome, some patients may get very adequate relief, but many do not. It is emphasized that management is individualized

tion of the articular facets. Muscle spasm is invariably associated with this syndrome.

The technique of manipulation was based on the normal range of motion of the joint being manipulated. The manipulation must be carefully designed and executed; it is in no sense a motion of brute force. Because of the limited indications for manipulation in the treatment of backache, the differential diagnosis of low-back conditions becomes of utmost importance. Careful diagnostic investigation must be made before manipulation is considered. Contra-indications for manipulation are pathological conditions elsewhere than in the back, tuberculous spondylitis, neoplasm, and the like.

In a very interesting paper, Lindemann and Rosak¹⁰ concluded:

In our opinion, it is not permissible to regard the reposition under anesthesia without further ado as technical blunders. . . . It deserves its place in the scale of the orthopedic therapeutic measures for the treatment of the protrusion and the dorso-lateral prolapse in the lumbar region. For the forms of the sciatic syndrome which are evoked through the dorso-lateral compression working on the nerve roots, the reposition under anesthesia is harmless and presents absolutely an acknowledged and trustworthy procedure in treatment.

Plan of this study

The aims of the present study remain essentially the same as those stated in the former paper.¹

The aims of manipulation of the low back under general anesthesia are to accomplish mobilization of the affected area, to stretch the muscles and fascia in the affected area, and to normalize osteopathic lesion pathology in the area. Fundamentally, of course, we want to relieve the patient's low-back pain and to return him to normal activity. We feel that in selected cases these aims can be accomplished much more rapidly and with much more ease by this procedure than by the usual office manipulative management. While there are many cases of low-back pain which require bracing or some other type of support, we feel that in the majority of cases it is highly desirable to obtain a thorough mobilization of the lumbar spine and sacroiliac areas prior to bracing or application of a support.

It is our opinion that manipulation of the low back under

general anesthesia has a definite place in the osteopathic armamentarium, since with it, as with all osteopathic management, the ultimate aim is the normalization of structure and function. By using anesthesia we feel that much more can be accomplished in a short period because of the absence of pain and protective muscle spasm. Since both pain and muscle spasm are nature's protective measures, we must be careful we do not damage tissues when they are inactive.

Similar comment applies to treatment of the dorsal and cervical areas.

In this particular study, reference to specific examinations, x-ray studies, and specific detailed diagnoses is not made. This is merely a report on the types of cases upon which this manipulative procedure has been performed and on the results obtained. The period of follow-up varies from 2 months to 10 years, but has been sufficient in each instance to know the result of the manipulative procedure as such. Generally, the cases fall into three groups: (1) chronic low-back disorders; (2) acute low-back disorders; and (3) the disk syndrome.

1. While chronic low-back disorders are classified by numerous terms by various writers, I have tried to narrow the classification to a few terms so that nomenclature is understandable as well as acceptable, and so that diagnoses will be in line with standard hospital terminology. We hear of cases termed as chronic lumbago, chronic osteopathic lesion pathology, sacroiliac strain, structural imbalance, myofasciitis, myofibrositis, torticollis, sciatic scoliosis, and many others. I have classified most of these conditions under the general term "myofibrositis," because all of them include either primarily or secondarily the pathologic state which I feel is present in the myofibrositic syndrome. I would refer to several writers in this regard.

Pathological anatomy does not yet keep pace with the clinical knowledge of this muscular affection, perhaps, among other reasons, because biopsy is connected with certain difficulties. . . . The anatomo-pathological picture of pure myofasciitis is still very poor. It shows moderately inflamed foci with oedema, multiplied fibroblasts, and connective tissue hyperplasia. Functional or colloid changes in the muscles have also been mentioned, and even waxy degeneration is considered possible. Among the manifestations which accompany the clinical picture of myofasciitis are muscular nodules. . . .

