

LOW BACK PAIN

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FOREWORD

When one carefully reviews this book, he is highly impressed with the thoroughness with which this subject is considered. According to my knowledge, this is the first and only treatise in book form of a very complex problem confronting all clinicians.

This book deals with an age old problem which has challenged the most brilliant and alert minds in the Healing Arts Profession, from a scientific as well as a practical consideration. The low back problem is no respecter of persons; it attacks the young, middle-aged and elderly individuals. It attacks all classes of people, regardless of their social status or their respective life work. The patient may be an executive, professional person or day laborer.

The author very emphatically and interestingly writes these facts in a manner which not only makes the scientific statement but, in many instances, cites the rationale of therapy. Furthermore, in his own positive factual manner, he not only presents scientific data, but gives actual and practical applications in such a fashion that representatives of all the Healing Arts (without actually being specialists) can comprehend. This, in my professional opinion, renders a most valid contribution to the Healing Arts Profession and, thereby, offers a facility to the general health care for the benefit of all who suffer from this malady.

I should like to express my personal congratulations to the author, as a member of the Osteopathic Profession, for his indefatigable effort to accept the challenge of the low back problem. Furthermore, in so far as I am able to determine, this is the first attempt by a D.O. to compile a treatise on this subject which contains such a diversified and comprehensive consideration of all the facets of this important realistic problem which manifests itself to physicians of all schools of scientific thought.

Certainly, any rational individual imbued with the desire to sincerely aid his fellowman will agree that in any more publications such as this eloquent treatise based on scientific authority, as well as experience by the author and his associates, will promote general health care and elevate the prestige of the Osteopathic Profession.

Respectfully submitted,

GALEN S. YOUNG, D. O., D. Sc.

PREFACE

**"He who will not reason, is a bigot;
he who can not is a fool; and he who
dares not, is a slave."**

SIR WILLIAM DRUMMOND, Academical Question Preface

The diagnosis and treatment of low back disorders is generally divided into two parts by physicians and surgeons. One part is in the realm of the general practitioner who makes such diagnoses as lumbago, rheumatism and sciatica and uses diathermy, analgesics, ointments and adhesive strapping to treat them. The second part falls into the realm of the orthopedic surgeon when either the patient's or the doctor's patience runs out or more expert advice seems to be needed. His diagnoses run more to herniated disk at L5, scoliosis and radiculitis and he advocates such measures as body casts, traction and laminectomy.

In this book an intermediate approach is presented. This approach is based on the premise of providing for general practitioners feasible and tried ways to handle low back cases in their own offices. The methods provided in this book are simple in application; they have been tried in many cases and their application will provide gratifying help for the patient and satisfaction to the physician.

To simplify a rather complex problem two broad diagnostic classifications are used: low back instability and acute low back strain. If the case at hand does not fit the diagnostic requirements of either of these two categories then other, less common causes must be sought. But these two broad classifications should be in the forefront. The majority of people disabled and in pain because of low back trouble can, as a rule, be classified in these two ways. This leaves a minority suffering from such disorders as cancer, osteoporosis, metabolic diseases, referred pain, rheumatoid arthritis and others that are considered separately. They too are a problem and at times very serious but in regard to numbers they are fortunately few.

Some may not readily place herniated disk in the classification of low back instability because of the theory, quite widely held, that the cause of pain and disability in these cases is due to the pressure on a nerve root of a bulging nucleus pulposus. A careful consideration of the evidence available from nucleograms, myelograms and other modalities should help to show that the basic pathology is instability due to weakened ligamentous support.

The emphasis in treatment follows from the diagnoses. Joint sclerotherapy has had a successful record since its modern methods took form in 1937 and that is the method taught in this book as the best method available today for instability. For acute low back strain the specific action of curare on voluntary muscles is stressed. The use of manipulation for specific corrections in cases demonstrating subluxation of joints and in treating disorders of the muscles is given.

The attempted effort to place a particular low back case into the proper diagnostic category, with reference to these characteristics which fit it for the category of instability, acute low back strain or some other will lead to a better understanding of the problem in each particular case. With greater understanding will come more definite and successful treatment. The attempt is made throughout the book to demonstrate a few successful methods of treatment and without quibbling to state that certain popular methods such as adhesive strapping, body casts, traction and laminectomy are to be avoided.

In essence, the low back problem will be less of a problem with more study of the anatomical features, more examination of the back and more widespread use of therapeutic methods that have proved satisfactory.

Philadelphia, Pa.

September, 1957

Chapter 1

THE LOW BACK; WHY IT IS A PROBLEM

Included in this discussion of the low back are the lumbar vertebrae and the pelvis. As a working unit for carrying you about, bending, lifting, twisting and absorbing shocks, this collection of bones, along with the ligaments that hold them together, the muscles that move them plus the nerves that control them, is marvelously efficient.

Those who take the stand that we have backaches because the back has not sufficiently evolved to cope with the upright position overlook some important facts. Without getting into a long and fruitless discussion about just where we are in the apparently endless process of evolving it should be pointed out that man does not get backache just because he is in the upright position.

Let's consider some important characteristics of a normal low back. There are five lumbar vertebrae in it, the facets are bilaterally well developed and all face in the same plane, the coronal. The neural canal is unbroken and there is no infringement by the facets on the intervertebral foramina. There is a moderate curve convex anteriorly. There is no curve to either side. The top of the sacrum doesn't tilt to either side when weight is borne on it and the sacroiliac joints, being stable, permit a small amount of motion. There are the usual muscles, nerves and blood vessels. The person with this kind of back can go a whole lifetime without any backache - some do. Like as not he can develop one too. Whether or not he has backache obviously cannot be due to his position which, in either case, is erect.

Just what is expected, of the back? There is no complaint about the evolutionary development of the human arm or hand but if a man who worked day in and day out as a physician, for instance, took a day off and pitched ball all day long he would have a sore arm. No doubt about it. Or if, due to some violent trauma, there is a dislocation of that arm followed then by recurrent dislocations for trivial reasons the arm is not said to be poorly evolved. Why then hurl that unwarranted criticism at the back? The fact of the matter is that the human body has the ability to adapt. There is in this process, however, the element of time. It hardly seems reasonable to expect a person with a sedentary occupation to engage in such strenuous pursuits as building a patio or digging in the garden for several hours when this is done only once in a great while. It is so well recognized how easy it is to get out of shape and the constant effort needed to stay in shape.

The back is capable of heavy duty. It can stand up well and grow stronger with brick laying, carpentering or ditch digging but these pursuits are not to be engaged in on a one day a year basis. Strenuous pursuits should be eased into gradually to properly condition anyone doing them. This is particularly true for those who are no longer possessed of the elastic properties of the young.

As to trauma of the back, it may be that many times trauma is overlooked because the back is relatively insensitive and there has to be a lot wrong with it before this fact rises

to the level of consciousness as an ache. Under trauma I would include those physical factors that are strong enough to injure the back whether it comes from improper lifting of a heavy object, falls, violent twists, blows or difficult childbearing.

Trauma can produce backache immediately as is evidenced by many a compensation case of acute low back strain or sprain. It can also be the cause of backache that shows up days or weeks later too. Consider some traumatic episode like a fall down the stairs with the buttocks hitting several of the stairs. The cuts, abrasions and contusions that may be produced are obvious. But after several weeks backache may be present which is not explained by the marks which were obvious and are now but a memory. An x-ray may be taken with the idea that something further might be learned. More likely than not the report will be negative - no evidence of fracture or dislocation, the intervertebral spaces appear normal, no evidence of bone disease.

It is not easy to diagnose accurately what is wrong but so often in cases like this the trouble is in the weakened ligaments that were produced by the fall, cause instability with its attendant symptoms and are hard to demonstrate. There is, however, one place that they can very well be shown by inference provided they are injured enough and that is in the sacroiliac joints by using the Chamberlain¹ technic. If there is some damage to the ligaments of the disk or zygapophyseal joints there can be backache but the cause may not be determined by x-ray study. The annulus fibrosus and the capsular ligaments of the zygapophyseals may be damaged analogously to the sacroiliac ligaments.

Damage to the soft tissues may be only partly diagnosed. If the muscles are sore that is known and they heal rather fast. But the damage to the ligaments may not make itself known for some time. The chances are that after the accident the person takes it easy so that no real strain is put upon the ligaments. But as the usual occupations are taken up again strain is put on the ligaments which heal slowly, if at all. With the normal strains coming on to a weakened joint perhaps several weeks after the accident, pain is complained of which may get worse as time goes on. Unless the ligaments are kept in mind there may not be an adequate explanation for the pain and disability that can show up sooner or later.

Conditioning, or the lack of it, and trauma, or the lack of it, play the biggest roles in determining whether or not an individual is going to have backache. Add to this a third factor, developmental defects, and the most important etiological points for consideration are covered.

Significant in the category of developmental defects are; defects in the neural canal giving rise to spondylolisthesis, 6 lumbar vertebrae, unusually small facets, abnormal facet facings and anomalous joints. Anyone having one or more of these is more liable to develop backache because he has not the reserve strength to bear added strain.

Strange as it may seem, people with these disorders can reach middle age and older without being bothered with backache. On the other hand I have treated a boy sixteen

years old because of troublesome backache due to first degree spondylolisthesis. He was a newsboy and handled heavy bundles of papers. Some middle aged patients who developed backache for the first time after some strain were found on x-ray examination to have second degree spondylolisthesis. The variables are how much strain the back is subjected to, how efficiently lifting is done and of course, how bad the defect is.

Trauma may result in just acute low back strain or it may be severe enough to cause a breakdown of some of the ligamentous support of the back and cause instability. Instability is the largest single cause of serious backache and referred pain and it can result from either trauma or developmental defects.

Besides the three etiological factors mentioned for backache there are several that account for only a small percentage of the cases. Cancer, osteoporosis, osteosis condensans, metabolic disorders and referred pain from viscera are in this group.

The low backache can be a problem and there is no more one answer for it than there is one answer for all the acute infectious diseases or all the metabolic diseases. Unless some one comes up with a cure-all for disease we will continue to try to determine what is the cause of the backache and then use the appropriate treatment.

Determining the cause and then applying the right treatment may at times be easy but more often than not it isn't. It can, however, be done, but it does take a keen interest and dissatisfaction with palliation by itself and ineffective therapy.

In the first place the doctor can't depend on the x-ray and laboratory nor just the history for his diagnosis. He must adequately examine the back in his own office, the patient's home, the hospital or wherever his contact with the patient is. If, without an adequate examination and history, a belt is prescribed or diathermy used good results can not be expected often enough. No matter what you do at least half of them can be expected to recover within a few weeks. But if you are dissatisfied with your present results you can learn how to diagnose and treat better. And you will find that as your understanding of the problem grows your interest will too. It can be very rewarding in personal satisfaction to clear up a difficult case right in your own office that you thought might be too much for you to handle.

The incalculable amount of suffering endured by people with low back trouble should arouse not only sympathy but spur us on to greater efforts to understand the problem and treat it effectively. The experience of any general practitioner will testify to the large numbers that are afflicted. In compensation cases of industry the accidents that cause low back complaints run second only to those that cause such results as; cuts, abrasions, fractures, crushing and mangling.

So besides the humane consideration of relieving suffering there is also the economic factor involved. Some of these victims will be seriously concerned about earning power. Weeks or even months of disability are not uncommonly encountered because of a bad back.

Statistics covering the whole field of backache are difficult to compile. It is not reportable like communicable diseases nor does it appear on the mortality tables. The greatest number are handled right in the general practitioner's offices while those that he can't handle reach the orthopedist and the hospital. There are, however, some figures in regard to operations done for certain causes of backache which show to some extent the size of the problem. In one year in Pennsylvania, 1952, the Blue Shield² paid for about 4686 laminectomies and spinal fusions, 213 body casts and over 1000 applications of traction. In that same year the veterans administration³ treated 10,172 veterans for backache listed under several classifications such as lumbago 162; displacement, prolapse and rupture of intervertebral disk, herniation of nucleus pulposus (also includes radiculitis, neuritis, and sciatica due to displacement of intervertebral disk) 5082; affections of sacroiliac joint 1326 and other sprains and strains. Also in that same year the veterans administration accounted for 3042 operations on the spine including 1956 laminectomies; 170 arthroclasia-manipulation, joint; and 618 fusion or arthrodesis and 293 for fracture.

Besides the diagnostic difficulties involved in the low back problem there are problems of therapy too. There is a lot of deadwood around being treated as though it were alive. Many of the time honored measures, and some of the new ones too, used in treating low back disorders are useless or there is some better way to accomplish the end sought or they may even make the patient worse. Among these measures are adhesive strapping, diathermy, belts and braces, sciatic nerve stretching, laminectomy and fusion operations and traction.

Instead of using adhesive tape use an elastic bandage to gain temporary support for a sprained back or sacroiliac. The belts and braces used in this area for instability are not curative. Joint sclerotherapy can be used to restrengthen the weak area of the back.

Diathermy is productive of a pleasant warmth but honestly what do you think it can do for a hypermobile sacroiliac or spondylolisthesis? Do you want to relax a muscle in acute spasm? You can do so very effectively with curare or perhaps you will use procaine and manipulation on one more chronically affected. As an impressive time wasting measure it rates but as an effective help in eliminating the cause or helping nature to compensate in some way for the cause of the backache it is valueless.

About the most useful aspect of belts and braces is to serve as a reminder that something is wrong with the back so that the patient drastically restricts his activities. With disuse comes atrophy. There is no gain in long continued use of belts and braces. Body casts for the same reason, only more so, are also a waste of time.

Sciatic nerve stretching, so called, involves deep anesthesia for the patient and then the operator produces marked flexion of the affected thigh with the knee in extension. This maneuver would be utterly impossible to the patient if he were conscious. Nerves aren't contracted and relaxed like muscles and this procedure is without merit. The sciatic nerve pains because of some irritation to it or its roots and that cause should be

attacked rather than performing an unwarranted manipulation that puts the leg in a most uncomfortable as well as unnatural position.

Laminectomy alone will give about 60% satisfactory results for herniated disk and when fusion or arthrodesis is combined with it the results are about 70% satisfactory according to a survey reported in the Journal of Bone and Joint Surgery.⁴ In this same survey it is also pointed out, as many are aware, that some are worse off following the operation. For an elective surgical procedure of considerable risk these figures damn with faint praise. When it is a matter of record that many people who had herniated disk recovered from the bad effects of it by using nothing more than weeks of rest considerable thought should be given to the advisability of ever using this operation.

Traction has a good name when it comes to pulling on the distal fragment of a fractured bone in order to secure good alignment. It does nothing, however, for a back that is in spasm. It doesn't relax muscles nor does it help an injured disk. There is absolutely no proof of any beneficial effects from traction used for these purposes. Indeed, there is proof that it accomplishes nothing. Consider the evidence produced by a surgeon⁵ at the time of a disk operation. Leg traction has been used in cases of herniated disks because of its supposed production of distraction of the intervertebral joints and also because it is supposed to produce relaxation of muscle spasm and this will also help the disk to resume its normal shape or position. In testing this proposition five patients were observed during operation for ruptured lumbar disks. The experiment was as follows: Each vertebra had a hole drilled into it about 1 mm. in diameter to be used as a reference point. The distance between was measured carefully with dividers before, during and after traction was applied. As much as 25 pounds of traction to one leg or 50 pounds to both applied at time of operation did not produce any perceptible change in the disk measurement. If no change is noted in a deeply anesthetized patient with as much as 50 pounds of traction used there certainly seems to be no chance for the usual amounts used to produce it in the un-anesthetized, pain wracked, spastic patient. Rest in bed without traction would have the virtue of at least letting the patient be more comfortable while any healing that could take place got in its beneficial effects.

SUMMARY

- 1. The low back is a problem. There are diagnostic and therapeutic reasons why this is so.**
- 2. There are two broad classifications which cover the greatest number of low back aches and referred pain. These are: a. Low back instability and b. Acute low back strain. Productive of these conditions are three basic etiologies: Trauma, lack of conditioning for work attempted, Developmental defects.**
- 3. Some extensively used therapeutic measures are to be avoided as useless or worse. These are: 1. Adhesive strapping 2. Belts and braces 3. Diathermy 4. Body casts 5. Sciatic nerve stretching 6. Traction 7. Laminectomy and fusion.**
- 4. Some less well known therapies are mentioned that are more desirable. These are: 1. Joint sclerotherapy 2. Curare 3. Manipulation.**

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2. Medical Service Assoc. of Pa., 13th annual report and personal communication Nov. 16, 1953.
3. Communication from Reports and Statistics Service Department of Medication and Surgery Veterans Administration Nov. 3, 1953.
4. Research Committee of the American Orthopedic Association; End Result Study of the Treatment of Herniated Nucleus Pulposus by Excision with Fusion and without Fusion; J. Bone and Joint Surgery Vol. 34-A #4 October 1952 p. 981.
5. Rothenberg, Sanford R., M.D., Surgery, Gynecology and Obstetrics May, 1953.

Chapter 2

THE HISTORY

The easiest part comes first; name, address, telephone number, occupation, age and whatever else in the way of identifying information you keep on your patients.

The next question: What's bothering you? begins that part of the history in which the essential information is obtained. This demands skill. If it is obvious that a "back" is in question, have the patient indicate, as clearly as he can, the part where the hurt is. To arrive at some diagnosis more revealing than lumbago, which simply means pain in the lumbar region of the back, it is helpful to know the answers to a lot of questions which concern the immediate attack and any previous ones, especially how the very first one started.

Ask simple, direct questions and then keep the patient on the question until you get your answers. There are many more useful questions that can be asked, especially as you get into other systems that need further investigation, but the following questions will serve as a guide to elicit important information about the status of the back itself.

1. What's bothering you or where does your back hurt? That part of the back above the lumbar area is more likely to be the site of referral pain than the lumbar or pelvic areas just simply on the basis of number, importance and sensitivity of viscera supplied with nerves from the respective areas. Liver, kidney, stomach and intestinal disorders will give rise to more referred dorsal pain than pelvic organs will cause referred pain in the lumbar area. Pain in the lumbar and sacroiliac areas will most often be direct pain due to some disorder in the lumbar and sacroiliac areas.

2. Does the pain stay right there in the back or does it radiate into the buttocks or legs? If the pain radiates it does so, more likely, because of one of the following conditions; (a. uncompensated, degenerated disk; b. hypermobile sacroiliacs; c. spondylolisthesis or d. anomalous development of the lumbar apophyseal joint.) If the pain does not radiate nothing is ruled out. Any of the conditions that can eventually cause radicular or nerve trunk pain may not have developed sufficiently to cause it at the time of your history taking. Pain in the back or side of the leg are common sites for pain radiation, less commonly the front of the leg is mentioned. Numbness and paresthesias may be complained of as numbness and "pins and needles" or "crawling sensation". These sensations also are significant of nerve root irritation. Occasionally motor disturbances will be noted, like inability to raise up on the toes or raise the toes, which are indicative of nerve root degeneration at L4 or L5 or S1.

3. When did it start? Were you doing anything to strain at the time? There are two extremes in answers that you may get from these questions. The most revealing answer describes some heavy strain from lifting or direct trauma from an accident in which case acute low back strain is a very common result. The other extreme gives an account of a

vague beginning some indefinite time ago with no apparent cause. This answer leaves the field wide open for just about any diagnosis except low back strain. It could be cancer, spondylolisthesis, osteoporosis and many others.