Myofasciitis is characterized by great diversity of its clinical picture. After an acute and striking onset it sometimes assumes a very chronic form. . . . In the majority of cases, the clinical picture is characteristic, its initial components being oedema, painfulness, limitation of movements, and contractures.¹¹

The pathological processes seem to be an affection of the interstitial tissue with secondary changes of muscle fibers. Chronic inflammation due to the typical repeated attacks of muscle spasm or foci of infection elsewhere usually constitutes the condition popularly referred to as fibrositis which is merely a low-grade edema with lymphocytic infiltration producing pressure on myoneural sensory endings and hence painful contraction and contracture.⁴

Kuhns¹² suggests the terms "intramuscular fibrositis" and "periarticular fibrositis" as most descriptive, and then proceeds to describe the pathology in this type of condition:

The fundamental nature of fibrositis has not yet been established by corroborated pathological studies. Inflammatory exudation and hyperplasia of white fibrous tissue has been described as the early findings with later nodular formation and painful indurations in the tissues. Numerous biopsies of the tender areas in the muscular and fibrous tissues have been performed, but the reports have been vague and at times contradictory. It has been suggested that there is first an outpouring of serum with fibroblasts and the formation of new blood vessels. Infection has never been found nor have bacteria been recovered. Firm areas of fibrous tissue have been described clinically but rarely demonstrated in microscopic studies. Three stages in the pathological process have been described. These are, first, low grade inflammation with exudation, local thickening of tissues, sometimes with large subcutaneous nodules with, secondly, fibrous contracture and capsular thickening; with thickening of the tissues there is increased tension on motion leading to pain and other symptoms. The end stage, with persistent thickening and stiffness, leads to a greater liability to future attacks.

Does not the above sound similar to the pathology of the spinal lesion of Still as described by Burns¹³ and others? I feel that this chronic pathologic state of the muscular and ligamentous structures of the spine, associated with the articular and periarticular disorders, frequently is best treated by manipulation of the spine under anesthesia.

2. In the instance of the acute low-back disorder, osteopathic physicians have long shown that manipulative procedures are frequently of distinct value. However, many of these cases are so acute and so involved with pain and muscle spasm that it is difficult to treat the area with the patient awake. Later, when the acute phase subsides, treatment is easier. Very few of the cases in this study are of the acute type, chiefly because of a problem of bed space in the hospital. However, I believe that manipulation under anesthesia might well be the ideal treatment in many cases of acute low back and neck problems. In the few cases thus treated, I have seen rapid results, unless there was a serious intervertebral disk lesion.

3. In the case of the disk syndrome, manipulation is carried out under anesthesia in an effort to give relief to the patient. It has long ago been demonstrated that many patients with a disk syndrome can be relieved by manipulative procedures.

Techniques used in this study

The specific method of anesthesia is left to the discretion of the anesthesiologist. In most instances intravenous Pentothal or Surital has been used. A muscle relaxant may or may not be used with the anesthesia, depending upon the particular case and the anesthesiologist. Preoperative medication is

There are certain contraindications to this manipulative procedure, including malignancies, tuberculosis, and acute fractures. Osteoporosis and hypertrophic spondyloarthritis are not necessarily contraindications; however, patients with this type of disorder must be fully evaluated

similar to that for any surgical procedure under anesthesia.

The lumbar spine and the sacroiliac joints are mobilized with the patient on either side, and using a criss-cross technique. Further mobilization of the sacroiliac areas is carried out with the patient supine, by circumduction technique, and the hamstring muscles and the sciatic nerve are stretched by a straight leg raising procedure. The dorsal spine is mobilized by an extension type of technique with the patient supine. The cervical spine is mobilized with a side-bending rotation technique to each side.

The techniques used are practically identical to those used in ordinary office treatment, but generally with a bit less force applied. The operator must be familiar with manipulative techniques used on patients when awake before attempting these procedures with the patient asleep.

The management of the case following the manipulation under anesthesia will vary considerably. It is to be emphasized that there is no routine management of these cases.

Some patients require sedation while others do not. The various muscle relaxants have been tried upon series of patients without any specific conclusions as to their value. The average patient does not require traction following the manipulation, although I have found a number of patients who seem to do better with the use of traction. If the problem is chiefly of the low back, bilateral leg traction is used. If the problem is primarily of the cervical spine, then either continuous or intermittent cervical traction is used.

Follow-up manipulative treatment also varies considerably in frequency. Its application is based largely on the clinical findings each particular day. A minimal amount of the so-called soft tissue treatment is used, with the chief aim being mobilization of the involved areas. A considerable number of patients require relatively short periods of follow-

up with a minimum of manipulative treatment. Others require very long periods of follow-up and regular manipulative treatment in the office for extended periods. This aspect of management naturally depends upon the individual and the basic pathologic condition involved. The important point is that case management must be individualized.

Methods of evaluation

In order to assess the value of this procedure, the 728 cases in which manipulation under anesthesia was performed between July 1, 1950, and July 1, 1960, were analyzed by reviewing each case record and office follow-up. In approximately 100 cases, additional follow-up was secured by mail contact. In a large number of cases, the follow-up ran into several years because of subsequent care of the patient for the same or other conditions.

A file card was prepared for each case, containing the pertinent information regarding this procedure of manipulation under anesthesia in the management of that particular case. The cases then were tabulated by numbers which had been assigned as each card was prepared. The tabulation included age, primary diagnosis, secondary diagnosis, indication of previous surgical treatment, indication of subsequent surgical treatment, indication of repetition of the procedure, indication of myelography having been or not having been performed, and, finally, a rating of results as good, fair, or poor. The first 100 cases from the previous study¹ were also gone over again and re-evaluated on a similar basis because the rating of results had been slightly different originally.

A case was rated as having good results if the patient was able to return to normal activity, relatively symptom-free. A case was rated as having fair results if the patient demonstrated improvement and returned to relatively normal activity, but with some residual symptomatology. Those cases in which there were only temporarily good results, and who later required operation or perhaps a second manipulation, were also rated as fair. Cases in which there was little or no improvement, or in which the symptoms were aggravated, or in which there was a very early recurrence of symptoms, were rated as having had poor results. Adequate information for these ratings was contained in my follow-up hospital and office records on 723 of the 728 cases.

Summary of data

There were 723 cases in which there was sufficient information to evaluate the immediate results. Of the last 628 cases (sex was not noted in most of the first 100 cases) 305 were females and 323 males.

Manipulation under anesthesia was performed two or more times on the same patient in 57 cases. The total number of different patients undergoing the procedure was 666.

The diagnoses were distributed as follows:

1. Myofibrositis or similar diagnoses, 500 cases.
2. Myofibrositis plus other significant pathologic states, 33 cases.
3. Myofibrositis plus herniated nucleus pulposus, 162 cases.
4. Myofibrositis plus herniated nucleus pulposus plus other significant pathologic states, 11 cases.
5. Herniated nucleus pulposus, 16 cases.
6. Herniated nucleus pulposus plus other significant pathologic states, 1 case.

In a total of 533 cases myofibrositis occurred without herniated nucleus pulposus. In a total of 190 cases (26.3 per cent of the total number of cases) herniated nucleus pulposus occurred initially.

Laminectomy was performed at some date subsequent to manipulation under anesthesia in 112 cases. Laminectomy was performed prior to manipulation in 45 cases. Myelography was performed in a total of 171 patients in this series.

Over-all results in the 723 cases were as follows:

Good results	431 cases (60 per cent)
Fair results	218 cases (30 per cent)
Poor results	74 cases (10 per cent)

In patients having a final diagnosis of herniated nucleus pulposus, results of the manipulative procedure were as follows (185 cases):

Good results	49 cases (26.4 per cent)
Fair results	82 cases (44.3 per cent)
Poor results	54 cases (29.3 per cent)

A total of 95 of the 185 patients (51 per cent) underwent disk operations after manipulation, with a definite diagnosis of herniated nucleus pulposus.

Of the 538 cases with a final diagnosis of myofibrositis or similar pathologic states without herniated nucleated pulposus, results were as follows:

Good results	382 cases (71 per cent)
Fair results	138 cases (25.3 per cent)
Poor results	20 cases (3.7 per cent)

Attention is called to the difference in results between those cases having a diagnosis of myofibrositis and those having a diagnosis of herniated nucleus pulposus. Of the patients having merely myofibrositis or a similar pathologic state, 96.3 per cent were improved, making manipulation worthwhile. Of the patients having a herniated nucleus pulposus, 70.7 per cent were improved. However, this improvement was quite temporary in a number of cases, since 51 per cent required subsequent operation. Associated pathologic states other than herniated nucleus pulposus did not influence the statistics. However, it must be remembered that these were selected cases, and that patients having

some contraindication to manipulation under anesthesia were not so treated.