4. Does it hurt, ache or pain constantly? Be careful here. There are not many kinds of backache that hurt constantly regardless of position or activity. If the patient says that it aches constantly then some further questions are in order to make sure he means that. Even when you are lying down? After you have rested awhile? After a bad disk has developed radiculitis to a severe degree there may be constant pain. There may be a more or less constant ache of a minor degree in osteoporosis. Cancer will definitely cause an ache or pain that is constant regardless of position or activity. Most other types of backache allow a person to find at least one position or posture that gives them relief. Most of the acute cases including sciatic neuritis can get relief from lying down on one side with the legs partly flexed on the thighs and the thighs partly flexed. Pain that is made worse by lying down may indicate an intraspinal tumor.

5. Is it worse first thing in the morning or later on in the day? If it's worse first thing in the morning fibrositis or hyperuricemia maybe present. An unstable back will usually be worse with use so that if that is the cause of the pain the answer will usually be, "later on in the day".

6. Does bending or straightening up make the pain worse? When the muscles in the lumbar region are in spasm it hurts worse to bend and straighten because of the pull or strain on these muscles. Muscles will be in spasm in acute low back strain and in an acute stage of one of the various disorders of stability in their attempt to produce splinting. In the more chronic conditions the answer will be no.

7. Does coughing or sneezing or straining at stool increase the pain? The increase of abdominal pressure from these acts may cause an increase of radicular pain. These acts can also cause an increase of pain in acutely spastic muscles too. Significantly, pain may shoot down the leg when a nerve root is involved. Chronic conditions are not affected by them.

8. In which positions are you most comfortable; standing, sitting or lying down? Those with sciatica are more comfortable standing and lying down - not sitting. Those with fibrositis will feel comfortable in various positions but have a tendency to stiffen up so that after sitting for a while they will have an ache when they get up. Acute low back strain and unstable back cases will usually find relief lying down.

9. Are you able to work, what are you able to do? This is asked to help gauge the severity of the attack. Perhaps they can work if they don't have to do any lifting or bending even with a fairly acute back. It must also be kept in mind that there is a vast range of sensitivity to pain in the general population.

These are the most important questions asked of men and women about the back and its aching. In addition to these women are asked the following:

1. Does your back feel more comfortable when you wear a corset or a girdle? Frequently some relief is obtained for a hypermobile sacroiliac with a corset or girdle especially if not much work is required of the back.

2. How many children do you have? Did you have a difficult time delivering them? Were forceps necessary? Did your backache get worse with each succeeding pregnancy and delivery? All of these questions are related to the sacroiliac. A hypermobile sacroiliac will get worse with each pregnancy. The hormones, that cause the sacroiliac ligaments to relax, may not be opposed in the puerperium and the ligaments will stay too loose. There may be severe trauma to the ligaments from too large a passenger for the passage. In any case pregnancy is a hazard to the sacroiliac ligaments.

Besides the answers that are given in regard to the present attack, further light can be brought to bear by finding out about previous attacks. Ask if there has been back trouble before. Get the patient to describe the first and subsequent attacks. They may follow the same pattern or there may be significant differences. Find out if the pain has been confined to the back or did it radiate into the leg. Try to get details of the very first attack to determine if there was some trauma to account for it. Ask if there have been any bad falls on icy pavements, down the stairs or were there automobile accidents or some injury in a sport. Particular incidents mentioned in this way will sometimes recall accidents that might have been forgotten.

Ask about the occupation to see if there have been repeated strains from that source. Repeated strains can cause ligamentous weakening as well as trauma from accidents. Many acute attacks from trivial strains are indicative of instability whereas a more or less constant aching of less intensity may indicate such conditions as fibrositis, osteoporosis or Paget's disease.

The previous questions are directly concerned with the back. In addition to these it is helpful to conduct a complete history for the, at times, valuable information that is gained about other parts and conditions that indirectly affect the back.

Ask questions that will give you some idea of how the major systems are operating. A brief outline might go something like this.

1. Neurological: Do you sleep well or do you have to take something to help you sleep? Do you get headaches often? Are you nervous, worry a lot? How is your life at home, at work? Answers to these and similar questions will help to assess the pain threshold and whether or not is a neurotic or emotional factor involved.

2. Gastrointestinal: How is your appetite? Elimination-have to use something to move your bowels or are you regular without any drugs? Apparently simple questions and yet

if you don't ask them the patient may not volunteer the information. It may lead to a patient telling you that lately he has had a craving for water. This will perhaps suggest the advisability of a blood sugar determination. The finding of diabetes and its treatment can influence favorably the back. Or there may be unexplainable changes in bowel habits that lead you to have a gastrointestinal x-ray study which picks up cancer of the bowel that is in turn metastasizing to cause that person's backache.

3. Genito-urinary: Here the questions are of particular benefit in men to find out the status of the prostate. Do you have to get up at night? Have trouble starting the flow? Frequency and irritation during flow are also of significance. Urinalysis and prostatic examination by rectal palpation may be done.

4. Obstetrics and gynecology: Childbearing and its aftermath have at times, an important bearing on backache. Was delivery difficult, did forceps have to be used? Is there dribbling of urine? Difficult delivery can tear sacroiliac and other ligaments and perineal tears can lead to uterine prolapse. Pains or lumps in the breast as well as post-menopausal bleeding and other abnormalities can be clues leading to the detection of a primary site of cancer.

The past personal history should come in for some questioning. How is your general health? Have you had any serious illnesses lately? Any operations? Serious accidents? You will have to ask a lot of apparently useless questions to get something worthwhile but what you gain is worth the trouble and time. Maybe while you are asking about past personal history he will tell you about an attack of pains in a couple of his fingers and you will go ahead and have a uric acid determination made on his blood which you otherwise would not have done. Gout can definitely influence the course of backache.

In family history you want to know whether the parents are living and well, suffering from some chronic illness or one like cancer that has possible transmittable qualities, or are dead. If dead, what did they die of and at what age. Data on diabetes, cancer, rheumatic and gouty tendencies as well as other significant facts may be obtained in this way.

Probably many patients will not be asked all these questions and in just this order or at the first visit because circumstances can demand and alteration in procedure but it is educational to try to follow a complete outline for it will help to develop skill in diagnosis.

Some patients in acute misery may be asked only a few questions before some particular examination, like an x-ray, is indicated as being urgently needed or perhaps some treatment to relieve severe pain must be given. Others, more at ease, but still suffering, may be asked more questions and perhaps some certain line of investigation may be opened up before appropriate therapeutic measures can be applied. With some few despite all our questioning, let's admit it, we will be baffled and the answer may show up only after numerous examinations of a special nature.

But this outline of history taking can be a useful guide and plenty of time should be allowed for the first visit and other visits until a diagnosis is made. Subsequent visits may be short as a consequence of learning at or near the beginning what is wrong and formulating a decisive course of action.

Chapter 3

EXAMINATION

For the most part people with backache walk into the office and for them the examination begins then. Their gait, posture and facial expression are signs to read.

The one who, standing reasonably straight or slightly bent, waddles in like a duck may have to walk in that peculiar fashion because of hypermobile sacroiliacs.

Another walks in with a full stride on one side and a jerky half or even quarter stride on the other side. He is coming to you for backache but the chances are that the root of the trouble lies in the hip. As an example, a well developed case of arthrosis, *malum coxae senilis*, will materially limit the stride. Because of this limitation the only way the leg can be moved forward is by a characteristic, semicircular swing of the entire hip bone. It is obvious that the joints of limited motion, the sacroiliac and the symphyseal and zygapophyseal joints of the lumbar area, are not good substitutes for the free-swinging hip joint. The unnatural jerky motion takes its toll. Because these joints are chronically sprained, backache is present.

Then there is the bent figure with one hand on his back, which is often cocked to one side, who shuffles in with a pained expression. You suspect that he has an acute low back pain, is in misery and wants relief just as fast as you can give it. He may have a simple acute low back strain or he might have sciatic neuritis with one or more herniated lumbar disks. Bending to the side opposite the sciatic nerve involved is typical.

To proceed with the examination the back is exposed. If the patient is a man simply ask him to remove his clothes. For women an examining gown which opens down the back to the pelvis has been found very satisfactory.

With the back exposed a routine examination is then made. You may find the following order of procedure convenient in eliciting what information you can gather from a clinical examination.

Look at the back while the patient is standing. In this position any scoliosis, lordosis, kyphosis or pelvic tilt that may be present will be most apparent. While standing the back is at work and information may be obtained in this position that can't be in the recumbent position. With your eyes at the level of the pelvis look at the position of the posterior, superior iliac spines which you can pinpoint best by placing our thumbs just under them. If one side is noticeably well below the other side there will often be a scoliosis also. A pelvic tilt is usually due to a developmentally short leg. Place your hands on the iliac crests and note whether or not these are at an equal height.

Direct the patient to bend forward without bending the knees and stop when it starts to hurt or he has to bend the knees. In acute low back strain and the acute phases of some other disorder this is a pain inducing procedure and may be impossible. In such

disorders as osteoporosis, fibrositis and referred backache of visceral origin, where there is not an acute spasm of the muscles in the lumbar region, forward bending may be done without pain but there may be some stiffness.

To test the motor function of the lower nerve roots ask the patient to stand on his toes. Try it first with both feet and then with each one singly. Then ask him to stand on his heels again with both and singly. Nerve roots at L5 and S1 are used to stand on the toes and those at L4 and L5 are used to stand on the heels. There are varying degrees of involvement found from complete inability to raise up to slight decrease in ability to stay up.

After gaining what information can be obtained in this position have the patient sit and test the patellar reflex. The patient's legs should hang clear of the floor while you top just beneath the patella either with a rubber hammer or your finger tips. Characteristically the leg jerks forward. Occasionally it is necessary to have the patient look at the ceiling and pull on his hands while you are trying to elicit a response, what the neurologists call reinforcement. The third lumbar nerve is concerned in this reflex.

A test that may be done in either the sitting, standing or supine positions is the jugular compression test. It may be done with a blood pressure cuff around the neck pumped up to 40 mm. of mercury and held there about 30 seconds. The test is positive if radicular pain in the leg is increased by the pressure of the cuff or when it is released and this indicates some intraspinal or nerve root irritation. This has about the same significance as a positive reply to the question, "Does it hurt worse in the leg when you cough, sneeze or strain at stool?"

With the patient lying prone on the examining table the tibio-femoral and Achilles reflexes may be tested. Percussion is made slightly below the medial aspect of the knee at the insertion of the semitendinosus and semimembranosus to test the tibio-femoral reflex. A contraction occurs high up on the inner side of the thigh if this reflex is active. The 4th lumbar nerve is the pathway of this reflex. While in the same position the Achilles reflex may be tested by flexing the leg and then tapping the Achilles tendon. When active the heel is drawn toward the leg. It sometimes helps to use a little pressure on the ball of the foot when performing this test. The 5th lumbar nerve is concerned with this test.

When the patient is in the prone position he is about as relaxed as he can be and palpation of the back muscles will be more satisfactory in this position. Note the feel of the lumbar muscles. Press in gently, firmly and steadily both superficially and deep and take the pressure off slowly because in the acute case a sudden release of pressure is often stimulus enough to initiate or accentuation of the acute spasm. In acute spasm the muscles feel hard as a board and they stand out prominently. Notice should be taken of the location of particularly tender spots. Sometimes the patient's complaint will lead directly to a specific tender spot of localized spasm. There is diagnostic significance in

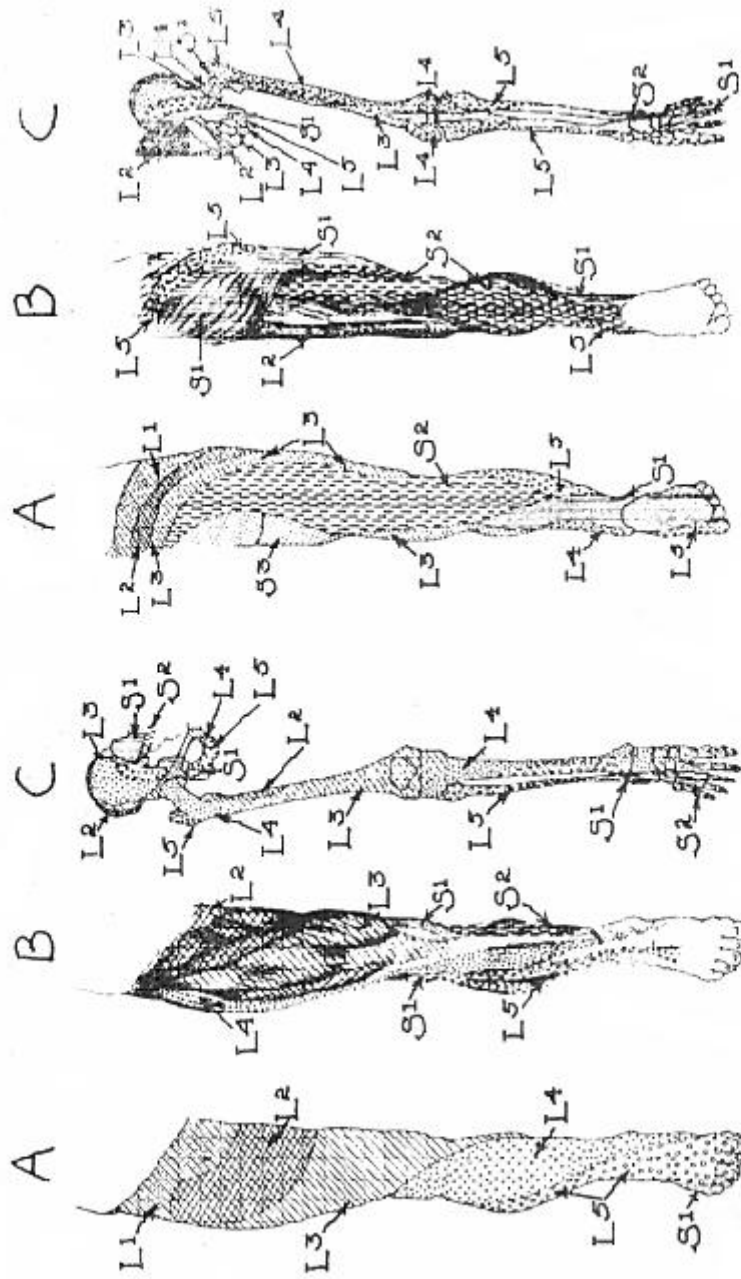
specific tender areas or as they are often called "trigger spots". A patient may place his hand over or near a sacroiliac joint when he is trying to show you where it hurts. On examination you might find the sacroiliac perfectly normal but if you move your fingers a couple of inches laterally you might find a trigger spot in the buttock due to a spastic gluteal muscle. This might be a purely local disturbance from a strain or it might be indicative of some trouble at L 5 or higher.

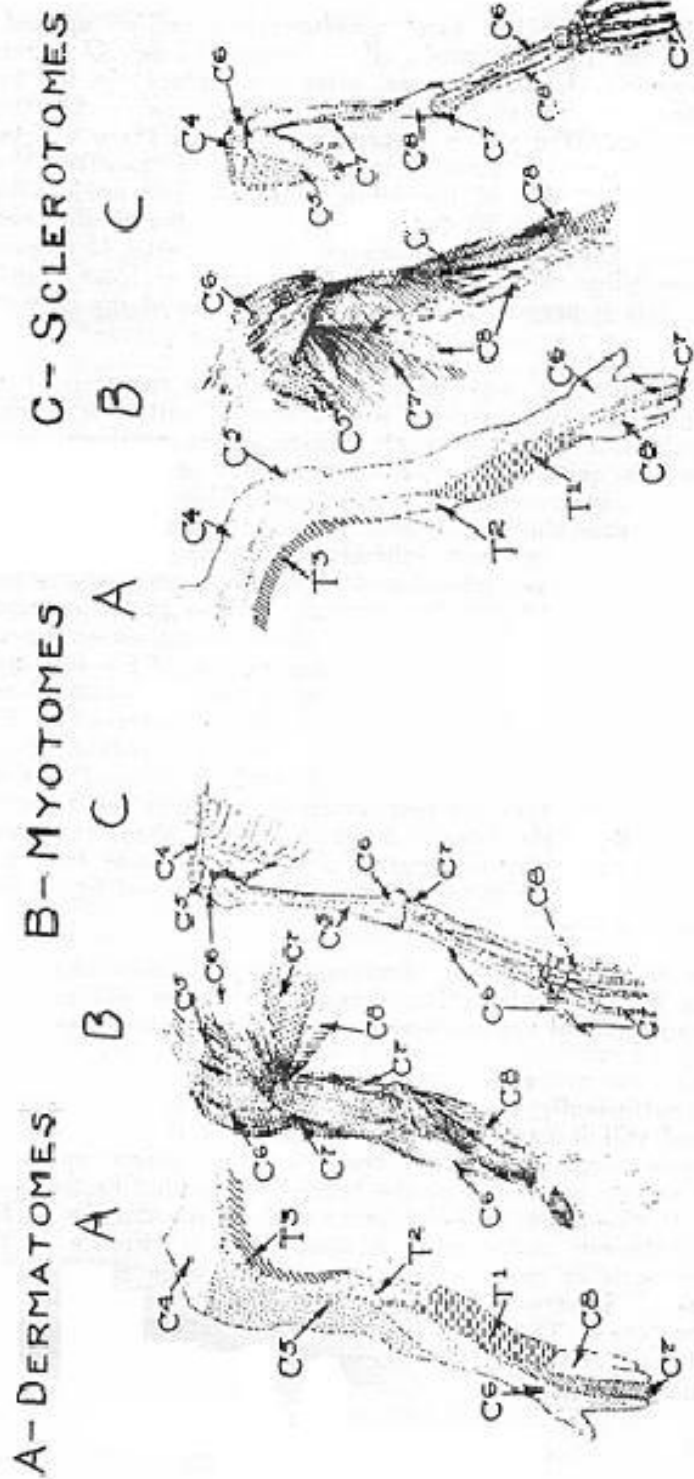
Palpate over the sacroiliac joints and note any tenderness or pain. While the finger of one hand is over the sacroiliac joint with the tip of the finger touching the posterior, superior iliac spine, the other hand grasps the leg just above the knee and extends the thigh of that side being tested for motion. When the sacroiliac is hypermobile the amount of extension possible is usually increased and the finger palpating the posterior, superior iliac spine may feel an increased range of motion. It may be painful in either a slipped or hypermobile sacroiliac.

Dandy's sign is elicited by pressing downward on a spinous process with one thumb reinforced by the other hand over it. In weakened disks this pressure will be painful and, a distinct slip is sometimes felt. The sign may be masked if there is marked splinting of the lumbar muscles and it may seem to be positive in an acute low back strain where pressure any place on the back irritates tissues that are in an inflamed or spastic state. Test again in a few days if you do not think the results are conclusive at the first testing.

In the supine position the state of the sciatic nerve is gagged and some information may be gained about the sacroiliac and lower lumbar joints by using the straight leg raising or Lasegue's test. One leg at a time is raised without flexion of the knee, then when the thigh is flexed as far as it will go the knee is flexed and further flexion of the thigh is obtained. Keeping the thigh flexed try to extend the lower leg. The significance of the test is this. When the thigh is starting to flex there is often some pain felt in the lower back in sacroiliac disorders or low back strain. If sciatic irritation has been present long enough it may not even be possible to raise the leg due to degeneration of the nerve and muscle atrophy. In the more acute stages of sciatic neuritis the higher the leg is raised the more likely there is to be pain and when the lower leg is flexed to gain further thigh flexion and then extended a sharp pain is felt in the back of the thigh or leg if sciatic irritation is present.