Discussion

It becomes evident from the review of these cases that manipulation of the spine under general anesthesia is a valuable procedure, but that cases must be specifically selected. In the case of the herniated nucleus pulposus syndrome, some patients may get very adequate relief, but many do not.

It is emphasized that the management of these cases is individualized. The patient is treated on the basis of clinical findings presenting themselves daily or at each office visit, and upon his response to treatment.

There are certain contraindications to this manipulative procedure, including malignancies, tuberculosis, and acute fractures. Osteoporosis and hypertrophic spondyloarthrosis are not necessarily contraindications; however, patients with this type of disorder must be fully evaluated, and then the procedure may or may not be considered indicated on the basis of total findings.

In a series of articles that appeared some 25 years ago, the use of manipulation in low back problems was suggested. The premise stated by Pitkin¹⁴ in one of them still applies:

Any pathological process, except a neurotrophic disturbance, that involves a joint or the supporting mechanism of a joint, produces reflex muscle spasm and a temporary decrease in the mobility of that joint. The protective muscle response elicited by affections of the upper sacral joints is intense and prolonged, because of the fact that stability is paramount in sacral structure and function. Moreover, sacroarthrogenic muscle spasm results in wide-spread limitation of motion in primarily mobile joints, because the muscles which control the position of the sacrum go far afield for attachments to the spine and to the lower extremities. The steady spasm and the consequent postural defects combine with local pain, tetralgia, disturbances of the sympathetic nervous system, insomnia, and fatigue to form a vicious circle which magnifies the disability.

Therefore, in an attempt to break up this vicious circle, manipulation of various types is carried out through the spinal areas. This can be applied more effectively in many cases with the patient under general anesthesia.

Summary

This report concerns a series of cases in which manipulation of the spine was performed with the patient under general anesthesia, including both the cervical and lumbar areas and occasionally the dorsal area. It is emphasized that there must be selection of cases for the procedure, and the care of each patient must be individualized. A high percentage of good results can be obtained with careful evaluation and selection of cases.

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Discussions

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It would be impossible to appreciate this paper without first reading the previous report by Siehl and Bradford,¹ which sets up certain categories and indications for manipulation under anesthesia. The general considerations in this first paper were as follows:

After examination of the spine with x-ray films and determination that no other disease was present, they found that a person had what they chose to call myofibrositis. Many of these individuals had not responded to ordinary manipulative treatment without anesthesia. Then they gave anesthesia and performed manipulation on whatever section of the spine seemed indicated.

The present analysis and evaluation is interesting, and certainly Dr. Siehl is to be commended for relating his experience with this particular technique.

Manipulation under anesthesia is not difficult, and any osteopathic physician, who has done any manipulation at all, can do this if he uses ordinary judgment and care. But the differential diagnosis in selecting the cases which are expected to respond is, to my way of thinking, one of the most difficult problems in low-back treatment. I have found that many patients have had their backs manipulated under anesthesia when they already had a marked hypermobility of the fourth, fifth, and third lumbar vertebrae. Manipulation under anesthesia in these cases was harmful. In cases in which the clinical signs of a herniated disk are positive, it is my judgment that manipulation under anesthesia is also harmful, not helpful.

I think, also, that we must analyze what we are attempting to do in manipulation under anesthesia. It must be remembered that anesthesia removes the protective mechanisms. What are we trying to accomplish?

Are we attempting to treat an existing capsulitis? Synovitis? Or are we stretching adhesions? Or clon-

gating interspinous ligaments? Or destroying fibrotic muscular fibers? Are we attempting to change the lateral scoliosis or the lordosis, whichever case may be? Are we attempting to realign the so-called adhesions now present and replace them with the development of other adhesions? Are we attempting to break up a neurologic reflex syndrome which produces low-back pain or neuritis? Are we attempting to produce hemorrhage in the capsule, the muscles, and the skin, in order to throw into the system a foreign protein which may be part of the recovery factor?