Another test for sacroiliac motion may be made in this position. It is done as follows: See that the patient is lying straight on the table, and standing at the foot of the table, grasp both ankles so that your thumbs are under the internal maleoli. Note whether or not they are opposite one another. Assume that the right one is above the left one i.e. that the right leg appears shorter. To see if anterior rotation of the right sacroiliac is possible, which will bring the right maleolus further down toward the foot of the table, stand on the left side of the table, grasp the right ankle with the left hand and adduct the right thigh and flex the knee to 90 degrees. Then with the right hand on the right knee pushing toward the table and the left hand simultaneously pulling upward, external rotation of the thigh is produced. If motion is possible then there is no slip present and you will note, after you replace the leg by the side of the other one, that the maleoli may now be even or that the difference has diminished.





DERMATOME: Cutaneous areas innervated by different nerve roots. These may be tested by pin pricks, wisps of cotton and hot and cold test tubes.

MYOTOMES: Areas of muscle innervated by different nerve roots, frequently referred to by patients as painful areas.

SCLEROTOMES: Areas of bone and joint innervated by different nerve roots, sometimes referred to by patients as the site of "deep seated pain".

If a slip is present on that side there will be no change. To produce posterior rotation in an attempt to "shorten" the left leg, stand on the left side of the table, grasp the left ankle with the left hand, flex the knee to 90 degrees and abduct the thigh, then push down on the left knee as you pull up on the left ankle. If motion is possible in the sacroiliac this too will even them up or at least diminish the difference. If a slip is present on this side, the relation of the maleoli will stay the same.

Some of the dermatomes may be determined while the patient is lying supine. Using a pin prick, stroking with a wisp of cotton or touching with hot or cold test tubes areas of hypoaesthesia or numbness may be delineated. There is quite a lot of literature, some of it conflicting, that is rather complex concerning the dermatomes. They are of use in determining specific radicular involvement and with certain general characteristics in mind you can gain valuable information without being an expert neurologist. The more lateral and lower down areas of the leg are served by the lower down roots. For instance, looking at the anterior aspect of the lower leg, from about half way down on the outer aspect and curving over to the front and down to the medial side of the foot and first three toes is the area served by nerve root L5 located at the level of disk L4. The lateral part of the ankle and little toe is served by L5. nerve root found at the level of L5 disk. Cutting a swath running diagonally from lateral to medial from the knee toward the medial side of the ankle is the area served by L4 root which is found at the level of disk L3. Immediately above the knee is a broad strip on about the lower third of the entire anterior surface that is served by the root from L3. Above this in about the middle third position is an area served by L2 and above this is a narrower strip served by L1.

Consideration of the dermatome, myotome and sclerotome chart will help in localizing nerve root irritation. Proper localization will aid materially in treating disks and zygapophyseals and in using nerve root block for relief of pain.

While it is not usually considered when musculoskeletal disorders are being discussed still it pays to go slightly a field at this stage of the examination to gain some information about another system while the patient is in the supine position. Palpate behind the medial maleolus to learn the status of the posterior tibial pulse and on the dorsum of the foot to gage the dorsalis pedis pulse. A diminution or absence of the posterior tibial pulse is of more serious import than when this happens to the dorsalis pedis. Sometimes the pains complained of in the leg are not due to just one cause. There may be a defect of sufficient magnitude in the peripheral circulation to either account for the pain in the leg or make a sciatic pain worse.

Another useful test performed on the supine patient is for hip motion. See how far each thigh can be flexed. Test abduction and external rotation. To do this place the foot of one leg against the knee of the other leg and push the knee of the side being tested, toward the table. Internal rotation is tested by flexing the thigh and then with one hand grasping the ankle and pulling laterally the other hand pushes the knee medially compare the two hips. There is pain in the leg and restriction of hip motion to a marked degree in *malum coxae senilis*.

Of great help in further study of the back is the x-ray examination which should include at least 5 views of the lumbar spine and pelvis. There should be an antero-posterior, a right and left oblique and a lateral taken in the recumbent position and an A/P in the erect position with the shoes off. Additional films of use, especially if hypermobile sacroiliacs are suspected, are the ones used in the Chamberlain test.

In the antero-posterior recumbent view the radiologist can get the bone detail he needs to pick up diseases of the bone like osteoporosis, osteomalacia and Paget's disease. Anomalous joints may also be seen in this view. It is also useful to compare the degree of scoliosis present in the A/P erect. The lateral view is most useful for finding spondylolisthesis, estimating the differences in the disk spacing, heights of vertebral bodies and showing loss of the normal anteriorly convex curve when marked spasm is present. The oblique views are necessary for an evaluation of the facets and the condition of the zygapophyseal joints. The A/P erect will show variations in leg length and pelvic tilt.

Laboratory tests are frequently used when some metabolic or metastatic factor is being considered as either causing the ache or making it worse. Blood uric acid determination is done when there is some suspicion of gout. Pain in the big toe is usually given as the most frequent spot for an attack of gout. Pain complained of in this joint should make you suspicious but in my, admittedly limited, experience with' gout there have been more complaints from gouty fingers than toes. The complaint is not always of a severe pain either. Sometimes its inability to grasp a plate or a tea cup or there may be just soreness there or puffiness. Squeeze the finger joints and see if they are tender. If there is any reasons to suspect diabetes have a blood sugar done and a cholesterol determination too. If the history and examination suggest the possibility of metastasis to the spine from the prostate have a serum acid phosphatase done. It is increased in prostatic carcinoma, hyperparathyroidism and Paget's disease.

Besides the examination of the back itself, which will reveal the cause to you most of the time, other systems need to be examined when signs and symptoms point that way. The genitourinary system, particularly the prostate, the female pelvis and the gastrointestinal tract are some times the sites of pathology indirectly affecting the low back. If you are not satisfied with your own pelvic, rectal or other examination don't hesitate to ask for consultation to determine the status of the system in question.

Chapter 4

THE UNSTABLE BACK

The commonest cause of repeated attacks of low back pain, chronic low back ache and referred leg pain is some form of low back instability.

These cases reveal weakness of one or more of the several joints of the lumbar spine or the sacroiliac joints. The weakness may be acquired, through trauma, or it may be due to a developmental defect of the bones in this area. Trauma weakens the joint by tearing or stretching the ligaments of that joint and it may be due to a fall, a blow, and strains from lifting, twists and difficult child-bearing. These are the basic causes of herniated disks and hypermobile sacroiliacs.

Under developmental defects are included; separation of the neural arch from the body which gives rise to spondylolisthesis, abnormal facet facing and rudimentary facets, anomalous joints formed by the sacrum, 5th lumbar and the ilia and short leg may be included because it can cause excessive wear and tear on the spinal joints and sacroiliacs. Spina bifida does not seem to play a significant part in the production of low back pain but is often found with other developmental anomalies.

Unstable back comes in varying degrees of severity. There have been those people with sacroiliacs so hypermobile that walking with the help of two canes was difficult and backache was constant. On the other hand there are those people who have walked around, for years, apparently as normal as the next fellow, who have second degree spondylolisthesis and then only developed backache because of some trivial strain.

The instability may only be a potential cause of backache that doesn't occur because of the absence of strain and trauma in the life of that individual. He travels along on a thin edge of safety and never has to call on reserve strength that isn't there. Just how often a person with an honest to goodness unstable back goes through life without backache of any consequence is unknown. However, more than once 40 to 50 years have passed before the delicate balance was upset, the parts slipped and backache developed.

Somehow people with unstable back often know or sense that something is too heavy for them to attempt to lift or push. Sometimes a brace or a corset will make these people feel more at ease. This is particularly true in women who have a moderate degree of sacroiliac hypermobility. They will say they feel more comfortable with their corset on or that they couldn't do their housework without it. Where the occupation is more strenuous or the instability more pronounced corsets and braces will not be praised.

The delicate margin of safety that exists in some backs may suddenly be destroyed by circumstances that would appear trivial to those with a normal back. It could be lifting a suitcase from a car or lifting a child, or just a sneeze.

On the other hand a normal back may be made unstable by some violent trauma like a fall from a considerable height or being thrown from an automobile in an accident or perhaps from repeated strains as in improper lifting of heavy things.

Regardless of the cause of the instability there are certain features of the unstable back that distinguish it from other back disorders. People having an unstable back exhibit these characteristics:

1. Minor strain or trauma will bring on an acute attack of low back pain. This may be either an original attack or one of a series. Referred pain may also be present. As an example of one of a series there is the acute attack in the hypermobile sacroiliac that was severely traumatized some months or years ago. As an example of an original attack there is the person with spondylolisthesis who hasn't had backache before.
2. Relief is usually obtained by lying down.
3. Acute episodes are accompanied by noticeable muscle spasm that acts in a splinting capacity. They don't want that part moved.
4. After they have had one or more, attacks they are apt to be cautious about how they use their backs. They may develop the habit of bending the knees when picking something up. They remain conscious of their backs even after acute episodes clear up.
5. They respond well to joint sclerotherapy and rest.

Particular signs and symptoms are the same in two examples of instability. These are the degenerated, uncompensated disk and spondylolisthesis. The pain pattern, the type of acute pain of sciatic distribution is the same and even the history may be the same. Dandy's¹ test is positive in both conditions and so are the straight leg raising tests. It takes a lateral x-ray view of the part to make the differentiation.

Hypermobility sacroiliac may be differentiated from disk and spondylolisthesis on the basis of the physical examination. It is tender and painful over the weak sacroiliac. Pain is usually complained of across the pelvis which is lower than the back pain complained of in the other two. Whereas the other two have sciatic pain that is patchy in the leg, as is characteristic of radicular pain, the sciatic pain that comes with hypermobile sacroiliac begins in the buttock and gradually extends down the leg, with time, in one continuous line. Again the x-ray can be useful for in a well developed hypermobility of the sacroiliac the Chamberlain² test can be depended on. When it is positive there is no question about it - hypermobility is present.

The Disk

A very brief review of some of the more important aspects of the anatomy and physiology of the disk will aid in understanding some of the diagnostic tests and the rationale of the treatment as it is taught in this book. For a more detailed discussion of the disk reference may be made to any standard anatomy book.

You might think of a doughnut to get a mental image of the basic shape of the disk. The outer part is the annulus fibrosus, which is ligamentous in nature, and the inner part, corresponding to where the hole would be in the doughnut, is the nucleus pulposus. The function of the annulus is to hold the two vertebrae together in a firm and stable manner and yet allow a little motion there. The nucleus pulposus, like water, being incompressible, is the heart of the shock absorbing mechanism. What gives way under the stress of shock and weight is the slightly elastic annulus fibrosus. This must be kept sight of to fully understand the disk problem. With this picture of pathology in mind the diagnostic import of the nucleograms becomes clear; the limitation of the myelogram, which shows evidence of degeneration of the annulus only when it is accompanied by posterior protrusion of the nucleus pulposus, is evident and the rationale of treatment designed to restrengthen the weak area is apparent.

Degenerated, Uncompensated Disk

This is a descriptive term for the pathological condition which is usually referred to as herniated disk, slipped disk and herniated nucleus pulposus. It seems evident that there is much more to the pathology than could be described from just the protrusion of the nucleus pulposus. As various investigators, such as Lindblom and Hultquist³ and Coventry, Ghormley and Kernihan⁴, have shown this protrusion is at the worst only a temporary affair. The uncontained nucleus pulposus is absorbed. Indeed, the leaking nucleus is a result and not a cause. The important fact is that the annulus has broken down. Nucleograms demonstrate this very well. This is not to pick at trifles. There is a basic difference in approach to therapy depending on whether you are looking at the stuff leaking out or the rent through which it is passing. This book looks at the rent in the annulus fibrosus.

Some physicians and surgeons⁵ consider that the back and leg pain of uncompensated, degenerated disk is due to a protrusion of the nucleus which in turn causes pressure on the nerve root at that level. The main cause of the pain and disability associated with a herniated disk is the weakness in the annulus fibrosus and it remains much longer than the extruded nucleus. Healing is slow and the area remains unstable for some time. If left to Mother Nature there may, in time, be a fibrous or a bony infiltration, as a compensatory mechanism, developed that will prevent undue slipping of the bodies.

So it is called an uncompensated, degenerated disk when the annulus is degenerated to the point where it can't contain the nucleus under pressure anymore and there isn't enough fibrous tissue growth or calcification between the involved segments to keep the part stable.

Etiology: So far as we know today trauma is the cause of the breakdown of the annulus fibrosus. The effects of various metabolic and disease states on the annulus is not well understood at the present. There are several variations that produce the same result—a non functioning or malfunctioning disk. Sometimes it probably happens all at once as in a fall from height or being thrown out of an automobile in a collision. Sometimes it appears to happen all at once and probably doesn't. For instance the person who tells

you he just sneezed or coughed or bent over to pick up a suitcase and then suddenly was seized with an excruciating pain in the back and perhaps in the leg too. In this latter type of example it seems safe to say that these trivial stresses merely acted as the proverbial straw that broke the camel's back. Sometime before, and probably more than once, there was trauma in the form of repeated back strains or an old accident that weakened the annulus to the point where it didn't take much to break down the few remaining fibers that represented that person's slim margin of safety. A normal annulus is very tough and strong and it will take more than a sneeze to break it down.

The obvious pathology present as seen in a laboratory specimen is the break in the fibers of the annulus fibrosus. In life the extent and patterns of breaks in the annulus can be seen in the nucleogram.⁶⁻⁷ The hydrodynamic action of the nucleus pulposus is irrevocably lost. The action of the nucleus in its normal state under pressure insures even weight distribution in all positions and absorbs shocks.

For a very variable length of time there will be instability at the level where the defect occurred. Some of the variables in the picture are; the degree of severity of the break, the usual occupations of the person and the amount of judicious rest that is used.

Certain conclusions may be inferred from the fact that the fibers of the annulus are broken down in degenerated, uncompensated disk. The first is that normal motion with stability is no longer present. There is instability. The second is that there is some swelling present locally just as there is when, for instance, the ankle slips and there is a sprained ankle. This swelling itself can cause pressure on nerve roots and produce pain. Third is the guarding or splinting mechanism that nature uses to keep a painful, injured part at rest. This accounts for the severe spasm present.

History: The chief complaint is usually low back pain with or without pain radiating into the leg. The back pain is often worse on one side and at about belt level. The patient may consult you at a time when the back pain has gone and only leg pain remains. Still later there may be some nerve degeneration and muscle atrophy.

The commonest pattern, I think, is marked by a series of attacks of low back pain and then finally the worst one comes along and the leg pain increases sharply. The present attack may have come on with not much strain if it is the latest of a series of attacks. A hearty sneeze can do it. On the other hand if it is the first attack and it is a severe one then there is usually a bad accident in the background. To the following questions you will receive affirmative replies:

1. Does it hurt worse when you bend forward?
2. Does it hurt worse when you sneeze, cough or strain at stool?
3. Do you feel better when you lie down?

This establishes the fact that they have considerable back pain but it does not rule out acute low back sprain or sacroiliac sprain.

Examination: The body is often side bent to the side opposite to the one that is painful or away from the painful leg. This is most noticeable in the standing position. The normal anterior curve of the lumbar region is lost due to the marked spasm of all the lower back muscles. When you ask the patient to bend forward he may try but will produce very little if any flexion in the lumbar spine or hips without a lot of knee flexion.

Test the patellar, tibio-femoral and Achilles reflexes. Various patterns show up. In the acute case there may be an accentuation of one or more on one side and in a late case there may be a loss on the same side as the sciatic neuritis. Sometimes reflexes are bilaterally absent without any significance. Evaluation of the dermatomes is important and areas of hypoesthesia are strongly suggestive of herniated disk. at the level of the involved root.

The straight leg raising or Lasegue's test is usually positive. There are some variations on this test that sometimes bring out the sciatic involvement very clearly when the usual procedure is equivocal. After the leg is raised off the table push on the ball of the foot to produce dorsiflexion.

Dandy's test of pressure over the spinous processes at the suspected levels is often positive. You may not elicit this on the first visit, however, because of the marked splinting present. After some degree of muscle relaxation has been obtained you may then find it is positive.

After the clinical examination is done an x-ray study of the lumbar spine and pelvis should be done. There may be diminution in the disk spaces. If done in the acute stage there will be a flattening of the lumbar curve. Lipping at the anterior margins indicates that there has been irritation of Sharpe's fibers and may be considered a compensatory mechanism following repeated strains to that part. Other causes of instability may also show such as spondylolisthesis, facet abnormality and anomalous joints.

Diagnosis: The most likely difficulty in making a diagnosis will be in differentiating between an acute low back sprain and disk. In acute low back sprain there isn't the radicular pattern of leg pain and when you obtain good relaxation, which can be done with tubocurarine in a long lasting menstruum, rest and manipulation, the patient feels considerably better. This is, at one and the same time a therapeutic and diagnostic procedure because in the acute disk case with sciatic neuritis he won't feel better. You may obtain a positive Dandy's sign while he is relaxed.

With a history of trauma, repeated low back aches, pain of radicular distribution, dermatomes of hypoesthesia, positive straight leg raising tests, a positive Dandy's test and an x-ray negative for spondylolisthesis or zygapophyseal disturbances a diagnosis of degenerated, uncompensated disk or, if you prefer, herniated disk may be made. If there is no referred pain or areas of hypoesthesia the diagnosis may be made without them only after ruling out some other disorders such as acute low back strain and sacroiliac strain. In sacroiliac trouble there is pain and tenderness over the sacroiliac joints

and the sciatic pain is different in that it starts at the sciatic notch in the buttock and extends down the leg further and further as time goes on.

In acute low back sprain there is good response to the relaxation of tubocurarine in a long lasting menstroom and recovery is much quicker.

Treatment. The treatment for degenerated, uncompensated disk is sclerotherapy directed to the involved disk, and any of the other ligaments in that area as may be needed, and rest.

The details of sclerotherapy are taken up in the chapter on treatment.

Rest as used here is not absolute. It may be just not working, not lifting and not pushing or it may mean spending some time in bed part of each day. As a general rule I think it is best to keep them as active as the pain will permit.

The Sacroiliac Joints: There is normally very little motion in these joints which receive the downward thrust of the body's weight from the spine and carry it outward toward the legs. At the end of each step they give just a little to fulfill their purpose. And, who can put the reason for these joints any better than Gray's Anatomy, "In order to lessen concussion in rapid changes of distribution of the weight, joints (sacroiliac articulations) are interposed between the sacrum and the iliac bones; an accessory joint (pubic symphysis) exists in the middle of the anterior arch."

The sacroiliac ligaments are strong and not easily torn or weakened but there is apparently some hormonal effect on these ligaments because it has been shown that there is a loosening takes place at the time of the menses and during pregnancy. If after childbirth something goes wrong with the hormonal control these ligaments remain loose and the sacroiliac joints will be hypermobile.

Aside from the physiologic loosening of ligaments, which in turn makes the joint more movable, there is still controversy about these joints slipping or becoming hypermobile because of trauma. There is probably no better starting point for a discussion of this subject than the Chamberlain test.² For those of you unfamiliar with it here is a brief description of this simple test. X-ray pictures are taken of the symphysis pubis. First when the weight is borne on one foot and then when it is borne on the other. The pictures are taken posterior-anterior and the patient stands on a block about ten inches high and just lets one foot hang free while the exposure is made. Usually there is no shifting noted at the pubic symphysis. In other words by this method normal sacroiliac motion cannot be demonstrated. Or to put it another way the strain of standing on one foot is not sufficient to produce noticeable motion at the sacroiliac joints.

If as much as 2 or 3 mm. shows up in a man or non-pregnant woman the sacroiliacs are certainly hypermobile. One case I had of a woman, who had been thrown from a horse and dragged along the ground when her foot caught in the stirrup, showed 7 mm. difference. Chamberlain estimates that motion at the sacroiliacs is magnified about 7 times at the symphysis pubis.

This test can also demonstrate the presence of a sacroiliac slip or lesion. As an example; if there is a posterior slipping of the ilium on the right then the right pubis will stay higher throughout the test.

The innumerable x-rays, of persons with low back pain, showing changes at the symphysis pubis are irrefutable evidence that the joint can slip and it can become hypermobile.

Hypermobile Sacroiliac: This is a condition in which the normal ligamentous support of the joint has broken down to the extent that joint stability is lost. It is usually accompanied by pain across the lower part of the back below the level of the iliac crests. There may be referred pain in the sciatic nerve, a feeling of weakness in the lower back and weakness in the legs.

Trauma in some form such as falls, strains, automobile accidents and difficult child-bearing, is the usual cause of hypermobile sacroiliac. Another cause which seems to be a hormonal disturbance affects the ligaments so that they are flabby. This is seen sometimes months after childbirth even when labor was not difficult. The ligaments just don't return to the tone of the pre-pregnant state.

But whether they are torn, stretched or flabby the net result is an unstable joint which can slip at the slightest strain. The irritation caused by this mechanical fault causes pain in the sacroiliac joint area and it may also irritate the sciatic nerve which courses just anterior to it. It is best visualized by thinking of any sprained joint such as the ankle. There is tenderness and swelling present and weight bearing is difficult.

History: Usually the complaint is one of low back pain that is felt right across the back of the pelvis. This is lower down than most other back pains are felt.

The first attack usually follows some severe trauma but often this does not happen immediately afterwards. There may be an interval of several weeks between some traumatic incident like an automobile accident and the start of more or less chronic low back pain or recurrent attacks of acute low back pain. Patients often remark that they are conscious of their back. In some individuals the ache is not chronically present but minor strains may produce an acute attack. "I just leaned over to pick up the newspaper when I heard a click and my back started to hurt then," some will tell you or perhaps it was to tie a shoelace or pick up a bag of groceries. These attacks are sometimes relieved by rest for a few days or a correction and at other times the pain persists for weeks.

Belts and braces and corsets are often worn with some degree of relief. Some even wear them to bed at night. Many women will tell you that they wouldn't think of doing their housework without wearing a corset because their back would bother them. In persons who are engaged in more strenuous pursuits or who have a more hypermobile sacroiliac you will hear that the brace or corset doesn't help.

At times pain is complained of down the back of the leg which starts in the buttock because the sciatic nerve is affected. This pain is felt further and further down the leg the longer they have the pain. Interestingly enough as healing takes place it will heal from the bottom up.

After being afflicted with this disorder for any length of time these individuals develop a sense of what they can safely lift and what they can't and in common with those having other types of instability they learn to pick things up by bending the knees and hips and keeping the back fairly straight.

During an acute attack bending is difficult and painful and sneezing and coughing can make the pain worse too. Lying down with the legs slightly flexed is the most comfortable position.

Examination: There is tenderness and pain over the sacroiliac joints. The tenderness is elicited by pressing just medial to the posterior, superior iliac spines. Testing for motion in the joint will reveal abnormal motion and will often bring a response that this increases the pain.

Even before pain is felt in the leg a beginning sciatic nerve irritation may be detected. Palpate the greater trochanter of the femur and the ischial tuberosities. Midway between these points the sciatic nerve leaves the pelvis and lies beneath the piriformis muscle. Pressure at this point may produce pain on one side and not the other. Even in marked sciatic radiculitis due to a disk lesion this area will not be painful to pressure.

The x-ray test for hypermobility is the Chamberlain test and when it is positive there is hypermobility of the sacroiliacs beyond question. When it is negative there may be doubt. If other signs and symptoms suggest a hypermobile sacroiliac then it should be kept in mind, that this test does not show normal motion and it is not known just how weak a sacroiliac must be before it will register on this test.

Diagnosis: In the history it is significant that some trauma of a rather severe nature preceded the first attack and that subsequent attacks come on easily; sometimes just from bending over. This may be accompanied by an audible click or a feeling of something slipping in the lower back. On examination there is tenderness over the joint and an increase in motion. Procaine injected into the posterior sacroiliac ligaments will often give temporary relief. A positive Chamberlain test clinches the diagnosis.

Treatment: Joint sclerotherapy.

Anomalies Of Development And Unstable Zygapophyseal Joints:

Unstable zygapophyseal joints are considered with anomalies of development. They may be unstable because of trauma. Very often, however, they are unstable because of some fault in development, either in the joint itself or in the leg. A leg that is shorter by, say ½ of an inch, creates excessive wear on these joints and if there is saggital facing

on one side and coronal on the other that situation will also create abnormal mechanics that will produce excessive wear and tear on the joint and its ligaments. Then there are the zygapophyseal joints that are inherently weak because of their small size, rudimentary is the usual term used, and those that tend to face in a more nearly horizontal plane or obliquely.

A break in the continuity of the neural canal is classified by some as a developmental defect and by others as a birth injury. At any rate spondylolisthesis develops from this defect. The zygapophyseals, part of the neural - canal and the rest of the posterior part of the vertebra stays put while the body and anterior part of the canal slips slowly forward over the years. This is not exactly a rare condition and it is certainly not a disease of civilization. The natives of America had it long before the White man came over. Congdon⁸ found that 5% of 200 skeletons of American Indians had neural arch separation. And Willis⁹⁻¹⁰ found the same neural arch defect in 79 of 1520 American skeletons which is also roughly 5%.

Joints which have no business existing, such as between the transverse process of a transitional L5 or S1 vertebra and either the sacrum or the ilium, do occasionally occur. These anomalous joints start out weak and, it doesn't take much strain to start them slipping and hurting. They too may be the site of pain.

Characteristically the defects of development go unnoticed in early life and show up in maturity after some strain or accident which may be slight. Sometimes a history of trauma can't be elicited. The condition just gradually lets itself be known as parts become weaker and the person heavier as time goes on.

Perhaps the easiest way to understand the function of the zygapophyseal joints is to look at two lumbar vertebrae. It is evident that while sitting or standing the weight falls on the bodies of the vertebrae and the disks. Now tilt the two vertebrae forward as would happen if the person were bending forward. It then becomes clear that the zygapophyseal joints do at least two things because the facets are imbricated. These are: 1. Act as a secondary bearing surface while the person is bent forward. 2. Prevent a shearing force to act on the annulus fibrosus.

Thus it is seen that any alteration from the correct size or normal coronal facing of the facets will weaken that part in direct proportion to reduction from normal size or change toward horizontal facing.

A fairly typical history would disclose that something not too heavy, like a suitcase, was lifted and the back started to hurt. Perhaps ever since this first attack there have been numerous attacks from just such minor strains. On examination you will find, during an acute attack, that there is marked spasm present in the lumbar muscles, bending is difficult or impossible and there may be tenderness elicited when you press down on the involved zygapophyseal.

As in the other types of instability the mechanism for pain production is the same. There is the localized swelling at the site of the sprained joint which in turn irritates nerve endings. Then there is the splinting action of the muscles in that area which often produces marked pain and disability because of the violence and intensity of their contracture.

There may be referred pain which will resemble that found in disk trouble or spondylolisthesis rather than the type of pain found in a hypermobile sacroiliac. The back pain and muscle spasm will be like that found in both acute low back strain and disk involvement. Very often the correct diagnosis will not be made until adequate x-rays are taken. The oblique views are most important.

The signs and symptoms of spondylolisthesis are the same as are found in a disk lesion. The lateral x-ray view clinches the diagnosis. The pain found in anomalous joints is usually right at the involved joint. Here again the x-ray makes the diagnosis

Treatment: Sclerotherapy.

Treatment Continued: There should be a section under treatment of low back instability devoted to prophylaxis. Not that there is any known method of preventing some of the worst causes of instability, like spondylolisthesis for instance, but there is a preventive side to this subject.

Some of the measures that can be followed to prevent instability are known and urged upon workers in industry. Employees are shown the correct way to lift-get it in close to you and bend the knees a little. Various safety measures are urged and men are told to get help when something real heavy is to be lifted. All these measures are helpful but they don't go nearly far enough.

As an important additional measure to cut down on the incidence of backache x-ray examination of the lumbar spine and pelvis of those expected to do heavy work should be made. This examination should include A-P erect, lateral and right and left oblique views as a minimum and others should be taken if there is any indication for further study. Those with significant anomalies of development could then know about them before a serious breakdown of their backs occurred and seek other types of employment or training. On a straight out economic basis to cut down on compensation claims the insurance companies should be interested in this.

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Chapter 5

ACUTE LOW BACK SPRAIN AND STRAIN AND OTHER CONDITIONS

In this chapter the first four conditions described: acute low back sprain and strain, facet syndrome, fibrositis and fascia lata or iliotibial band syndrome are frequently encountered. The sacroiliac lesion is less frequently encountered and there is a marked falling off in frequency in the disorders mentioned after this.

1. ACUTE LOW BACK SPRAIN AND STRAIN: According to the dictionary¹ to strain is to over exercise; use to on extreme and harmful degree. And in connection with the low back we are concerned with the effect this has on the joints, ligaments and muscles. A sprain is the wrenching of a joint with partial rupture or other injury of the attachments and without luxation of the bones. It is accompanied by heat, swelling, pain and disablement.

In actual practice it is not necessary nor is it usually possible to differentiate between the two. What appears to be a more realistic and workable approach is to consider that there are varying degrees of acutely sprained bock because in either case treatment follows a similar pattern at least during the initial stages.

Perhaps as classical a picture of a mild sprain as there is, is presented by the office worker who does too much gardening the first balmy day of spring to appear. His muscles are flabby and he is not -in condition for several hours of digging, raking and hauling. As a result his joints and muscles become extremely achy; bending, straightening and possibly even walking become difficult.

He comes to you partly bent over, he might prefer to stand while .you question him and if he does sit down he has a hard time getting up. The history has nothing significant in it except the overuse of on unprepared bock. The examination will show a straightening of the lumbar curve with perhaps some side bending. If you ask him to bend forward he can bend only a few degrees. The reflexes are not altered in any significant way. The straight leg raising tests will elicit pain if there is marked involvement. In a mild case the legs can be raised without producing pain. If you attempt to extend either leg when he is lying prone pain will be increased. Probably the main muscle involved in these tests as well as the difficult walking, which causes him to materially shorten his stride, is the psoas or iliopsoas to be more inclusive.

While there is a lot of ache or pain in these cases it does not have the sharpness characteristic of sciatica or radiculitis. Any pressure on the back while he is lying prone, as in doing Dandy's test, will increase the pain but this is different from a positive Dandy's test in that the pain will be felt with pressure anywhere rather than just at certain specific spinous processes. There is no radiation of sharp pain into the leg as there is in radicular involvement. There is, however, in the more severe cases, enough iliopsoas involvement to cause some ache in the legs. .

More severe sprains are common in industrial plants, the construction field and automobile accidents. A fairly typical cause in industry is sudden increase in weight-bearing as is exemplified in the following instance: Two men will be carrying a heavy piece of equipment when one will slip, suddenly lose his grip and the other man will just as suddenly be holding, at least momentarily, the full weight of the material. In attempting to save himself from a disastrous fall sometimes a man will wrench his back just from the sudden, violent twisting he gives it. Powerful blows from some piece of heavy equipment or in the construction field heavy rocks or piles of dirt or other material falling on the back cause some of the most severe sprains. Being thrown violently out of an automobile or against a part of the inside causes many an acute low back as well as unstable backs.

Characteristic of the acute low back sprain whether mild or severe are these findings in regard to the position patients assume and the examination. They do not want to move the back end their most comfortable position is lying down. In the more severe cases this is obligatory. They will lie where they are whether it is a living room floor, a factory workshop bench or out on the ground right where pain, that was violent and sudden as a bolt from the blue, hit them. Then from the examination; inspection shows a straightening of the lumbar curve and palpation notes the hardness of the muscles in the lumbar region. The more severe the case the more rigid is the back from the spasm set up. It would be easier to understand the pain and disability of these severe cases if the sprained zygapophyseal joints were as easy to display as a sprained ankle.

Equally characteristic is response to a certain type of treatment. In a mild case of sprain with no complications one or two doses of Tubadil, a voluntary muscle relaxant, of the proper amount plus some rest in bed will produce relief in a matter of hours and the ability to resume ordinary activities in two or three days. Even in very severe sprains Tubadil produces fast relief and because of this it is also of diagnostic import how a patient reacts to it. If the proper dose for his weight is given repeatedly with no discernible change for the better the chances are that there is more than an uncomplicated sprain present.

Contributing to many a case of low back sprain is the factor of chilling. The man first cited, who did too much work in the garden the first nice day of Spring, may have worked up a little sweat after a while and then stopped for a cool drink or to chat with a neighbor. While resting thus or otherwise he probably neglected to cover up and it didn't take long for an early spring breeze to chill the lumbar area.

Construction men, delivery men and many others who either do some of their work out of doors or who have to be in and out in the winter time are subject to chilling. Wherever and whenever there is the factor of sudden temperature change it should be guarded against. A most effective way is the wearing of the proper clothing. This may involve nothing more elaborate than switching from a flimsy cotton undershirt to a 25% wool undershirt when conditions dictate the advisability of such a change.

So far the instances of acute low back sprain mentioned have followed some traumatic incident which reasonably could cause trouble in a normal back. There are those cases where an acute low back sprain picture is presented and the history is negative for anything more severe than bending over to tie a shoe lace, leaning over to shave or just sneezed. The spasm that is found in these cases along with the other characteristic findings is there to guard a weak, unstable joint. It is splinting action but painful nonetheless.

An acute episode in these instances may be quickly relieved by manipulation to the muscles and joints. Some people give a history of numerous attacks that are quickly terminated by lumbar correction. Tubadil too is useful in terminating the acute phase promptly. The stability obtained by using joint sclerotherapy to the weakened areas is the most satisfactory method of preventing future attacks from trivial causes.

The use of procaine around the sprained joints is useful in alleviating the pain and disability. This often speeds an early return to use which seems to aid recovery.

The judicious use of rest will help recovery but this does not mean that there should be no movement at all. In the very painful, acute stages bed rest is indicated but even here some movement even if it involves only rolling from side to side should be encouraged. The use of the bathroom and sitting up should follow as soon as absence of pain will allow.

The use of extension also helps. To produce a moderate, but satisfactory amount, a rolled up blanket placed under the lumbar area as the patient lies supine may be used. At first there may be some discomfort with its use and the roll may be only 2-3 inches thick. Later on the roll may be 5-6 inches thick. It is much easier on the patient if extension is used about an hour or an hour and a half after an injection of Tubadil. The roll may be left in place for a half hour at a time and used several times a day.

In regard to advice to people on how to avoid attacks of acute low back sprain these points should be stressed.

- a. Be in condition for the work you are going to do or do very little of it the first few times until you are in condition.
- b. Dress properly to avoid chilling. Put on more during rest periods than you had on while you were working up a sweat.
- c. Consider the leverage factor when lifting anything. Get it in close to you. It has been estimated² that an object weighing 100 lbs. will put a strain of something like 1500 to 1600 lbs. on the lumbosacral junction if that object is lifted with the trunk bent forward and arms are outstretched; like reaching into a car trunk, for instance. Besides getting it in close to you before lifting, it is also a good idea to bend the knees slightly before you attempt to straighten up with the object. In this way the powerful thigh muscles can help in the lift and some strain is taken off the lumbar muscles.

2. *FACET SYNDROME*: The facet syndrome or the lumbar lesion and the sacroiliac slip or lesion may be a part of acute low back sprain. More than likely, repeated attacks of lumbar lesioning or facet syndrome are the result of instability of the zygapophyseal joints. There are probably more than one set of findings covered by this term.

To one lexicographer¹, at least, facet syndrome is; "A form of traumatic arthritis involving the articular facets of the spinal column, usually in the lumbar region. The symptoms are sudden in onset with low back pain relieved in certain postures and exaggerated in others, the pain being described as of the locking type."

The words subluxation and lesion are also used to describe a condition which, if not the same as facet syndrome, has differences which escape my understanding. As these words are used they carry this meaning; there is a restriction of motion present within the normal range of motion of that joint. Now the joint surfaces may or may not be in extremes of that range of motion but they are not dislocated.

An x-ray man³ went to some pains to do some measuring on this part of the back and has some figures for us. He measured the spaces between: 1. the top of the facet of the vertebra below and the pedicle of the vertebra above and 2. the bottom of the facet of the vertebra above and the lamina of the vertebra below. According to him the normal spaces vary according to the level, thus:

	L2	L3	L4	L5
a.	15mm.	14mm.	8mm.	5mm.
b.	7mm.	6.5mm.	4.5mm.	5mm.

a. equals the distance from the top of the facet of the vertebra below to the pedicle of the vertebra above.

b. equals the distance from the bottom of the facet of the vertebra above to the lamina of the vertebra below.

As a working basis for the practical treating of disturbances in the zygapophyseal joints we can use all of the ideas about the joints presented here from the lexicographer to the x-ray man. The idea of a traumatic arthritis is good if we remember that this develops over a period of time and not overnight. Some men call this arthrosis and excessive wear and tear are cited as the cause of it. It is nothing like rheumatoid arthritis. The faulty mechanics caused by a short leg, trauma and misuse can lead to it and it can be demonstrated on the x-ray film in the oblique view. And, I hesitate to use the word always, there is usually a diminution in the spacing between the facets and lamina and pedicles demonstrated at the same time also.

Perhaps these more commonly encountered disorders of the zygapophyseals may be more simply classified thus:

- A. Acute low back sprain. In this condition there has been some form of trauma severe enough to understandably sprain that particular back under the circumstances.

The patient complains of the pain and altered function. The doctor, in his examination, is soon made aware of some of the other components of inflammation even though, because of the position of the joint, he cannot see some of the others. Spasm and altered function he can see and feel for himself. Curare, in the form of Tubadil, will relax the spasm and procaine injected around the involved joints, which are most frequently the lumbosacral and the one above it, will help speed reuse and recovery of the joints. So, this disorder may be rightly called acute low back sprain and it should be kept in mind that joints and muscles are involved as the basis for the signs and symptoms that are present.

B. Unstable zygapophyseal. When this is present the amount of strain, trauma or chilling necessary to cause an acute flare up is minimal. Frequently there is an underlying chronic ache. Depending on severity, referred pain to the buttocks or legs may or may not be present. The history records a series of attacks extending over a period of years and with it a back consciousness and an awareness that there is a lowered limitation on what should be attempted in the way of physical activity.

In those patients treated by osteopathic manipulation relief is often secured from manipulation of the low back muscles and reduction of the subluxation of the involved joints. The pattern in these instances, is low back pain from a trivial cause or no known cause then one or more treatments followed by relief of variable duration from a few days to weeks. The area may be said to lesion easily and often and in this way resemble the hypermobile sacroiliac.