Have we performed this procedure because it is more useful and immediate than a slower method of manipulation? Have we taken this on because the compensation is greater?

Dr. Siehl has answered some of these questions in his follow-up on 723 cases, in which he stated that 96.3 per cent of the patients with myofibrositis were improved. I am surprised at his figures on cases with herniated nucleus pulposus. If he had said sciatic syndrome, I could agree, but it has been my experience that if there is a true herniation of the nucleus pulposus, manipulation under anesthesia is of no value, and may be harmful.

It would have been interesting, if possible, to hear a figure of the total number of low-back cases treated during this period, and what percentage of these were treated by manipulation under anesthesia.

I want to compliment Dr. Siehl on the excellent bibliography which he has presented with this paper. I am convinced that manipulation under anesthesia is one of the methods used which will be helpful in certain cases of low-back disorders. I believe that manipulation under anesthesia should be taken seriously, however, and that a careful analysis of the cases should be made—not particularly with regard to tuberculosis, cancer, or some other bone disease, but to be assured that there is a reasonable chance of obtaining a good result. This is in contradiction to the practice of manipulating every patient with low-back complaints that can be persuaded to take an anesthetic.

1. Siehl, D., and Bradford, W. G.: Manipulation for low back pain. J. Am. Osteop. A. 52:239-242, Dec. 1952.

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After reviewing this fine paper, I was reminded again that osteopathic manipulation has an importance that cannot be duplicated any other way, provided the manipulator understands the problems with which he must deal. Dr. Siehl has given pros

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and cons concerning manipulation of the spine under anesthesia. As far as I can ascertain, the good far overshadows the poor. It must be remembered, however, as Dr. Siehl has stated, that the cases must be carefully selected, and it is very important that a careful diagnostic study be made for certain pathologic conditions which are contraindications to this procedure.

Schaubel¹ has said that "Chronic low back pain of indefinite etiology is most probably caused by periarthritic fibrositis or adhesive capsulitis involving the joints of the spine and the surrounding tissues. The problem is similar to that of the frozen shoulder and manipulation should be considered." It was pointed out by Dr. Siehl, subluxations or osteopathic lesions play a very important part in this statement. It is very true that when manipulating under anesthesia it is advisable to use care, as brute force can create an even more pathologic state than was already present.

I agree that it is very necessary to know the type of back with which one is dealing, what the x-ray studies revealed, and what management should be employed after manipulation. This will vary with the manipulator and the individual patient. In low-back conditions it must be decided whether or not to use traction, and if so, whether it should be unilateral or bilateral. My own practice is to have a standing anteroposterior roentgenogram taken of the spine, and then to place traction on the side of the lumbar concavity in an attempt to prevent adhesions from recurring in the psoas region. I recommend the use of a brace or support when I feel it is warranted. It is my practice to place the patient in an antigravity position for at least 72 hours after manipulation, and before weight bearing is allowed.

I do not use the scissors technique or the side-to-side motion. I use the posterior hamstring stretching procedure, plus the strap technique while the patient is prone, as I feel that in this way I can free the sacroiliac joints much more easily and completely than by the side-to-side or the criss-cross movement. The procedure may vary somewhat with the manipulator, but the objective is movement and normalization, by whatever method.

I would like to make one statement regarding the disk lesion or syndrome. If, after examining the patient, I am convinced that a herniated nucleus pulposus is present, and orthopedic and neurologic findings verify this, I find manipulation useless. I have tried it many times and failed to obtain satisfactory results. My failure may be due to poor technique, or it may be because the case is too far advanced to obtain good results, but it has been my experience that surgical intervention is inevitable. I have used manipulation after surgery and found it very helpful in breaking down myofibrositis.

Dr. Siehl has categorized a number of cases very thoroughly. He has prepared a complete and concise report. It proves that manipulation under anesthesia is valuable in many conditions of the spine. If we would all take a lesson from this report, I am sure that there would be fewer patients with scars on their backs. It has been my opinion for many years that school children should be examined for structural defects. Many such defects could be corrected before the children become older men and women, when wear and tear, stress and strain, play such important parts in many back conditions.

1. Schaubel, H. J.: Manipulation for low back pain. *J. Bone & Joint Surg.* 42A:355, March 1960.