When an x-ray study is made the oblique views will show a diminution in the spaces between facet and lamina and pedicle. Also, just like calluses develop on a hand from rubbing so too can sclerosis develop on these joints. That's the traumatic arthritis or arthrosis of the dictionary definition and the roentgenologists report.

During an acute flare up, which can be a frequent occurrence, the findings are the same as in the uncomplicated acute low back sprain in which severe muscle spasm is an outstanding sign. In between attacks there is an additional finding that is often of importance and may frequently be elicited. Pressure exerted right over the lumbosacral joints or others that are involved will reveal tenderness. As this part becomes stronger through the use of joint sclerotherapy this tenderness disappears.

3. FIBROSITIS: This is a chronic type of back trouble and it is characterized outstandingly by a history of feeling better after moving around. Immediately after getting up from bed or sitting awhile there is stiffness and ache but walking and other exercise improves the feeling in the back. The sensation complained of here is of a dull ache rather than a sharp pain. It is usually worse in colder weather, especially if the person does not dress warmly enough. The muscles are chronically stiff with what might be described as a combination of low grade spasm and fibrous deposit. Palpation will reveal tender trigger spots in the lumbar muscles which feel leathery. Procaine injected into these areas followed by manipulation to secure further relaxation and improve the circulation will mate-

rially improve the back. Proper clothing will also help. There is nothing characteristic found in the x-ray or in laboratory examinations.

4. THE FASCIA LATA AND ILIOTIBIAL BAND SYNDROMES: The gluteal muscles with their connection to the iliotibial band and fascia lata are important to consider in back, leg and knee pain. These structures are so intimately related that spasticity in the gluteal muscles can cause an ache or pain anywhere from the buttocks to the knee and even below the knee. Pelvic tilt, increased lumbar lordosis and torsion of the tibia on the femur have been said to occur because of this syndrome⁴. It is frequently encountered and very often accompanies a facet syndrome or weakness at the lower zygapophyseal joints. Perhaps the most characteristic finding in this disorder is the tender, painful gluteal muscle that may be easily palpated since it is so markedly contracted. There are wide variations seen in the severity of the syndrome from a mild ache in the buttocks to severe pain there, and into the leg, resembling a sciatic neuritis.

This syndrome responds very well to procaine injections in the involved gluteal muscles plus manipulation using a deep, steady pressure on that same muscle. If the zygapophyseal joints are contributing a referred source of irritation because of their weakness then they too must be treated. Sclerotherapy is the choice for that. Fasciotomy⁵ which is used by some is not recommended.

5. SACROILIAC LESION OR SLIP: The amount of motion ordinarily found in a particular joint is what is important for that joint. Some ordinarily have very little motion but that little bit, even if only a fraction of a millimeter, should be there and is important to that joint's normal, pain-free functioning. The sacroiliac is one of the joints exhibiting normally only a very small amount of motion, perhaps a fraction of a millimeter.

Probably because this has been overlooked a great deal of unnecessary controversy has raged regarding sacroiliac lesions and hypermobility.

The same type of trauma that can cause acute low back sprain can cause a sacroiliac lesion. Perhaps the most common finding in this regard is for one ilium to be moved slightly backward on the sacrum and be stuck in that position. On examination the posterior superior iliac spine on that side will be a little lower than the opposite one. The ilium can stick in a forward position also in which case the posterior superior iliac spine will be found higher than the opposite one.

Characteristically rest doesn't help much to relieve the low back pain from this which is usually located at the involved sacroiliac. In this regard make sure of location since slightly laterally, in the gluteal muscles, there may be painful muscle spasm independent of the sacroiliac joint. Tests for sacroiliac motion will reveal a difference in the two sides very often, because only one side is usually involved. The Chamberlain⁵ technic for sacroiliac motion will demonstrate manifestations of the lesion visually.

There is probably no manipulative procedure, short of reducing a frank dislocation, that can bring more dramatic relief than the correction of a sacroiliac lesion. They are

not very common being considerably less often encountered than disturbances of the lumbar joints.

6. *REFERRED CAUSES*: This is one of the less commonly encountered causes of low back ache. Gastrointestinal disorders causing constipation may cause an ache occasionally in the lumbar area. Uterine and ovarian disorders such as fibroids, endometriosis, chronic pelvic inflammation and cysts are sometimes at the root of a chronic type of low back ache. Prostatic disorders such as hypertrophy can cause a referred low back ache while disorders of the kidney can cause a low dorsal backache.

Usually this type of backache is not too severe but it persists and changes of position and activity don't have much effect on it. The menstrual cycle does produce changes in the backache due to gynecological disorders in that the ache is usually worse just before the flow starts but then this same observation could be made about most any type of back ache that a woman has. In these cases the history and examination of the parts suspected will help to determine the cause. The treatment is, of course, directed to the underlying pathology.

7. *METABOLIC*: Hyperglycemia, hyperuricemia and hypercholesterolemia will help to perpetuate a backache and slow down the recovery rate of back sprain and other back disorders. Diet is, of course, important and there are other measures for control notably Benemid for hyperuricemia and insulin for hyperglycemia.

8. *OSTEOPOROSIS*: In this condition there is a demineralization of the bones. The backache that may accompany it is of the chronic low grade type. It is not very common and those cases that do show it are usually in women past the menopause. It is easily diagnosed by x-ray. A combination of estrogen and testosterone in small doses taken by mouth every other day and continued for a long period of time will produce good results.

9. *CANCER*: This is usually metastatic with the female breast and the prostate gland probably the two commonest primary sites. It is, fortunately, rare. X-ray can not be depended on for an early diagnosis. By the time osteoblastic or osteoclastic activity shows in the x-ray picture of the vertebrae cancer is well developed. Suspicion of cancer should be aroused in the more severe type of steady backache which is not relieved appreciably by rest or change of position. The commoner types of therapy like manipulation, procaine injections, belts and analgesics are valueless. Narcotics give only brief relief. An increased sedimentation rate, serum alkaline or serum acid phosphatase is often found in prostatic cancer. The best that can be hoped for here is that suspicion of cancer will be aroused early and an intensive search for the primary site will be made. The treatment, obviously, is to the primary site. Strange as it may seem cases are on record with the American Cancer Society where well advanced cases of prostatic cancer with spinal involvement have responded very well to such measures as prostatectomy, castration and female sex hormone.

10. *OSTEOSIS CONDENSANS*: This is quite rare and very little is known about it. The only way to diagnose it is by x-ray. Areas of increased bone density show up adjacent to the sacroiliac joints and other areas of the ilium. The pain may be steady for a while and then there will be remissions. I have only seen it in women and it seems to get worse with each succeeding pregnancy. Therapy consists of palliation and avoidance of future pregnancies.

11. *OSTEOMALACIA*: Again the x-ray makes the diagnosis possible. This is the adult form of Rickets and as in the child there is softening of the bones with consequent deformity. The pelvis may be pressed in by the weight of the body on the femoral heads and the sacrum is pushed deeper into the pelvis so that its superior surface faces more anteriorly. There is a dull ache and the bones are tender. Due to the deformity and basic skeletal weakness walking may be difficult. The treatment is the same as for Rickets-an adequate diet containing large amounts of vitamin D. A rare disease in prosperous times.

12. *RHEUMATOID SPONDYLITIS*: This usually begins in the sacroiliac joints and gradually progresses to the zygapophyseal joints. If unchecked it can go on to complete ankylosis of the spine. X-ray treatments, cortisone and related compounds and ACTH are useful in checking the progress of the disease. Even before the x-ray pictures makes the diagnosis clear there may be a stiffening of the spine accompanied by ache. A rare disease.

13. *PAGET'S DISEASE*: In this disease there is a thickening of bone accompanied by deep seated ache, tenderness and gradually progressive stiffness. It is readily diagnosed by x-ray. There is no known cause nor is there any treatment known that is of any specific benefit in arresting or improving the disease. A rare disease.

14. *POTT'S DISEASE*: A disease most commonly found in children. There is pain and stiffness of the spine; two unusual symptoms to find in children. Crying out at night occurs, it is thought, when the splinting of the spastic muscles lets go a little bit and the normal movements cause pain in the sensitive involved areas. The x-ray demonstrates the eating away of the bodies of the vertebrae. Surgical fixation seems to be about the most successful method to date for obtaining the rest that is necessary for healing. There is considerable mortality to this disease which is fairly common among tubercular children but in the over-all picture of backache it is rare.

15. *POST-LAMINECTOMY SYNDROME*: There comes to the doctor every once in a while a patient who has had laminectomy with or without fusion or arthrodesis weeks or months before because he had an intractable backache or sciatic neuritis and now he has backache and/or sciatic neuritis. There may or may not have been some temporary relief following the operation.

Just why this should happen, and according to some statistics⁶ it might happen 30%-40% of the time after laminectomy, is a field for speculation. The picture presented

by these people, which some call post laminectomy syndrome, is very much the same as is presented by many cases of lumbar instability.

While good results have followed the use of joint sclerotherapy directed to the involved vertebral areas, usually L4 or L5, the results are not as uniformly good post-laminectomy as when joint sclerotherapy is used initially.

Since this disorder is difficult to classify the effect of the surgery on the etiology being hard to assess, it ends up here in this catch-all chapter in a class by itself.

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Chapter 6

TREATMENT 1 - JOINT SCLEROTHERAPY

Joint sclerotherapy is as old as Hippocrates¹, at least, and as new as 1937. In treating recurrent dislocations of the shoulder, which was mighty important in the days when a strong sword arm was vital, Hippocrates used hot irons to produce sclerosis. He makes a point of telling that some physicians produce scars on top of the shoulder, which is the wrong place, and then goes on to say that to produce good results the scars should be produced in the axilla.

In 1937 modern joint sclerotherapy may be said to have begun with the use of sclerosing solutions in the treatment of hypermobile sacroiliacs, trick knees and recurrent jaw dislocations. Gedney² and Shuman² worked on the sacroiliacs and knees at first in the clinic of the Philadelphia College of Osteopathy. Schultz³, in Chicago, developed a technic for recurrent jaw dislocations or slipping of the jaw. Since then technics have been developed for almost all the joints of the body that are capable of be-coming unstable including the shoulder⁴ and zygapophyseal⁵ joints.

Scars are one of nature's prime healing agents and various parts of any number of people are held together better because scars developed properly after some cut, burn or operation. The scar tissue produced by sclerosing solutions is the same as that produced by the irritation or stimulation, whichever way you want to look at it, of a cut or a burn or some foreign body.

The formation of scar tissue in weakened ligaments may be accomplished by the injection of sclerosing solution to these ligaments. This is often necessary because ligaments are notoriously slow to heal. True enough they are tough and do not tear or weaken easily but, no doubt because of their poor blood supply, once weakened they tend to remain that way. And so it naturally follows that the joint that is supported by those weakened ligaments is also weakened, perhaps to the degree that it is unstable.

Modern sclerosing solutions are effective and safe to use. They were well tested by animal experimentation before ever being used on human beings⁶. The results of an injection are known, the scar tissue that develops from the injection has been studied and results are predictable. In over 10,000 injections of one of these solutions, Slynasol (Searle), I have never had any slough or other serious reaction. The worst that has ever happened has been a temporary pain at the site of injection that was somewhat worse than I usually anticipate and in about 1% of all cases there is an allergic reaction such as hives or perhaps a gastrointestinal upset or maybe even a slight elevation of temperature. This type of reaction simply means that at the next and subsequent visits of that patient I use a different solution such as Alparene #2 (DeQuin Pharmacal Co.), Neo-Plasmoid (Farnsworth) or Sodium Sotradecol (Wallace & Tiernan).

Joint sclerotherapy is used in disorders of the back classified under the category of instability. This would include degenerated, uncompensated disk, hypermobile sacroiliac, spondylolisthesis, weakness at the zygapophyseal joints as may be seen in obliquity of facet facing, rudimentary facets and facet syndrome and anomalous joints.

It should be kept in mind that at each level of the spine there are three joints with their ligamentous support and also ligaments giving added support between the spinous processes. Increased stability can be obtained by treating all of them but the particular weakened area or areas should be localized and treated.

Patients vary widely in their reaction to sclerosing solutions and in the degree of instability present. As is well known, the pain threshold also varies widely from patient to patient. Because of these variables there is also variation in: 1. the interval between treatments, 2. the number of injections needed and 3. the dose used at each injection. The patient who feels a lot of pain from .2 cc. of Sylnasol injected into the sacroiliac ligaments and hardly recovers from an injection in 4 or 5 days is obviously not to be treated oftener than once a week or even 10 days. But some people can take a full 1. c.c. at this spot and be ready for more in 3 or 4 days. Likewise there is no set number of visits necessary but usually some change for the better is noted after 5 or 6 injections and many are stabilized to the point of comfort after 10 injections.

In the case where more than one joint has to be treated multiple injections at one visit may be made to the point of tolerance of the patient. There is no toxic reaction to be feared from the amount of solution used. Only the discomfort of getting stuck and the after pain have to be considered. Many people, for instance, can stand to have the sacroiliacs and L5 zygapophyseals injected bilaterally at one visit.

It is advisable for those who have not done this work before to start in with injections to those ligaments that are reached most easily, like the sacroiliacs, and interspinous. As a touch is developed in sensing tissue resistance then the zygapophyseals and finally the disk may be treated.

You will have no bad after effects from your injections if you are sure you are in ligaments before you inject and if you have properly spotted the weak area at fault your results will be gratifying.

Technic For Disk Injection: To locate accurately any area of the spine under treatment it is most useful to have an antero-posterior view x-ray film at hand, preferably on a view box, to correlate the landmarks. These are the crests of the ilia and the spinous processes of the involved vertebrae. Perhaps most commonly the spine of the fourth lumbar is found at the level of the crests but the space between the 3rd and 4th spines may be found there or the space between the 4th and 5th.

Preparation of the patient: The area to be treated is adequately exposed. If there is hair of any account present it should be shaved off. The patient lies prone on the treatment table with some method to cause flexion of the lumbar spine used. This may be

accomplished in some mechanical tables by raising a center section or lowering the leg section. If the table used is of the straight variety a foam rubber cushion placed over a large book may be used under the abdomen.

Have the patient extend the arm, on the side to be treated, over the head and sideband slightly toward the other side. This will open up the space between the transverse processes and make it easier to pass the needle between them to reach the disk. You stand on the side to be treated and transpose the level of the crests of the ilia to the midline. Here are two ways it may be done; 1. Span the back with the thumb above one iliac crest and the index finger above the other crest. Bring the finger toward the midline in the direction of the thumb and meet the spinous process or space at that level; 2. Mark each iliac crest with a skin marking pencil and then simply draw a finger from one iliac crest toward the other until the spinous process or space is met. Then count from here to the spinous process of the vertebra above the disk you want to treat. For instance; if you want to treat the disk at L4. which is the disk between L4 and L5 vertebrae, and the x-ray shows that the space between L3 and L4 lies at the level of the crests then just slip down a trifle after you have transposed the crest level and you will be on the spinous process of the L4.

The point at which you will insert the needle lies about $2\frac{1}{2}$ to $2\frac{3}{4}$ inches directly lateral from L4 spinous process. Use the lesser distance in thin people and the greater distance in heavier ones. At this point prepare the skin with alcohol and raise a skin wheal by injecting about .25 c.c. of procaine using a 27 gage $\frac{1}{2}$ inch long needle. The purpose of this injection is to anesthetize the skin so that you can insert painlessly through the skin the necessarily larger gage needle that is needed to reach the disk.

The Injection: To reach the disk, or its immediate vicinity just cephalad or caudad to it, use a 19 or 20 gage needle 4 inches long. It is inserted through the skin wheal in a medial and anterior direction. If, because of a tough skin, the needle bends too much. for you to enter make a hole with an 18 gage 2 inch needle and enter through this. The angle with the body surface is roughly 45 degrees. It is inserted slowly to the disk. Attempt aspiration. If no blood shows inject .2 c.c. to .4 c.c. of synasol and withdraw. On the way into the disk you may hit the transverse process which is only about 2 inches under the surface. If you do, withdraw the needle partially, get reoriented and reinsert. You may aim for a point too superficial, get near the nerve root and cause a sharp pain in the leg. Again remember the needle enters slowly. Since you have done this no damage is done, you simply withdraw until you can change direction and reinsert more deeply. When you hit the disk or slightly caudad or cephalad to it there is no outcry and that is where the injection is given. There is a distinct resistance felt at this point which is much more pronounced than that felt as you pass through muscles and their sheaths.

On the other hand you may go too deep and when you attempt aspiration, or even before you try, there will be blood in the syringe. No harm is done if you haven't pushed on the plunger. Simply withdraw and reinsert just slightly more superficially. A reaction that

can occur when you are too deep is a feeling of cold water or pins and needles or "just a funny feeling" running down the leg. This is due to irritation of the sympathetics and the same advice holds as for the times you get blood in the syringe-withdraw to where you can change direction of the needle point and reinsert just slightly more superficially.

Inject bilaterally.

Some lumbosacral disks are so deeply seated between the ilia that it is practically impossible to get at them before you hit the nerve root. In these cases it is best to get what stability you can by injecting the zygapophyseals and the interspinous ligaments.

Remember: 1. Insert slowly.

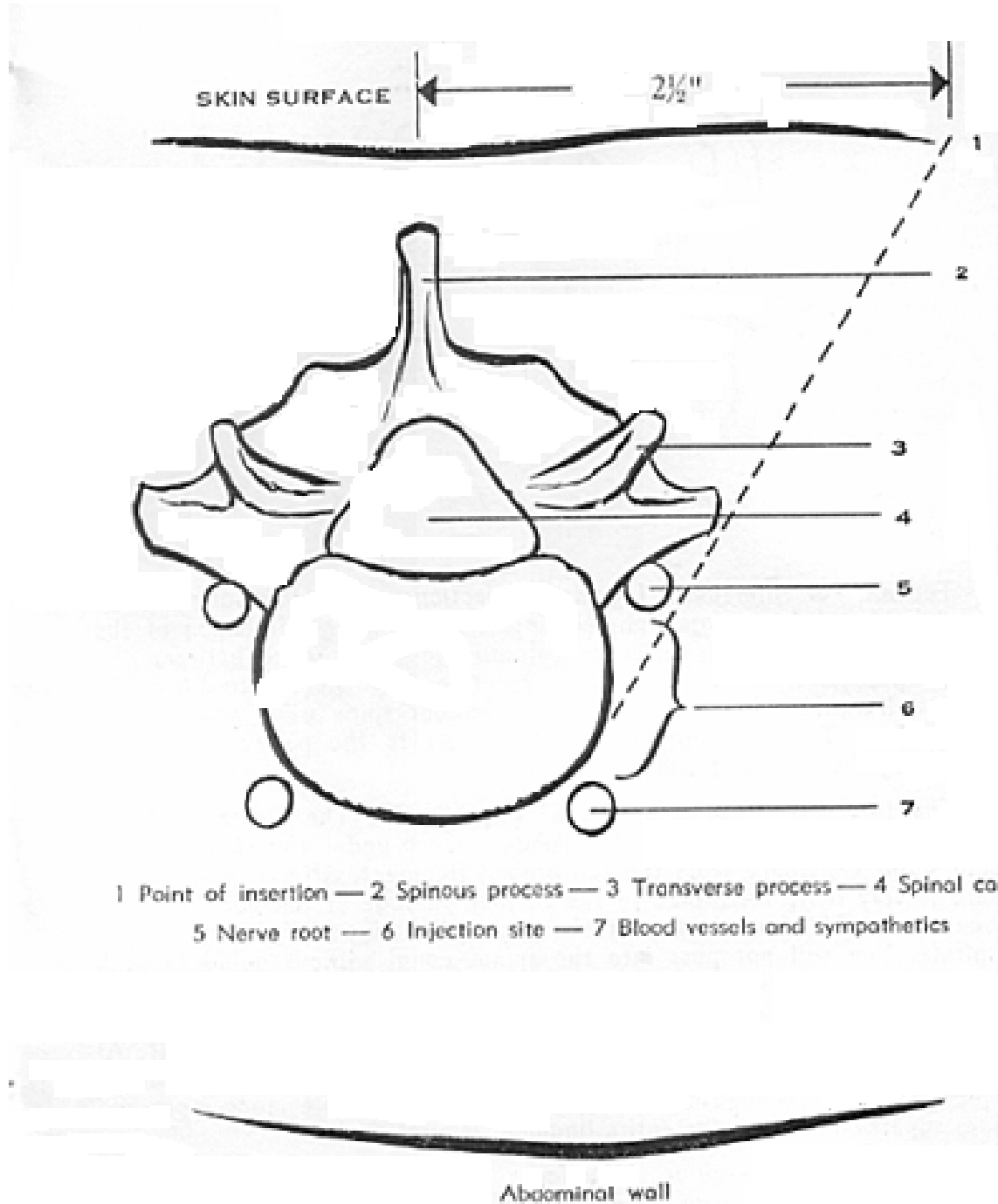
2. Always attempt to aspirate before injecting.

3. Know where you are before injecting.

Technic For Zygapophyseal Injection: As in treating the disk or the interspinous ligament the landmarks for the zygapophyseals are the crests of the ilia and the spinous processes. The patient lies prone with some method used to produce adequate flexion of the lumbar spine which is just about as for flexed as the patient can comfortably stand. Because this makes it easier for you to work and get it over with faster it is ultimately easier on the patient. After locating the spinous process of the vertebra to be treated the point for insertion is located about $\frac{3}{4}$ of an inch lateral to the lower part of that spinous process. At this point prepare the skin as usual for an injection; swab with alcohol.

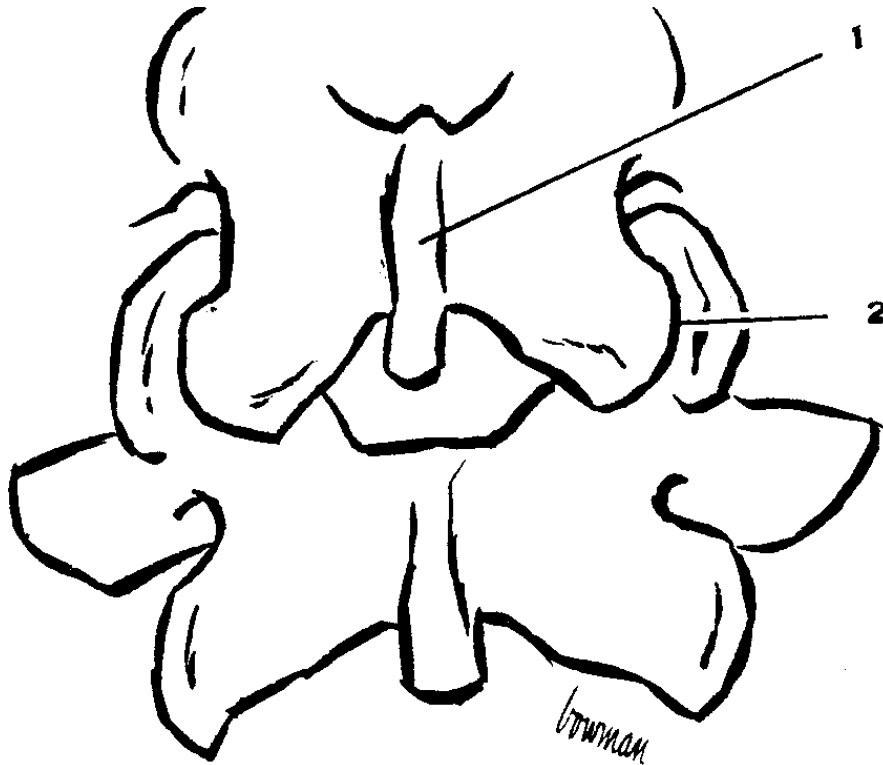
The injection: Use a 22 gage, 2 inch needle and insert the point directly downward toward the table. Since the zygapophyseal joint is not evenly the same distance under the skin throughout its extent it may be contacted by the needle at about $1\frac{1}{4}$ to $1\frac{3}{4}$ inches. At this point inject 0.2 C.c. to 0.4 cc. of slynasol. If the needle is directed too far medially it will contact the tough coverings of the spinal canal and if it is directed too far laterally it will just pass through muscle. There is an abrupt termination to any further progress of the needle when the joint is reached.

DIAGRAM FOR DISK TECHNIC



- 1 Point of insertion — 2 Spinous process — 3 Transverse process — 4 Spinal canal
5 Nerve root — 6 Injection site — 7 Blood vessels and sympathetics

DIAGRAM FOR ZYGAPOPHYSEAL TECHNIC



1 Spinous process - 2 Zygapophyseal

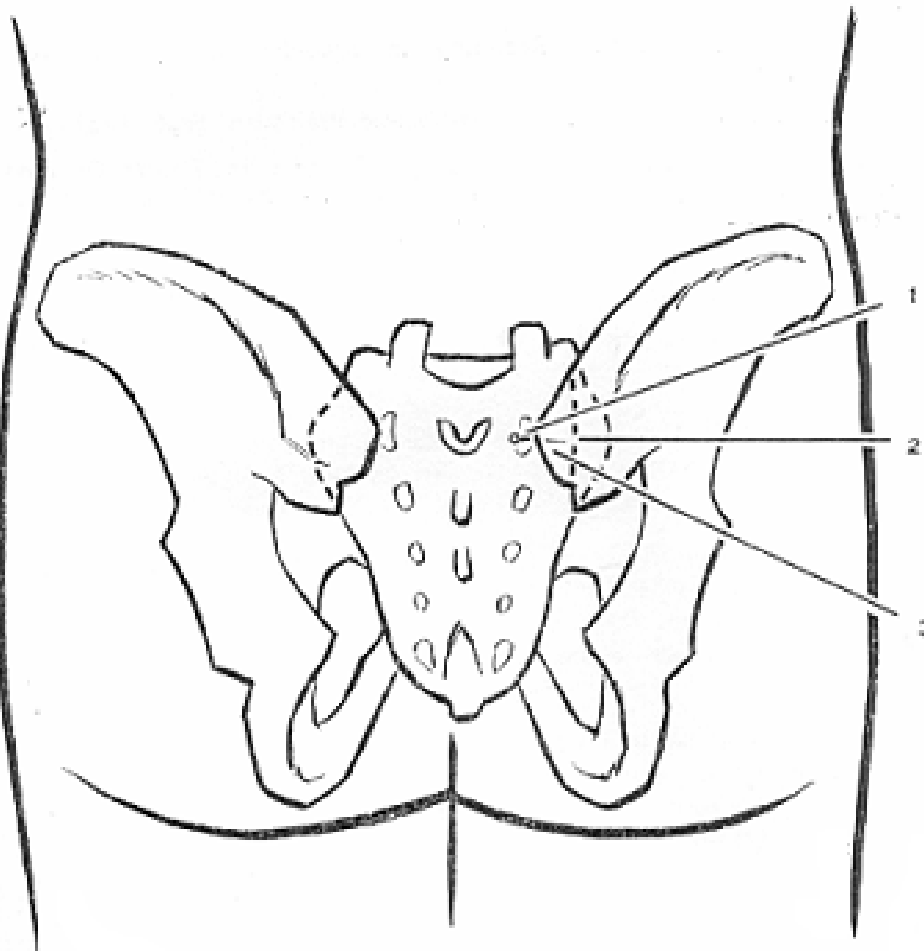
Technic For Intraspinous Ligament Injection: Have the patient positioned as for disk or zygapophyseal injections. With good flexion of the lumbar area it is much easier to palpate the small space between the spinous processes. A further aid in locating this spot is to have the patient alternately flex and extend the lumbar spine while you palpate in the area. The idea may be gotten across to the patient better by just asking them to raise and lower their hips.

The Injection: Use a 2 inch 22 gage needle. The direction of the needle is downward and slightly cephalad. Just under the skin there is some slight resistance from the supraspinous ligament. After this is pierced there is very little resistance to the further passage of the needle. Insert about $\frac{1}{2}$ to $\frac{3}{4}$ of an inch past the supraspinous ligament. At this depth aspirate, you will not pass into the spinal canal without going through a second, tougher resistance point but to make sure that you are in a safe place aspirate and providing nothing is drawn into the syringe inject .2 cc. of sylvanaseol. The deeper portion is injected and built up first. At subsequent injections increased resistance is felt in the interspinous ligament to the passage of the needle and injections are made more and more superficially until the entire ligament is built up.

Technic For Sacroiliac Injections: Probably the most important anatomical fact to keep in mind when injecting this joint is the way that part of the ilium, which terminates in the posterior superior iliac spine, overhangs the joint. You can't pass a needle straight down to the joint.

The Injection: For this joint no flexion of the spine is necessary. The patient lies flatly prone on the table. Locate the posterior, superior iliac spine. At a point about ½ inch medial to it insert a two or three inch needle depending on how thick the person is. The gage is 22 for the 2 inch needle and 20 for the 3 inch one. Pass the needle laterally and anteriorly to reach the posterior sacroiliac ligaments. You are standing on the side opposite to the one being treated. The ligaments will be contacted from about an inch and a half to three inches from the point of insertion. Inject from .2 cc. to 1. cc. of sylvanaseol.

DIAGRAM FOR SACROILIAC INJECTION



1 Point of insertion — 2 Sacroiliac joint — 3 Posterior, superior iliac spine

Technic for anomalous joint injection: The most commonly encountered ones giving rise to backache are those between a fifth lumbar transverse process and the ilium or the sacrum. The technic is similar to that used for the sacroiliac but the dose used is usually smaller, about .1 c.c. to .3 c.c.

1. The Genuine Works of Hippocrates, pages 212-214. Francis Adams Translation, William and Wilkins, Baltimore, Md., 1946.
2. Gedney, Earl H., The Hypermobility Joint, Osteopathic Profession, June 1937.
3. Schultz, *Louis W.*, A Treatment For Subluxation Of The Temporomandibular Joint. The Journal of The American Medical Assoc., Sept. 25 1937, Vol. 109, Pp. 1032-1035.
4. Shuman, David, Luxation Recurring In Shoulder, Osteopathic Profession, March 1941.
5. Shuman" David, Unstable Bock, Osteopathic Profession. Sept. 1951.
6. Rice, C. O. and Matson, H., Histologic Changes In Tissues Of Man and Animals Following Injection of Irritating Solutions Intended For Cure of Hernia, ". Med. J. 70:271-278, Sept. 1936.

Chapter 7

TREATMENT II - MANIPULATION

The skilled use of the hands on the body as a form of therapy is what is meant here by manipulation. It is one of the more important measures available for the treatment of low back disorders. It is not new. Hippocrates discussed its uses 2000 years ago. Since that time its field of usefulness has been increased as our knowledge of anatomy and physiology has increased.

Specific effects may be obtained with certain manipulations and more general effects with other manipulations. There are manipulations that are done suddenly and with some force while other~ are done very gently and slowly but whatever the maneuver we can consider all the manipulations discussed here under two headings. These are:

1. Manipulations applied to muscles.
2. Manipulations applied to joints.

To understand and properly use manipulations on the back the sense of touch must be developed so that differences in tone of muscle can be readily palpated, bony landmarks felt and joint motion properly assessed. This can only be gotten in one way; by making 0 thorough visual and palpatory examination of a lot of backs. You can gain this experience in your own practice by making these examinations on each patient, whose back you are going to treat, before you treat.

1. Manipulation applied to muscles: There are two purposes of manipulation to muscles and these are to relax spasm and improve circulation. The part to be treated is exposed. Do not attempt to treat through heavy clothing; it's a handicap to your sense of touch. Palpation along the paravertebral muscles of a person suffering from low back-ache will usually reveal some areas that feel harder than others and pressure exerted on them elicits the response that the part is either tender or painful. . When marked, acute spasm is present it is very easy to feel since the entire low back area is hard and rigid. Inspection may even show a lack of normal anterior convex curve and instead a rigidly straight lumbar spine. At other times only isolated spots of spasm are present which may be felt by careful deep palpation.

Some important areas of muscle spasm may also be felt in the gluteal muscles and the piriformis. Spasm of the piriformis is commonly found in sciatica due to sacroiliac trouble. Tender, spastic areas in the gluteal muscles often accompany various low back troubles and the fascia lata syndrome.

Technic for muscle relaxation: The patient lies prone on the treatment table with the area being treated exposed. The operator stands on the side to be treated. If the area of spasm is extensive place the fingers of one hand, palmer surface down, on it and reinforce with the other hand.

With the hands in place apply pressure gently and firmly in a downward, medial direction. Rapidly increase the amount of pressure to the point of tolerance and hold it for several minutes. Spasm is relaxed by steady pressure. Release the pressure slowly in acute spasm otherwise there will be a sudden increase in the spasm and pain.

If there is no acute spasm the pressure may be released more rapidly and if the area to be treated is small the thumb may be used instead of the whole hand.

With deep palpation trigger areas in the gluteal area may be found that cause pain down the outside of the thigh. The piriformis can also be palpated midway between the ischial tuberosity and the greater trochanter.

As an aid to further relaxation in these areas and to make it easier on the patient, which also helps, procaine may be injected beforehand. As an example of how this may be used to further the effectiveness of manipulation consider a tender, painful trigger spot in the gluteus medius. On palpation this may feel like a marble or a pencil deep under the skin, surrounded by normal muscle fibers. Without procaine, pressure would have to be applied slowly, because of the pain produced by the pressure, and it would take much more time to get any relaxation. Meanwhile the patient is uncomfortable and harder to handle. With procaine used first in the spastic part deeper relaxation is obtained faster, easier and without much discomfort to the patient; 3 to 4 c.c. of 2% strength in one spot is usually enough.

After holding the pressure on a spastic area for two or three minute's release the pressure, slowly if there is acute spasm, and reapply. After this has been done a few times at one treatment some relaxation will occur. The acute case will also benefit from the use of curare which will be discussed later.

Sometimes there seems to be a sort of chronic or sub-acute spasm present which may be termed fibrositis. Repeated treatments with procaine and manipulation are useful in this disorder. The procaine is spread out over a wide area of the paravertebral muscles on both sides of the spine before manipulation.

In general the more acute conditions are treated daily or every other day and those not so acute or chronic are treated once or twice a week.

Another method of treating the lumbar muscles is to stand opposite the side being treated and use the heels of the hands. The motion used is one that older doctors will readily recognize. It's like kneading bread. The heels of the hands push downward and away from the spine using a moderate amount of pressure. It is done in an easy relaxed way with the pressure being held for a few seconds at a time and repeated often in the course of a treatment. This method is for general use only and should never be used in an acute condition as it will just make it worse. It is good, however, for a general relaxing effect in non-acute cases.

Whichever method is used some improvement is produced in the circulation in that part. This is due to the fact that it is easier for blood to flow through a relaxed part than a spastic one and also because of movement of the parts by the operator's hands; a pumping action.

If, because of the acuteness of the pain, you are tempted to just let the patient lie in bed completely immobilized remember that motion is essential to circulation, healing and life itself. Encourage what movement is possible; discourage absolute immobility.

Let me tell you about a twelve year old boy I was called in to see several years ago to illustrate the importance of movement. His father told me that he had severe pain in the neck and had had it for three days. Would I come as soon as I could? I soon arrived and saw the boy stretched out on the bed and in obvious pain and fear of more pain from any movement that might be necessary in the course of my examination. I was the third doctor on the case. On the first day of his disability doctor number one made a diagnosis of meningismus and prescribed, among other things, rigid bed rest; bed pan use and meals in bed. The second day doctor number two made diagnosis of swollen cervical lymph glands and prescribed an ointment to be rubbed on the neck. It was difficult for me to palpate the cervical area because the least motion made the pain worse but I did manage to feel some very spastic muscles in this area.

As I stood up after making the examination and told the father that the boy had torticollis the father said, "This is what has me really worried," and showed me a sample of urine obviously loaded with blood. The boy had been flat on his back without so much as even one movement from side to side. I managed, with the help of some heavy sedation, to get some relaxation by manipulation of the cervical and upper dorsal muscles. It was then possible to get him on to his side and I left instructions that he was to turn or be turned several times during the day. Before leaving I told the father that there probably wouldn't be any "brick dust" in the next day's urine and there wasn't.

That example of hypostatic congestion has stayed fresh in my mind and if that can happen to a twelve year old boy think how much easier it can happen to an older person. Movement, motion; active and passive is important. It's a necessity. In older and middle aged persons there is the additional risk of phlebitis, embolism and thrombosis with the type of rest that eliminates practically all movement.

Prescribe rest that involves at least the movement of turning in bed from side to side, of sitting and use of bathroom if at all possible. Encourage patients to do what they can.

2. Manipulation Applied To Joints: The word sacroiliac is used more often in low back disorders than the word zygapophyseal; it's in common usage and to some it has become more or less a generic term for any low back disorder like the word lumbago. However, the zygapophyseals are more often in trouble and need your attention many more times than the sacroiliacs. The disorders that manipulation of these joints is used for go by the following names sacroiliac lesion or slip and lumbar lesion or facet syndrome.

Technic For Correction Of A Sacroiliac Lesion: The ilium can slide on the sacrum so that either one of two lesions may be present. The two lesions are:

1. The posterior sacroiliac lesion or slip.
2. The anterior sacroiliac lesion or slip.

When the ilium has glided posteriorly and jammed in that position the following changes take place in the anatomical landmarks:

1. The posterior superior iliac spine is more prominent on that side.
2. The pubis on that side is elevated above the opposite pubis (seen in the Chamberlain test).

To correct this jammed condition, or as it is also called slipped and lesioned, do the following:

1. Have the patient lie on the treatment table on his side with the side to be treated uppermost. His legs and thighs are slightly flexed. Let's say it's the right side being treated.
2. Drop the right leg off the table.
3. Place your left hand over the patient's right hip, to control the proper positioning of the patient, and at the same time grasp his left wrist with your right hand and pull so that a torsion effect is " produced all the way down the trunk. But the hips don't move because your other hand prevents that. The patient is now positioned. His right arm is allowed to rest on his body and his left arm is lying on the table.
4. The corrective manipulation is made as follows: Place your right hand on the front of his right shoulder and your left arm on the crest of the right ilium. With all the slack taken out by a gentle pressure of both arms in opposite directions the stage is set for the correction. Simultaneously there is a thrust made posteriorly with the right hand while the left arm thrusts forward. There is usually a sharp click heard as the lesion is corrected.

The sacroiliac lesion is not very common but when it is present and the proper technic is used so that a successful correction is made then the change for the better that follows is about as dramatic as any in medicine. Pain and disability are eased with a rapidity that may be compared to that gained by the reduction of a dislocation, especially if it is corrected soon after it has been produced.

The anterior sacroiliac lesion: When the ilium has glided anteriorly and jammed in that position the posterior superior iliac spine is less prominent than the one on the other side and the pubis on that side is lower (seen in the Chamberlain test).

For the correction of this particular lesion the same positioning is used as for the posterior lesion with one exception and that is that the arm is not placed on the crest of the ilium but on the tuberosity of the ischium. An easy way to remember the positioning of the arm on the pelvis is to visualize the sacroiliac joint as the hub of a wheel which lies between two points on the rim of that wheel, the crest of the ilium and the tuberosity of the ischium. The naming of the lesion is dependent on which way the upper part of the wheel, the ilium went. So if you want the upper part of the wheel to go forward as in correcting a posterior lesion you push forward on the upper part of the wheel and if you want the upper part of the wheel to go backwards as in correcting an anterior lesion, push forward on the bottom part of the wheel.

Technic For Correction Of A Lumbar Lesion (The Zygapophyseal Joint); Steps 1, 2 and 3 are the same for this manipulation as they are for the sacroiliac lesion correction.

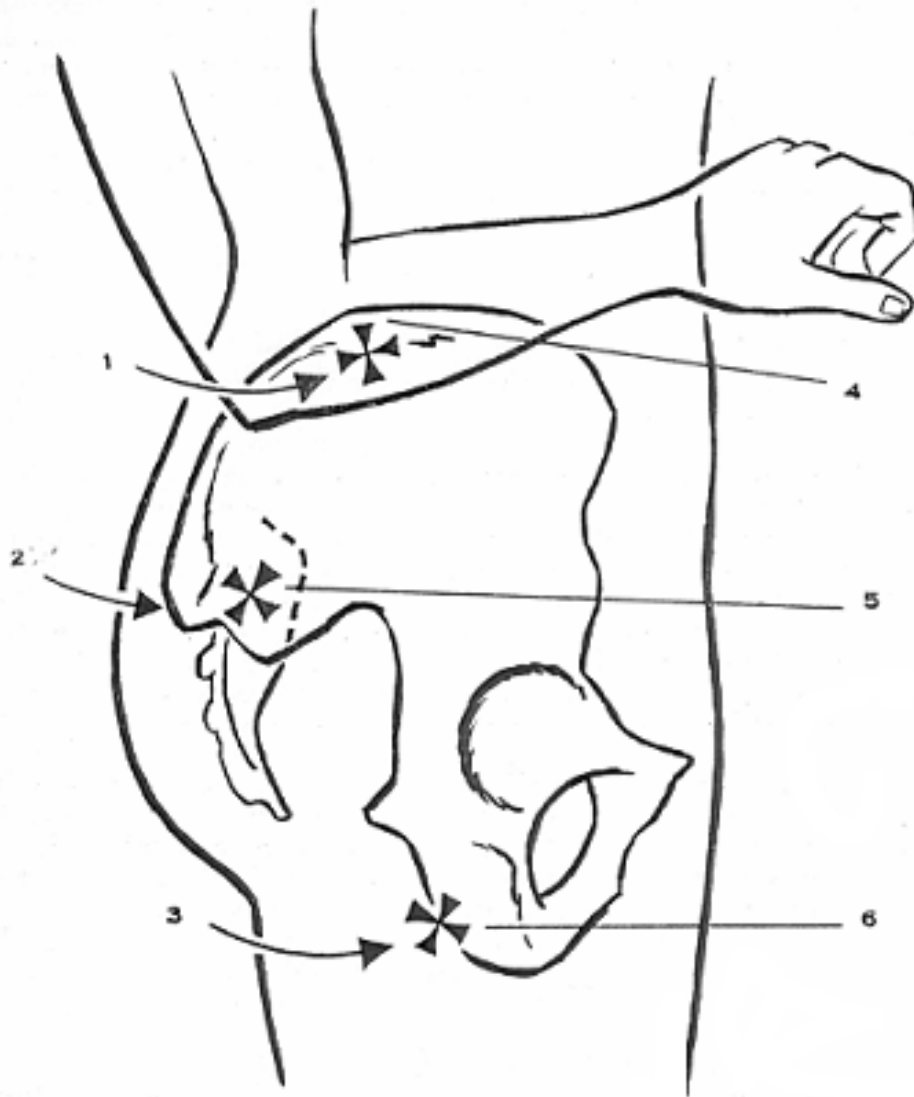
Assuming again that we are concerned with the: right side the right hand of the operator is placed against the patient's right shoulder but the left arm is placed differently. In the sacroiliac correction we wanted to turn a wheel but this time we want no movement of the wheel on its hub but rather a forward movement of the sacrum and ilium so the arm is placed over the sacroiliac joint. The correction is again made with a sudden force after the slack is taken up. The right and left arms travel a short distance very fast and as in the sacroiliac correction one or more clicks may be heard as the joints are moved.

Sometimes because of the pain that is present or muscle spasm or just the severity of the jamming of the joint it may seem that a sacroiliac lesion can't be corrected. With the help of about 2 c.c. or 3 c.c. of 2% procaine injected into the joint ligaments a few minutes before the correction is again attempted, the manipulation may then be successfully completed. Procaine can also be used at the zygapophyseal joints to help out with a lumbar correction. Again using the 2% solution, 1 c.c. and 2 c.c. is spread around the joints to be manipulated.

At times these lumbar and sacroiliac lesions resist correction even with a local anesthetic to help out. The patient may then be hospitalized, given a general anesthesia that insures thorough relaxation, and then corrected. The short acting intravenous preparations such as Pentothal are excellent for this purpose.

Although the positioning of the patient and the direction of the corrective forces is the same there is one big difference in the corrective technic when the patient is completely relaxed under general anesthesia. Great care must be used on these patients, since the usual resistance of the muscles is gone. There is considerably less force used or needed and the thrust is not given as suddenly. It is more like a gradual increase in the force that is used to take up the slack when they are being positioned.

DIAGRAM FOR CORRECTION OF SACROILIAC AND LUMBAR LESIONS



- 1 Arm thrusts in this direction for correction of posterior sacroiliac.
- 2 Arm thrusts in this direction for correction of lumbar lesion.
- 3 Arm thrusts in this direction for correction of anterior sacroiliac.
- 4 Crest of ilium — 5 Sacroiliac joint — 6 Tuberosity of ischium

Chapter 8

TREATMENT III – (CURARE)*, LOCAL ANESTHETICS

INTERNAL MEDICATION, X-RAY AND LIFTS

The description of the doses of d-tubocurarine in aqueous solution and Tubadil that were used by Dr. Shuman and many other doctors thousands of times without any harmful results have been removed from the text because of current inapplicability.

Local Anesthetics: There are several of these on the market and they may be classified for our use according to duration of effect as short and long lasting ones. They are useful in treating muscles, joints, nerves and nerve roots. Procaine, probably the commonest, is used in strengths of 1% and 2% and it is short acting. In conjunction with manipulation their use on muscles and joints was described which leaves their use on nerves and nerve roots to be described here. Dolamin (Harvey Lab.), an isohydrotonic solution of ammonium sulfate, is a slow acting local anesthetic with a durable action of up to several days or longer. It may be added to procaine at the rate of 2 cc. of Dolamin to 1cc. of 2 % procaine to make a solution having the quick acting properties of procaine and the durable action of Dolamin. By itself or in combination with procaine it is useful for nerve and nerve root infiltration and in treating trigger spots, fascia lata syndrome and other spastic muscle conditions. Since it is effective by itself and is non-toxic it may be used that way in those individuals who react adversely to procaine.

Nerve Injection: Sometimes it is helpful to inject around an individual nerve like the sciatic to gain relief of pain. This is most likely to help in neuritis or neuralgia and not in radiculitis. The technic for injecting around the sciatic nerve is as follows:

1. The patient lies prone on the treatment table with the buttock of the side to be treated exposed.

2. Following the usual aseptic technic and after the area is swabbed with alcohol a 3 inch 20 gage needle is inserted at a point midway between the ischial tuberosity and the greater trochanter of the femur.

3. The needle is inserted directly anteriorly toward the nerve where it leaves the pelvis through the sciatic notch. As the nerve is approached there is a painful sensation. At this depth 4 C.c. to 5 C.c. of 2 % procaine may be fanned out around the nerve. If one of the longer lasting anesthetics is used like Elocaine, Metycaine or Cyclaine the appropriate dose for that preparation should be used. Usually there is less of these preparations used than there is of procaine.

When these injections prove helpful they may be repeated once or twice a week while the underlying cause of the pain is also sought and treated. There is immediate relief of pain when this procedure has been successfully carried out on a sciatic nerve that is painful because the nerve trunk is involved and not the roots. Also there will be some temporary lack of control in that leg. This will make it feel rubbery, flabby and undependable for about a half hour or so.

Nerve Root Injections: Immediate relief of the pain of radiculitis may be obtained by the injection of local anesthetics to the appropriate nerve roots.

The material used is to be deposited at the nerve root as it emerges from the foramen. This point may be located as being approximately 1 1/4 inches lateral to the tip of the spinous process of the vertebra above the one it is numbered by and about 2 1/2 inches beneath the skin surface. This point may be reached, in an average person, with a 20 gage 3 inch needle in the following manner:

1. The patient lies prone with the back arched by placing a pillow beneath the abdomen.

2. Using a 27 gage 1/4 inch needle and 2% procaine raise a small wheal 2 inches lateral to the spinous processes of the vertebra above the nerve root being treated. For instance, if the 4th lumbar nerve root is to be treated the wheal would be raised 2 inches lateral to the tip of the spinous process of the 3rd lumbar vertebra. The skin is prepared as usual by swabbing with alcohol. Sacral 1 nerve root is between L5 and S 1, lumbar 5 nerve root is between L4 and L5 etc.

3. Insert the 20 gage 3 inch needle through this wheal and direct it downward and at about a 5 degree inclination medially. By inserting the needle somewhat lateral to where the anesthetic is to be deposited the lamina and articular facets are more easily avoided. If bone is struck before the root is reached it is probably a transverse process in which case simply withdraw partially and redirect more or less cephalad.

4. As the nerve root is approached a sharp pain is felt radiating to that area of the leg served by that particular nerve root.

5. At this point it would be very helpful and convenient if a red light would flash, a bell would ring and a voice would intone in emphatic accents, "Always attempt to aspirate before injecting." This safeguard against putting material where you don't want it is

important in other areas, but here, in this area of abundant large blood vessels, it is critically important. More than once the only reason I knew I was in a vein at this spot, or doing a disk injection, was because I attempted aspiration and got blood. Probably because blood runs into a syringe so easily from an arm vein bulging from a tourniquet we expect it to come right up into the syringe under any condition. This is not so and furthermore blood may not show even though the needle is in an artery. Lacking the warning system described it remains a necessity for all of us to train ourselves to consciously perform this life-saving act just before we push on the plunger, every time.

6. After aspiration has been attempted and no blood shows, deposit 2 cc. to 3 cc. of the chosen anesthetic. If blood shows the needle is withdrawn a little and placed more superficially. The injection is made only after a bloodless spot has been reached in the root vicinity.

The relief obtained from a successful block of a nerve root may last for 'several days with a long lasting anesthetic. The severity of the disturbance present seems to have an affect on this and in a mild case good results can be obtained with procaine while in a severe case to obtain relief of any account a long lasting agent must be used. The procedure may be repeated after the effects of the previous injection have worn off. Outside of the risks involved from not aspirating before injecting it is a safe method of relieving pain and may be used repeatedly.

Internal Medication: Under this classification will be considered a few drugs which have a more lasting value than sedatives and analgesics, which are considered under management. Hormones, Benemid and Aralen are examples.

Thyroid: Some cases of hypothyroidism develop a low back ache which is not sharp and does not radiate. Adequate thyroid dosage daily will help relieve the backache.

Female sex hormone: Backache developing from metastasis of cancer of the prostate to the spine will be helped by large doses of estrogenic substances used in conjunction with whatever surgical procedures may be indicated for the prostate or with castration. Oral preparation may be used.

Combined Male And Female Sex Hormones: Osteoporosis is helped considerably by continued small doses of these hormones. After being used for a period of about a year changes may even be seen in the x-ray study. An oral preparation may be used, one containing 5 mg. methyl testosterone and .625 mg. estrogenic substance is satisfactory. Improvement may be noted after several weeks use of this preparation using a dose of one tablet every other day. Its use at this rate may be continued indefinitely.

Insulin: While this hormone may not be thought of often in connection with low back disorders still it can happen that a troublesome ache will not respond adequately to treatment until an unknown case of diabetes is discovered and brought under control.

Cortisone and Related Compounds: Rheumatoid spondylitis is fortunately a rare disease but when it does occur these preparations may be used for relief. The lowest dosage consistent with results is used. That may be 75 to 100 mg. a day of cortisone or if prednisone is used it may be 10 to 20 mg. a day. It is also useful for temporary use in gout which can at times cause some backache.

Aralen: This does not have the same dramatic, speedy effect that cortisone has but then neither does it have its unwanted side effects such as water retention and masking of certain diseases. As far as the back goes it is used only for rheumatoid arthritis and it exerts a beneficial effect over a long period of time. It is used in doses of 250 mg. a day.

Benemid: This has the specific effect of reducing the level of uric acid in the blood. It will not produce fast relief of the pain of gout as will colchicines or cortisone. It may be used in conjunction with cortisone and can be continued indefinitely in doses of .5 gm. one to three times a day. By regulating the blood uric acid level in this way future" attacks of gout may be avoided. The use of aspirin at the same time as Benemid reduces the effectiveness of the Benemid. While an elevated blood uric acid level does not produce the exquisitely tender joints in the back that it does in the hands and feet it does often make a backache hard to clear up and that is where the Benemid proves useful.

X-rays: These have a beneficial effect in arresting or, slowing down the development of rheumatoid spondylitis especially if it is spotted when the disease is starting in the sacroiliac region.

Lifts: Pieces of leather 1/4 inch to 1 inch or more thick are used in the heels of shoes in attempting to remove one source of chronic strain on the lower back and sacroiliac region, the short leg. Usually a pelvis will tilt to the side of the low leg but not always. It is not recommended here to use lifts on the long side of those exceptional cases where the pelvis does not tilt to the short leg side. It is recommended here that lifts of a 1/4 inch and more, as is appropriate for the discrepancy, be used. Where the difference in leg lengths is great, say 1/2 to 1 inch, and the person is middle aged or older the full difference may not be prescribed at once but perhaps only one half the difference inserted immediately and the rest in a few months. If the difference is 1 inch or more in the heights of the heels then some must be added to the sole of the shoe. As an example if there is 1 inch added the heel then about 1/2 or 3/8 of an inch should be added to the sole of the shoe. Rechecks of an erect A-P x-ray study should be made to study the effects of the lift on the spine. They are taken while the shoes are on that have the lifts. Sometimes the height of the lift must be changed and at other times they can remain unchanged indefinitely.

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Chapter 9

MANAGEMENT

The essence of good management is the orderly handling of a patient to secure the most useful information, make a diagnosis, institute the most effective treatment and see that it is carried out and at the same time put the patient at ease, instill confidence and hope and maintain a firm command of the situation.

Helping the doctor to manage a case in the most effective way is the discipline he gives himself by establishing routines of history taking, examination, diagnostic endeavors and treatment efforts.

Time should be taken for an adequate history. It is only the most unusual case of an emergency nature that should lead to a suspension of this. Patients are often impatient for relief and by their manner show that they are annoyed at this, to them, unnecessary delay in your "doing something." "Doing something" meaning your production of fast relief. Tact, patience and your own conviction of the importance of proceeding in an orderly fashion must be used to maintain you in your rightful position of master of the situation.

The same goes for a thorough examination. The sureness that comes from repetition of careful, painstaking examinations is the greatest factor in the building of an aura of confidence that is so reassuring to the patient. An explanation of the importance of finding out what is wrong first and that this is the way that is done will sometimes satisfy impatient patients as to the necessity of taking time for a thorough history and examination.

At the other extreme is the patient who must be restrained from talking too much about inconsequential details. Care must be used here in the form of frequent interruptions to get the answers that are required rather than a lot of time-wasting trivia.

Maintain a confident, cheerful outlook on the situation even when faced with a patient seriously disabled and full of pain. This doesn't mean that serious disorders are passed off as being trivial or that they are dealt with in an offhand manner. Patients can stand being told that they have a serious disorder like spondylolisthesis or ruptured disk but it is hard to be told that there is no hope for relief. There are many effective measures today for even the worst situations and the worse the patient's condition the more he needs someone to give him hope.

The doctor who has some understanding of the back in general and of the particular back under consideration plus the knowledge of what can be done to help and the ability to apply that knowledge is the one qualified to lift and maintain the patient's morale which can get low. It.; can even reach the low point of hopelessness. This serious state is reached usually after several doctors have tried to help and still there is pain and disability.

Demanding some immediate attention to relieve pain is a situation sometimes encountered in the acute low back sprain. It may be a construction worker whose back has been crushed and wrenched by a ditch cave-in, a factory hand who was hit by a heavy metal part or a laborer who slipped and fell ten or twelve feet. When you are summoned to a case like one of these, or if they are brought to you, even a brief examination of the back that includes looking at it and feeling it will reveal marked spasm.

One of the greatest advances in treating backs has been in this type of case. Whereas formerly narcotics were practically mandatory in frequent doses over a period of days very little or no narcotics at all may be used now. Early and adequate doses of Tubadil serves much better. For example; consider a man 30 years old weighing 180 Lbs. who was working in a ditch when some of the timbers shoring up the sides gave way and he was forcibly knocked on the back and at the same time wrenched his back as he tried to escape. When he was pulled out from the rubble he was in agony with back pain. With the brief history just given plus a brief examination it was obvious that there was severe, acute spasm. For its rapid relief $\frac{1}{4}$ grain of morphine or other narcotic may be given subcutaneously but the effects of this will last no more than 3 or 4 hours probably. At the same time he should be given, for his weight, about 1.45 cc. of Tubadil and put to bed. Before the morphine has worn off the curare has begun to act and will continue to act for up to 24 hours.

As an additional help in securing relaxation some extension of the back may be used. A convenient way to accomplish this is to use a blanket rolled up to make a roll about 5 inches in diameter. This is placed under the lumbar area after the Tubadil has begun to work, which is usually within an hour, and left there for a half hour at a time and used three or four times a day.

The chances are good that within a few hours this man will be able to get out of bed to use the bathroom. The following day he should have another injection of Tubadil. Tubadil is used only once in 24 hours. The size of the second dose will depend on these criteria; 1. The degree of relaxation obtained in the lumbar muscles, 2. The presence and degree of blurring of vision, 3. The effect on the legs and 4. his present condition. A large dose was given the first time in this case because of the severity of the condition and because he was going to bed immediately. In cases of lesser severity of the some weight the starting dose might be only 1 cc. If there was marked blurring of vision and the legs felt "rubbery" the second dose could be reduced to 1.25 cc. Some blurring of vision is not necessarily to be taken as an indication to reduce the dose. If weakness is complained of in the legs that is an indication to reduce the dose.

This man will be given more privileges as rapidly as his improvement will allow. From the very first he is encouraged to at least roll from side to side in bed and as soon as possible he will sit in a chair. If there were x-ray facilities where he worked he could have been x-rayed immediately but if there weren't then by the second or third day he may be ready for an x-ray examination. If no fractures are shown in the vertebrae light work is undertaken again within a few days and his regular work may start within a week.

This is a fairly typical result in an acute low back sprain when Tubadil and rest are wisely used in the proper amounts.

The doctor should see a case like this every day until the patient is up and around freely. At first the patient will be treated at a hospital or at home; later visits, when he is able to walk about freely, are at the doctor's office. After the patient has been back at work for a month without treatment it's a good idea to have a reexamination to check on the possibility of some damage to the ligaments which could cause low back instability

In some individuals with acute low back sprain there may be some indication of a more limited area being involved, for instance, the 5th lumbar which is commonly affected. When you can pinpoint a very tender area like the 5th lumbar or the sacroiliacs, more help may be secured if, in addition to the Tubadil for muscle relaxation, procaine is injected to the in involved joints.

The use of injections is at times a problem. Some people suffer agonies of anticipation far greater than any pain that could be produced by any hypodermic injection yet devised. It isn't a problem with Tubadil because that is not hard to take in the relatively insensitive gluteal region and there aren't many injections involved in one case. But, nerve block or joint sclerotherapy injections can be an ordeal to some.

For these people there are other measures that can be used to prepare them for the injection. Not the least of these is talking to them, reassuring them that there will be very little pain and even less if they loosen up and relax. One of the simplest measures is the use of ethyl chloride spray. Just the numbing that comes from spraying a little of this on the injection site will satisfy some people. The use of a small dose of sedative like secenal a half hour before treatment will help others.

For those with more than a little dread of the needle there are other measures. One of these is the use of Trilene (trichloroethylene) in the Duke University inhaler. A few cc. of it is poured into the inhaler which is then given to the patient to hold as he inhales and exhales through it. A strap is used to secure the inhaler to the patient's wrist. Since the patient is holding the apparatus too much can not be inhaled since it falls away as relaxation occurs. Without getting very much of the material a degree of analgesia is reached long before deep anesthesia occurs. If a nerve is reached in doing joint sclerotherapy or nerve block the pain will be felt and reacted to but the lesser pains of skin, muscle and fascia penetration are easily borne. There are two distinct advantages to this method; 1. the memory of the injection is very hazy so that at subsequent visits there isn't the apprehension there is when the memory of the injection is keen; 2. within seconds of stopping the inhalation the effects wear off. It is extremely short acting. Sodium secenal intravenously in doses of 1. gr. to 3. grs. provides a quick, satisfactory alleviation of acute anxiety. Some pain is felt but it is reacted to in a more nearly normal manner. Things just don't bother patients as much. The recovery rate from this is fairly quick but slower than it is from trichloroethylene. Usually within "about a half hour

or so a patient is ready to leave the office after an injection of seconal unless too much has been used. For the first use of this material on a patient use a small dose; about 1 gr. to 1.5 grs. If need be more can be used at the same visit because the effects are immediately apparent. Besides its use to make the taking of certain injections easier it can also be used to make certain manipulations, like the correction of a painful subluxation or even a dislocation, possible or capable of accomplishment with less trauma than would be possible without its use.

In some of the longer lasting back pains like that of the disk or weakened zygapophysal relief as well as the more lasting benefits of other measures such as joint sclerotherapy must be thought of. For the temporary relief of pain that is too much for aspirin to handle Percodan and Percobarb may be used at the rate of up to 4 or 5 a day. Percodan contains salts of dihydrohydroxycodone and homatropine plus caffeine, aspirin and phenacetin. Percobarb is Percodan plus hexobarbital. As with any narcotic it should just be used for temporary relief while the main cause is being treated.

When there is acute pain from a radiculitis or neuritis nerve block can be most useful. The duration of pain relief from nerve block varies from a few hours to several days. The anesthesia used and the severity of the pain to be controlled are two important factors which must be considered in this regard. In acute cases it may safely be used two or three times a week and it can be used in conjunction with other therapy such as joint sclerotherapy, manipulation and curare.

In the use of joint sclerotherapy a treatment once or twice a week may be used. Very rarely can it be used oftener. After a patient has been made fairly comfortable, the acute stage having passed, then the visits can be made every other week if necessary without any sacrifice of effectiveness. For the discomfort that often follows an injection cold compresses will give some relief. For the first night after an injection and perhaps the following day one capsule of Percobarb every 4 to 6 hours may be used.

Treatments with the sclerosing fluid should be continued until the area treated is re-strengthened. The patient's ability to do his usual occupations without pain is one good test of returning strength. Another is that palpation and pressure over the involved joints don't cause pain. The build-up of ligaments can be felt with the needle too when an injection is given. It becomes harder to pierce the ligaments.

In about 1 % of the cases receiving Sylnasol an allergy will develop. This may require the use of epinephrine and antihistamines to bring it under control. At subsequent visits other sclerosing solutions like Sodium Sotradecol, Alparene #2 or Neoplasmodin may be used.

Besides active treatment advice to the patient is important. Those who are outside much of the time in cold weather such as delivery men, carpenters, plumbers, etc., should wear at least part wool underwear. If x-rays show a fundamental weakness such as spondylolisthesis or serious developmental anomaly a non-laborious type of work

should certainly be sought or trained for. For those who don't do laborious work except irregularly like the first nice days of Spring, conditioning for such work should be stressed. In other words don't try to do it all at once but work into it gradually. Periodic reexaminations are useful for those who have had a bad back. In some of them, particularly those who have had a lift prescribed, re-x-ray should be done. This applies particularly to those whom you think may have to have a change made in their lift because the difference was so great you did not want to use that much of a lift all at once. Changes may also be observed in the x-ray of those who are taking hormone treatment for osteoporosis. Changes of this nature are observed over a long period of time - years - at semi-annual re-examinations.

For any of these individuals a periodic clinical check-up may turn up some beginning muscle spasm or joint weakness that can be taken care of without too much trouble by some manipulation or injection before it becomes serious.

Advise those that have joint sclerotherapy that if through some accident or strain there should be a recurrence of trouble matters can again be straightened out without an operation. All that is often needed is a few more injections.

Last of all, to the patient in pain, relief is of paramount importance. So after the history and examination and perhaps a tentative diagnosis has been made give consideration to doing immediately what you can to relieve the pain of those in agony. After this comes the program for more permanent benefit.

Chapter 10

OTHER CONDITIONS WHERE JOINT SCLEROTHERAPY MAY BE USED

Just about any joint that becomes unstable, too loose, hypermobile, may be treated with good effect by joint sclerotherapy. The knee, shoulder, jaw, acromioclavicular, ankle, wrist, sternoclavicular and costochondral articulations and others have been successfully treated and as with the joints of the spine and sacroiliac these too may be treated at weekly intervals.

1. **THE KNEE:** This frequently is injured in such sports as basketball, football and hockey. However, it isn't necessary to be an athlete to injure the joint sufficiently to produce an instability. Housewives develop them too. The complaint is often made that the knee feels like it was going to give out sideways. This is particularly noticeable when coming down stairs or stepping off a curb. It seems that the instability or looseness present allows some disengagement of the articular surfaces momentarily when the lower leg hangs free and then there is not perfect engagement of these some surfaces when the weight comes on to the joint.

A useful way to examine the knee is as follows. Have the patient sit on the examining table with both legs hanging loosely over the side. Hold the ankle of the one being examined between your legs just above your knees. This leaves both hands free to test the knee for abnormal motion. Grasp the knee firmly with both hands and produce full extension. If one of the cartilages has slipped this will be impossible. With the leg in full extension attempt to produce side bending of the knee. In a normal knee none is produced but in a hypermobile knee you may be able to move it to one or both sides. Then put both hands just below the knee and attempt to push the tibia backward. If the first test is positive the collateral ligaments are weak. If the second test is positive, that is the tibia may be pushed or slid backward on the femur, then the cruciate ligaments are torn. Test both knees for comparison.

If there has been any slipping of the cartilages, either medial or lateral, as may be evidenced by a bulging anteriorly beneath either the medial or lateral, femoral condyles then the coronary ligaments have been torn as well as the collaterals.

TECHNIC: Any of the involved ligaments may be treated. The collaterals, the ones most frequently involved, are injected at the sides of the knee. Since the knee is one of the more sensitive areas treated it is best to start with a small dose, about .1 cc. of sclerosing solution and gradually increase at weekly intervals to point of tolerance which may go as high as .6 cc.

The coronaries are injected at the anterior rim of the tibia. For these two areas, the collaterals and the coronaries, a 1 inch 24 gage needle is used and the amount of sclerosing fluid used is also the same.

The cruciate ligaments are reached by going into the joint with a 2 inch 22 gage needle. The point of insertion is at either side of the patellar tendon and the needle is inserted to the ligament where the sclerosing fluid is deposited.

Treatments are continued at weekly intervals until a definite feeling of strength is noted by the patient. Tests for abnormal motion will reveal a change for the better too. After about six injections some improvement is usually noted and after 10-15 no more may be needed.

If at any time one of the cartilages has slipped forward it should be immediately relocated. The technic for this is as follows. Hold the ankle between the thighs as in the examination, grasp the knee firmly and produce some flexion with side bending toward the side that is out. For instance, if it is the medial cartilage, the one that is most often out, that is being replaced produce medial gaping of the joint and then suddenly produce extension. This maneuver may have to be repeated several times. The longer it has been out the more swelling is present and the harder it is to get back. If there is too much pain, local anesthesia may have to be infiltrated at the swollen area and some Seconal used intravenously. Failing to replace the cartilage with these simple measures, that may be used in the office or home, then the patient should be hospitalized, given an intravenous general anesthesia and when well relaxed the same manipulation carried out. The cartilage must be replaced before sclerotherapy is started.

For the pain that often comes after an injection of sclerosing fluid cold compresses are useful and at times a narcotic like Percobarb may have to be used for relief. When the pain is very severe a reduced dose should be used at the next visit.

2. THE SHOULDER: This is the joint with the widest range of motion and the shallowest socket. The glenoid labrum, a piece of cartilage, at the inferior lip of the glenoid helps to deepen the articular crescent somewhat but it may be loosened in a violent dislocation. Those who complain of recurrent dislocations usually give a history of a primary dislocation that followed some violence which could conceivably dislocate anyone's shoulder. Later dislocations then follow from trivial causes such as turning over in bed, driving a car, putting on a coat or just reaching up overhead.

TECHNIC: To produce additional strength in the joint the weaker, under side of the capsule is treated. The patient lies supine with the arm of the affected side abducted and the hand of that arm rests under the neck. Some anxiety is often felt, as abduction is attempted, particularly when there is a very weak joint which has allowed many easy dislocations. Calmness, patience and reassurance by the doctor as he gradually attains this position without force are necessary. Letting the patient's elbow rest against your body rather than just hanging free sometimes lends added assurance.

Before injecting the joint the axilla is shaved. With the axilla fully exposed the head of the humerus is located and at the point where this meets the inferior part of the glenoid the injection is made. The axillary artery is usually palpated while getting oriented. It is easily pushed of the way of the needle or avoided. A 2 inch 22 gage needle is used and

at the first injection 1. cc. of sclerosing fluid is used. For those who develop an immediate pain, spraying with ethyl chloride will often give immediate relief. Usually the shoulder can be injected with 2 cc. to 3 cc. of Slynasol without much reaction but occasionally someone will tolerate only .3 cc. to .5 cc.

At the same time that injections are being taken the patient can gain additional benefit by exercising the arm and shoulder muscles with simple calisthenics such as raising the arms to shoulder height and describing circles with the arms, flexing and extending the forearms at the side, forward and above the head. Extreme abduction as in raising the arm above the head may not be attained at first but as improvement in the capsule strength occurs more abduction can be secured. The movements to be avoided are pushing upward with force as in trying to push up a window sash. Exercises will aid in strengthening the muscular support of the joint and also by minimizing the painful after effects of injections. Also with use another valuable point is gained; some of the fear that makes some individuals practically freeze the arm to their side is gradually lost.

As with other sclerosing injections to joint ligaments the build-up in the ligaments can be felt by the increased resistance to needle penetration. The frequency of slipping and almost-going-out-feeling as well as frank dislocations diminishes and finally disappears altogether. This may take 10 to 15 injections. If after stopping the injections for a period of time, say six months, some additional strain produces a weakness, then more injections may be given.

3. "THE JAW: This articulation is easily reached and satisfactory results are rapidly obtained. The complaint may be just a very annoying clicking as the condyle slips or there may be an actual dislocation. The bite may or may not be obviously malaligned.

TECHNIC: Just in front of the tragus, about a half inch, the joint may be palpated as the patient, lying supine on the operating table, slowly opens and closes the mouth. Usually on the side complained of some slipping of the mandibular condyle is felt as the mouth is opened and closed.

The amount of sclerosing fluid necessary to restrengthen this joint is very small. About .05 cc. to .15 cc. is used at one time. The needle is inserted approximately 1/2 inch in front of the tragus, immediately over the joint. When the ligament is reached the injection is made. Use a 1 inch 24 gage needle and since the amount of sclerosing fluid used is so small the use of a 1 c.c. tuberculin syringe is helpful for careful measurement. Usually there is a very quick response with some improvement often noted a few days after the first injection and symptom-free stability after about three or four treatments.

4. THE ACROMIOCLAVICULAR: Direct violence to the shoulder or, force transmitted up the arm are the usual antecedents of an acromioclavicular separation. Parachute jumpers are probably more prone to develop this trouble than any other class of people. Besides pain and soreness at the site of the torn ligaments there is usually some weakness and disability in the arm that this articulation supports. Inspection of the two joints

will reveal the difference between the well and the weak side as the acromion on the weak side is seen well below the clavicle instead of in its normal position immediately beneath the clavicle. The palpating finger will feel the space between the two bones and x-ray shows the separation quite clearly.

TECHNIC: The patient sits on the operating table or a chair of convenient height. The operator approaches the joint from the side of the patient. Use a 1 inch 24 gage needle. The amount of sclerosing fluid may be .15 cc. to .3 cc. It is injected between the ends of the clavicle and the acromion. A sling must be worn for some time to give the induced scar tissue a chance to toughen. It may take a month of sling support and six or more injections to obtain adequate support.

5. **STERNOCLAVICULAR:** Occasionally trauma to the upper extremity or direct violence to the sternoclavicular joint will result in a dislocation of the sternoclavicular joint or a tearing of the ligaments. Since this is the joint which ultimately bears the weight of the upper extremity and transfers it to the body various movements of the upper extremity will cause an increase in the pain and discomfort in this joint and there will be some embarrassment to movements of that upper extremity. Inspection will usually reveal the difference between the two sides very readily. The clavicle on the affected side is more prominent at the joint. Palpation of the two sides will reveal the difference in movement as the shoulders are alternately raised as in shrugging, moved backward and moved forward.

TECHNIC: A 24 gage 1 inch needle is used and .1 cc. to .25 cc. of sclerosing solution may be injected to the anterior sternoclavicular ligament. As with the acromioclavicular joint a sling must be used to support the arm on that side to take its weight off the joint for about a month for best results. Several injections given at weekly intervals will probably be necessary to effect an appreciable amount of strengthening.

6. **THE ANKLE:** If you palpate the lateral side of the ankle, just below the fibular malleolus, of a person who suffers from repeated, easily sprained ankle you will find the area tender and this same area is often painful when inversion is produced. The main ligament to be considered here is the calcaneofibular. This ligament, which normally limits inversion, is often weakened in ankle sprain and is the part to be restrengthened for the relief of weak ankle.

TECHNIC: Use a 1 inch 24 gage needle. Palpate the ligament just below the fibular malleolus; insert the needle to the ligament and inject .2 cc. to .4 cc. of sclerosing solution. After 6 or 7 injections there is usually marked improvement and the patient will note that the ankle does not turn over every time a rough spot is stepped on.

7. **THE WRIST:** Occasionally from some abuse or accident the wrist will be weakened and there will be a complaint of soreness, weakness or aching which is particularly noted during certain activities like driving a car, ironing or playing golf. Palpation of the dorsal aspect of the wrist just distal to the end of the radius will elicit tenderness which

is increased on flexion and extension. X-ray examination in an uncomplicated case will reveal nothing like arthritis or peritendinitis present.

TECHNIC: Use a 1 inch 24 gage needle. Insert the needle on the dorsal aspect just distal to the radius. At this point the dorsal radio carpal ligament is treated. Injections are also made at the lateral side of the joint to treat the radial collateral ligament. Inject .05 c.c. to 15 c.c. After six or seven injections there is usually a marked improvement.

8. **STERNOCOSTAL, COSTOCHONDRAL AND INTERCHONDRAL:** Rarely the joints between the sternum and the cartilages of the ribs are loosened by direct violence. It can happen at that point or between the cartilages and ribs or between the cartilages of the lower ribs, the 6th, 7th and 8th. Usually a snapping or clicking is heard as the loosened parts move in an abnormal manner. There is some pain usually as this happens. By palpating at the site of the weakness the cartilage may be felt to slip posteriorly on slight pressure and a deep breath will often "pop" it back into place.

TECHNIC: The injection is made directly to the point where slipping is felt. A 24 gage 1 inch needle is used and it is inserted to the ligaments at which point .1 cc. to .3 cc. is injected.

9. **CERVICAL DISK:** Less often than the lumbar disk but often enough to be an important clinical problem one of the cervical disks will degenerate or herniate with accompanying signs and symptoms. The ones most commonly affected are those between C5 & 6 and between C6 & 7. Pain and stiffness in the neck with pain in the shoulder and arm and numbness and tingling in the hand are significant symptoms. Side bending the head toward the affected side will increase the pain and paresthesia and sometimes it may be relieved by side bending to the well side. There may be some change in the motor response as seen in testing the biceps and triceps reflexes.

In the lateral x-ray some decrease in the intervertebral space may be noted. When ordering an x-ray of the cervical area, request a lateral view with the neck in full flexion. Additional information of great value may be obtained with this view because a defective disk may be seen this way when it is not revealed in a lateral view without flexion. The usual A-P and right and left obliques are made at the same time.

TECHNIC: No attempt is made to treat the cervical disk directly with sclerotherapy. Instead stability is obtained by treating the ligaments of the zygapophyseal joints and the interspinous ligaments. The patient sits during this treatment with the head bent forward. To inject the ligaments of the zygapophyseals use a 22 gage 2 inch needle. The needle is inserted about 3/4 of an inch lateral to the spinous process of the upper vertebra involved and slowly directed anteriorly and slightly cephalad since the tip of the spinous process projects lower than the joint. For instance, if the zygapophyseal between C 5 & C 6 is being treated the needle would be inserted about 3/4 of an inch lateral to the spinous process of C 5 and directed anteriorly and slightly cephalad to reach the joint.

The joint will be contacted at a depth of about $1\frac{1}{4}$ to $1\frac{1}{2}$ inches in an individual of average weight. Care should be taken not to get too far medial. While the extreme imbrication of lamina in this region makes a penetration of the canal unlikely, still, if there is any danger it lies in being too far medial. If the needle is too far lateral it will just sink to the hilt in neck muscles. At the joint .2 cc. to .3 cc. of sclerosing fluid are injected.

To inject the interspinous ligaments use a 1 inch 24 gage needle and insert it between the appropriate spinous processes while the neck is in flexion. After the initial resistance of the ligamentum nuchae is pierced there is practically no resistance from the intraspinal ligament. About $\frac{1}{2}$ inch past the ligamentum nuchae the sclerosing fluid is deposited in the intraspinal ligament.

Usually some relief is obtained from these injections in a few weeks and after about 8 or 9 there is adequate support obtained for the joint with a consequent clearing of symptoms.

A view box with good quality A-P and lateral x-ray is a great help in getting properly oriented for these injections.